This raises the pressure plate and makes the soft plasticine above it ooze out between casting and mold, thus breaking the "seal" between the latter and lifting the casting with ease. The plasticine may be softened by working into it a small amount of vaseline. It should be soft but not sticky. The jack should be located below the estimated center of gravity of the casting, and for large castings several may be used, so disposed that any massive parts will be assisted out of the mold. Where several jacks are used, each must be given a small fraction of a turn in rotation so that the casting rises smoothly as a whole and does not come out at one end first. It is assumed that some one of the usual "parting compounds," such as a mixture of soap and coal oil, will be used on the mold.

An Improved Method for Quantitative Impregnation of Textiles With Germicidal Emulsifiable Oils

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Oil treatment of floors and bedclothes has been shown to effect significant reductions in concentration of air-borne organisms (*2*) and offers an encouraging approach to the partial control of respiratory infections. Until recently textiles were impregnated with dust-laying oils in a commercial laundry by the addition of an emulsifiable oil to the last water rinse. Subsequent agitation of the laundry rotator produced good contact of the textiles with the emulsion, resulting in absorption of a portion of the oil. This procedure was responsible for considerable waste, since the unabsorbed emulsion was drained off and not reused. The process was not only uneconomical but also technically inadequate for impregnation of a definite concentration of oil per weight of textile material.

Harwood, Powney, and Edwards (*1*) have recently described a technique for application of dust-laying oils to hospital bedclothes. Their method allowed quantitative removal of oil emulsion by the textiles, although different types of emulsions were required for cotton and woolen articles. Loosli and Robertson (*2*), in their recent review on control of dust-borne bacteria, conclude, in part: "Methods for oil-treatment of bedclothes on a large and practical scale have been reported. Much remains to be done in perfecting economical and stable oil-in-water emulsions and techniques of application which can be carried out by unskilled laundry workers."

This laboratory has developed a simple technique for quantitative impregnation of either cotton or woolen textiles with a single stable and inexpensive oil-in-water emulsion.

The procedure for practical application in laundries is as follows:

(1) The textiles are washed in the usual laundry manner, allowing sufficient rinsing for complete removal of soap.

(2) A stable and readily emulsifiable, nonionic, oily material[2] is added to the last water rinse, resulting in a stable oil-in-water emulsion after a few revolutions of the laundry rotator.

(3) During continued agitation a cationic germicidal agent is added, transforming the nonionic emulsion into a bactericidal cationic emulsion. The negatively-charged cotton and woolen textiles quantitatively remove positively-charged oil droplets from the emulsion. After a few minutes of the usual laundry agitation the original milky emulsion loses its opalescence and appears as a clear, watery fluid. This visible change serves as an end point, indicating complete absorption of oil by the textile.

(4) The watery fluid is drained off, and the textiles are finished in the usual laundry manner.

Many thousands of woolen blankets, cotton sheets, and pillowcases have been tested for impregnation, with a uniform degree of success. It should be pointed out, however, that the laundering process is not a prerequisite for oil impregnation. For example, with colored textiles such as olive-drab blankets laundering need only be practiced when necessary from the standpoint of cleanliness. Analyses of the initial emulsions and the clear drainage fluids have shown complete quantitative exhaustion of the germicide and oil by the textiles. By repeated Soxhlet extraction analyses of the treated textiles it was demonstrated that a known amount of oil can be introduced into either cotton or woolen articles. Detailed procedures for these techniques will be published elsewhere.

The advantage of using a positively-charged emulsion is clearly seen in both the laboratory and commercial laundry. Prolonged manual agitation of cotton or woolen textiles in the original nonionic emulsion produces no visible clearing of the fluid; however, upon addition of the cationic detergent to such an emulsion, a rapid and complete removal of oil droplets ensues. At the present time it is not feasible to employ commercially produced cationic emulsions, since considerable difficulty exists in large-scale com-

[1] The opinions advanced in this publication are those of the writers and do not represent the official view of the Navy Department.

[2] The cooperation of the California Research Corporation and the Shell Oil Company in development and preparation of these nonionic compounds is gratefully acknowledged.

pounding of such agents. It should be noted further that the ratio of the emulsifiable oil to the cationic detergent per given weight of textiles is a critical one and that colored textiles require less detergent than white articles. After trial of several cationic agents available, "Roccal," a quaternary ammonium compound (alkyl-3-dimethyl-benzyl-ammonium chloride), appeared to be most suitable.

Blankets treated according to the above procedure and containing 2.5–3.0 per cent of oil by weight of the textile are not oily to the touch, nor are they distinguishable from normally washed controls in appearance or texture. The approximate cost of treatment of a blanket, over and above the usual washing charge, is approximately \$.03–\$.05, while the cost for a sheet is \$.01–\$.015.

Experiments involving shaking or mechanical agitation of blankets impregnated with oil emulsion have shown them to retain over 90 per cent of bacteria and dust when compared to untreated controls. The effective duration of a single treatment is at least six months. Laboratory evidence suggests that the "Roccal" retained in the blankets may be bactericidal to organisms settling and remaining on the textiles.

The oil-treatment process described above offers definite practical advantages in that (a) a single stable emulsifiable preparation is used for impregnation of both cotton and woolen textiles, (b) controlled concentrations of oil can be introduced into the textiles, (c) no waste of oil is involved, (d) the added bactericidal detergent may result in lasting and improved sanitization of treated materials, and (e) an easily determined end point is available to judge the completeness of impregnation.

Subsequent papers to be presented in more detail will deal with: (a) the effective duration of a single impregnation of textiles with oil-Roccal emulsion; (b) the influence of textile treatment combined with floor oiling on the rate of upper respiratory infections, the carrier rates for streptococci, and the dust and bacterial content of air; (c) the minimal effective concentration of retained oil; and (d) the effect of the washing of treated blankets on their residual oil content and dust-retention properties.

Addendum: While this article was in press, Puck, Loosli, *et al.* reported similar results (*Amer. J. Hyg.*, 1946, **2**, 91–120). This work will be considered in greater detail in subsequent publications from this laboratory.

References

1. Harwood, F. C., Powney, J., and Edwards, C. W. *Brit. med. J.*, 1944, **1**, 615–616.
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A Multiple Light Source Microscope

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It is often of considerable importance to be able to compare microphotographs of tissue which have been made by light of different wave lengths. With this in mind a setup has been arranged so that this can be accomplished without the necessity of moving the light sources when a change in wave length is desired.

This arrangement is shown in Fig. 1. It can be

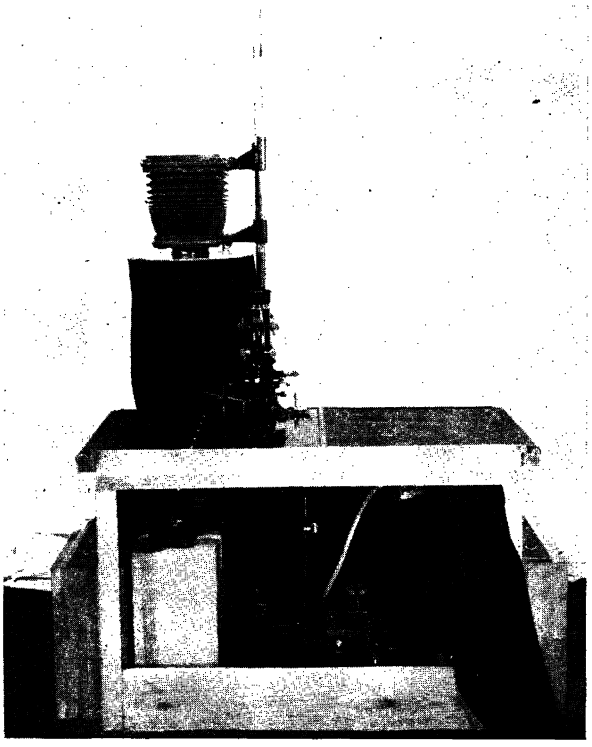

Fig. 1

seen that the light sources are in a row, and the microscope and camera are mounted above on an optical bench. At either end are small black window shades, so that when the microscope and camera are moved from one light source to another, one shade pays out and the other winds up. Once the sources are lined up this never has to be done again. The black cloth draping is necessary in order to protect the eyes from ultraviolet light.

At present pictures can be taken using visible, infrared, polarized, fluorescent (3,600 A.), and 2,537 A. light (*1*).

Reference

1. Lavin, George I. *Rev. sci. Instr.*, 1943, **14**, 375.