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ECONOMIC AND PRACTICAL ASPECTS OF THE PRESSURE GAUGE ADAPTER
FOR THE HUDSON X-Pert SPRAYER

by

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Introduction

Most malaria eradication programmes encounter difficulties arising from rapid corrosion of the pressure gauges and the consequent difficulty in regulating the working pressures (25-55 lb. per square inch).

An experimental study of these problems was made at the beginning of the campaign in São Paulo, Brazil in February 1960, and consideration was given to remedying this defect by the use of a small poly-ethylene adapter (Figure 1) filled with fine oil, which was secured to the pressure gauge by means of a threaded copper collar (Larrea, 1961).

This device was tested in the field, and it was quickly found that the inner mechanism of the pressure gauge could thus be isolated, so preventing the insecticide, which in most cases is in suspension, from reaching it. Nevertheless, a number of difficulties were noted in practice, and these caused the original design of the adapter to be modified. These operational difficulties were as follows:

- (i) The quality of the poly-ethylene supplied was not as good as the original sample, being stiffer and coarser.
- (ii) When the spraymen cleaned the pump every day, they knocked the adapter moving it from the proper position with the result that some of the oil it contained leaked out.

- (iii) The spraymen did not always take care to ensure that the recommended level of oil within the adapter was maintained.
- (iv) The junction between the poly-ethylene adapter and the pressure gauge was not always perfect and occasionally it came uncoupled.

Factors to be considered in modifying the adapter

As a result of these difficulties it was decided to modify the adapter, retaining the basic principle, i.e. prevention of direct access of insecticide into the gauge, but eliminating the various difficulties mentioned.

Consequently, in June 1961 a new adapter was designed (Figures 2 and 3), consisting basically of a small copper tube 25 mm long and 8 mm external diameter, i.e. with a base cross-section of 50 mm². At one end, a fine outer screw thread of four turns was cut, exactly fitting the inner thread of the pressure gauge. Should the existing pressure gauges not already have a thread, it is recommended that a three-turn screw thread be cut, using a fine thread tap. A piece of cloth or felt 19 mm long is placed inside the adapter, so that its end is approximately 1 mm inside the tube.

Operation

The compressed air passes through the felt and operates the pressure gauge mechanism, but the insecticide is retained by the felt without clogging it.

The malaria eradication programme in São Paulo has been using this modified adapter since June 1961, with good results. Of the 387 pressure gauges in continuous use since that date up to September 1963, only two have been changed. In both these cases it was found that the sprayman had not followed the recommendations to keep the cloth 1 mm inside the tube and to wash it every week in clean water. The loss of pressure gauges has thus been just over half per cent. in the 26 months during which the device has been in use.

Construction of the adapter

Cut a piece of 8 mm diameter copper rod into 25 mm lengths and drill lengthwise, so as to obtain a tube with walls 2 mm thick. At one end, cut a three-turn screw thread and then bore out the unthreaded part of the tube until its internal diameter is 6 mm. To plug the tube, use may be made of a cloth or felt cylinder (if available) with a diameter slightly larger than that of the tube, or of square or rectangular strips of cloth or felt, which will fit tightly inside the adapter.

Use in the field

The completed adapter is sent out to the field to be fitted into the pressure gauge as shown in Figure 2. For greater convenience, it is advisable to send with the adapter a tap for recutting the inner thread of the pressure gauge, so as to ensure that a perfect fit is obtained.

Recommendations for maintenance

Very little maintenance is needed for the adapter, and all that is required can be done by the sprayman himself:

- (i) The felt should be washed in clean water once a week when the pump is given its general maintenance.
- (ii) Although the piece of felt will last a long time, it is recommended that it be changed every three months. The old piece should be reconditioned by washing thoroughly in clean water, drying and vigorously shaking to free it from any residue of insecticide, after which it will be suitable for use again.
- (iii) It is recommended that the copper tube and the pressure gauge should always be regarded as a single unit, and in order to wash the felt the following procedure should be adopted: unscrew and remove the pressure gauge; remove the felt for washing; replace the dry felt in position; screw the pressure gauge back into place. Normally this operation is carried out by hand, the pressure gauge being tightened until no air escapes.

Cost

The cost of a complete adapter in São Paulo may be broken down as follows
(in US cents):

25 mm of 8 mm diameter copper rod	1.0 cent
cost of initial drilling (25 mm long and 4 mm internal diameter)	0.5 cent
cost of cutting a fine screw thread of three turns	0.3 cent
cost of boring out the hole from 4 mm to 6 mm internal diameter	0.5 cent
cost of two pieces of felt 20 mm long	0.2 cent
Total cost	<u>2.5 cents</u>

Considering that the average output of a sprayman in the State of São Paulo is 1000 houses per cycle (DDT), it will be seen that the adapter increases by only $\frac{2.5}{1000}$ cents (0.0025) the annual cost per house sprayed, which in 1962 was equivalent to US\$ 0.91.

Advantages of the system

When it is considered that the cost of a pressure gauge is US\$ 2.60 and that without protection it lasts barely three months, the saving in a programme when an adapter is used can be readily appreciated. Furthermore, it has been shown that proper control of the working pressure of the pump prevents irregular wear of the nozzle and excessive consumption of insecticide.

On the basis of the results obtained in the States of São Paulo, Paraná, Santa Catarina and Mato Grosso, using approximately 1220 adapters in all, it is recommended that this adapter be used as a practical and economic means of avoiding the rapid deterioration of pressure gauges.

REFERENCE

Larrea, O. (1961) Bull. Wld Hlth Org. 25, 276

FIG. 1
ADAPTER FOR PRESSURE-GUAGE IN HUDSON X-PERT SPRAYER

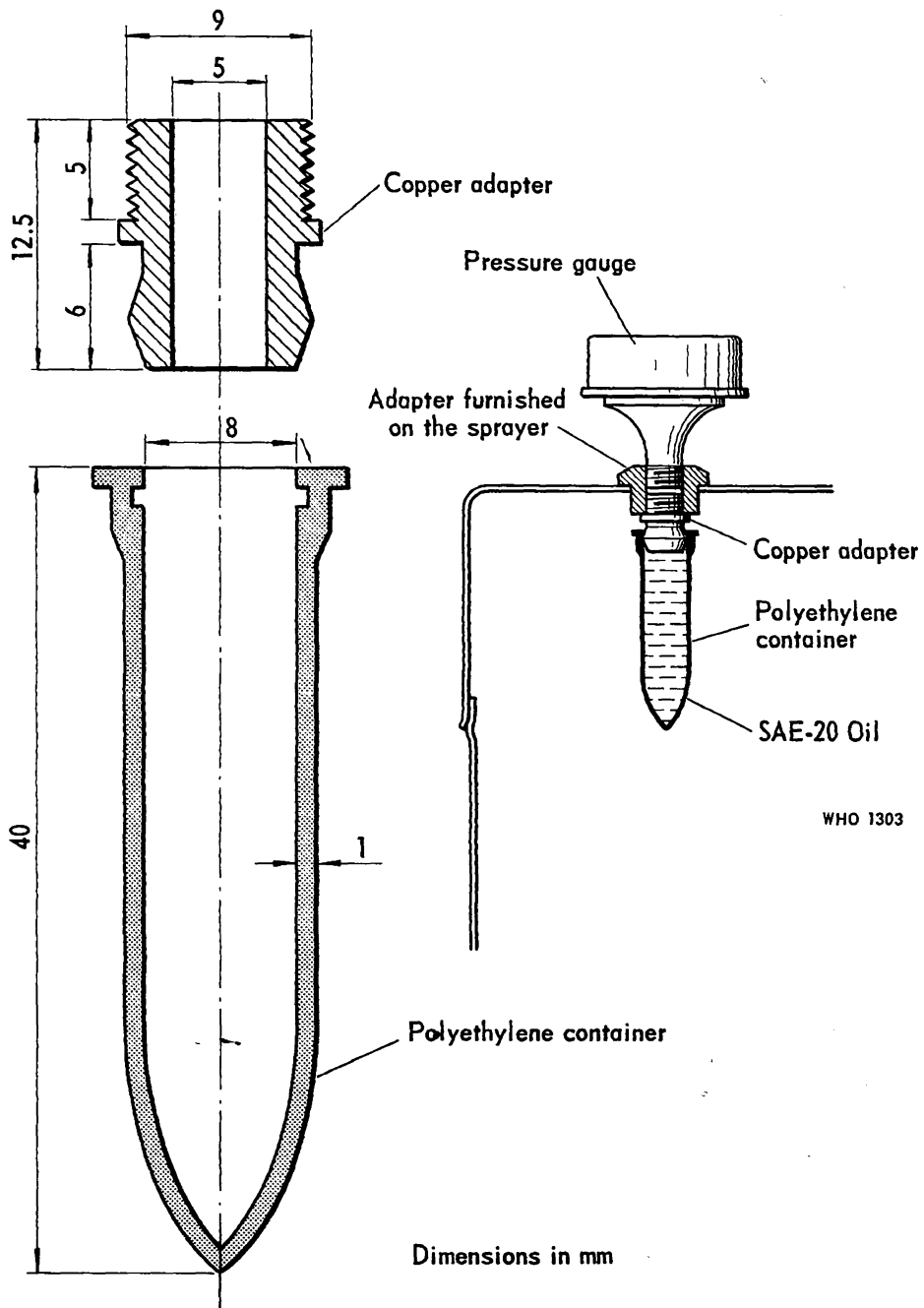


FIG. 2
NEW ADAPTER FOR PRESSURE GAUGE OF HUDSON X-PERT SPRAYER

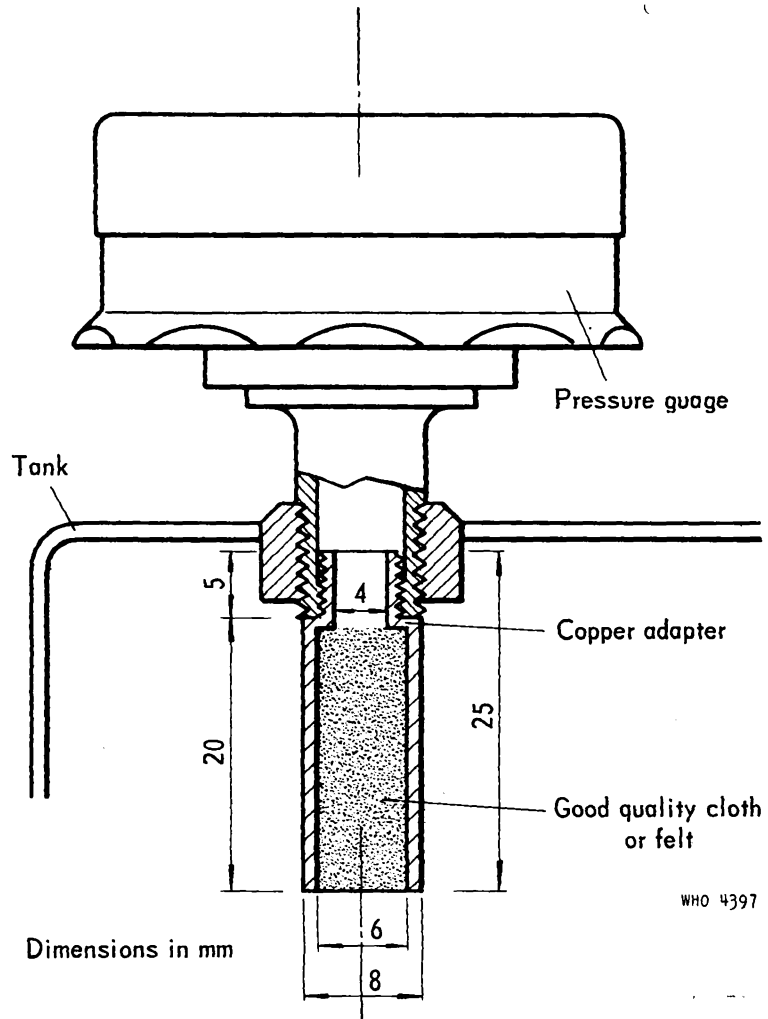
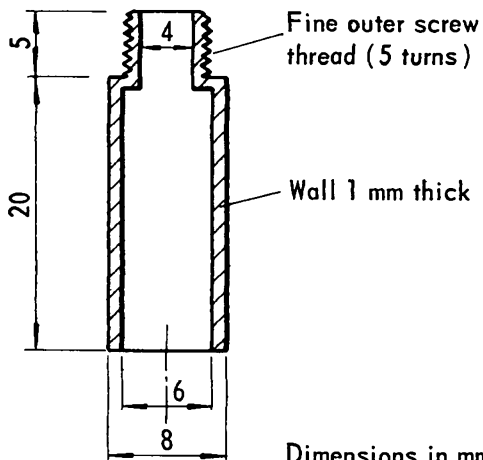
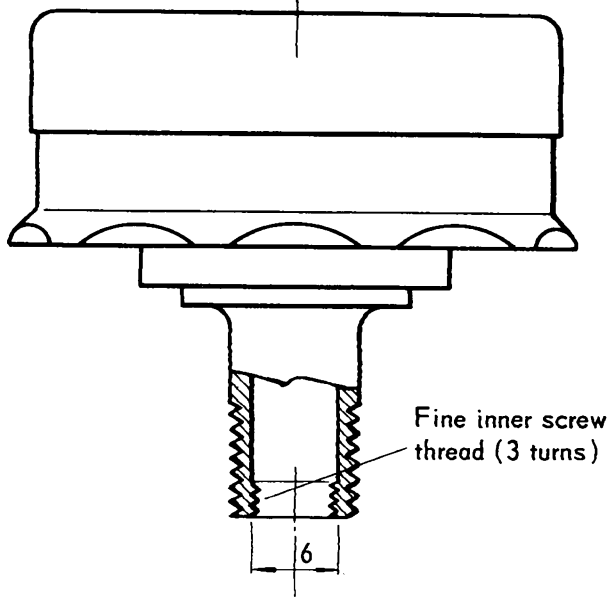


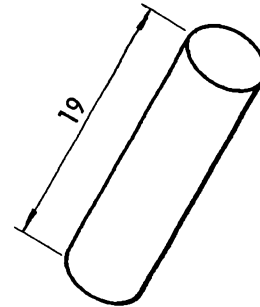
FIG. 3

A) DETAILS OF COOPER ADAPTER AND PRESSURE GAUGE

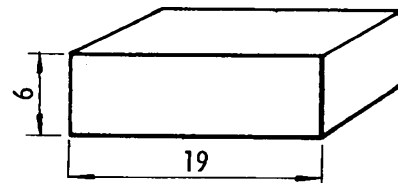


Dimensions in mm

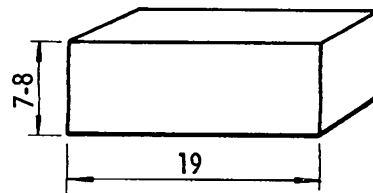
B) DETAILS OF PACKING FELT



Cloth or felt roll diameter 7-8 mm



Rectangular strip of packing cloth or felt



Square strip of packing cloth or felt