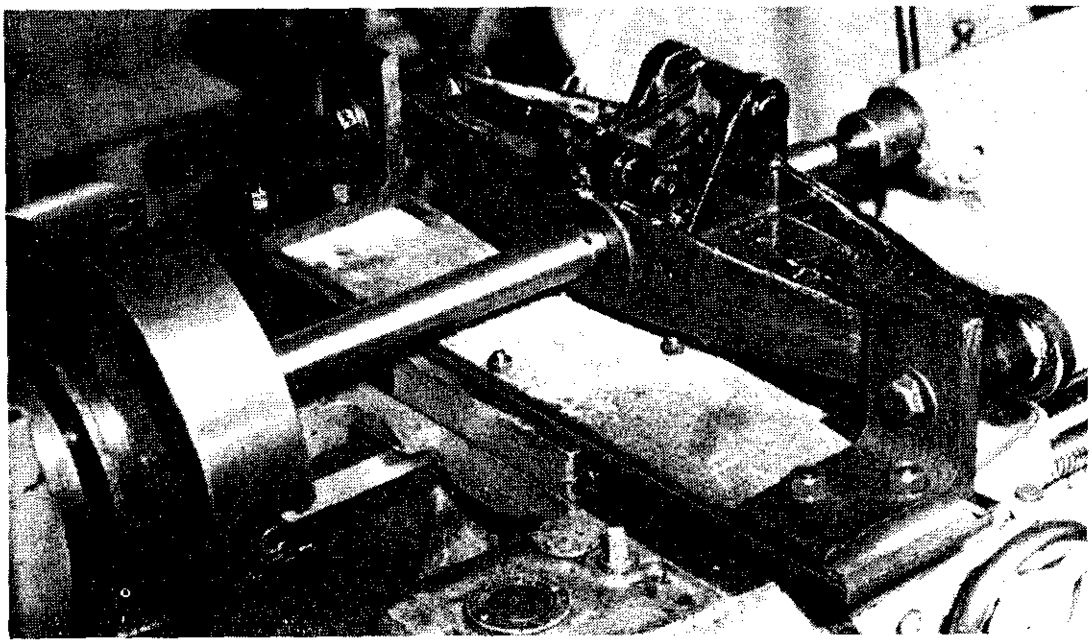

FIG. 1

CORRESPONDENCE

SIR,

An Unusual Repair

The article headed ' An Unusual Repair ' which appeared in the March issue of the *Journal*, aroused considerable interest in H.M.S. *Caledonia*.

During the war years, *Caledonia* was called upon to repair a number of similar crossheads, and a method was evolved which proved quick and satisfactory.

The tool box of an ordinary 6 in. lathe was removed and a piece of $\frac{3}{8}$ in. plate bolted in its place, using the bolts that normally secure the swivel tool box as shown in FIG. 1. Two pieces of angle iron were prepared and bolted to the plate to form ' landings ' for the two outer bosses. The centre height of the bore was obtained by means of lines scribed through centres of all three bosses. Concentricity and alignment in the vertical and horizontal planes were adjusted by working from the machined face of the centre boss, using a ' Unique ' gauge fixed to a length of steel bar held in the chuck. The securing of the crosshead by bolts through the outer bosses facilitated the making of small adjustments. The boring bar was made from a length of bar steel and the tool held in position by an Allen's screw. When the crosshead was satisfactorily set up, machining proceeded in the usual way, boring and screw cutting presenting no difficulty. After completion of the bore, a bush was machined to fit the internal thread cut in the crosshead, and the two rods. This bush was screwed into the casting and secured by set screws.

The approximate time taken to repair these crossheads was 16 working hours, working at normal speeds ; but this time could be reduced in cases of emergency.

(*Sgd.*) S. T. S. TRAIN,
Workshop Inspector.

SIR,

Birdseed for Gas Turbines

Lieutenant-Commander Williams in his article in the March issue mentioned some of the problems involved in the cleaning of gas turbine axial compressors which have become fouled due to running in industrial atmospheres.

Recent work undertaken in this field by the Naval Marine wing of the National Gas Turbine Establishment has shown that successful cleaning can be achieved using water-hydro-carbon emulsions if injected efficiently and rapidly. For example, in the Ruston & Hornsby TA gas turbine alternator good results have been obtained by injecting two gallons of emulsion in half a minute.

(*Sgd.*) W. T. LOCK,
Commander, R.N.

SIR,

Journal of Navàl Engineering

I have been pleased to receive, sent on to me from my former office, the March, 1960, Vol. 12, No. 2 issue.

Please note that I retired from the British Transport Commission on 30th April, 1959, and being now over 65 years of age doubt whether I can be of help to you in future.

Since I retired I have been acting as the metallurgical correspondent to *The Engineer*, the oldest of the engineering periodicals. Perhaps you should, therefore, have my name crossed off your mailing list and let my copy of your most valuable *Journal* be sent to some much younger man.

May I add that I have greatly admired the way in which your *Journal* has been balancing the technical and the human aspects of the Service. Looking back to the ten years during which I worked, as a civilian in charge of railway laboratories co-opted because of my special knowledge, on the Admiralty Boiler Corrosion Sub-Committee, I recall with great respect many R.N. engineer officers and remember with pleasure their friendliness and enthusiasm for their jobs. It was a privilege to work with them. That was one committee that really did make a difference to the way things were done and its recommendations were quickly of value to the men at sea, and to the country as a whole.

(*Sgd.*) T. HENRY TURNER.

SIR,

Controllable-Pitch Propellers

I feel that Lieutenant-Commander Warsop would find it interesting to turn up the files recording the experimental work carried out between 1942 and 1948 on a Fairmile ' D ' type Hull, fitted with four ROTOL C.P. propellers, driven by Bristol ' Hercules ' engines. Although this craft never became operational, it was, I believe, the first naval vessel to use this type of propeller. The results support most of Commander Warsop's conclusions respecting Diesel drive, and confirm the robustness of the C.P. propeller mechanism when the blades are damaged by grounding.

In this boat, a system was devised for linking pitch control with throttle opening (or fuel pump rack setting), so that each engine always operated over the same r.p.m./b.h.p. characteristic curve, regardless of the number of engines used for propulsion, or the variations in propulsive resistance. Now called ' combinator control ', it was then known as ' power lever control ', and was, I believe, the subject of an Admiralty patent.

One tends, in peace time, I think, to attach undue importance to ship performance at the designed displacement, and not to look long and hard enough at performance under ' deep and dirty ' and ' light and clean ' conditions, and beyond. War service widens considerably the range of displacements between which the ship must work. The normal displacement of all ships increases significantly, as more armament, stores and equipment of all kind are placed on board to meet operational requirements not anticipated in the design. Action damage can exaggerate the ' deep and dirty ' condition to the point of caricature. Operation and action on a remote station can deplete fuel, stores, and ammunition far beyond what might be expected in peace-time. While a fixed-pitch propeller allows a higher maximum ship-speed at the designed displacement, the C.P. propeller allows increasingly higher comparative maximum speeds as the displacement is increased or reduced relative to the designed figure. This is so because the C.P. propeller permits the engines to develop their full power in any condition, whereas this power is not attainable by the fixed pitch installation, being reduced by the maximum permissible b.m.e.p. on the one hand, and the safe maximum engine r.p.m. on the other.

This extra degree of freedom which the C.P. installation confers seems particularly valuable in war-time for all ships, and is especially so for hard chine craft. These normally have a ' hump ' in their speed/power characteristic, and an increase in displacement may make it impossible in a fixed-pitch installation for the engines to produce enough power to get the boat over the hump. This was a serious problem in the M.T.B.s sent to the Mediterranean in 1942, when increased displacement, aggravated by loss of power due to high ambient temperatures, reduced the maximum available speed from 36 to 24 knots. A C.P. propeller installation would have been spared this embarrassment.

The type 41 frigate gearboxes appear to be larger editions of the S.L.M. gearboxes (made under licence by Modern Wheel Drive Limited) fitted in M.T.B.s 28–34 (Twin screw, two engines per shaft). These boxes worked well and reliably, but were fantastically heavy. The figure for specific weight (lb/b.h.p. transmitted) of the type 41 boxes would be of interest.

Slow convoy escort duty, and certain types of shadowing, must be rendered very difficult in these craft by their inability to run easily at speeds below 11 knots. One can imagine that *Jaguar* will be looked at with some degree of envy by the other ships of the Squadron.

I was surprised to read of ethylene glycol being used as a corrosion inhibitor in the engine coolant. Ethylene glycol introduces corrosion problems of its own, which require combating by methods set out in B.S.3150 *et seq.* Unless an anti-freeze coolant is a service requirement, it would surely be better to use pure distilled water with the usual anti-corrosion chemical additives.

(*Sgd.*) J. H. D. MIDDLETON,
Commander, R.N. (*Rtd.*).

Reply by D.M.E.

Unfortunately, no records of the Fairmile ' D '/Bristol Hercules/Rotol installation referred to can be found. The system for linking Pitch control with throttle opening in this case was the result of much work by Commander Middleton and Lieutenant Young and was the subject of a proposed Admiralty Patent which was later abandoned since it could be applied only to Rotol type propellers. Rotols subsequently handed all design details to Stone Marine Engineering Company and most of the C.P. propellers in service today are manufactured by Stones to K.M.W. design, incorporating the design knowledge gained from early Rotol experience.

Combinator control works on a different principle and has to have included a pitch trimming device to ensure that optimum conditions are always maintained and therefore cannot justly be called a single lever control.

Commander Middleton's remarks that ' While a fixed-pitch propeller allows a higher maximum ship speed at designed displacement . . . . ' are not strictly correct. Our experience with the C.P.P. frigate ships is the reverse—probably due to being able to increase the pitch beyond the design pitch without overloading the engines. These ships, of course, have independent pitch and engine controls.

The C.P. propeller gains in performance and economy are well known but even more important is that, with a C.P.P. installation, clutches and reverse gears are not necessary and so the gearing is lighter and less complicated. This applies equally to steam turbines as the turbine can then be designed as a constant-speed machine with no astern turbine and troubles with condenser overheating, etc.

Type 41/61 gearboxes are larger editions of S.L.M. gearboxes and are manufactured by Modern Wheel Drive Limited. The smaller types of gearbox have worked well and reliably but severe clutch troubles have been experienced in the larger gearboxes. The specific power/weight figures for these boxes is 8·1 lb/b.h.p. compared with 2·69 for A/S frigates, 3·71 for *Daring* Class and 2·1 for the Emergency Class war-time destroyers.

The quoted figure of 11 knots is rather high. Ships can steam as low as nine knots on two shafts and this can be reduced to six knots on one shaft. These low speeds are to be avoided as much as possible since they lead to ' sooting up ' of engines and blowers fitted to type 41/61 frigates.

Anti-freeze coolant is a Service requirement and the glycol used is corrosion inhibited ethylene glycol to Specification D.T.D.779.

SIR,

A New Secret Weapon

' I've never Seen a purple cow,
I Never want to See one.
But I can tell you anyhow,
I'd rather see than Be one.'

I have just seen one of the cornflake type about 1½ in. long, made in plastic, stuck in a condenser tube. This however is only part of the new weapon. We were all told at College and some of us have experienced the havoc that a shoal of whitebait can cause in a condenser. However, the new threat which threatens us is an insoluble or insolvable problem : polythene bags, the ones food or shirts come from the distributors in. They delight in spreadeagling themselves across the tube plates, they love floating back and forth on the tide as a menace to all lucky engineers who have so far not experienced them. Have polythene sheets or plugs, released under water from bombs or shells, therefore a strategic use ? It is certainly an interesting theory.

(*Sgd.*) R. HALES,

Lieutenant-Commander, R.N.