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LOYSEL'S PROCESS FOR MAKING TEA AND COFFEE IN LARGE QUANTITIES FOR TROOPS.

By MR. E. LOYSEL, Assoc. Inst. C.E.

THE introduction of these machines into the British army was suggested to me by Captain Fowke in the year 1855, when Secretary of the British Commission at the Paris Exhibition, where these machines were exhibited, and were at work for five months. All the coffee and tea that was consumed during the Exhibition was manufactured by them. They attracted the attention of his Majesty the Emperor, and, in consequence, I had the honour of offering him the first cup that was made (in a large machine on this principle by steam power) at the Paris Exhibition. It was naturally brought under the notice of the French Secretary at War, Marshal Vaillant, and a commission was named to examine the invention. Their report was satisfactory, experiments were made in the army, and were highly successful, and a large machine was erected in 1855, and is still at work at the *Val de Grace*, the largest military hospital in France, where all sorts of infusions are produced daily. Captain Fowke, having seen the machine at Paris, naturally thought that it might be usefully adapted to the wants of the British Army, and he had the kindness to give me an introduction to Captain Siborne, the Commander of the Royal Engineer Train at Aldershott. Captain Siborne received me with great kindness and courtesy, and gave me all the information I wanted respecting the habits of the British Army. I accordingly had machines for eighty men made at Birmingham, and they have given satisfaction. Captain Siborne, who examined the working of the machine with great care, pointed out various modifications, which I have adopted, to increase the efficiency of the machine, and the machine which I am going to explain to you is constructed from the suggestion of Captain Siborne. It has been in use six months at Aldershott and Chatham, coffee and tea being prepared alternately morning and evening in the same machine. The men report that the machine imparts no unpleasant taste whatever; it has merely to be thoroughly well rinsed after each operation. This fact illustrates practically how easy to cleanse the machine is; and, after six months' use in camp, and in the field, the machine in question is as sound and clean as the first day. Now, if you will allow me, I will read the following Report, which will state better than I can what the apparatus will accomplish.

Copy of a Report by Captain H. S. Siborne, R. E. upon Loysel's Patent Hydrostatic Tea and Coffee Machine, used by the Royal Engineer Train.

SIR,

Aldershott, 18 Nov. 1856.

I have the honour to submit for the information of the Lieutenant-General commanding the division, the following report on the "Hydrostatic Tea and Coffee Ma-

chine," which I recently took to him for his personal inspection. The machine he saw contained 12 gallons; and, as there appears to be an objection to its size, I have since ascertained from the patentee, Mr. E. Loysel, C.E., the price of a 6-gallon machine, and I presume the prices of others of different sizes would be in proportion.

The 12-gallon machine, which can supply tea or coffee for 100 men, costs 10*l.*, whether for a single one or a number of them; that of 6 gallons, suitable to 50 men, would cost 5*l.* 10*s.*

They can be used, however, for only two or three men if necessary, and are consequently extremely well suited to hospitals. I have sent one of them to the Purveyor of the Hospital at this Station, who speaks very highly of it, and is endeavouring to get them generally introduced into the service of the hospitals.

The great merits of the invention are—

1st. The simplicity and celerity with which the tea or coffee can be made for a large number of men.

2nd. The certainty of the essence of the material being entirely extracted from it for the use of the consumer.

3rd. The saving in expense of material which is effected.

The A troop, R.E. train, has now used them for upwards of three months, and we find that the men's meals can be instantaneously provided at any moment. The tea or coffee is as pure as can possibly be produced from the leaves or berries, both being previously ground. Sugar being added before applying the water, its essence is so much better extracted than in the ordinary manner as to necessitate a much smaller quantity of it.

The saving effected to the men's messing amounted (previously to groceries being issued by the Commissariat) to no less than 18 per cent. the only requisites are that both the tea and coffee should be ground, and a quantity of boiling water added equal to the amount of liquor required.

The proportions were an ounce of either tea or coffee to every six men, and a pound of sugar to every eight. These proportions were used in making tea or coffee for an average of 80 men; for very small numbers, perhaps, more material would be requisite.

We used the machines on the occasion of throwing up field-works before Her Majesty in August last with perfect facility, merely boiling the water in the camp kettles; if these had not been at hand the men's canteens might have answered the same purpose.

I drank some of the tea, and found it excellent. From the experience we have had, I am convinced that their introduction into the service would be of the greatest benefit to the soldier, as he would, under all circumstances, when able to secure a supply of hot water, be instantaneously provided with good wholesome liquor, in fact the reverse of what he now sometimes receives, particularly on service. He would save money by means of them when he finds his own groceries, and the public when it supplies them to him.

The one I submitted to the Lieutenant-General was fitted so as to be perfectly portable on service either in a waggon or on a packhorse. For the experience we have had of them, I think their introduction into the service would be of the greatest possible benefit both to the soldier and to the public; and I also beg to bring to your notice the extreme willingness of the patentee to meet any suggestions for improvement, or to make such reduction in the price as not to deprive him of a due remuneration.

(Signed) H. S. SIBORNE,

Capt. Com. R.E. Train.

I will now explain the operation.

The material to be operated on is placed between two or more finely-pierced plates or diaphragms, the lower one being a little distance from the bottom of the containing vessel, and through which a small pipe passes so as to deliver the fluid (poured in a reservoir at the upper orifice) below it. The infusing liquid is then introduced from the upper reservoir, and, displacing the air, forces its way upwards by the pressure of the column (or hydrostatic pressure) through the substance under operation, (every particle of which is saturated in its passage,) and accumulates above the upper plate. When a sufficient quantity has been thus forced upwards, by opening a tap the whole is drawn off, percolating

again downwards by its own specific gravity through the material, which now acts as a filtering bed, and the infusion is obtained perfectly clear, and containing all the aromatic and useful principles of the substance.

In tea-making, the whole of the soluble and aromatic principles are rapidly and completely extracted, and thus one homogeneous infusion of excellent quality is at once obtained instead of the two or three continually diluted ones which attend the ordinary routine. I am able also, by this apparatus, greatly to increase this effect by previously tritulating, crushing, or grinding the tea, and thus exposing a very largely extended surface to the action of the boiling water—an operation which is incompatible with the ordinary tea-pot.

In constructing these apparatus, the dimensions must vary according to the quantity to be treated in them. If I construct a large apparatus, and put in a large quantity of coffee, it will be impossible to expel all the air in the mass of substance by hydrostatic pressure, and percolation cannot take place. To overcome this obstruction, I divide the substance into layers, by using a greater number of perforated diaphragms or filters, and putting one-half or one-third, or a smaller quantity, of ground substance between them as circumstances may require. But here an obstruction occurs, owing to the volume of air there is between the separate layers of substance, and this is got rid of by putting in a vertical tube, perforated so that the air passes off. In Paris I have constructed machines in which they put some 60lb of coffee, and in a quarter of an hour the process of infusion and extraction is completed. These machines have as many as eight chambers; and, by multiplying the chambers and providing for the exit of the air, there is no limit to the size of the machine. It can be applied on any scale for any vegetable substance, in fact it can be applied to brewing, for extracts of dye-wood, and for all sorts of medical extracts. The apparatus may be made of various materials, and in various shapes, to suit the pocket and the taste of the buyer; and, to provide against the infusion getting cold, the machine can be supplied with an enamelled chamber, into which the liquid passes, and there it can be kept hot by the use of a little lamp, or of gas, lighted underneath.

Mr. Loysel next explained the properties of tea and coffee, and discussed their relative merits; and as the result gave the preference to coffee as a beverage to soldiers, both on the ground of economy and health. The soldier in the field, he said, would support fatigue a great deal better, and the quantity of food he would require would be a great deal less. It was found by a practical experiment that the saving would be no less than 25 or 30 per cent.

The CHAIRMAN.—What is the proportion of coffee you ordinarily give?

Mr. LOYSEL.—Scientific authorities in France recommend an ounce and a half to a pint, but that makes a very strong coffee. In this country I recommend one ounce to the pint.

The CHAIRMAN.—You recommend that the tea should be triturated, or bruised. Why do you bruise the tea?

Mr. LOYSEL.—Because I extract more of the properties of the tea, and the infusion is instantaneous. It is an error to think that by triturating the tea it will extract too much, and give a woody taste. In tea there is nothing obnoxious except the tannin, which is extracted only by boiling or by prolonged infusion, whilst in the hydrostatic percolator the extract is obtained instantaneously, and by mere infusion and lixiviation.

The CHAIRMAN.—The Chinese simply pour hot water on the leaf, and pour it off immediately.

Mr. LOYSEL.—Yes, but they have no war tax or duty on tea. I believe the flavour of tea properly made in this machine is superior to any extract in the tea-pot, especially if you draw it at once.

Mr. LOYSEL then performed the process of making tea and coffee with his machines; and, in a very short time, made a large quantity of both beverages, which was served out in cups to the ladies and gentlemen present, who proclaimed it excellent.

From Military Drawings made under the Direction of
COL^L SHAFTO ADAIR F.R.S.
Aide de Camp to the Queen.

Explanations.
a. a. a. *Old Fortifications.*
b. b. b. *Works in course of Construction.*
c. c. c. *Additional Works proposed by Col. Adair.*
d. d. d. *Ground to be reclaimed.*
e. e. e. *Sunken Road with Europeet.*

S C A L E .

PROPOSED WORKS
For the
DEFENCE OF LONDON
THE PLANS PREPARED BY
COL. SHAFTO ADAM.