PRESSURE REGULATION OF KNAPSACK SPRAYERS

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In the *Tea Quarterly* Vol. XXIII, Part III of 1952, the writer made a note on an improvement to pneumatic knapsack sprayers, namely regulation of the outlet pressures. Since that time several manufacturers of spraying machinery have incorporated pressure regulating devices as a normal fitting on their knapsack sprayers. It might be mentioned also that the attachment of such fittings is recommended by the World Health Organization. Although pressure regulating valves are by no means new and have been used for many years for accurate reduction in the pressure of compressed air, gas, liquid and steam etc., I think we can claim to be the first to have adapted these to suit knapsack sprayers. In low volume knapsack spraying constant output pressures are most desirable, especially as the spray characteristics of a given nozzle alter with any variation in the pressure.

Fig. 1 shows a section drawing of an efficient pressure regulating valve very similar to that fitted on the 'Favori-Colibri' equipment, and the principle of its operation is as follows :—

Assuming liquid to be in the inlet side, Fig. 2 shows the valve held in the closed position by spring B. It will be noted also that the valve spindle is clear of the elastic diaphragm.

In Fig. 3 pressure has been applied to the diaphragm by altering the position of the handwheel which compresses spring A and in turn opens the valve and allows liquid to flow into the outlet side and thence to the spray nozzle. On liquid passing through the valve, the pressure gradually increases on the outlet side, compressing spring A through the diaphragm until the reduced pressure to which the valve is adjusted is reached, when the valve closes. As soon as the pressure on the outlet or reduced side begins to drop, spring A begins to open the valve again and the same cycle of operations takes place. Although a valve of the type shown in Fig. 1 can be adjusted to suit any pressure desired within the operating limits of a knapsack, there is no point in adjusting it to a higher pressure than the initial charge of air in the knapsack, as it becomes inoperative at any pressure lower than that to which it is adjusted.

Owing to the drop in pressure in a knapsack as the liquid discharges, regulation of outlet pressure within reasonable limits can only be obtained if the diaphragm in the reducing valve is of adequate area.

This type of valve has proved highly satisfactory and can be substituted for the normal outlet cock on a knapsack sprayer, the liquid supply being cut-off when desired by rotating the handwheel in an anti-clockwise direction. The two nuts fitted to the handwheel spindle are locked in position to give the desired pressure at the nozzle, after which no further adjustment is necessary.

A 'Favori-Colibri' knapsack charged with air to 40 lb. per sq. inch and then with liquid up to 115 lb. per sq. inch (approximately 2½ gallons) and fitted with No. OC-02 Boomjet Nozzles discharges in 6 minutes. When fitted with the Cooper Pegler Pressure Regulating Valve adjusted to give a nozzle pressure of 40 lb. per sq. inch, the time taken to discharge the knapsack is approximately 8 minutes. In other words the nozzle output with the regulating valve is 18¾ gallons per hour and without 25 gallons per hour. It is obvious from the foregoing figures that the additional cost of regulators is fully justified.

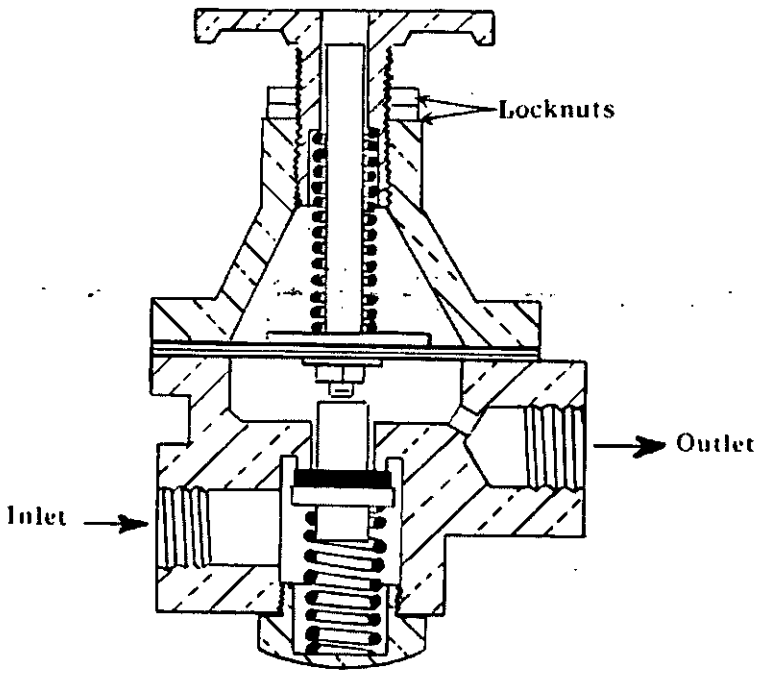

Fig. 1
Section Through
Pressure Regulating Valve

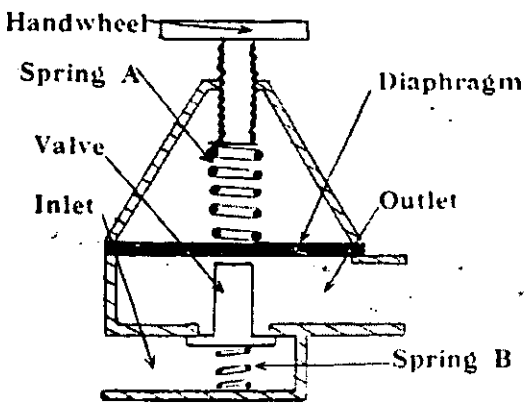

Fig. 2

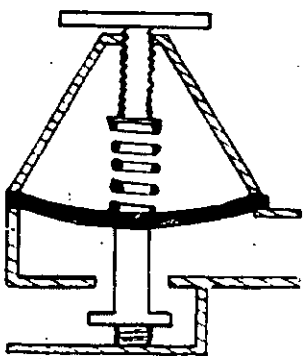

Fig. 3