

IMPROVED GUNS FOR THE DELIVERY OF LIQUID D.D.T. SPRAY AND POWDER BY MECHANICAL COMPRESSORS

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(With 5 Figures in the Text)

I. LIQUID SPRAY GUN

Experience with spraying with D.D.T. in solution has suggested that when mechanical compressors are available a number of improvements should be made to the spray gun. The conventional paint or oil spray gun is unsuitable for delivery of D.D.T. for the following reasons:

(1) The gun is not long enough, necessitating use of ladders in buildings or paddling in heaps of muck when spraying fly-breeding grounds. Should an attempt be made to obviate this by connecting a long delivery tube to a pressure cylinder, D.D.T. solution must run through a rubber tube, which is liable to corrosion.

(2) The reservoir in a paint sprayer is too small, approximating to a pint, making frequent refills necessary when doing a large area. It is impossible to make the container larger, as the gun becomes too heavy to hold in the hand.

(3) The gun is operated by a trigger, which must be continually pressed when spraying large areas and this causes cramp. It is unnecessary to have a trigger, as the compressed air can be turned on and off by means of a handle or stopcock.

(4) Paint-type spray guns work on the principle that a current of air passing over the reservoir sucks up the liquid by means of an arrangement of tubes, then the compressed air, continuing along the horizontal delivery tube, atomizes the liquid at the nozzle.

(a) Thus a reasonably high pressure must be used in order that there be sufficient power to suck up the fluid, and the deeper the reservoir the greater the pressure required, until, with a certain depth of reservoir, no reasonable degree of pressure will be satisfactory. A high pressure of air at the nozzle further means atomization of the liquid to an extent which, though satisfactory for some purposes, does not give the relatively coarse spray required for a contact insecticide such as D.D.T.

(b) This high pressure means also that a mechanically operated compressor must be used, either petrol or electrically driven, and simple means of

pumping air, such as the foot-operated tyre pump, are out of the question.

(c) As compressed air continually flows from the nozzle a compressor of fairly high capacity must be used. Thus a paint-spraying machine must be larger than a tyre-pumping machine which usually has only a displacement of 2.5 cu.ft., insufficient for a spray gun. An ideal insecticide gun should be one that could be used with the smallest compressor, even if necessary with a foot- or hand-operated one.

(d) If a high pressure is to be used, as needs must with the conventional paint gun, all apparatus must be stoutly built, to sustain that pressure. A gun made to work at a low pressure, i.e. below 30 lb./sq.in., will cost much less to produce and can even be improvised, as has been done in a field hygiene section by a tinsmith with few resources beyond solder, screws and rivets.

In order to meet these needs an insecticide spray gun has been devised. It involves no new principle, but is in fact a reversion to far more simple and elementary practices than is found in the commercial paint sprayer.

The gun is 5 ft. long, or can be made even longer; it has a reservoir of half a gallon or more, and in order to make this weight and length practicable it is carried under the arm slung from the shoulder like a Tommy-gun. The compressed air is turned on and off by means of a lever. The compressed air is led into the reservoir at the top and displaces the insecticide which is discharged from the container through a tube reaching to the bottom. The liquid is then passed to the nozzle and the spray is formed by the patent nozzle. The nozzle used in this case is that of a Mackenzie Sprayer, but any of the commercial types may be used, provided that the spray produced is satisfactory. No compressed air is used for atomization, in fact, none gets beyond the container. The advantages of this apparatus are as follows:

(1) A small pressure, below 30 lb./sq.in. is all that is required, so that a mechanical or foot-operated tyre pump can be used; also construction need not be too robust.

(2) As no compressed air escapes, the smallest

compressor is suitable. A mechanical tyre pump that is inadequate for a paint-spray gun can work two or three of these sprayers. A foot pump can work one.

(3) The spray produced is relatively coarse, does

irrespective of the pressure delivered by the machine.

(4) Compressed air only, not D.D.T. in kerosene, comes in contact with the tubing, hence its life is prolonged.

Finally, if the device is to be used with a foot

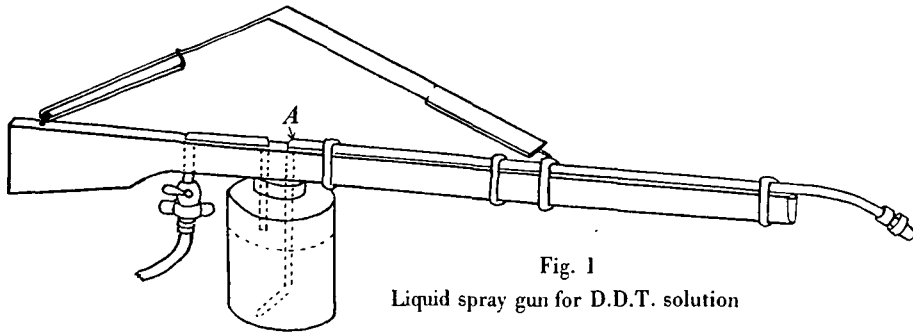


Fig. 1
Liquid spray gun for D.D.T. solution

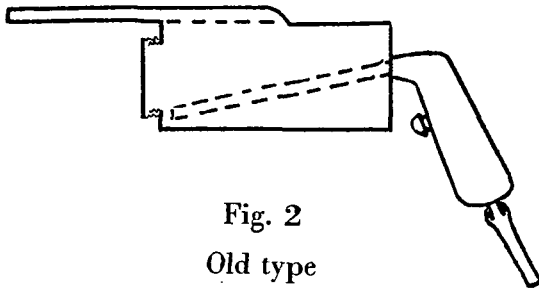


Fig. 2
Old type

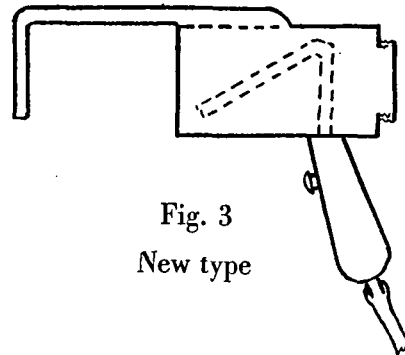


Fig. 3
New type

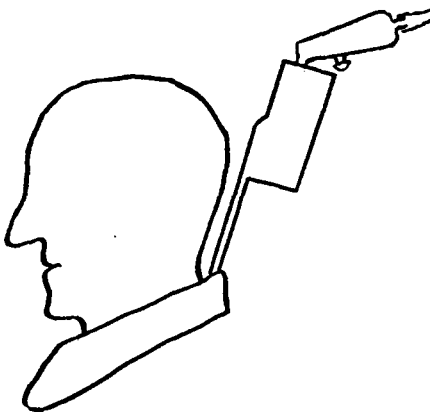


Fig. 4
Old method

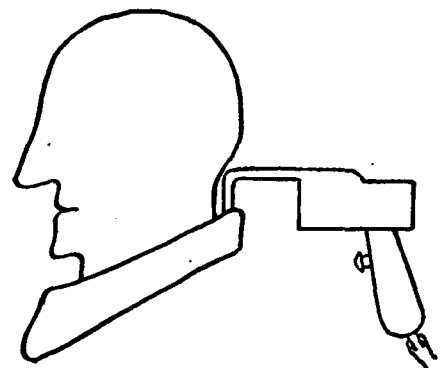


Fig. 5
New method

not float away because of excessive atomization, and can be varied in type by varying the pressure. As a lever or stopcock is used instead of a trigger or push valve, the amount of air entering the gun can be varied by partial or complete opening of the stopcock, thus varying the pressure of the spray

pump, it is advisable to put a stopcock on the delivery tube at A (see Fig. 1) so that, when shut, the pressure can be built up in the reservoir, and when spraying commences this stopcock is opened and pumping continued. Alternatively, compressed-air cylinders may be filled at a depot, transported to

site of spraying, and then individual cylinders carried on the sprayer's back attached to a gun.

II. POWER-OPERATED DUST GUN

The conventional dust gun is a copy of the horticultural type. Compressed air is introduced into a small horizontal cylinder at the base near the front end. The cylinder is partly filled with powder, the compressed air from the tube dipping into the powder churns the latter up and drives it through the only exit, i.e. holes in the top leading to the delivery tube. The delivery tube is straight. This is most inconvenient when delivering powder down the neck and less so down the trousers, as can be seen from the diagram. The simple remedy is to have the last few inches of the delivery pipe turned down at a right angle, the angle itself being turned in a curve to prevent an awkward corner traumatizing the skin. Not only does this device ensure that the nozzle is less likely to injure the skin, but also the powder is blown between the clothes and the skin and not against the skin.

The official gun also neglects the mechanics of the

lever, as the container is between the handle and the delivery tube; thus when the gun is full undue leverage causes strain and fatigue to the operator. The solution is to have the handle beneath the container as in the diagram. Compressed air must still, however, be delivered at the same place, and as seen in the diagram, this is easily arranged.

One further benefit of this rearrangement is that the filler cap is more accessible, being placed at the rear out of the way of the delivery pipe.

SUMMARY

On the basis of experience in using D.D.T. as an insecticide in both liquid and powder forms, suggestions are made for improved spray and dust guns.

My thanks are to S./Sgt. Toop, workshop foreman, and Pte Carter, tinsmith, of my old hygiene section, for the months of experiment, trial and error involved in producing these apparently simple innovations. Also to Brigadier H. B. F. Dixon, D.D.M.S. West Africa Command, for permission to forward this article for publication.

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