

Mechanical lighter, particularly a pocket mechanical lighter.

The invention relates to a mechanical lighter, particularly a pocket mechanical lighter, which is essentially distinguished in that, in addition to the direct pipe (main pipe) to the burning spot, a further pipe (secondary pipe) operates in conjunction with a liquid container, the secondary pipe having a widened cross-section over a part of its length. The secondary pipe may also preferably lead into space at the end of the main pipe, - which can as desired be connected to and shut off from the outside air - such that, of the two pipes connected in parallel, the main pipe has a greater resistance to the flow of fuel than the secondary pipe, and also each of the two pipes at least one part impeding the flow of liquid.

Further features of the invention are mentioned in the specification and claims and some arrangements of the mechanical lighter in the form of a pocket lighter are illustrated diagrammatically by way of example in the drawings.

Fig. 1 shows one form of execution in longitudinal section,

Fig. 2 shows another form of execution in longitudinal section,

Fig. 3 shows a variant of the execution according to Fig. 1,

Figs. 4 and 5 show details in vertical section.

According to the arrangement illustrated in Fig. 1, a short tube 3 is inserted in the cover 2 of

the liquid container 1, this tube projecting at one end into the interior 1a of the liquid container and projecting out at the other end above the cover 2.

This tube 3 forms a direct pipe from the interior space 1a to the burning spot 3a and is in the following termed the main pipe. In the main pipe 3 an absorbant body 4 is arranged, for instance in the form of a wick.

In the cover 2 a fixed ring 5 is arranged concentrically with the tube 3, the space 5a surrounding this ring can be connected as desired with the outer air or closed off from it, preferably by the sealing means 6 in the closing cover 7 of the lighter. Into the closeable space 5a at the end of the main pipe 3, a secondary pipe from the liquid space 1a opens at 8. This secondary pipe in the example illustrated consists of branch tube 9 which opens into a hollow space 11 formed by a container 10. From the hollow space 11 a further part 12 of the secondary pipe opens at the top at 13 into the liquid space 1a. The part 12 of the secondary pipe then extends in the form of a thin tube almost to the bottom 10a of the container 10. This container 10 is arranged in the interior of the liquid container 1 and forms a widening of the cross-section of the secondary piping 8, 9, 10, 11 and 12. Thereby this secondary piping runs from the interior 1a of the container along the tube 12 in a direction away from the burning point 3a. The flow through the secondary piping consequently takes place from the spot 13 downwards and through the hollow space 11 and the

tube 9 into the closable space 5a on the main pipe 3. Of the two pipes connected in parallel (main and secondary pipes) the main pipe has a greater resistance to the flow of fuel than the secondary pipe, because of the provision of the absorption member 4. However, in addition to the main pipe, the secondary pipe also has at least one part impeding the flow, which in the present example consists of the small tube 12, which serves to impede the flow, but allows gases to pass through it freely.

In Fig.4 a further variant of the secondary piping is shown wherein the pipe 12a, passing downwards from the spot 13, opens at the bottom into the hollow space 11a of the container 10a, whilst the outlet 9a above from the hollow space 11a of the container 10a takes place to the space 5a.

In the last mentioned example the mechanical lighter is one in which the liquid container 1a has no absorbing material.

In the example according to Fig.2, a liquid container 1 is provided, which is filled with a capillary substance 14, as for instance wadding, staple fibre, or the like. The main pipe here consists of a small tube 15 which is fitted in the cover 2 and does not project into the space 1a. The wick 4 is accordingly only guided at the top of the outlet from the container 1. The secondary piping here opens out of the space 5a, in the form of a small tube 16 into a suitable widening 17, which is formed by a branch tube 18 provided with holes 19 in the walls. These holes in the walls, as well as the

top and bottom openings of the branch tube 18 into the space 1a, form the mouth of the secondary piping opening into the liquid container 1a.

The example according to Fig.3 is a variant of the arrangement according to Fig.1. Here, the hollow space 11 of the inner container 10, in addition to the opening 9 to the closable space 5a at the end of the main pipe 3, has two openings out of the liquid space 1a, of which one opening 20 is arranged at the top and the other opening 21 at the bottom in the hollow space 11 of the container 10, and both of them can be alternately closed. The alternate closing of the two openings 20 and 21 in the hollow space is automatically effected by heavy bodies 22 in the form of balls, in such a way that when the lighter is held in the position shown in Fig.3, the lower opening 21 is closed, whilst when holding the lighter for instance in the reversed position, as is shown in Fig.5, the balls 22 close the opening 20. When blocking the openings 20 or 21 the heavy ball valves operate with a time lag. This is effected in the following manner: At each of the blocking positions of the tubes 20 and 21 a heavy plastic substance is provided as sealing means. This sealing means consists of a substance which swells slightly in petrol, such as synthetic resin, and has the property of responding to the slightest pressure and clinging to the pressing member, thus immediately sealing by contact.

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The sealing substance has a certain stickiness which is, however, slight in the highly polished balls 22, but nevertheless enough to ensure a certain clinging together. If the mechanical lighter is held horizontally, the sealing ball does not leave its position. When turned through more than 90° , i.e. up to 180° , the balls on the other hand roll in the opposite direction without the ball 22a (Fig.5) immediately detaching itself. Consequently these will be a short interval during which time both the openings 20 and 21 are closed. The gas pressure and the weight of the ball itself will ensure that this double closing lasts only a short time, and that the only opening remaining closed is the one situated at the liquid end. Consequently always the liquid end of the two openings 20 and 21 will be closed.

According to a further important feature of the invention, which is common to the arrangements already described, the end 4a of the wick 4 in the pipe leading from the interior of the liquid container to the burning spot, is surrounded by the actual burner 3b and arranged sunk in it. The actual burner 3b, in the following termed burner tube, surrounds loosely the part of the main pipe 3 projecting from the liquid container 1 and is displaceably arranged along that part. Between the burner tube 3b and the cover 2 of the liquid container 1, a spring is provided, which tends to push the burner tube 3b upwards into the so-called igniting position, where it is held by means

of a stop not shown in the drawing. The end 4a of the absorbant body 4 consequently makes contact with the inner wall of the burner tube and is sunk within it in the ignition position of the tube. The burner tube 3b^{is} as can be seen from Figs. 1 - 3, movable up and down between the fixed ring 5 and the main pipe 3 within the closable space 5a. The burner tube 3b is, according to the arrangement illustrated, controlled by the closing cover 7 of the mechanical lighter. When the cover 7 is closed, the sealing surface 6 presses the burner tube downwards so that the space 5a is tightly closed. When the cover opens, the burner tube 3b moves upwards under the influence of the spring 23 into the ignition position, soaked with fuel. It has also to be mentioned that the upper edge of the mouth of the fixed ring 5 projects a little beyond the edge of the mouth of the main pipe, in order to ensure connection of the space 5a with the main pipe even when the lighter cover 7 is closed.

The novelty, purpose and operation of the aforementioned constructions of the various arrangements are as follows:-

Speaking generally, the purpose of the arrangement according to the invention is that, in consequence of pressure fluctuations (over pressure or depression) liquid which has begun to move in the liquid container into the hollow space 11 or 17 of the secondary pipe can

escape (over pressure) and from there be again led back (depression), whilst the gases can freely escape when the closing cover 7 is opened. In this way the introduction of fuel in the main pipe remains uninfluenced by pressure fluctuations, and is consequently always uniform, thus ensuring a constantly uniform flame. The following separate points are here also referred to: If a pocket mechanical lighter filled with petrol and hermetically sealed by the closing cover is subjected for a given time to warmth, for instance to the warmth radiating from the human body when the lighter is carried in the whistcoat pocket, when the lighter is opened a jet of petrol will be expelled even through very small outlet openings in consequence of the overpressure. The reason for this is that, when the cover is opened, the petrol is carried over with the escaping gas as pressure is released. This carrying-over is helped by the fuel rising or foraming up at the moment when the pressure is released. With usual lighters the pipe leading the fuel consists mostly of a small tube with an enclosed wick. In such a case the resistance to flow in this pipe need be only great enough to prevent the supply to the burning spot being adversely effected. Consequently the wick should be of a quality having only a loose structure in order that the density of the wick and the external and internal friction of the liquid may not become too great, But on the other hand, and here the present invention applies, for pressure equalisation

a continually free opening must be present in order that the movement of liquid in the wick pipe may neither be accelerated nor retarded by pressure fluctuations. Since, however, the pressure equalisation must take place in a fraction of a second in order to deal with this problem, the hitherto mechanical means for pressure equalisation becomes inadequate. By reason of the pipes being connected in parallel, as shown in the examples according to Figs. 1 and 3 with liquid containers free from absorptive material, and with their afore mentioned features, in particular the widenings of cross-section in the form of a hollow space 11, not only ensures constantly uniform supply of fuel through the mainpipe 3 to the ignition spot 3a, but in particular also prevents the annoying issuing or squirting-out of the liquid-fuel when the mechanical lighter is opened.

The arrangement according to Fig.3 contributes more particularly to procure the afore-mentioned conditions for each position of the mechanical lighter. Owing to the parts 20, 21 of the secondary pipe extruding approximately over the whole height of the inner fuel space 1a, there is no space where the gas can accumulate. In order that the liquid in the fuel space 1a may have no connection with the hollow space 11, the alternate closing at both ends through the steel balls 22 and 22a is provided. The action of this alternate closing has already been explained before. It is only necessary to add that the delayed opening of the mouth 20 or 21 is

provided in order to avoid the risk of both mouths being open at the same time, and thus preventing ultimately an instantaneous connection with the liquid space.

Now regarding the arrangement according to Fig. 2 when the liquid container is filled with an absorptive body, the following is to be mentioned here: With this arrangement pressure fluctuations with respect to atmospheric pressure causes unpleasant phenomena. If the wadding present in the fuel container 1a is supersaturated and is subjected to an external overpressure, fuel will be forced out through the wick with a strong squirting action according to the internal pressure when the cover 7 is opened. In the opposite case of depression, the air flowing in to equalise the pressure will disturb the distribution of the liquid in the absorbant substance; in particular at the inflow region the liquid will be drawn away from the burning position, so that (if the wadding in any case already contains little fuel) a long time may pass until order is again restored and the burning position once more has sufficient fuel supplied to it. In order that these unpleasant phenomena may not occur (particularly the squirting action in consequence of the hermetic closing of the cover) a secondary or relieving pipe is here arranged parallel to the wick pipe 3, as already described before. Here also the secondary pipe leads to a widening in the form of the hollow space 17, which in the afore-mentioned manner is in contact with the capillary substance surrounding it. This friction prevents free liquid being drawn over as pressure is

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released when the capillary substance (wadding or the like) is supersaturated. In the contrary case of depression, i.e. when air flows in, a rapid pressure equalisation is then ensured in the hollow space 17. In both cases the guiding of the wick remains uninfluenced.

As regards the purpose and the method of working of the burner tube 3b movable up and down in the space 5a, mention of an important feature should be made that the wick end 4a, when the cover is opened, for instance when lighting, is not in the region of the flame, since it is arranged sunk with respect to the upper edge of the burner tube 3b where the flame is formed. The burner tube 3b pressed down by the cover 7, takes up fuel internally and externally, particularly if it consists of a substance which can store liquid. When the cover is opened and the burner tube 3b moves a corresponding distance upwards, the wick end 4a moves over this inner wall. The burner tube 3b is consequently well supplied with fuel in the ignition position, so that when operating the friction ignition wheel an immediate formation of flame takes place. Because of the surrounding and sinking of the wick end 4a, this takes no part in the forming of the flame, the wick therefore does not become smoked and is also not consumed. Consequently all the drawbacks connected with smoking and burning are avoided.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

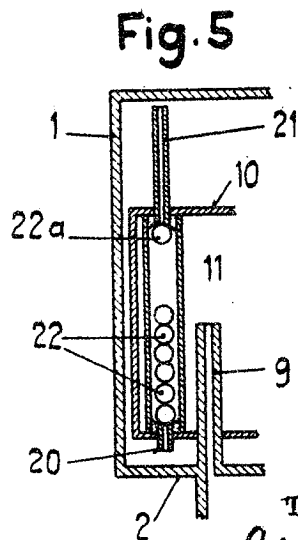
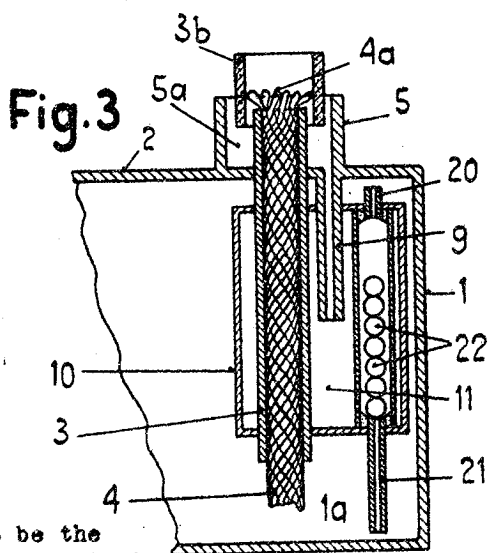
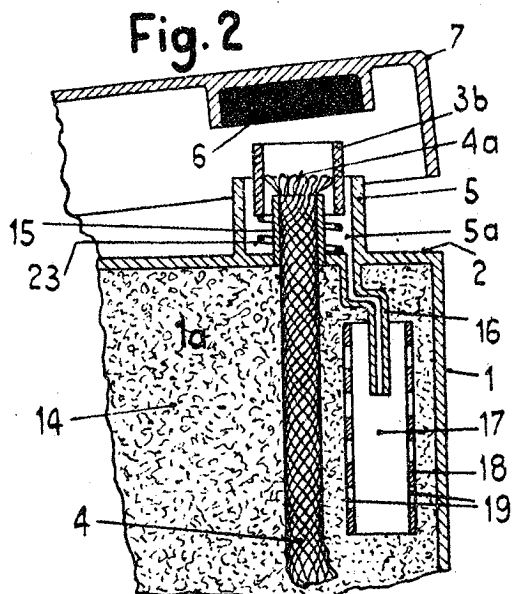
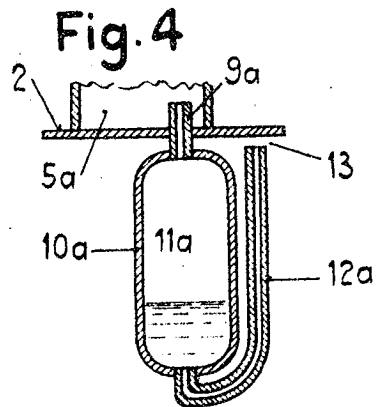
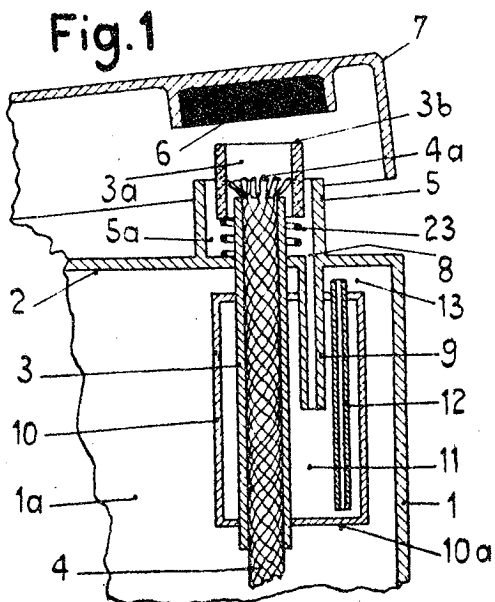
1. A mechanical lighter comprising a container to receive a fluid, a main tube projecting from the container and adapted to receive a wick, a ring member secured to the outer surface of the container and surrounding the main tube in spaced relation, an auxiliary container in the first-mentioned container, and a tube in communication with the auxiliary container and the space between the ring member and the main tube.
2. A mechanical lighter comprising a container to receive a fluid, a main tube projecting from the container and adapted to receive a wick, a ring member secured to the outer surface of the container and surrounding the main tube in spaced relation, an auxiliary container in the first-mentioned container, a tube in communication with the auxiliary container and the space between the ring member and the main tube, and a burner tube surrounding the main tube in spaced relation and mounted in the space between the main tube and the ring member.
3. A mechanical lighter comprising a container to receive a fluid, a main tube projecting from the container and adapted to receive a wick, a ring member secured to the outer surface of the container and surrounding the main tube in spaced relation, an auxiliary container in the first-mentioned container, a tube in communication with the auxiliary container and the space between the ring member and the main tube, a burner tube surrounding the main tube in spaced relation and mounted in the space between the main tube and the ring member, an a spring between one end of the burner tube and the first-mentioned container to urge the burner tube upwardly when a cover of the lighter is opened.

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4. A mechanical lighter according to claim 1, in which the main tube extends into the first-mentioned container.
5. A mechanical lighter according to claim 1, in which the main tube extends into the first-mentioned container and entirely through the auxiliary container.
6. A mechanical lighter according to claim 1, in which a pipe section extends into the auxiliary container and the first-mentioned container.

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THIS DRAWING is to be the drawings referred to in the specification hereunto annexed.
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