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only slight headaches occasionally. The tremor has disappeared, his memory is good and he is quite cheerful. Some voluntary movement returned to the extensors of the hand and wrist after treatment of the spine by labile galvanism, and the power of movement is increasing, although he has had no local treatment for these muscles.

The conclusion I have arrived at from the trials I have carried out of this treatment is that nearly all cases of the neurasthenic type of shell-shock would derive great benefit from it, and the majority of cases, excepting those of the most severe type, would be cured in under three months.

DEVICES FOR THE DISPOSAL OF WASTE WATER IN CAMPS.

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The sanitary requirements of camps of some months or perhaps years duration, which are, however, not constructed on a permanent basis, have, like many other military matters, become more manifest since the outbreak of war. For temporary field camps, and for permanent ones, a guide as to these requirements can be obtained from the existing handbooks on camp sanitation, but the large number of base camps in existence at the present time make their requirements more deserving of attention than has been the case in the past. I venture to believe that the sanitary structural work carried out at a large base camp will furnish some useful information on this subject. We have been under the necessity of finding by experience satisfactory methods of dealing with these problems, and the form of appliances that have eventually been adopted are of so successful a nature that I am induced to give some account of these in the hope that they may be of service to others. I am introducing no new principles, but rather what I consider to be the most satisfactory forms of apparatus that can be economically placed in field camps, which in all probability are destined to be occupied for the duration of the War, but are supplied with no drainage system. They are limited in space, and are under the necessity of getting rid of their refuse within their own area. The upper surface of the soil consists of about two feet of sand, under this is solid chalk, not readily absorbent.

The congestion of these camps renders it most necessary that the ground be kept in as clean a condition as possible. The carriage of waste liquids into underground spaces without fouling the surface earth is a problem presenting difficulties which I do not think can be appreciated except by those that are familiar with the practice of dealing with such matters.
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The subjects can be divided into three sections:—
(1) The disposal of excreta.
(2) The disposal of kitchen waste.
(3) The disposal of ablution water.

The Disposal of Excreta.

It is understood that in such camps as are under consideration, any form of open trench is impossible. Excreta must either be carted away or burnt. It is almost invariably burnt, along with the general camp rubbish. The difficulty of combustion is not very great, especially if the supply of wood or coal is not too limited. I wish however to confine myself to the disposal of waste liquids. The separation of the liquid from the solid excreta, and the disposal of this, along with the contents of urine pails, are operations not easy to perform without fouling the ground. When the incinerator is built upon a concrete floor a hole in this, leading by a pipe into the soakage pit, serves admirably. If, however, no concrete floor is available, a hopper has to be constructed. The simplest form is a shallow square shaped funnel of not less than two feet diameter, so that the bucket can be placed inside the hopper before being tipped up for the purpose of pouring off the liquid portion.

Another form which I have found satisfactory is shown in fig. 2, and is two feet long by eighteen inches wide.

The lid is hinged on by a couple of stout screws, and serves as a rest to the bucket, so that any drippings flow down into the hopper portion of the contrivance, which is kept well tarred. The practice of filling pits with the innumerable burnt tins, which are available in large quantities in most camps, has, I believe, become very general. The tins are preferably pierced. The top layer of tins is covered with old cloth or sacking, and about a nine-inch layer of earth forms the upper covering.

The Disposal of Kitchen Slops.

This problem presents the chief difficulty mentioned in the preceding paragraph, viz., the emptying of dirty water into pits, and at the same time avoiding surface pollution.

For a camp in continual use, the short earth trench filled with straw or stubble is not satisfactory. Something of a more lasting nature is advisable. At the same time the objects of the grease trap have to be fulfilled, the removal of grease which is so fatal to the life of a soakage pit, and the removal of solid matter. Moreover, the inlet to such a trap must be of a sufficient size as to allow of the emptying of large cauldrons of hot greasy water without spilling, and the trap itself of such proportions as to retain and cool large quantities of hot greasy water and so prevent the melted grease from being swept through into the pit. The difficulty of obtaining a good supply of a combustible filtering medium for
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such traps, and the difficulty of combining efficiency of filtration with the required permeability, have led me to abandon any further attempts at filtration, and to adopt a grease box as shown in fig. 1. This box is about four feet long by two feet wide, and has a depth of about two feet. It contains a baffle plate (B) coming to within six inches of the bottom of the box. In front of the outlet is a piece of bent tin (A) serving as a
second baffle. The shape of this is more clearly understood by reference to fig. 3. The contrivance is kept well tarred.

A movable tray (C) serves to retain the coarser solids, but its perforations, unless of fair dimensions, are readily choked up.

The sanitary squad is instructed to clear off the grease which collects on the upper surface of both compartments, but more particularly of the first, an operation carried out twice a day. The solid matter collecting at the bottom of this box is removed less frequently. It will be noticed that a considerable quantity of water is retained by such a trap, and that such water serves to cool any hot greasy water thrown into the trap. The box is covered by two lids supplied with handles. Another kitchen requisite which it was considered expedient to install was a table for the cleaning of mess tins and camp kettles. A handful of sand or clean earth rubbed on a greasy mess tin will produce a clean polished article quicker than any other means.

![Washing Table for Mess Tins & Dixies](image)

The soldier knows this and to avoid the fouling of the ground, a simple form of table, made by a piece of corrugated iron, ten feet by two feet six inches, as shown in fig. 3, was constructed. Clean sand is placed in a box every morning.

A simple form of grease trap on the same principle as the one above described is essential, as grease, tea leaves, etc., are washed down the table.
THE DISPOSAL OF ABLUTION WATER.

This, perhaps, is the most difficult problem in large camps where the water supply is not to any very great extent limited. Partly because of the large quantity of soapy water that may have to be dealt with, and partly because of the clogging effect which such water has on most soils. Unless one is content to allow ablation water to lie about in open spaces, over 5,000 gallons may have to be got rid of daily.

I have preferred to keep this water entirely under ground, especially in the summer. Instead of making use of pits, long underground trenches running in the looser upper surface have been much more satisfactory. These trenches are either covered over with odd pieces of wood, or filled with tins, and covered with old sacking and a little earth. It is most impracticable to run soapy water into such underground systems without previously removing the scum which settles on the surface of hard waters which have been rendered soapy. The result of neglecting this precaution is to considerably reduce the absorbing capacity of soakage areas. This scum is readily removed by passing the water through a trap not unlike that described above, for dealing with kitchen slops. Such a trap is shown in fig. 4.

The amount of lime soaps daily removed from the surfaces of compartments (A) and (B) of this box is often as much as two or three buckets full. Such a device does not remove the more finely suspended matter of soapy water, nor is such colloidal matter readily removed by filtration. In my opinion, any attempts at filtration of soapy water are most impracticable without previously passing the water through some such trap as the one described; for the scum of soapy water has the most clogging effect on any filter. If, however, this preliminary treatment be carried out, filtration through sand or coke is possible as in this way the water is partially clarified, but I consider the additional process of filtration is not satisfactory or economical. It is fortunately not often necessary. The colloidal nature of such water does not readily lend itself to a clarifying process, unless some precipitant such as aluminium hydroxide be introduced.

In one case I have installed an alum precipitating process. This was because the ground available for absorption was extremely limited, and a deep well had to be sunk to take the waste water. To avoid the choking of this I considered it worth while to introduce the scheme which is described below. A very much simpler method of adding alum could have been devised, but the main objective was the economy of the reagent. Preliminary quantitative experiments with samples of soapy water from the ablation troughs indicated that about ten grains per gallon of alum was the least quantity that could satisfactorily carry down the colloid. The apparatus constructed required some pieces of two-inch water piping, otherwise, the material employed consisted mainly of easily obtainable
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Fig. IX

Installation of Alum Clarifier for Soapy Water.

Fig. V

Mixing Box.

Alum Box.

Settling Pit

A. B.
articles, such as one or two packing cases and an ordinary square petrol can. This process can be readily followed by reference to figs. 4 and 5. The water is first passed through a trap to remove the scum as previously described. Such a trap is shown in fig. 4. A saturated potash alum solution, containing approximately ten per cent of the crystalline salt or 5.5 per cent of the dried salt, is introduced into the petrol can through its ordinary stopper opening, which is then screwed down. The diagram shows that this solution cannot get out of the pipe $p$ unless water is passing into the mixing box. In this case water will rise in the tube $c$, and forcing air up the can will force an equal volume of the solution through the pipe $p$. When this mixing box is full, it automatically syphons out through a trap $D$, which serves on a constant level, and ensures the proper working of the syphon. From thence the water passes into a settling pit lined by two barrels. This acts as a sedimentation tank, and the clear water flows away by the pipe $E$. It is preferable to fix a baffle plate in front of this outlet to retain a slight scum which collects on the surface water of this puisard. When the mixing box empties, air is sucked through $p$ equal to the volume of the fall of water in pipe $c$. The $S$ shape of $p$ is essential, and it should be as short as possible.

It should be noted that the mixing box is made of such a size that its capacity is the volume requiring the amount of alum delivered by the length of pipe equal to the water depth in the box. It is more easy to make a box suitable to accompany an odd piece of piping, than to obtain pipe of a particular bore. This particular method of delivering an exact amount of alum requires the mechanical filling and emptying of the box, an action most conveniently carried out by means of a syphon.

The bell syphon was constructed of wood with an inner iron pipe. The wood is well tarred and preferably coated with pitch. Such a scheme has been working with little attention for some time. A drawback is the clogging of the pipes with soap. They have to be cleaned occasionally with a large test tube brush mounted on an iron rod or cane.

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