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APPARATUS FOR SLOW DEPOSITION OF LIQUID

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Fig. 1.

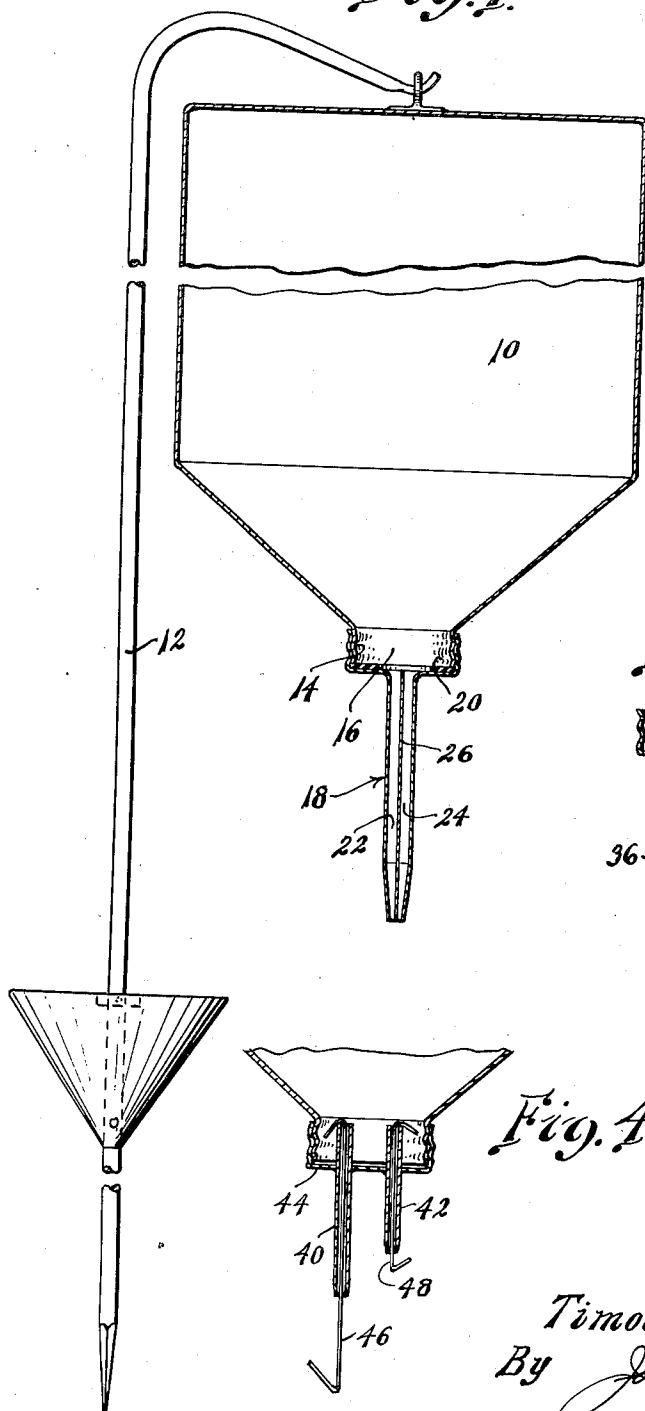


Fig. 2.

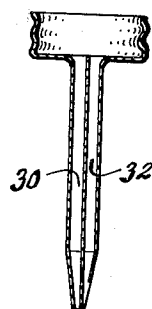


Fig. 3.

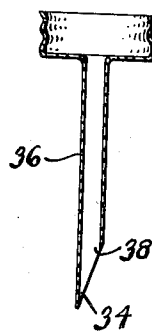
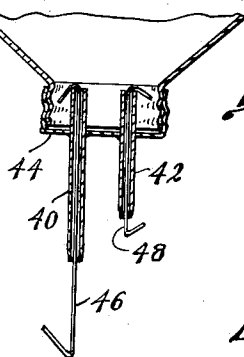


Fig. 4.



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APPARATUS FOR SLOW DEPOSITION OF LIQUID

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5 Claims. (Cl. 221-67)

This invention relates to improvements in apparatus for slow deposition of liquid. More particularly it provides an automatic liquid dropper, and means whereby the individual drops, coming from a suitable liquid supply, occur at infrequent intervals. For example, a single drop of liquid may be deposited at say eight minute intervals; and the supply may be such that the intermittent deposition can continue through long periods of time, such as a month or three months, without need for replenishing the supply. The invention is useful and effective for handling all relatively free-flowing liquids, and may have a variety of applications. One particular utility is for depositing and maintaining a film of oil over the surface of water in pools or marshes which are known to be breeding beds for mosquitoes and other insect pests.

Strenuous campaigns are waged each year in certain areas of this country, and elsewhere, to exterminate mosquitoes and, more especially, to prevent their multiplication during the warm summer months. These certain areas are peculiarly prone to invasion by mosquitoes and, unless preventive steps are taken, the extreme rapidity with which the pests breed and multiply, results in a very annoying, discomforting and unsanitary condition.

It is well known that bodies of stagnant water, such as rain water in pools, and in catch basins, and even water in pools and marshes which may change with rise and fall of the tide, but which may stand for several hours at times of low tide, release thousands of newly hatched mosquitoes daily during the warm weather. And it has become well known that a film of oil spread over the surface of such breeding beds acts as a smothering blanket for exterminating newly born insects, and as a deterrent to use of the water as a breeding bed.

Beneficial effects have been incident to the use of oil as above set forth. But the applying and maintaining of an oil film over the water surfaces, by the usual manual application and frequent replenishing, is expensive and not entirely satisfactory. It is expensive because of the almost constant attention needed to keep the water surfaces covered with the film. And it has proven not wholly satisfactory because in many cases the water changes with rise and fall of the tide, and it is practically impossible, by manual spraying, or the like, to keep the water surfaces completely blanketed.

It is an object of the invention to provide for deposition of liquid, from a suitable supply, in infrequently occurring drops, with continuous but intermittent deposition throughout long periods of time.

Another object is to provide for having intervals

of several minutes duration between successive drops.

Still another object, in the use of the invention for extermination of insects, is to provide so that the oil treatment of insect-breeding bodies of water may be accomplished automatically, effectively and at relatively small expense.

It is, moreover, an important feature that the invention may be embodied in a portable apparatus which may be held as desired by a suitable suspension support; or the invention may be in the nature of a permanent inter-connected system with multiple liquid droppers serving a substantial marshy area, or an extensive body of water.

These objects and results may be attained by means of a dropper-nozzle having provision for restricted outflow of liquid, and providing also for inflow of air sufficient to replace liquid which has flowed out from the nozzle. Strictly speaking, there is no flow-discharge at the nozzle, but rather the liquid forms at the end of the nozzle in a succession of drops. This result is occasioned by the fact that the supply of liquid is held in an air-tight receptacle, and by further fact of the restricted character of the nozzle. Thus, in the absence of further features of the invention, a drop of liquid, forming at the end of the nozzle, would completely seal the nozzle against inflow of air; and atmospheric pressure would hold the drop indefinitely. The invention, however, provides for the slow formation of the liquid in drops, and for admission of a little air through the nozzle after a drop is completely formed. The nozzle may have two passages through it, one for liquid outflow and the other for air inflow; or may have a single passage providing that the tip end of the nozzle is suitably formed, as will be hereinafter described.

In a preferred embodiment, the dropper nozzle may be connected directly to a container capable of holding a suitable supply of liquid. And such a receptacle, which may be portable in nature, may be supported as desired, to provide a continuous but slowly intermittent deposition of liquid, throughout long periods of time, without attention.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

In the accompanying drawing:

Figure 1 is an elevation, in medial section, of apparatus embodying features of the invention; and

Figures 2, 3 and 4 are elevations, in medial section, showing modified forms of dropper-nozzle.

Referring to the drawing, the container 10 may be considered representative of receptacles generally, whether portable, or permanently fixed

as a part of a distributing system. The container 10 of course may be of any suitable size, shape and material.

A portable sheet metal container is illustrated, which may be supported in any suitable manner, as by suspension from a post 12. It is in the nature of an air-tight inverted can, whose lower portion converges to a neck 14 which surrounds a mouth opening 16.

A dropper-nozzle 18 may be attached to the neck 14 in any practicable way, as by threaded engagement therewith, as illustrated. And a gasket 20 may be employed to ensure an air-tight connection. The nozzle 18 has two passages 22, 24 through it, one for liquid outflow and the other for air inflow; and both of these passages are somewhat restricted at the extreme end of the nozzle.

Nozzle 18 may be formed as a single tube with interior dividing partition 26, as represented, or a double tube formation will produce similar results.

In use, the container 10 may be filled or partly filled with liquid, which may be oil in the case of an insect exterminator. The dropper-nozzle then may be attached, and the device be transported as desired, and ready for instant operation when inverted. Suitably held or supported at its destination the dropper-nozzle will drop the liquid with slowly intermittent action, the liquid flowing through passage 22 to form successive drops at the end of the nozzle, and sufficient air being admitted into passage 24, as a bubble forms, to fill the space in container 10 which was vacated by the drop of liquid. The air admission, restricted by the passage inlet itself, is further restricted by the forming drop of liquid, and as a result, the development of each drop to the extent that gravity pulls it from the nozzle, takes a considerable time. Experiment has demonstrated that the successive drops may be eight or even more minutes apart. Consequently, with a supply container of suitable capacity, the device can function throughout a month or several months without replenishing the supply, or giving it other attention.

In the application of the invention for deposition of oil for exterminating insects, there are very definite advantages. It makes the oil treatment of breeding beds efficient and practically economical, whereas by prior manual methods, this treatment has not been entirely satisfactory, and has been almost prohibitively expensive if carried to the desired extent.

In Fig. 2 of the drawing a somewhat modified form of dropper-nozzle is illustrated, but with the liquid passage 30 extending beyond the air passage 32. With this form air is admitted more freely than in the form of Fig. 1, and the successive drops will be more frequent.

Fig. 3 shows a single-passage dropper-nozzle with the end cut away on an incline with respect to the axis of the nozzle. In this form liquid forms in successive drops as in the previous cases, but each drop as it forms runs to the extreme end 34 of the nozzle 36, thus permitting air to enter at 38.

If desired two separate tubes may be employed as in Fig. 4, one for liquid outflow and the other for air inflow. In this case both tubes 40, 42 extend through the cap 44, terminating interiorly a little beyond the mouth of the receptacle, and extending exteriorly any suitable distance, with the air tube 42 preferably a little shorter than liquid tube 40. The operation of this form is similar to the others.

However, in Figure 4, there is represented a wire 46 in the liquid tube, and a wire 48 in the air tube. By this means the nozzle passages may be restricted as desired, by inserting wire of gage to suit the particular requirements. And the wires may be bent at either end to prevent their falling out. In this case the successive drops coming from the nozzle, run down the wire which projects from the liquid tube, and finally drop, under the influence of gravity.

The wire for regulating the rate of deposition, although shown only in connection with Fig. 4, may be employed in like manner in the other illustrated forms of the invention.

I claim as my invention:

1. Apparatus for slow deposition of liquid, comprising an air-tight container for holding a supply of liquid, a tubular nozzle projecting from the container at a low down location having its passage restricted to an extent whereby liquid encounters difficulty in passing therethrough, and reaches the nozzle end in the form of successive drops; and means at the end of said nozzle for admitting air into the container past a drop of liquid which may have formed on the end of said nozzle.

2. Apparatus for slow deposition of liquid, comprising an air-tight container for holding a supply of liquid; a tubular nozzle projecting from the container at a low down location, and having two parallel passages, each communicating with the interior of the container, and each open to atmosphere at the end of said nozzle; one said passage being restricted to an extent whereby liquid encounters difficulty in passing therethrough, for slow feed of liquid in a succession of drops to the nozzle end, and the other constituting an air inlet past the liquid deposited at the nozzle end from the passage for liquid.

3. Apparatus for slow deposition of liquid, comprising an air-tight container for holding a supply of liquid and having a sediment-collecting bottom-wall portion; a tubular nozzle projecting out of said collecting portion of wall, and projecting inward an appreciable distance beyond said collecting portion of wall; and means at the end of the nozzle for simultaneous outflow of liquid and inflow of air; said nozzle having its passage restricted to an extent whereby liquid encounters difficulty in passing therethrough, and reaches the nozzle end in the form of successive drops.

4. Apparatus for slow deposition of liquid, comprising an air-tight container having fixed interior dimensions, for holding a supply of liquid; a tubular nozzle projecting from the container at a low down location, the end of said nozzle being cut back at an incline with respect to the axis of the nozzle to provide an approximately elliptical nozzle opening, thereby to unbalance the forces effective on a drop of liquid at the end of the nozzle and preventing liquid sealing of the end of the nozzle.

5. Apparatus for slow deposition of liquid, comprising an air-tight container having fixed interior dimensions, for holding a supply of liquid; a tubular nozzle projecting from the container at a low down location; means at the end of the nozzle for admitting air past a drop of liquid on the end of the nozzle; and removable nozzle-restricting means extending down through and beyond the nozzle.

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