CORRESPONDENCE

SIR,

Flash Evaporators

The article on flash evaporators in the June issue was most interesting; but in my opinion the Author has omitted to mention the plant characteristics of great interest to the ship designer and engineer officer.

2. If the following figures may be assumed :—

Sea water temperature	— 75 degrees F
Feed inlet	—170 degrees F
Fresh water outlet	— 96 degrees F
Brine outlet	— 96 degrees F

so that a heat balance and efficiency can be calculated, it becomes abundantly clear that the ingoing feed at 170 degrees F. must contain all necessary heat to provide the latent heat for flashing off the designed output ; for no heat is added to the feed after entering the flash chamber. For a brine outlet temperature of 96 degrees F., the heat available is 170 minus 96 B.T.U./lb, or 74 B.T.U./lb. As each pound of fresh water made requires 1,000 B.T.U. of latent heat, the feed quantity must be about 13 times the fresh water output.

3. To give the necessary 30 degrees F. temperature rise through the heater, the external heat source must provide (in the case of a 50 ton/day plant) no less than $1{\cdot}8 \times 10^6$ B.T.U./hr.

4. This low efficiency inherent in the flash plant because of the necessary high rate of feed and the consequent loss of heat from the plant via the brine, is the most significant characteristic and responsible for its rejection as a waste heat plant in Diesel ships.

(*Sgd.*) A. E. WILDY,
Lieutenant-Commander, R.N.

Comment by D.M.E.

The calculation made in paragraphs 2 and 3 is substantially correct, but to obtain a true picture a similar calculation should be made for other types of plants. (It should be realized that a distilling plant has no thermal efficiency and to avoid confusion the term ' performance ratio ' is used.)

It is generally accepted that a conventional submerged surface plant will produce 1 lb of water per lb of steam supplied and from this it can be seen that the heat required by a 50 tons per day or 2 tons per hour plant will be of the order of 4·7 million B.T.U.s per hour.

A vapour compression plant of this size would require approximately 180 to 200 kilowatts which is equivalent to $\frac{1}{2}$ to $\frac{3}{4}$ million B.T.U.s per hour. All of these ignore the pump requirement.

Any calculation made is true only for a particular plant or set of conditions. Each of the above cases could be greatly improved in performance by a more complicated design in which more of the waste heat was used. For example, in place of a single effect unit a six effect compound unit could be used, or a Diesel driven vapour compression plant using jacket water and exhaust gas heating for supplementary heating of feed water.

In the Service the performance ratio is of consequence only in certain installations and it is on the basis of the following that the true assessment of the design for warship use should be made:—

(*a*) Stability
(*b*) Ease of maintenance
(*c*) Simplicity of operation
(*d*) Weight and space.

On the basis of trials carried out at the Admiralty Distilling Experimental Station the flash plant is the best in (*a*), (*b*) and (*c*) above, and is very little inferior to either of the other types in (*d*). With reference to this it should be remembered that flash designs are still at an early stage of development and without a doubt operational experience and the consequent design changes will enable considerable improvements to be made in most respects.

As regards the heat lost in the brine a rough calculation can be made showing that this is approximately one-third of that lost in the circulating water of a conventional coil or element plant and approximately four times the heat lost from a vapour compression plant. It should also be pointed out that primary heat used by flash plant is basically waste heat while the vapour compression unit requires heat produced electrically either in the compressor or preheater.

With reference to paragraph 4 it should be pointed out that the flash plant is used for Diesel ships in the Merchant Marine. In the Royal Navy it was intended to fit a flash plant as a replacement for a vapour compression unit, but considerable structural work was entailed in opening up the ship to instal the unit and this was the main reason for not proceeding further although several suitable designs are available.

SIR,

Ships' Paints

It may seem ungenerous to take up Mr. Kingcome's excellent survey of ships' paints but the problems of the fouling of ships' bottoms are so vital that I venture to do so.

A basic factor in the fouling of ships' bottoms is that it can only be initiated when the water speed past the surface is less than about three knots ; it seems that above this speed the organisms and growth cannot get their teeth, feet or roots, dug in as they go past. Once they are established, they can cling on up to high speeds and will grow but multiplication and spreading of colonies will only occur slowly while the ship is moving (this varies with different growths).

The damage is done, so far as fouling is concerned, when the ship is at a standstill—at anchor, in port or drifting.

To prevent fouling taking place, the poison leaching rate at water speeds of less than three knots must be adequate.

It is implicit, though not actually stated by Mr. Kingcome, that the leaching rate is greatly increased at the speed of a steaming ship.

Might it not be a profitable line of attack to try to evolve a paint with a constant leaching rate?

(*Sgd.*) N. S. STEWART,
Commander, *R.N.*