

## PATENT SPECIFICATION

423,894



Convention Dates  
(Austria)

Dec. 21, 1932 :  
Jan. 21, 1933 :

Corresponding Applications  
in United Kingdom

No. 36039/33, } Dated Dec. 21, 1933.  
No. 36040/33. }

(One Complete Specification Left under Section 91 (2) of the Patents and Designs Acts, 1907 to 1932.)

Specification Accepted: Feb, 11, 1935.

## COMPLETE SPECIFICATION

## Improvements in and relating to Pyrophoric Lighters

I, LEOPOLD KUTTER, of Austrian nationality, of 4, Johann Hoffmannplatz, Vienna XII, Austria, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

It is known in pyrophoric lighters to arrange the wick tube swingably so that the burner (the wick end) can be supplied with fuel from the fuel container also in a position turned away from the ignition position (swung upwards). In this lighter, the swinging joint is made from two bored bodies in which the axial and radial borings through which the wick is drawn from a channel with a diameter which is only slightly greater than that of the wick. The result of this is that the wick has to be guided under tension through the joint axially and radially round several (three) sharp corners and is thereby sharply bent or squeezed at these corners. These bends are unsuitable for conducting the liquid fuel and, in fact, the flame becomes extinguished after a short time on account of the absence of fuel supply

In another known construction the wick tube is arranged axially, that is vertically, on the joint which is mounted in the lighter casing with its swinging axis vertical, and is then bent back horizontally and consequently can swing in a horizontal plane; here also the joint has only a channel corresponding to the diameter of the wick and the wick is bent in the wick tube through 90°, and under tension, so that the drawing through of the wick is made difficult and its life is reduced. In addition to this the wick is twisted when the wick tube is swung through 180°.

These drawbacks of the known lighters are avoided, according to the invention, by the joint which enables the wick tube (swinging arm) to swing, having, instead of a wick channel, a hollow space with internal dimensions much greater than the wick diameter, which hollow space

allows the wick to be lead through without tension, sharp bends and twisting.

In a constructional form of the invention the swinging wick tube, in addition to the burner opening, carries a sealing plate surrounding it at its side surface, on which a sealing cap, provided on a hinged cover, adapted to spring into the closed and open positions, is adapted to bear in the igniting position of the wick tube, the opening movement of which cover is employed in a known manner for automatic ignition.

In the accompanying drawings a constructional example of a pyrophorous pocket lighter according to the invention is illustrated in Figs. 1—3.

Fig. 1 being a vertical section,

Fig. 2 a section on the line B—B of Fig. 1 with the joint partly in elevation and with parts removed, and

Fig. 3 a section on the line A—A of Fig. 1.

Figs. 4, 5 and 6 show three other constructional examples of the lighter in elevation.

Figs. 7—9 show a fifth constructional example,

Fig. 7 being a section on the line C—C of Fig. 8, partly in elevation, Fig. 8 a section on the line D—D of Fig. 7 with parts removed and Fig. 9 a plan with the cover partly broken away.

In the examples illustrated a suitable material which absorbs fuel is used from which a wick leads the liquid fuel to the burner.

In the construction according to Fig. 1—3, from the fuel container 1 a conduit containing the wick 2 leads to the burner 3. In this conduit a joint formed in the manner of a swinging cock is provided which divides the conduit into a stationary tube 4 and a swinging arm 5. The hollow swinging cock consists of the fixed inner part 6 and the swinging outer part 7. They form two relatively rotatable, preferably cylindrical caps placed tightly one within the other, the stationary tube 4 being connected or integral with the

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part 6, and the swinging arm 5 being connected or integral with the part 7.

The swinging arm 5 can be swung out of the ignition position (shown in full lines) which is within the lighter casing, into a second position (shown in broken lines) which is outside the casing. The object of this is that the formation of the flame may take place within the lighter in a position protected from wind, for example, between the lighter walls 8 and by swinging the arm 5 a free flame outside the lighter may be formed which is not affected itself and does not noticeably heat the lighter.

In order to obtain this result, the fixed joint part 6 has a slot 6<sup>1</sup> of such length that in the desired range of turning of the swinging arm 5, which in this case is, for example, about 90°, the conduit 4, 5 is kept open so that the wick 2 in all positions with this range of turning can supply fuel from the container to the burner 3. The tube 4 and swinging arm 5 are offset in the joint axis, but preferably only to such an extent that the slot 6<sup>1</sup> is covered for the purpose of sealing in all positions of the swinging arm from the casing 7; for this purpose, the joint part 7 is provided with a recess 7<sup>1</sup> (Figs. 2 and 3) for the tube 4.

As is clear from Figs. 1 to 3, the joint instead of a wick channel, has, according to the invention, a hollow space with internal dimensions much greater than the diameter of the wick; this gives the advantage that the wick can be drawn through the hollow space without tension, sharp bends and twisting which ensures the liquid fuel being constantly led through and also increases the life of the wick.

The swinging joint with wick tube is preferably secured in the lighter in the following manner. The tube 4 is introduced through an opening 1<sup>1</sup> into the fuel container 1, is packed by means of a packing 9 held between the collar 4<sup>1</sup> and container wall and is secured at the bottom of the fuel container by means of a screw 10 and there also packed by means of an insertion 11. The tube 4 is provided in addition over a large part of its length with a broad slot 12 or instead of this with a number of openings or slots through which the wick 2 comes directly into contact with the filling of the fuel container so that a satisfactory transfer of the fuel to the burner 3 takes place. The fixed joint part 6 can preferably be further secured by a screw 13 lying in the swinging axis on a wall 8 of the lighter, while the rotatable joint part 7 bears against the second wall 8 of the lighter with a small central working sur-

face 14.

By means of this arrangement the part 6 is securely fixed and the part 7 with swinging arm is easily rotatable. The rotation can be produced in any desired manner, for example by direct action of the thumb of the hand holding the lighter, for which purpose the part 7 is provided with a roughened or ribbed side surface.

As is clear from the example in Figs. 1-3, the swinging arm 5 in the ignition position, that is, in the position when swung into the lighter, is covered by a sealing cap 15 which must be moved away before ignition, it being possible to employ this movement for automatic ignition. In the drawing this arrangement is so carried out that the swinging arm 5 and the wick cap 15 connected with the lighter cover 16, can be swung in the same plane in the directions of the arrows 17 or 18, shown in Fig. 1, the cover in a known manner being such that after being given a start it springs into either the closed position or the open position under the influence of a spring. Further, the springing up of the cover is employed for automatic ignition.

The details for this purpose are as follows: The burner 3 of the hollow swinging arm or wick tube 5 is formed essentially of a transverse boring ending at the side wall from which the end of the wick projects and which is surrounded by a sealing surface, in the form of a sealing plate 19 on which the above-mentioned cap 15 is applied tightly. The end of the hollow swinging arm is tightly closed by a screw 20 which, for example, can serve at the same time for securing a small perforated cage 21 which has the object of giving a certain amount of protection from wind to the flame when swung out of the casing.

The cover 16 projects forwardly to near the swinging joint, is swingable rearwardly by means of its side walls 16<sup>1</sup> about the pin 22 and carries the above-mentioned sealing cap 15. The arrangement which allows the cover 16 to spring both into the closed position and into the open position consists according to the invention of a pressure spring 23 which surrounds a tube 24 and by means of a stirrup-like link member 25, which is pivotally connected with the side walls 16<sup>1</sup> of the cover at 26, presses on the cover in such a manner that this is held fast in the closed position illustrated because the pivot 26 is on the right of the pivot pin 22 of the cover. When the cover is opened by being depressed at 27 the pivot 26 moves over the dead centre position on to the left of the pivot pin 22 of the

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cover, whereupon the compression spring 23 causes the cover to spring rapidly upwards to a stop. During this movement the link member 25 is guided on the tube 24 by means of the slotted extension 25<sup>1</sup>, which at the same time, on account of its concave shape, forms a proper support for the compression spring 23 in spite of its movement.

The arrangement, as compared with other known covers which also spring into the closed and open positions, has the advantage of a comparatively small space requirement so that the fuel container 1 can extend upwardly at 28 at the side of the vertically arranged parts 23, 25 and thereby can be enlarged, while the size of the lighter remains the same.

This raised part 28 serves at the same time as an abutment for the swinging arm 5 when swung into the lighter when, with the cover 16 springing into the closed position, the sealing cap 15 bears against the sealing plate 19. It is of course also possible to have a quite short tube 4 permanently connected with the top of the fuel container 1 if the packings 9, 11 are to be avoided.

The arrangement which automatically causes ignition when the cover 16 springs up is substantially known. On the axle 22 of the cover 16 or on a sleeve placed thereover, the friction wheel 29 is rotatably mounted and is provided on both end surfaces with extensions 29<sup>1</sup> preferably of its own material. Between the side walls 16<sup>1</sup> of the cover a fork-like pawl 30 is mounted which by the action of a spring 31 is brought into engagement with the extensions 29<sup>1</sup>. If the cover springs up, the pawl is carried with it in a known manner and by means of the extensions 29<sup>1</sup> it turns the friction wheel 29 so rapidly that sparks are thrown against the burner 3 and cause ignition. In the open position the cover 16 is secured by stops of the edge 16<sup>11</sup> on the tube 24. Now the swinging arm 5 with flame can be swung outwards from the casing (as shown in broken lines) in which position a flame protected from wind is obtained, which, for example, makes it possible easily to light pipes or when the lighter is turned through 90° may be useful for illumination. When the cage 21 is not used, a free flame is obtained with the arm 5 swung out from the casing.

The above-mentioned tube 24 serves at the same time for receiving the pyrophoric metal 32. For this purpose it passes through the fuel container 1 so that the metal 32, its pressure spring 33 and the screw 34 can be introduced from below.

The fuel is introduced after loosening the closing screw 35.

In the constructional example shown in Figs. 1—3, the swinging arm 5, together with the flame will remain in any position in which it is placed within the given swinging angle on account of friction.

It is, however, also possible to place the swinging arm 5 under the action of a spring.

Figs. 4 and 5 show diagrammatically examples of the first mentioned arrangement. According to Fig. 4, the swinging arm 5 is held in the igniting position by the action of a compression spring 36 which comes into action by means of a link member 37 engaging eccentrically on the part 7. The parts 36 and 37 are arranged outside the fuel container and the link member 37 can be moved by means of an operating member 38 accessible, for example, at the front narrow side of the casing and which, for example, is displaced with the thumb, in such a manner that by this means the swinging arm 5, when the cap 15 or cover 16 is turned away, is swung outwardly from the casing against the action of the spring 36. When the member 38 is released, the spring 36 brings the swinging arm 5 back into the igniting position.

In the constructional example in Fig. 5, the part 7 is connected through a link member 39 engaging it eccentrically with a two-armed lever 41 swingable about the pivot 40, the end 42 of which lever projects outwardly, for example, at the rearward narrow side of the casing below the pressure point 27 for the cover 16. The parts 39, 40, 41, 42 lie outside the fuel container and a spiral spring 43 is provided within the cock casing 7 which tends to turn the swinging arm 5 into the igniting position. If the finger pressing on the point 27 after the cover 16 has been opened is moved further in the same direction (the direction of the arrow) it reaches the part 42, by the downward depression of which the swinging arm 5 is swung outwardly from the casing against the action of the spring 43, and after the release of which the swinging arm 5 again returns into the igniting position.

Fig. 6 shows a constructional example of the second above mentioned arrangement, in which the swinging arm 5 is swung by a spring from the igniting position into a second position. This spring is, for example, a tension spring 44 and engages eccentrically on the part 7 by means of a short link member 45. The swinging arm 5 is fixed in the igniting position by a resilient automatically

engaging detent 46 which can be released, for example, by means of a press button 47. The parts 44—47 lie outside the fuel container and the button 47 is preferably accessible at the rearward narrow side of the casing and is actuated after the cover 16 has been opened and ignition has been produced thereby. The swinging arm 5 is swung back into the igniting position by hand; in order to facilitate this the part 7 can be provided with a projection 7<sup>1</sup> which may at the same time act as a stop for the outwardly swung arm 5 on the casing.

When the lighter shown in Figs. 1—3 is filled and especially when it is over filled, it is possible for the wick end to receive too much fuel, that is, to remain moist for a long time, and therefore be incapable of always being reliably ignited. Further, it is often possible that, in spite of avoiding bends in the wick in the hollow space of the joint, the regular supply of fuel to the wick end is disturbed and the wick end burns away. This is probably due to evaporation of the fuel in the hollow space of the joint, which in itself is so advantageous.

According to the invention this disadvantage also is avoided by providing in the hollow space of the swinging joint a material which will absorb the superfluous liquid which tends to go to the end of the wick and also prevents evaporation of the fuel in the hollow space. The hollow space, together with this material, thus serves, as one might say, as a second small fuel container or as an intermediate container or regulating container which makes it possible for the flame to be always uniformly supplied with fuel and makes the ignition of the wick certain.

In order, however, also to make possible the usual withdrawing of the wick it is advisable for this absorbent material to be formed partly or wholly by a wick reserve arranged in the hollow space.

Figs. 7—9 show a constructional example of this arrangement.

Fig. 1 is an axial section through the joint.

The wick tube 5 and burner 3 are again made swingable by means of a tube joint, formed, by the fixed inner part 6 and swinging outer part 7, which encloses a hollow space 48, the internal diameter of which is much larger than the diameter of the wick. Both parts 6, 7 form cylindrical caps which are only partly arranged tightly one within the other. The necessary good packing is obtained according to the invention by these caps being sealed at their adjoining cylindrical surfaces, as well as at the end sur-

face at 49. This end sealing is obtained by the end surface of the outer part 7 bearing against a shoulder of the wall of the part 6. Preferably the part 7 is connected with the swinging arm 5 and the part 6 with a tube 4 which projects into the fuel container 1 and is tightly connected therewith. The tube 4 may be dispensed with if the part 6 is directly connected with the wall of the fuel container 1.

The wick 2 is guided through the tube 4, the hollow space 48 of the swinging cock 6, 7 and through the swinging arm 5 to the burner 3 (Fig. 7).

In the hollow space 48 any material 50 which absorbs liquid, for example, loose wadding, is arranged (Fig. 8) whereby the above-mentioned drawbacks, such as dampness of the wick end 3 and evaporation of the fuel in the hollow space are avoided and a uniform flame is obtained from the beginning to the end of a filling of the fuel container 1.

As is further to be seen from Fig. 8 the wick 2 in the hollow space 48 is arranged to provide a reserve 2<sup>1</sup>. In this way the usual withdrawing of the wick at the burner 3, which can never be wholly avoided, is made possible when the wick end becomes burned away. The wick may extend in one piece from the fuel container 1 to the burner 3 or may be interrupted in the hollow space 48, in which case the suction connection between the two portions of wick is provided by the material 50.

It is, however, also possible to provide in the hollow space 48, such a quantity of reserve wick 2<sup>1</sup>, that it partly or wholly takes on the properties of the material 50, so that only a small quantity or none of the material 50 is necessary. When using both the material 50 and reserve wick 2<sup>1</sup> the above-mentioned advantages are obtained when the reserve wick 2<sup>1</sup> is entirely used if care be taken that the material and the wick always remain in contact.

The swinging cock is arranged between two bearings or walls 8, 8 of the lighter. Preferably the stationary part 6 engages with a pin 51 in a hole of the wall 8 for better mounting and the other part 7 has on its outer end surface a depression 52 for receiving a small compression spring 53 which presses both parts of the cock together at 49 and thereby ensures their sealing.

The swinging of the arm 5 after ignition of the wick end 3 may be effected in any suitable manner and preferably occurs through direct rotation of the rotatable swinging cock part, that is, for example, the cock casing 7, which for

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this purpose is provided with axial extensions 54 which, in the construction illustrated, preferably project over the whole width of the cock (Fig. 9) and can act at the same time as a stop for the swung arm 5.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A pyrophoric lighter with wick tube pivoted to the fuel container and capable of being swung out of the igniting position, characterised by the feature that the swinging joint instead of a wick channel has a hollow space with internal dimensions much greater than the wick diameter, which hollow space allows of the wick being led through without tension and without sharp bends or twisting.

2. A lighter as claimed in Claim 1, characterised by the feature that the swinging wick tube carries in addition to the burner opening a sealing surface surrounding the burner opening at its side surface, on which a saling cap, provided on a hinged cover adapted to spring into the closed and open positions, is adapted to bear in the igniting position of the wick tube, the opening movement of which cover is utilised in a known manner for automatic ignition.

3. A lighter as claimed in Claim 1 or 2, characterised by the feature that the swinging wick tube can be swung from an igniting position within the lighter casing to a position in which it extends out of the casing.

4. A lighter as claimed in Claim 1 or 2, characterised by the feature that the swinging joint is formed from two hollow caps fitting closely one within the other, the outer one being rotatable and carrying the wick tube with the burner, (3), while the inner part is stationary and is connected with the fuel container or with a wick tube projecting into the fuel container.

5. A lighter as claimed in claim 1 or 2, characterised by the feature that the wick tube is mounted on the joint radially with reference to the joint axis.

6. A lighter as claimed in claim 1 or 2, characterised by the feature that the swinging wick tube is held in the igniting position by a spring and can be swung against the action of this spring.

7. A lighter as claimed in claim 6, characterised by the feature that the actuating member for the swinging wick tube is a lever, which at one side, preferably the rear narrow side of the lighter, is accessible for its actuation and when a cover which carries the wick cap and springs up and down is provided, is actuated by the finger being further moved in the same direction after opening the cover.

8. A lighter as claimed in claim 1 or 2, characterised by the feature that the swinging wick tube is swung by a spring from the igniting position into a second position and is held in the igniting position by a releasable detent.

9. A lighter as claimed in claim 8, characterised by the feature that the detent is releasable by means of a press button arranged on a side surface, preferably on the rear narrow side of the lighter.

10. A lighter as claimed in claim 1 or 2, characterised by the feature that in the hollow space of the swinging joint a material which absorbs liquid is provided by means of which the hollow space forms a small intermediate or regulating container between the fuel container and the burner in order that a uniform flame may always be obtained.

11. A lighter as claimed in claim 10, characterised by the feature that the material which absorbs liquid is partly or wholly formed from a wick reserve which enables the wick to be withdrawn from the burner.

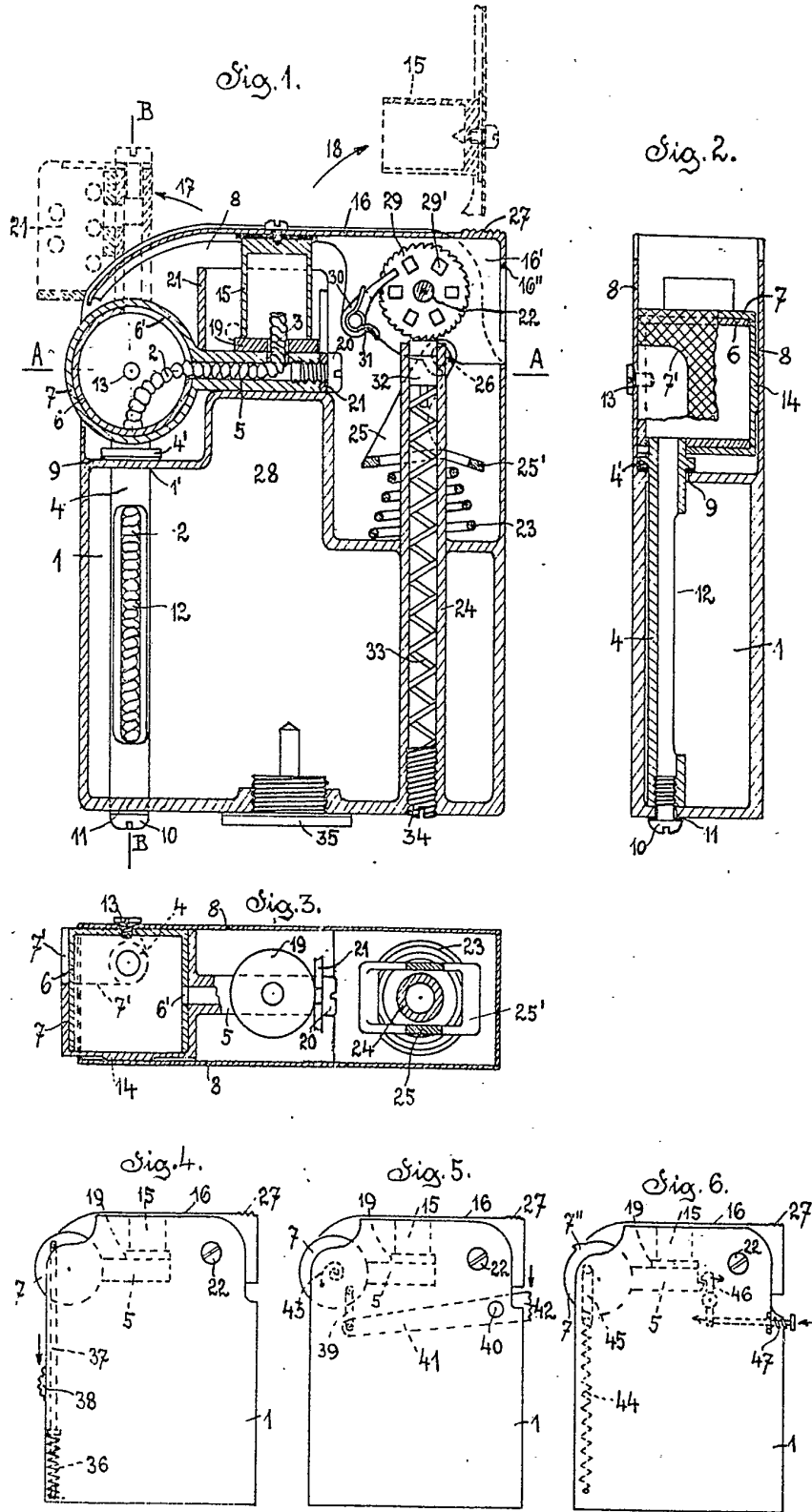
12. A lighter as claimed in claim 4, characterised by the feature that the parts of the swinging joint which are only partly placed one within the other form cylindrical caps which are sealed at adjoining end surfaces as well as at the adjoining cylindrical surfaces.

13. A lighter as claimed in claim 12, characterised by the feature that the rotatable part of the swinging joint receives in an axial depression at its end a compression spring which bears against an abutment and ensures the sealing of the end surfaces.

14. The improved pyrophoric lighter substantially as described and more particularly with reference to the accompanying drawings.

Dated this 20th day of December, 1933.  
MARKS & CLERK.

[This Drawing is a reproduction of the Original on a reduced scale.]



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Fig. 8.

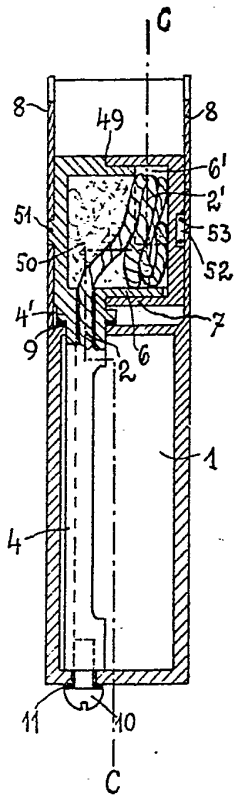


Fig. 7.

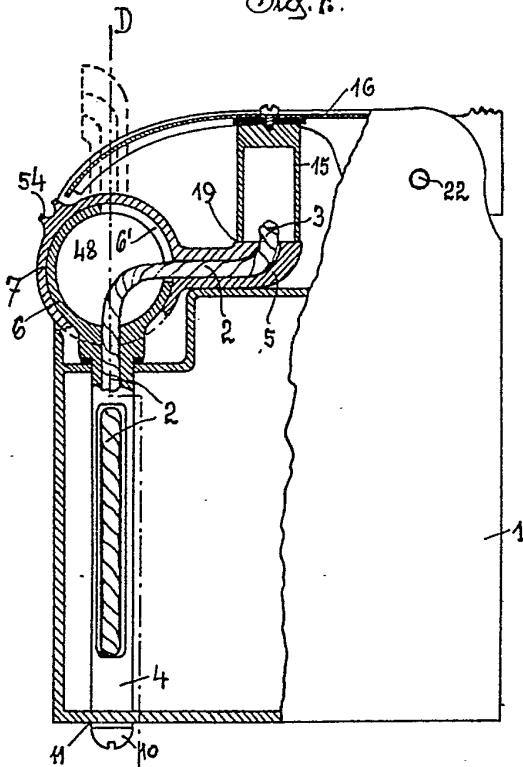
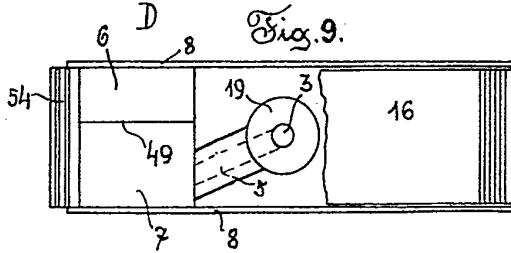
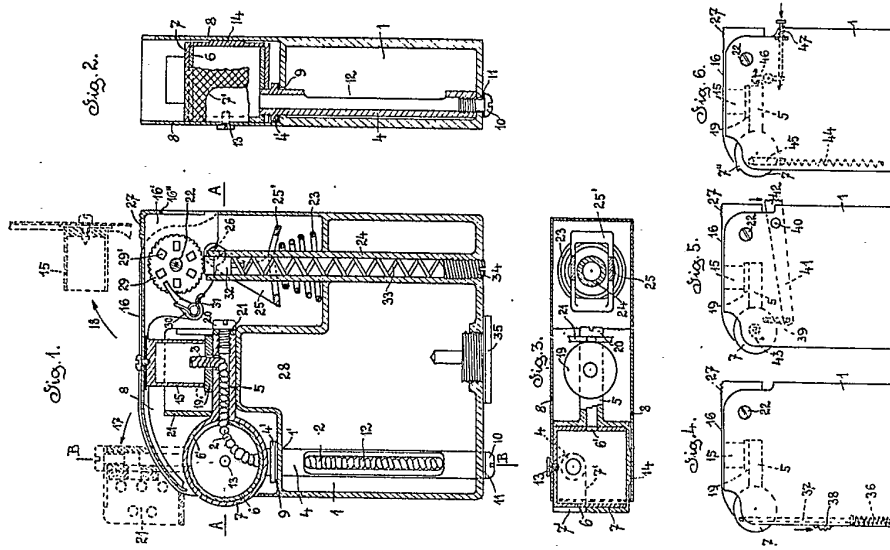


Fig. 9.





[This Drawing is a reproduction of the Original on a reduced scale.]

