

CORRESPONDENCE

“ Electric Arc Welding Equipment ”

SIR,

Whilst on service at Port Tewfik during the Suez Canal crisis H.M.S. *Corunna* had to render assistance to s.s. *Pine Hill*, a 7,000 ton Liberty Ship.

Two blades of her four bladed bronze propeller (diameter about 14 ft.) had

to the fuel oil with the object of eliminating some of the defects inherent in most present-day fuel oils.

As the additive is introduced it mixes readily and completely with the oil. It comes into contact with sludge and deposit-forming materials, and reduces their adhesiveness and surface tension, allowing them to disperse in the bulk of the oil, and thus produces a uniform, free-flowing fuel. An addition to fuel as it is bunkered not only prevents the formation of sludge deposits in the oil fuel, but helps to remove existing deposits which have already accumulated in tanks, pipe systems, etc. A clean, sludge-free system is therefore ensured, and the costly task of cleaning oil-fuel systems is eliminated. The improved combustion ensures steadier and more efficient heating, and there is a consequent saving in fuel costs.

New System of Tank Cleaning. *Shipping World*, **125** (1951), p. 129 (22 Aug.).

The Groom system of tank and chamber cleaning has been evolved to provide a convenient and efficient method of removing dirty oil and asphaltic and other deposits from the internal surfaces of tanks, principally in ships. Basically the system consists of using an aqueous detergent solution which is heated, though only to about 150° F., and pumped through a flexible hose or fixed pipeline to the point of operation, where it is discharged from either a manually operated or a special form of automatic projector against the surfaces to be cleaned. The heated detergent solution acts on the deposit and removes it by a combination of dissolution, reduction of interfacial tension, and scouring. An essential feature of the equipment is that the detergent is used in a closed circuit, so that only a relatively small amount has to be heated, and hence only a small heat exchanger is required. The used mixture of oil, deposit, and detergent is pumped from the lowest part of the tank and separated, and the detergent is then reheated and again pumped to the point of projection. The separating and heating tank is of relatively small dimensions, 5 ft. long, 4 ft. wide, and 5 ft. high, with an additional 'small make-up tank; these are sufficient for an equipment capable of cleaning four oil tanks simultaneously. Two types of projector are available, either hand-operated or automatic. The hand-operated projector has two nozzles, one giving a long unbroken jet, and the other a flat stream from a fish-tail end. Where it is undesirable for the operator to enter the tank, the automatic projector, which operates on the same principle as the rotating garden sprayer and has four nozzles on a hollow shaft, may be used.

It has been reported that the time taken to clean a tanker of 12,000 tons deadweight, with seven 1,000 ton tanks and fourteen 50 ton tanks, was only 322 man hours with Groom equipment, as compared with 14,400 man hours using manual labour.

been folded back during berthing operations so that they fouled the rudder, and prevented either the rudder being moved to starboard or the screw being turned. The requirement was to make the rudder operative through its full limits to enable the ship to be towed away for docking and repair.

Examination showed that it would be necessary to cut through about a 2 in. thick blade over a length of about 40 inches. The two blades were adjacent and the upper one clear of the water. In the event it was discovered that by turning the shaft so that the blades were at about 45° to the vertical full rudder movement could be obtained and the shaft was locked in this position.

However, prior to the examination being made, discussions were held as to the method of cutting the blades with the equipment available in a destroyer. Some schools of thought favoured plastic explosive, others the use of an electric drill, a drill post hammer and chisel and elbow grease. It was agreed that some form of oxy-acetylene or arc welding equipment would have been of great assistance. However, destroyers do not carry welding equipment.

It was decided therefore to make some form of gear and an experiment was carried out. Using a 20 in. signalling projector a heavy lead was taken from one carbon holder and wrapped round a No. 6 welding rod held in insulated pliers wrapped with rubber insertion. A piece of $\frac{1}{8}$ in. plate was held to the ship's structure with a "G" clamp and battle commenced. No difficulty was experienced and it was found that a reasonable run of metal could be deposited, and, using a smaller rod or a signalling projector carbon, cutting could also be accomplished. Current taken was about 60 amps. at about 80 volts.

It is felt that this "emergency welding and cutting equipment" is of great use in small ships without proper welding gear and, in any case, might prove invaluable from the damage control aspect during wartime or emergency.

Experiments continue and the matter is also being reported officially.

(Sgd.) MARK MARTIN,
Lieutenant-Commander (E) R.N.

Comment

A few words on arc-cutting might be appropriate to endorse the ingenious use of the process mentioned above.

For steel, an ordinary electrode and welding equipment can be used, the arc being drawn out to increase penetration. A high current should be employed. It is more successful, however, to use a carbon electrode which will take even higher currents. This is particularly important when non-ferrous metals or cast iron are being cut. It is very difficult to keep a straight line with this type of cutting and the kerf is always ragged.

Arc-cutting is a melting process as distinct from the oxidation which occurs with the oxy-acetylene flame process, so that provision should be made for the molten metal to flow away by sloping the work or cutting vertically. As will be appreciated from Lieutenant-Commander Martin's letter the simplest type of equipment can be used.