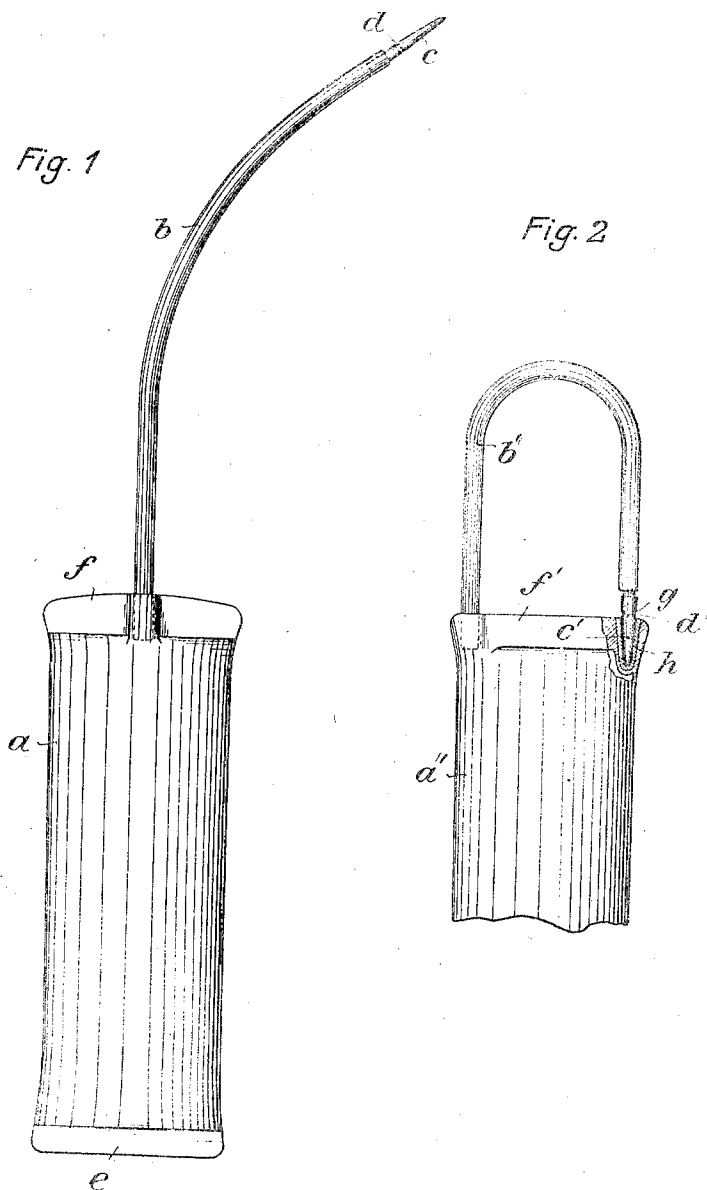


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FIRE EXTINGUISHER
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FIRE EXTINGUISHER

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The present invention relates to a hand fire-extinguisher that is simple in construction, light, and easy to manipulate, and is therefore particularly suitable for vehicles such as motor cars, motor boats, and the like, in order that in case of fire—in the carburettor, for instance—an effective extinguishing agent is available. In the case of relatively small hand fire extinguishers, it is impracticable because of complications encountered from a design standpoint, to make use of means for the production of a special gas to be employed in ejecting the extinguisher liquid. What is usual is to utilize the evaporation of such an extinguishing agent as carbon tetrachloride itself (the evaporation of which commences at normal temperature) for ejecting the extinguishing liquid from the container, as soon as it is opened, by the pressure of the vapour formed on the surface of the liquid. In such cases, the fire-extinguisher consists of a simple metal container with a glass vessel fitting into it and provided with a spraying nozzle, by means of which a jet of the extinguishing liquid can be directed on the fire. The known forms of this type of hand fire-extinguisher have, however, the disadvantage that they are effective only when the outside temperature is sufficiently high. When the temperature—as in winter—is low and below the boiling point of the extinguishing agent, these hand fire-extinguishers fail to act because the necessary pressure is not produced within the container; under such conditions the liquid trickles out of the container in drops, so that the device cannot be effectively used.

To overcome this difficulty, it has been proposed to use metal containers with flexible walls, so that a jet of the extinguishing liquid can be produced by compressing or squeezing the container. There are, however, no metals that are suitable for this purpose—because they are either incapable of resisting the chemical attack of the extinguishing liquid or fail to offer in themselves sufficient flexibility, even if strong enough to withstand the forces of compression, to make it possible to effect discharge of the entire liquid content of the container.

It has also been proposed to make the container of rubber, but this is not a practicable solution of the problem. Rubber is dissolved by such an extinguishing agent as carbon tetrachloride. Furthermore the great elasticity of rubber would likewise prove a disadvantageous factor, because when one part of the container is compressed, the other part will widen out by reason of the resistance provided by the small cross-section of

the outlet, thus making it impossible to control the speed of ejection and consequently the distance the jet will carry, without which control it becomes impossible for one to direct the jet of liquid on to the fire with any pronounced degree of accuracy.

The hand fire-extinguisher according to the invention avoids these disadvantages. The problem is solved by making the container of an artificial substance consisting of polyvinyl alcohol, or other polyvinyl compounds, which yield substances of a soft rubber character, such as polyvinyl chloride, polyvinyl acetate (the compound of polyvinyl alcohol and aldehydes), butadiene or the so-called "Duprene," "Neoprene," "Chloroprene," or of mixtures of these polyvinyl compounds, or of mixtures of these compounds with similar related polymeric artificial substances, especially the derivatives of the polyacrylic acid, also mixed polymerisation products from several of the substances mentioned may be employed. From all these substances can—if necessary with an admixture of softening agents known in the art—pliable, elastic bodies be formed. However, of the better known polyvinyl compounds, the polyvinyl acetate or polyvinylchloro acetate and the polystyrol obtained from polybenzol are unsuitable because these substances are too hard and, if softening agents are added, they assume a sticky consistence and cannot be brought into predetermined shapes. Polyvinyl alcohol and the other polyvinyl compounds specified as suitable for the container are not chemically attacked by the usual extinguishing agents, such as carbon tetrachloride; it is thus unnecessary to provide the container with an inside protective vessel, layer, or coating of any kind. Further it is of importance that it is possible to produce from polyvinyl alcohol or the other specified polyvinyl derivatives, containers having flexible and elastic walls. The softness and flexibility of the material may easily be regulated to values that lie between the values for flexible metal walls and for layers of soft rubber. Therefore the container may be formed in such manner that it can without difficulty be fully compressed or squeezed in the hand, while at the same time the walls of the container have such a measure of rigidity that finger pressure exerted at one position is passed on to the adjacent parts of the surface without spreading or stretching other parts of the container. Consequently the extinguishing liquid can be ejected as an effective jet even when at a low temperature and the distance to which the jet can be projected can

be exactly controlled by the exercise of the appropriate pressure. It is furthermore an advantage for the substances mentioned to be light in weight and not to tear easily. By reason of the small weight and flexibility the extinguisher can be conveniently stowed, for example in the usual side pockets of a motor car, from which it can be easily removed; moreover the extinguisher does not rattle unpleasantly while the car is travelling nor does it wear through the pocket (when made of relatively thin material) as is the case when metal extinguishers are used. If polyvinyl alcohol is used, it can, if desired, be transparent, so that it is always possible to observe whether or not the container is full of the extinguishing liquid. Finally, the substances mentioned, unlike rubber, are perfectly gas-tight for years and do not become friable or show signs of ageing.

Fire extinguishers constructed according to the present invention are illustrated in the accompanying drawing, in which Fig. 1 is a side elevation of one form of fire extinguisher; Fig. 2 is a fragmental view, partly in elevation and partly in section, of another form of fire extinguisher.

According to Figure 1, the fire-extinguisher consists of a bag or tube-shaped container *a* made of polyvinyl alcohol, one end of which is provided with a piece of tubing or hose *b* made of the same material; the tube *b* may be closed at its free end, but advantageously it is drawn over a short mouthpiece *c* (closed on the outside) made of glass, artificial resin or some other frangible substance, which may be notched for example, at *d*. In case of necessity therefore the mouthpiece is broken off at *d* and the tube *b* directed to the fire, pressure being at the same time applied to the opposite end *e* of the container *a*. The liquid in the container *a* is then ejected in a compact, powerful jet even in cold weather, when there is no compressed gas being formed within the container, particularly if the capacity of the container *a* is slowly and uniformly reduced by the squeezing together or rolling up of the wall of the container.

The fire-extinguisher according to the example described is very simply and cheaply produced; for polyvinyl alcohol can, by the use of hot steam, be welded like white-hot metal to form an integral body. Thus, it is merely necessary to produce a tubular body, whose ends *e* and *f* are pressed together and closed by welding in the manner indicated. At first it is merely necessary to insert the tube *b* into the end *f* and then, on the formation of the welded seam, join it to the container *a* to form an integral body. As the material is sufficiently elastic, the free end of the tube *b* can be drawn quite tightly over the mouthpiece *c*. The use of the welded seams *e* and *f* causes some flattening of the whole container, which facilitates its handling when it is being squeezed or inserted into narrow pockets.

In the construction according to Figure 2, the tube *b'* is not placed at the centre of the closure seam *f'* but on one side. The mouthpiece *c'* which consists of a closed tapered end is covered with an elastic material *g*, which may be of polyvinyl alcohol or a similar substance or a suitable varnish not dissolved by the extinguishing agent. This mouthpiece, made if desired, very noticeable by the colour of the covering, is partly—for example, about as far as the notch *d'*,—inserted into a pocket *h* specially provided; the pocket is advantageously

made of the same or a similar material to the container by means of a short tube closed at the end, and closely surrounds the mouthpiece *c'*. The covering *g* is advantageously intimately joined to the pocket lining *h* by brief application of a solvent or welding agent (steam in the case of polyvinyl alcohol). The pocket may as illustrated be inserted into the container on the other side of the welded seam *f'* in the same way as the tube *b'*, but it can also be mounted anywhere on the outer surface of the container.

To make use of the form illustrated in Figure 2, the tapered end *c'*, which is made of glass, artificial resin or the like, is gripped at the protruding end and broken off. By pulling the bow-shaped tube the thin covering *g* tears; the tube now open stretches out of itself into the proper position for use. This form affords the advantages that the extinguisher can be more easily stored, it can at once be seen when the container has been used and therefore is partly emptied, and a still further security is provided against the leakage of the extinguishing liquid should the mouthpiece accidentally break off. If there should be an accidental breakage, a certain amount of pull is still necessary in order to break through the covering *g*. Furthermore the covering protects the fingers from injury should the tapered end be broken off unskillfully.

A hand fire-extinguisher according to the invention disclosed in Fig. 1 can be easily refilled and re-used, since it is sufficient to replace by a new one the small mouthpiece *c* that has broken off. For this purpose it is only necessary to roll up the bag or tube-shaped container *a*, dip the free end of the tube *g* into a vessel containing the extinguishing liquid, and then again unroll the container, whereupon the liquid is drawn into the vessel until full; when the container is full, all that is necessary is to draw the end of the tube *b* over a new mouthpiece *c*. The extinguisher is now ready for use again, so far as relates to the more simple form according to Figure 1. In the construction according to Figure 2 a mouthpiece that is provided with a covering that can be kept in reserve has to be inserted into the spraying tube; the welding of this mouthpiece into the pocket that has previously been freed may without difficulty be carried out by the user since it is only necessary to treat the spot to be welded with hot water or steam. In any case with the extinguisher according to the invention only the small mouthpiece needs to be replaced, whereas in the known metal fire-extinguishers provided with an inserted glass vessel it is generally necessary to replace the whole glass body by a new one after each use, because the glass nozzle to be broken off is integral with the remaining glass vessel and the fusing on of a new glass nozzle is not worth the expense involved.

In the examples illustrated in the drawing it has been assumed that each of the containers *a*, *a'* is formed from a length of tubing. In this instance the substance is converted thermoplastically, that is by the application of pressure and heat, on an extruding press into tubes of any length from which the desired lengths are cut. Press moulds may also be employed in which the material is thermoplastically converted into pipe lengths or bags closed at one end. Furthermore the containers can be produced from a

liquid solution of the substance. In this instance there are several possibilities. Short pipe lengths can be produced by dipping a round core into the liquid solution, allowing the thin layer 5 formed on the core to partly but not completely dry, then forming a second thin layer on the first by redipping, then coating this with a third layer in the same way and so forth until a wall of sufficient thickness is formed. Similarly the liquid 10 solution may be painted on a suitable core in several coats; in this instance a fine fabric layer may be used instead of the core as backing for the composition to be applied and allowed to remain embedded in the finished body. A third 15 possibility is, to spray the liquid solution on to a core, a fabric or the like, by means of an air current. Even relatively thick layers can be formed when produced by so-called spraying process because the air current causes rapid 20 evaporation of the solvent.

Whenever the containers *a*, *a'* and their associated parts, such for example as the tubes *b*, *b'*, are formed from a polyvinyl compound, the same fabrication or assembling procedures may be employed as when the elements to be assembled are 25 of polyvinyl alcohol. That is to say, the various parts can be produced directly by the thermoplastic method or indirectly by first forming a solution, and by connecting by softening them at the points with the aid of a solvent. However, 30 in this instance the solvent is different. For example acetone or acetic ester come into question as solvent for polyvinyl chloride and methylene chloride for polyvinyl acetal, benzol 35 for butadiene and so forth. As stated, the polyvinyl alcohol can be worked particularly easily and cheaply because water can be used as solvent.

Although several forms of the invention are herein shown and described, it will be understood 40 that various other modifications may be resorted to without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. A fire extinguisher, comprising a container 45 provided with a pocket, said container being made of a resilient and chemically-resistant artificial substance, an ejection tube attached to

and communicating with said container, a mouth piece of hard frangible material carried by said tube, and a thin covering of elastic and chemically-resistant substance provided on said mouth 5 piece and intimately joined to the inner wall of said pocket.

2. A fire extinguisher, comprising a container provided with a pocket, said container being made of a resilient and chemically-resistant 10 artificial substance, an ejection tube attached to and communicating with said container, a mouth piece of hard frangible material carried by said tube, and a thin covering of elastic and chemically-resistant substance provided on said mouth 15 piece, said covering being of the same substance as that of the container and intimately joined to the inner wall of said pocket by softening the contacting parts of the covering and the pocket by the application of solvent.

3. A fire extinguisher, comprising a container 20 for the reception of a fire extinguishing agent, said container being provided at one side thereof with a pocket and being made of a resilient artificial substance which is chemically unaffected by the extinguishing agent, said container being 25 formed of a piece of wide tubing as a bag closed at both ends, an ejection tube formed of a piece of narrow tubing made of the same substance as that of said container, said tube being attached to and communicating with said container 30 at a point remote from said pocket, and a mouth piece over which the outer end of said tube is drawn, said mouth piece being normally housed within said pocket and having an end adapted to be broken off when it is desired 35 to use the extinguisher.

4. A fire extinguisher, comprising a container provided with a pocket, said container being made of a resilient and chemically-resistant 40 artificial substance, a flexible ejection tube attached to and communicating with said container, a mouth piece of hard frangible material carried by said tube and having an end adapted to be broken off when said extinguisher is used, 45 said end being adhesively secured in said pocket.

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