with *Escherichia coli, Staph. aureus, Bacillus subtilis, B. mycoides,* and the heat-resistant bacillus mentioned above. Results were as shown in Table 1.

A loopful of broth from the tubes showing no growth was then streaked on nutrient agar slants. No growth was observed on any of them. This test was repeated three times with the same result.

Test 4. Since running the above tests a large number of starch tryptone agar tubes containing 1: 30,000 Tergitol-7 have been sterilized in the Arnold for 30 minutes and allowed to stand at room temperature for at least eight days before using. About 4 per cent of these have shown limited growth.

Summary

Starch tryptone agar containing 1: 20,000 Tergitol-7 was successfully sterilized in the Arnold by one 30-minute heating period. Decreasing the concentration to 1: 30,000 resulted in 4 per cent failures.

A concentration of 1: 20,000 in the cold killed spores of *B. mycoides* and an unidentified heat-resistant bacillus but failed to kill spores of *B. subtilis.*

Concentrations of 1: 30,000 permitted growth after sterilization of all species of Streptomyces which were tested, while concentrations of 1: 20,000 permitted growth of all species but one.

Concentrations of 1: 20,000 did not inhibit the growth of selected species of *Penicillium* and *Aspergillus* or of *Staph. aureus.*

Concentrations as high as 1: 10,000 did not inhibit the growth of *E. coli.*

Reference

1. Baker, Z., Harrison, R. W., and Miller, B. F. *J. exp. Med.*, 1941, **73**, 249–271.

A Method for Continuous Parenteral Administration of Penicillin and Other Drugs

Baxter G. Noble, 1st Lt., MC

The Good Samaritan Hospital, Lebanon, Pennsylvania

The rapid systemic elimination of penicillin necessitates frequent and often uncomfortable injections. The method here used eliminates this disadvantage by the use of an inlying, deep subcutaneous needle connected to a syringe with automatic feed.

As shown in Fig. 1, the apparatus consists of two flashlight batteries (in series) connected, through a potentiometer, with two steel (needle) electrodes immersed in an electrolyte (3 per cent KOH). An outlet from the electrolyte bottle connects, through a rubber tube and stopper, with a rubber finger cot inside the syringe. As gas is formed, the finger cot expands, forcing out the contents of the syringe. Adjustment of the potentiometer affords control over the rate of injection. In the model employed, injection rate could be varied from 1 cc. per minute to 1 cc. per hour. To use, penicillin (100,000 units) is dissolved in 20 cc. of normal saline, loaded into the syringe, and the potentiometer adjusted to the desired rate of flow as shown by the improvised Murphy drip (usually 1 or 2 cc. per hour). The original model is compact and in its entirety can be strapped directly

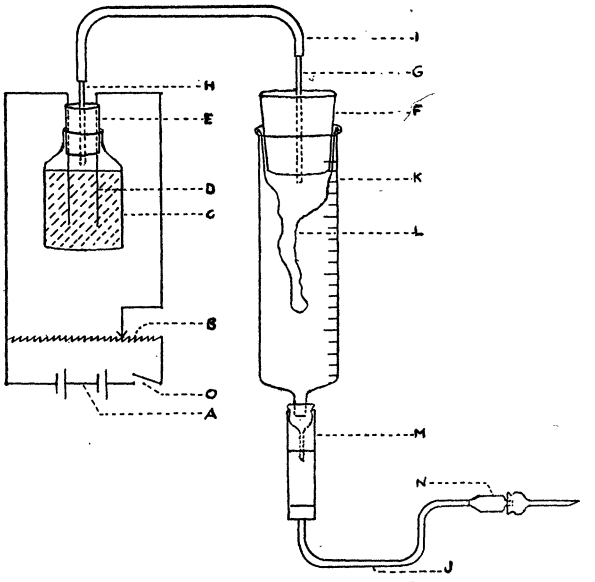

Fig. 1. A—two 1½-volt flashlight dry cells in series; B—25,000-ohm potentiometer; C—small electrolyte bottle of 3 per cent KOH; D—steel needle electrodes; E, F—rubber stoppers; G, H—hollow glass tubes; I, J—small-lumen rubber tubing; K—barrel of 20-cc. syringe; L—rubber finger cot; M—Murphy drip (size 23 needle inside a glass viewing tube); N—subcutaneous needle and adapter; O—switch.

to the leg or to an arm board, allowing relative freedom of movement; however, for more uniform injection elevation of the syringe at least two feet above the level of the patient is preferable. Battery drain is negligible, a single set of dry cells giving over 100 hours of service. The potentiometer should, however, be advanced to the full "on" position every six hours to depolarize the electrodes and prevent slowing up of electrolysis.

Continuous injection over 10- to 12-hour periods occasioned very little discomfort, though there was moderate residual tenderness that soon subsided. Only one reaction was observed, consisting of pronounced local irritation following removal of the needle and apparently caused by too rapid injection. The rate of injection should be slow enough for absorption to occur almost immediately, with minimum subcutaneous collection of fluid. The apparatus is also applicable for constant intravenous injection of penicillin and other drugs.