July 15, 1930. F. NEUMANN 1,770,623

FIRE EXTINGUISHING DEVICE FOR TANKS AND OTHER RECEPTACLES CONTAINING INFLAMMABLE LIQUIDS

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Fig: 1.

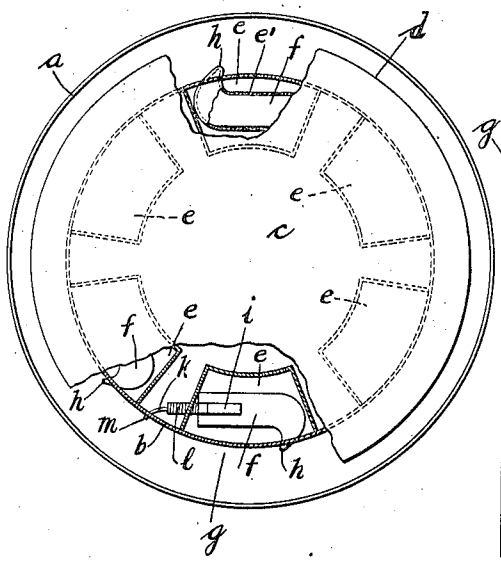


Fig: 2.

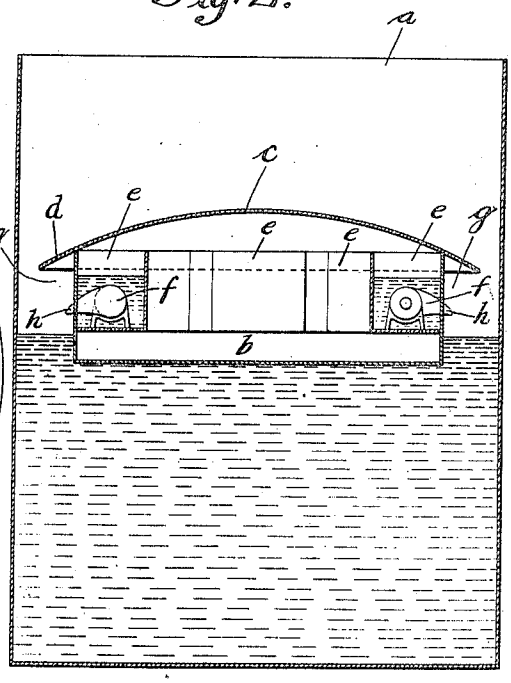
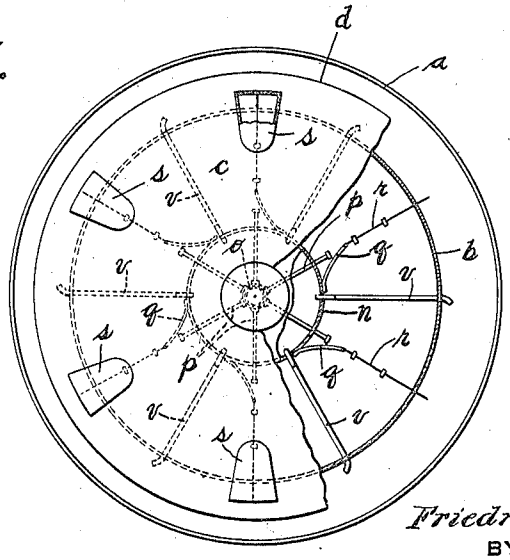


Fig: 3.



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Fig. 4.

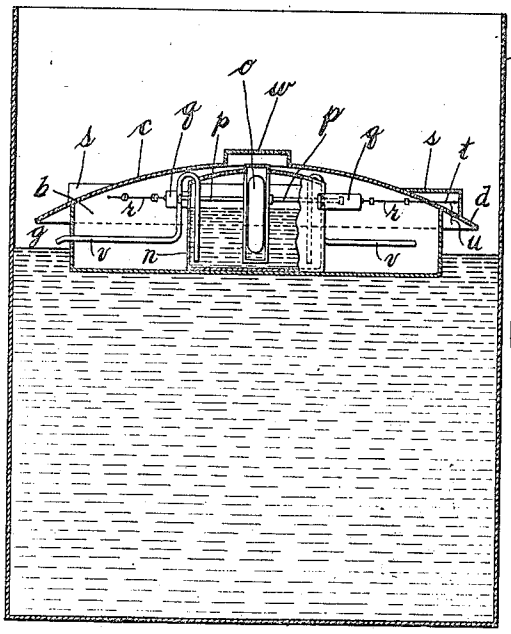


Fig. 5.

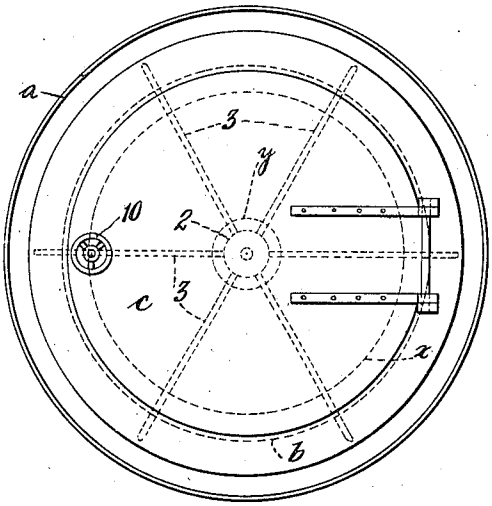
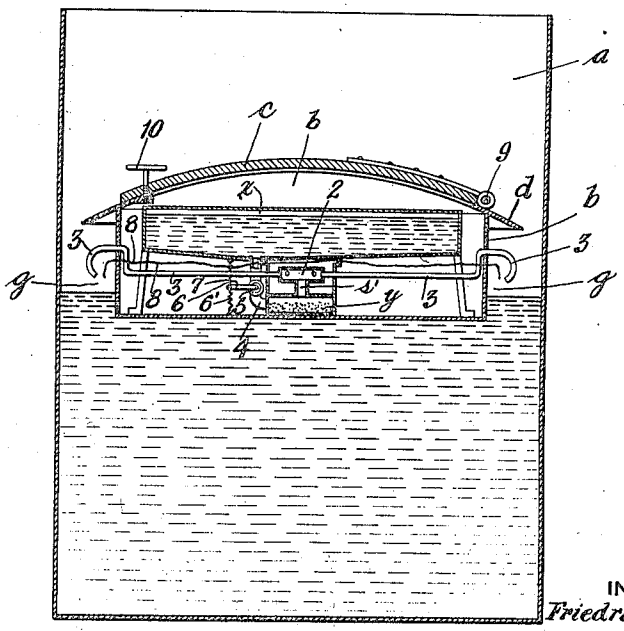


Fig. 6.



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Fig: 7.

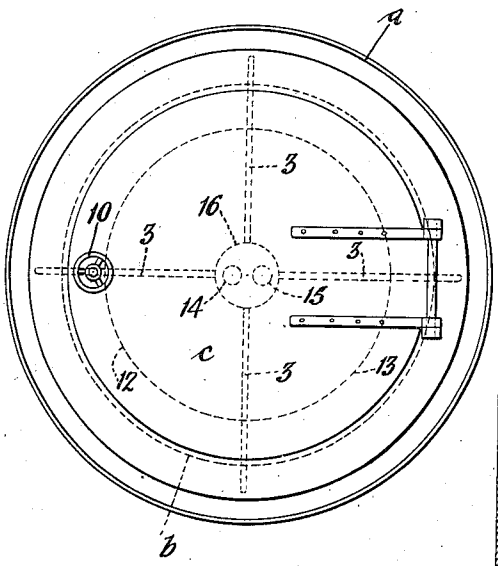


Fig: 8.

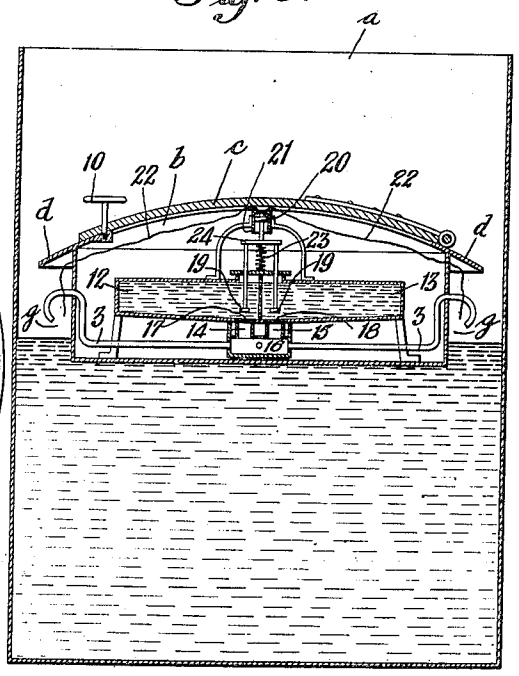
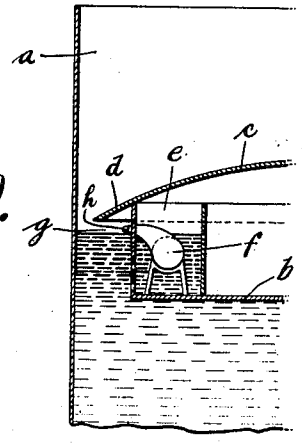


Fig: 9.



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Patented July 15, 1930 1,770,623

UNITED STATES PATENT OFFICE

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FIRE EXTINGUISHING DEVICE FOR TANKS AND OTHER RECEPTACLES CONTAINING INFLAMMABLE LIQUIDS

Application filed April 10, 1926, Serial No. 101,111, and in Germany April 11, 1925.

My invention relates to a fire extinguishing device for tanks and other receptacles containing inflammable liquids.

My improved device consists essentially of a hollow body floating upon the inflammable liquid and almost covering its entire surface. This body is provided with a projecting rim or flange at some distance from the liquid and which extends close up to the wall of the container, so that above the level of the liquid not covered by the float a roofed-over generally annular space is formed into which an extinguishing agent can be introduced which is preferably stored in the float itself in receptacles the outlets or discharge members of which are controlled or operated by the fire itself as soon as the liquid stored in the tank catches fire. The projecting, roof-shaped flange or rim of the float keeps the gases, in the event of extinguishing gases being used, as long as possible down upon the surface of the burning liquid and protects them against being blown away by currents of air. The float may consist of a light metal and may be internally braced, if desired. It is preferably made airtight and evacuated in order to increase its buoyancy. Of the hollow space within the float an annular concentric space may be portioned off at the circumference and divided into individual compartments each of which contains forms a receptacle for an extinguishing liquid. In order to retard freezing of the extinguishing liquid, the compartments of the float serving for the reception of the receptacles may be provided with a protective lining for the extinguishing liquid receptacles, such as asbestos. If desired the compartments may be charged with air or with the same material as the tank to be protected, such as naphtha, benzine, petrol, gasoline, oil and so on. In the latter case the compartments of the float may be put in communication with the liquid to be protected or be sealed against it, as required. As extinguishing agents extinguishing gases or liquids developing such gases come mainly into consideration, for instance brome in glass-vessels, carbon tetrachloride and the like. Foam is likewise applicable as extinguishing agent. The receptacles for the generation of the foam are then preferably also housed in the float and set in action by the effect of the flame. For this purpose the flame may be made to act directly or through fluzes and the like upon fusible bodies, cartridges and the like, in well known manner. The extinguishing devices stored in the float may be of known design and may, for instance, be equipped with gas developing cartridges for setting them in operation which might be fired by a striking pin upon which a spring, hammer, weight or the like acts which is held inoperative by a fuze or the like and set in operation when this fuze or the like is destroyed by the fire which has broken out in the tank.

The receptacles which contain the extinguishing agent or in which the agent is generated need not necessarily be distributed in considerable numbers along the circumference of the float. So may, for instance, a single extinguishing agent container, a single foam generating plant or the like be disposed in a central position in the float and a large number of ducts or pipes may depart from this central station and lead the extinguishing agent to the fire. Generally speaking any suitable automatically acting extinguishing device may be employed in conjunction with the float and upon or within it which would enable the end in view to be obtained.

In the drawings affixed hereto a number of embodiments of my invention are illustrated by way of example. In the drawings:—

Figs. 1, and 2 are a plan and a vertical section through a tank with float which has along its circumference a plurality of compartments containing individual extinguishing devices,

Figs. 3 and 4 are a plan and vertical section through a tank with float in which an extinguishing device is located in the center of the float.

Figs. 5 and 6 are a plan and vertical section through a tank with float which contains a device for generating foam and

Figs. 7 and 8 are a plan and vertical section through a tank with float in which a

modified foam generating device is provided.

Figure 9 is a detail view showing a modified arrangement of the compartments of a structure of the type shown in Figures 1 and 2.

Referring to the drawings *a* is the tank to be protected, *b* the float upon the surface of the contents of the tank and *c* the cover of the float with the widely projecting edge *d*.

Referring to Figs. 1 and 2 of the drawings, it will be see that the float *b* is designed as an airtight totally enclosed hollow body. In an edge zone at the circumference of the body are disposed compartments *e* in which receptacles *f* for an extinguishing agent may be surrounded by an asbestos covering *e'* or may be insulated by the air in said compartment or may be immersed, as shown in Figure 1, in a liquid serving as protection against freezing. If the liquid within the tank is to be admitted into the compartment the arrangement may be as shown in Figure 9 with openings *e''* in the outer wall of the compartment in communication with the contents of the tank. These receptacles *b* extend through the wall of the float by means of a nozzle *h* which may be sealed in suitable manner, for instance by a metal foil, into the annular space *g* confined at the bottom by the inflammable liquid, at the sides by the walls of the tank and the float and at the top by the projecting edge *d* of the cover. These nozzles are preferably directed against the wall of the tank at an angle of 33° to 40° and slightly downwards against the level of the inflammable liquid. In this way the jet of extinguishing liquid impinges first slightly above the level of the liquid against the wall of the tank so that it evaporates upon a comparatively large surface and the gas- or vapor-like extinguishing agent collects in the annular space *g* upon the narrow annular surface of the burning level of the liquid in order to extinguish the fire. The float may be caused to spin round owing to the reaction of the issuing extinguisher agent, provided it is not too heavy, which greatly improves the extinguishing action. The containers for the extinguishing agent are equipped with a gas-generating cartridge *i*, the striking pin *k*, which is controlled by a spring *l* and is kept in the striking position by a fuze cord *m* extending into the annular space *g*. When, due to a fire, the temperature within the annular space *g* rises to a point at which the fuse cord *m* begins to melt the pin *k* will be driven by the spring *l* to open the gas generating cartridge *i* and thereby cause discharge of the fire extinguishing fluid through the nozzle *h*.

Referring to the embodiment illustrated in the Figs. 3 and 4, it will be seen that within the float a receptacle *n* for the extinguishing agent is centrally supported. In the interior of this receptacle is located a gas developing vessel *o* against which are directed a number of striking bolts *p*. The bolts may be propelled by leafsprings *q* fixed upon the receptacle *n* which are maintained under tension by wires *r*. These wires pass through holes in the cover of the float *b*. Above these holes there are disposed upon the cover *d* closed protective hoods *s*. At the front wall of these protective hoods are fixed the wires *r* mentioned above through the agency of combustible bodies *t*, from which through holes in the edge *d* of the cover fuze cords *u* are passed into the range of the flames. From the bottom of the container *n* for the extinguisher agent branch off pipes *v* which are radially passed through the float and are provided with nozzles which similar to the nozzles *h* in Fig. 1, open in the annular space *g*. The cover *c* of the float *b* is provided with a central opening closed by a plate *w*, for charging the receptacle *n* for the extinguishing agent. In both the described embodiments carbon tetrachloride may, for instance, serve as extinguishing agent. In the operation of this second embodiment of the invention it will be understood that in the event of fire, one or more of the fuse cords *u* will be ignited and in turn set fire to the combustible elements *t* which will then release the springs *q* to drive the bolts *p* against the cartridge *o* and thus release the gas therefrom.

In the embodiment illustrated in the Figs. 5 and 6, the float *b* contains a device for producing extinguishing foam. This device consists of a receptacle *x* containing, for instance, a sodium bicarbonate solution, and resting upon feet. Below the receptacle *x* is disposed a receptacle *y* which contains an acid in powder form and a foam-generator likewise in powder form. From the receptacle *y* branches off a foam pipe *s'* which leads to a distributer 2 from which issue radial foam pipes 3 leading into the annular space *g*. The receptacles *x* and *y* are connected by the pipe 4 into which a cock 5 is inserted, the lever 6 of which is kept in the position shown in Fig. 6 by a fuze cord 7 against the action of a spring 61. To this fuze lead other fuzes 8 which extend right into the annular space *g*. If one of these fuzes 8 catches fire it burns down to the fuze 7 so that the lever of the cock 6 is set free and can turn under the action of its spring. The contents of the receptacle *x* can now flow across into the receptacle *y* and the generation of the foam now sets in. To enable the charging of the foam generating plant, the cover *c* of the float *b* is adapted to be swung around a hinge 9 and can be closed by a screw 10. It will be noted that the receptacles are surrounded by an air space within the float which effectively retards freezing.

In the embodiment illustrated in the Figs. 7 and 8, the float again contains a foam generating plant. It is provided with a

hinged cover, as before. The foam generating plant consists of a container resting upon feet which is divided into two separate chambers 12 and 13 by means of a central partition. In the first chamber a sodium bicarbonate solution may be contained, for instance, while the second chamber may contain an acid solution, for instance, to which is added a foam forming agent. From the bottom of the chambers 12 and 13 pipes 14 and 15 lead to a mixing chamber 16, from which again branch off radial pipes 3 which lead into the annular space *g*. The admission openings of the pipes 14 and 15 are ordinarily closed by thin metal plates 17 and 18 so that the contents of the chambers 12 and 13 cannot reach the mixing chamber. For penetrating and destroying these metallic partition walls two plugs 19 are provided which are joined together by a cross-head and are fixed to the rod of a piston 20 sliding in a cylinder 21. At the bottom of the cylinder there is a priming set adapted to be fired by a fuze 22 and which on ignition projects the piston 20 and thus the push pins 19 against the partition walls 17 and 18 which are perforated thereby so that the contents of the chambers 12 and 13 can pass into the mixing chamber 16 for the purpose of producing the foam. In order that the push pins after the penetration of the partition walls 17 and 18 should not obstruct the cross-section of the pipes 14 and 15, a spring 23 is disposed upon the guide for the pins 19, which when the pin advances is compressed by the cross-head 24 and after the cessation of the expansion in the cylinder 21 returns the pins 19 into the position shown in Fig. 8.

Various modifications and changes may be made without departing from the spirit and the scope of the invention, and I desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art.

I claim as my invention:—

1. In a fire extinguishing device for a receptacle containing an inflammable liquid, a hollow float upon the surface of the liquid and almost covering its entire area, a projecting edge upon said float at some distance from the liquid and extending close up to the wall of said receptacle, so that an annular roofed-over space is formed above the level of the liquid not covered by the float, and means for ejecting a fire extinguishing agent into said space.

2. In a fire extinguishing device for a receptacle containing an inflammable liquid, a hollow float upon the surface of the liquid and almost covering its entire area, a projecting edge upon said float at some distance from the liquid and extending close up to the wall of said receptacle so that an annular roofed-over space is formed above the level of the liquid not covered by the float, compartments along the circumference of said float, extinguishing agent containers in said compartments and nozzles extending from said containers into said annular space.

3. In a fire extinguishing device for receptacles containing an inflammable liquid, a hollow float upon the surface of the liquid and almost covering its entire area, a projecting edge upon said float at some distance from the liquid and extending close up to the wall of said receptacle, so that an annular roofed-over space is formed above the level of the liquid not covered by the float, means for ejecting a fire extinguishing agent into said space and fire responsive control means for said last mentioned means arranged in said annular space.

4. In a fire extinguishing device for receptacles containing an inflammable liquid, a hollow float upon the surface of the liquid and almost covering its entire area, a projecting edge upon said float at some distance from the liquid and extending close up to the wall of said receptacle, so that an annular roofed-over space is formed above the level of the liquid not covered by the float, a receptacle for containing a fire extinguishing agent arranged upon said float, and a nozzle communicating with said receptacle and extending into said annular space in a non-radial, non-vertical direction.

5. In a fire extinguishing device for receptacles containing an inflammable liquid, a hollow float upon the surface of the liquid and almost covering its entire area, a projecting edge upon said float at some distance from the liquid and extending close up to the wall of said receptacle, so that an annular roofed-over space is formed above the level of the liquid not covered by the float, a receptacle for containing a fire extinguishing agent arranged upon said float, and a nozzle communicating with said receptacle and extending into said annular space, said nozzle being slightly downwardly inclined so as to cause the extinguishing agent to strike the wall of the tank just above the surface of the inflammable liquid.

6. In a fire extinguishing device for a receptacle containing an inflammable liquid, a float upon the surface on the liquid and almost covering its entire area, said float having a lateral projection extending around the same so that an annular roofed-over space is formed above the level of the liquid not covered by the float and means for ejecting a fire fighting agent laterally from said float and beneath said projection.

In testimony whereof I affix my signature.

FRIEDRICH NEUMANN.