Dec. 24, 1935. J. M. F. BOUILLON 2,025,326

FIRE EXTINGUISHER

Filed Oct. 2, 1934 2 Sheets-Sheet 1

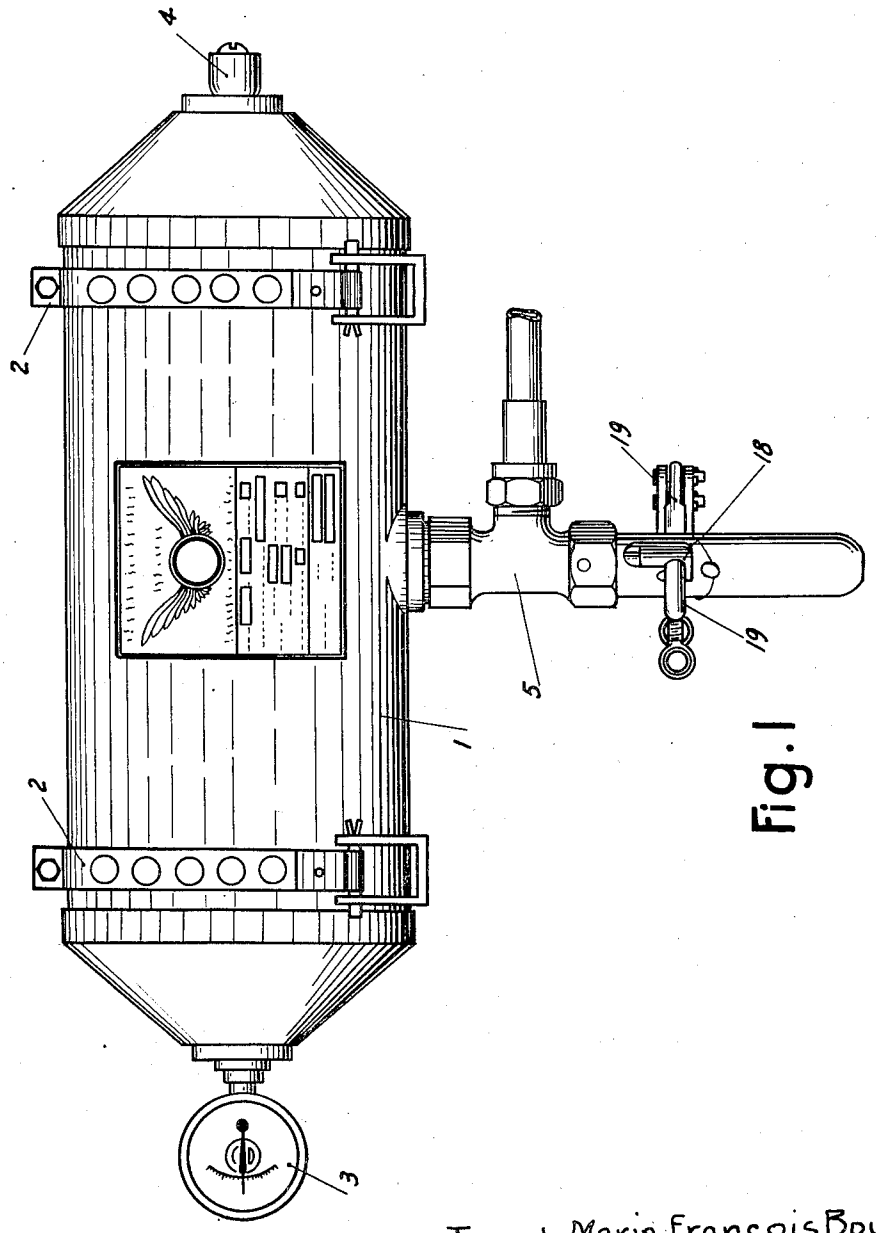


Fig. 1

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Fig. 2

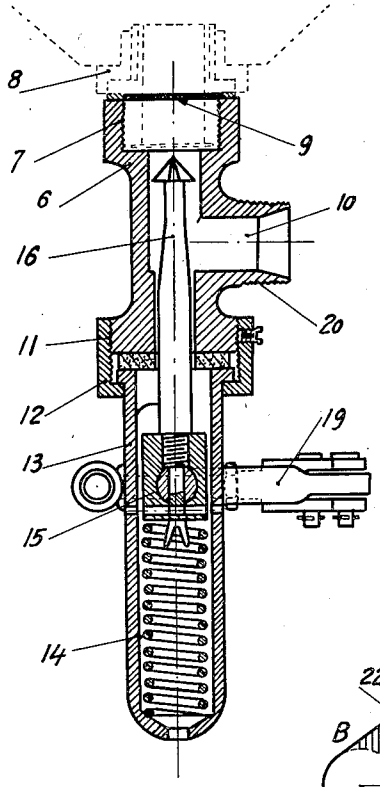


Fig. 4

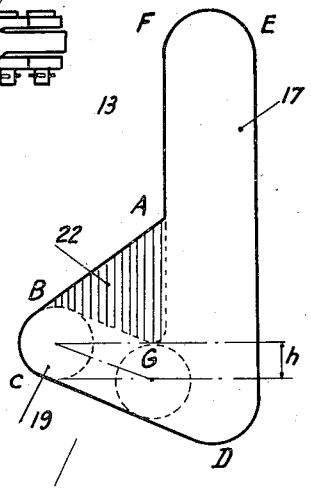
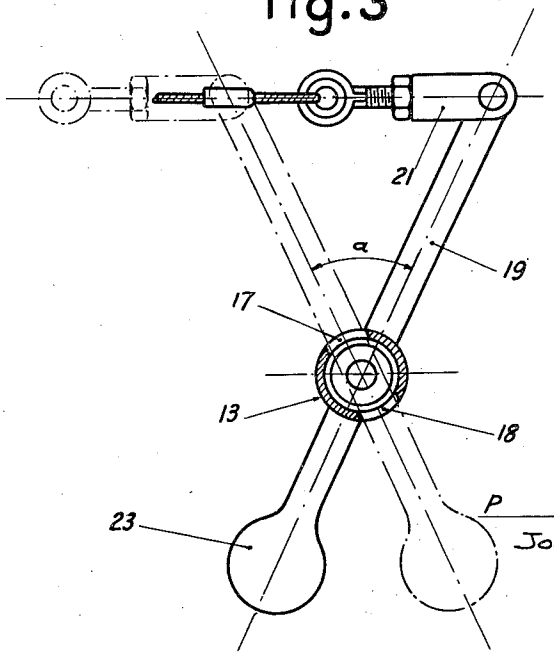


Fig. 3



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UNITED STATES PATENT OFFICE

2,025,326

FIRE EXTINGUISHER

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In France October 17, 1933

1 Claim. (Cl. 169—2)

The present invention relates to fire extinguishers by means of which an inert or incombustible liquid, gas, or vapour is projected onto the fire to be extinguished.

These apparatus consist, as a rule, of a reservoir containing the product to be projected onto the fire, associated with a reservoir of gas under pressure. The communication between these two reservoirs is normally cut off by a soldered partition which must be perforated, or by a valve to be lifted from its seat when it is desired to use the extinguisher. This result can be obtained either manually (for instance by pulling a control cable) or automatically by means of a fuse disposed at the proper place, or of a chain of fuses, or of an organ of a combustible material. These different organs, which melt or burn under the very action of the fire to be extinguished generally release a striker which, under the action of a spring normally compressed, perforates the partition above referred to or opens the valve. This operation produces the inflow of gas under pressure into the reservoir containing the extinguishing liquid, thus projecting the latter onto the flames by means of any suitable system of nozzle.

A simpler apparatus is obtained by making use of an extinguishing liquid the vapour pressure of which at normal temperatures is considerably higher than the atmospheric pressure. In this case, the reservoir of gas under pressure is unnecessary and the opening operation above described becomes merely the placing of the reservoir containing the extinguishing liquid into communication with the atmosphere through the nozzle system. It is known that materials especially advantageous for this use are carbon tetrachloride, methyl bromide and liquid carbonic acid.

The automatic control device and the manual control devices can be made in the form of two wholly independent organs, or they may be arranged to act on the same striker adapted to open the same orifice.

The present invention relates to apparatus of this kind; in its simplest form, use is made of an automatic opening system, acting suddenly, so as to produce a sudden and wide orifice, which causes the whole of the liquid to expand so rapidly that extinction is obtained not only by the negative action of the gas, but also by shock and violent discharge of the gas, thus lowering the temperature.

The reservoirs, of a suitable volume, are provided with a "Grinell" device, a well known system, which gives, after fusion of a small metal strip a very wide aperture. In the usual "Grinell" device the orifice of the expansion chamber containing the liquid is closed by a glass ball or the like. The ball is held against the orifice by means of elements which fuse at a certain temperature, whereupon the ball is released and the liquid discharged. The device may contain also means opposite the orifice to spread the liquid over a large area. Reservoirs of this kind can be placed very easily and even constitute extinguishing safety bombs, which can be thrown into the fire.

Apparatus of this kind are well adapted to be placed and used under the hoods of automobile vehicles, in cabins, rooms, passages, holds of ships, etc. It will be very advantageous to employ them as floats at the surface of the liquid in gasoline tanks, so that they will conform with the variations of level (which is not the case with devices fixed to the covers of the tanks).

Of course it will be necessary to calculate the resistance of the reservoir in such manner as to prevent any danger of explosion, that is to say as a function of the melting temperature of the "Grinell" device. Also, the volume of the reservoir will be calculated in such manner that, at this temperature, the pressure may be such that only a determined surface liable to be covered by fire may be subjected to the projection of extinguishing fluid.

Extinguishing bombs of this kind, if their reservoir is not made of glass, will not break under the effect of a shock, in the case of automobiles, for instance, or of airplanes. Furthermore, it is necessary, in these applications of the invention to provide means for controlling the working of the device.

I will now describe a new control device for the striker acting on the fuse of the "Grinell" system, or the equivalent, which involves many important advantages. This mechanism is adapted to act under the action of:

1. A manual control located close to the person using the device;

2. An automatic control operative by an abnormal rise of the temperature or by the action of the flames;

3. An automatic control operative by the effect of a sufficiently great shock, generally produced by an accident which may start a fire.

For these reasons, and especially for the last mentioned one, extinguishers provided with a control mechanism of this kind are particularly advantageous in connection with automobiles, airplanes, etc. But they can also be used to good

advantage in stationary plants because of their compact construction and of the great safety of working of this control mechanism (in particular for the protection of transformers, circuit-breakers, etc.).

Preferred embodiments of the present invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 is a general view of the fire-extinguisher with its control mechanism;

Fig. 2 is a sectional view of this mechanism;

Fig. 3 is a corresponding plan view of the control mechanism;

Fig. 4 is a view, on an enlarged scale, of a detail.

In the embodiment of the invention, illustrated by Figs. 1 to 4, the main reservoir 1 contains the extinguishing liquid, methyl bromide for instance. This reservoir is fixed at the suitable place, for instance by means of straps 2. The construction of reservoir 1 should, of course, be suited to the intended use of the device. At 3, there is fixed a pressure-gauge for indicating this vapour pressure. At 4 is provided a connection including a valve for filling the reservoir. At 5 is shown the striker control mechanism with which is connected the means for directing the methyl bromide vapour onto the fire to be extinguished.

The mechanism above referred to includes (Figs. 2 and 3) a piece 6 threaded at 7 and screwed on a boss 8 which, in the example shown, is located on one side of the reservoir, but this boss might also be provided at the place of 4 or at any other place. When in position, this piece 6 holds a diaphragm or partition 9 adapted to separate the inside of the reservoir from space 10. Threads 11 permit to fix, by means of a nut 12, a casing 13, containing spring 14, on piece 6. This spring 14 is normally compressed and acts on a member 15 screwed on the striker 16. Casing 13 is provided with two apertures 17 and 18, diametrically opposed. As shown by Fig. 4, each of these apertures 17 or 18 is in the shape of an angular slot. A lever 19, rigid with member 15, projects outwardly from said casing through these apertures. It will immediately be understood that, in the position of Fig. 1, this lever keeps the striker spring 14 compressed since it bears against the ends of the shorter branches of slots 17 and 18. It will also be readily understood that it suffices to turn this lever through the angle a of Fig. 3 for releasing the striker which, under the action of its spring, strikes partition 9 and perforates it, so that the bromide vapour can flow out through the hole thus pierced, the annular space between the striker and piece 6, space 10, and finally the threaded orifice 20, from which it is directed, through suitable nozzles and atomizers, onto the flames to be extinguished.

Striker 16 might be a rod directly driving the fixation plate of the "Grinell", either through the action of a shock or by pushing it.

Manual control is obtained through a "Bowden" or similar cable which is fixed to piece 21 jointed to lever 19. It suffices to pull this cable for producing a rotation of lever 19, that is to say the operation of the extinguisher, as above explained.

The automatic operation of the mechanism under the effect of the two causes above stated is obtained, according to an essential characteristic of the present invention, owing to the special shape of the apertures or notches 17 and 18, to the nature of the substances of which the edges of these apertures are made, and to the form of lever 19.

According to the invention, the casing 13, made of a metal that does not melt easily, for instance steel, brass, etc., is provided with an aperture having an outline A B C D E F (Fig. 4) and the aperture is given its definitive shape by adding a piece 22 made of an easily fusible material, or even of a combustible material, this piece 22 having, on the other hand, at normal temperatures, a sufficient resistance. The cross section of lever 19 is shown in dotted lines in Fig. 4.

It will be clear that, as long as fuse 22 has not melted, the mechanism cannot work by itself, since, owing to the inclination of edge B G the spring of the striker must be compressed by an amount corresponding to h for releasing lever 19. Once the fuse has melted under the effect of a rise in temperature, there is no longer anything to keep lever 19 in the locked position, that is to say to prevent the apparatus from working. Finally, it will be noted that manual control will be operative when fuse 22 or the fuse of the Grinell is not melted (it suffices to pull the cable sufficiently for compressing the spring) and that the presence of this control cannot in any case prevent the automatic operation. Piece 22 (one for each aperture) may for instance consist of a rivet fixed on casing 13. Of course, the extinguisher will be located at the place where fire or an increase of the temperature is more likely to occur (inside of the hood of an automobile, etc.) and the means for projecting the extinguishing fluid will be fixed in such manner as to act in the most efficient manner on the fire.

Automatic operation under the effect of a shock is obtained by adding at one of the ends of lever 19, for instance at 23 (Fig. 3) a small mass which, owing to its inertia in the case of a shock taking place in the direction PQ will cause the lever to turn in such manner as to release the striker in spite of the resistance of the striker spring.

The suitable choice of the angle of line BG with the main branch of the slot and of height h wholly prevents any accidental working of the apparatus under the effect of the shocks to which it is subjected normally, for instance on an airplane or a motor-car. Manual operation remains always easy owing to the fixation at the suitable place of member 21 on lever 19.

This apparatus is particularly advantageous on airplanes and motor-cars; it does away with the chains of fuses, which always give rise to accidental operation. It is compact and occupies but little space. Its safety of working, which results from its very structure, is very great. In the case of airplanes, it permits the provision of several apparatus, wholly independent from one another at the most suitable places.

Finally, the working of the apparatus under the effect of a shock (it suffices to so dispose the apparatus as to render it sensitive to the maximum in the direction in which shocks are most likely to occur) ensures a third kind of safety which is very advantageous. For instance in the case of a motor-car running into an obstacle, if the shock is sufficiently violent, the apparauts will be caused to work, filling the inside of the hood with an incombustible vapour, whether a fire has started or not. If the shock has not been violent enough but a fire starts, the apparatus also works, because of the rise of temperature. Independently of this, the manual control of the apparatus remains possible at any time.

This new principle of working of the device under the effect of a shock is an important feature of the present invention. Of course, it should be well understood that it might be applied to other forms of strikers and made in a different manner.

Another improvement of this control mechanism in the case of an extinguisher working with methyl bromide consists in suitably choosing the degree of filling of the reservoir and in giving space 10 a shape such that an appreciable preliminary expansion of the vapour takes place therein. As it is well known, this expansion produces a considerable drop of the temperature of the vapour and even its transformation into the solid state so that the matter projected onto the fire is not a vapour but a kind of snow (by analogy with carbonic snow) which has a double action on the fire, first by the inert atmosphere that it creates and secondly by the drop of the temperature of the fire that results from the heating of the solid material and its transformation into vapour, this considerably increasing the efficiency of the apparatus. The apparatus above described, when applied to bottles of CO_2 will, of course permit the use of carbonic snow with all the advantages above stated.

When use is made of an extinguisher requiring the action of a gas under pressure, the control mechanism above described shall serve to open, for instance, the communication between the gas reservoirs and the extinguishing products: liquids or powders.

While I have, in the above description, disclosed what I deem to be preferred embodiments of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the appended claim.

What I claim is:

A fire extinguisher which comprises, in combination, a reservoir of an extinguishing matter, a diaphragm closing said reservoir, a striker adapted to perforate this diaphragm, a casing surrounding said striker, a spring in said casing arranged to urge said striker toward said diaphragm, said casing being provided with at least one aperture consisting of a V-shaped slot having a branch extending in a longitudinal direction and a shorter branch inclined with respect to the first one and extending from the end thereof which is farther from said diaphragm toward said diaphragm, a lever rigid with said striker extending through said aperture, whereby, when said lever is in the end part of said shorter branch, it locks said striker away from said diaphragm, the portion of the casing limited by the inner edge of said shorter branch, a portion of the corresponding edge of the longer branch and a line extending from the end of said shorter branch to said longer branch in the direction of said diaphragm being made of a matter that yields under the action of heat, whereby a rise of the temperature releases said lever and permits it to slide directly into said first branch of the slot, a mass carried by said lever for bringing it into said first branch of the slot under the effect of a shock, and manual means for turning said lever about the axis of said casing so as to bring it into said first branch of the slot.

JOSEPH MARIE FRANCOIS BOUILLON.