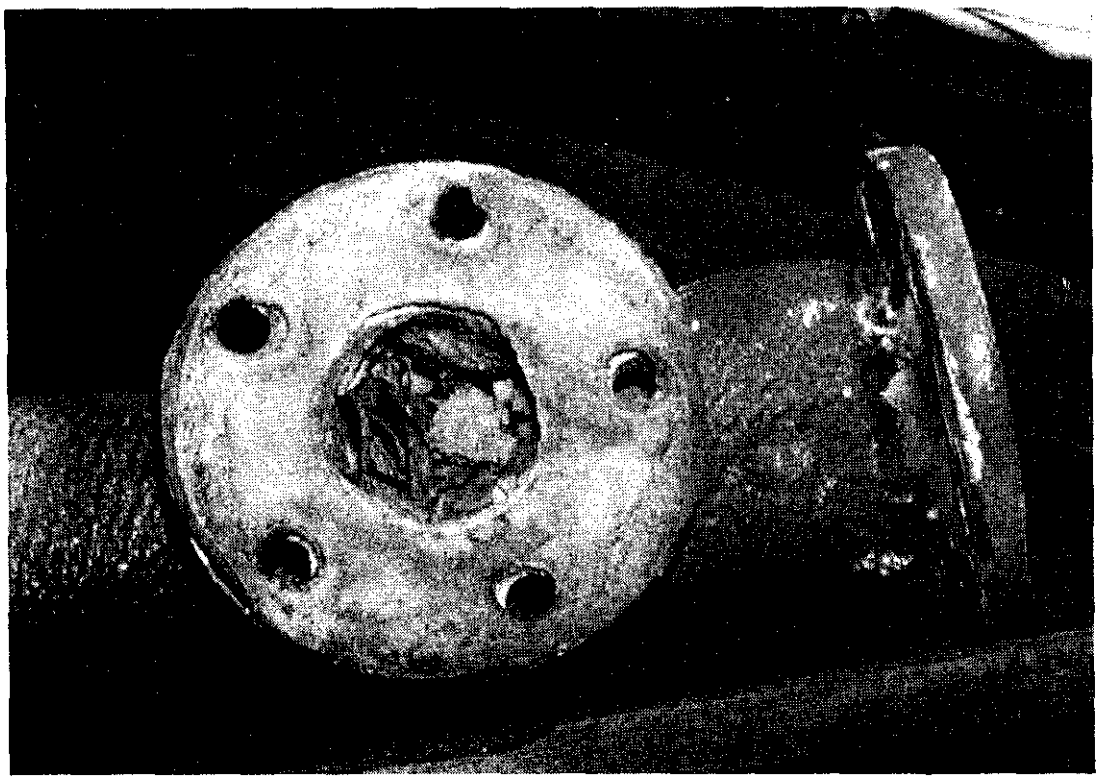

FIG. 1

NOTES FROM SEA

Readers are invited to discuss either the extracts or the comments in the correspondence section of the Journal.

MARINE ENGINEERING

Comments by D.M.E.

Firemain H.M.S. ' Loch Ruthven '

At the beginning of the refit various hydrants and isolating valves were removed in the normal manner for refit by dockyard. Within a day of this commencing it was apparent that the ship's firemain system was completely choked with a shell fish or mussel type growth throughout the entire length of the main run of piping on No. 2 deck.

Resulting from this chokage the complete run had to be removed, burnt out, regalvanized, replaced, relagged and repainted, which added considerably to the work already in hand.

It was noticeable that the chokages did not occur everywhere. The living growth was confined to the main run where a continual flow of water existed. Chokages, nevertheless, did occur in dead ends and downcomer leads from hydrants due to extinct formations of the growth being flushed into them. One of the denser sections is shown in FIG. 1. Had the system not been com-

pletely stripped the effect on cooling water supply to auxiliary machinery, especially air conditioning units with small bore piping, hardly bears thinking about.

For ships operating in areas where they are subject to marine growth of this density, it would be of great assistance to the maintainer if all firemain leads supplying auxiliary machinery, e.g. air conditioners, secondary supplies to T.G.s, etc., were fitted with a small strainer box containing a small strainer plate which could be quickly and easily isolated and cleaned. Devonport Dockyard tried to assist on these lines knowing as we do that plumbers' piping and threaded unions are not the easiest of pipes to disconnect and sight.

Comment by D.N.C.

The extensive fouling reported above is another example of the experience of ships fitted with mild steel systems and which have served for long periods in the Arabian Sea and the Persian Gulf.

New construction ships are fitted with copper-nickel iron sea-water systems which considerably reduces the incidence of marine fouling. (A.F.O.1218/60 refers).

Propellers and Shafting—H.M.S. ' Torquay '

The five-bladed propellers have reduced vibration but singing has been noticed between 90 and 100 r.p.m.

The rubber coating on the starboard outboard shafting was found to be blistered along its entire length. The condition of the rubber on the port shaft is better and the new jubilee clips, fitted in lieu of the forward wire binding, appears to be a very much better method of sealing.

Comment by F.O.2, F.E.S.

With regard to the starboard outboard propeller shafting, it is suggested that araldite and fibre glass be put on at the next docking.

Comment

The *Whitby's* five-bladed propeller is also known to sing and the problem of singing propellers is at present being investigated.

F.O.2's remark re aralditing shafts is concurred in. All new construction will have this covering. D.E.T.M. 57 and A.F.O.2489/59 refer.

Feed Water H.M.S. ' Torquay '

The salinity of the feed water has been very good but the consumption continually causes anxiety. For the first four months of the year, a maximum of 55 tons per day was expended.

For the first 24 hours at sea the average is about 25 tons rising to over 35 tons on the second day. The full cause has not yet been discovered. Both boilers were water pressure tested recently and all leaking joints renewed. The water pressure tests on completion were satisfactory. However, a concentrated effort is being maintained for making good all leaks. A great number of the flexatalic joints of the white asbestos, normal naval stores pattern, have been found to be leaking with the asbestos almost disintegrated. On the boiler water side, joints that were leaking have been refitted with the ' Walkers ' impervious pink asbestos by M.E.D., Portsmouth. Another cause of worry over joints is the apparent lack of presetting on nearly every pipe system, including such pipes as superheater downcomers and the main range in the boiler room. It would seem that after five years all the asbestos in the flexatalic joints tends to deteriorate and then requires renewal.

Main Safety Valves H.M.S. ' Dainty '

On examining a main safety valve to ascertain the cause of leakage it was found that the internal cage was seized, instead of floating, in the valve casting. No manner of brutal persuasion could move it and a strongback and screwed spindle were fitted up to act as an extractor. Actually, the main engine rotor jacking gear, with some adaptation, was used. Even this had no effect until a CO_2 fire extinguisher was let off with the nozzle inside the cage. The very rapid cooling effect of the released CO_2 shrank the cage sufficiently for it to ' jump ' out. By retightening the extractor and further cooling from two more CO_2 extinguishers, the cage became free.

Comment

An ingenious method. Seizure to such an extent would have been thought impossible had the clearances in accordance with Art. 0448 of B.R.1988 been allowed when the piston chamber had been originally fitted.

Main Boilers—H.M.S. ' Scarborough '

The main problem has been with leaky hand hole door joints. The economizers in particularly have given great trouble and caused very heavy losses of feed water before the boiler could be shut down and the defects dealt with. The gaskets fitted are of monel metal. They were fitted correctly by H.M. Dockyard, Portsmouth, and were tested to 825 lb/sq in. They were subsequently tightened under steam by ships staff. As they fail they are being replaced by double dipped Walkerite 1/32nd C.A.F., and this gives a satisfactory joint without the necessity of having to tighten under water pressure test, and the joints do not fail.

Comment

Trials in several other ships with a variety of materials have produced findings as in H.M.S. *Scarborough*. A complete change-over to this material for this type of handhole gasket is being arranged.

Auxiliary Boiler—H.M.S. ' Blackpool '

The value of the auxiliary boiler with regard to the maintainability of a Type 12 frigate cannot be overstressed. With the use of the auxiliary boiler it has been possible to supply domestic steam and distil approximately 0·8 tons per hour feed water (or a gain of approximately 0·7 tons per hour) with an auxiliary watch of one L.M. (E) auxiliary watchkeeping routine and one M. (E) daywork whereas auxiliary steaming on a main boiler, apart from the restrictions imposed by the presence of steam for associated auxiliaries, requires one P.O.M. (E), one L.M. (E) and two M. (E)s auxiliary watchkeeping, i.e. a total saving of four P.O.M. (E)s and eight M. (E)s who are available for daywork.

The boiler has been entirely satisfactory but was at one time limited in output for several weeks while awaiting a replacement igniter.

The accessibility of the uptakes for external cleaning would be considerably improved if additional accesses were made above and below the uptake damper.

Comment

Domestic boilers are being fitted into modernized *Darings*, converted *Battles*, the G.M. destroyer, the G.P. frigate and the *Leanders*.

Diesel Generators H.M.S. ' Blackpool '

Considerable trouble was being experienced by the presence of a dirty exhaust at powers above 40 per cent full power. This was eventually corrected in compliance with an Admiralty Letter which stated that injection tuning should be advanced 4 degrees for the uprated engine. This information was not in the handbook issued with the engine (B.R.1332(12)). The adjustment has generally, but not completely, cleared the exhaust which is very sensitive to injector cleanliness.

Boilers H.M.S. ' Undaunted '

Considerable trouble with air leakage through boiler casings has been experienced in the last six months, but a good deal of attention has been given to this matter and, by means of asbestos putty and the renewal of cotters and joints, boiler-room air pressures and fan speeds have been reduced to a reasonable level. However, it has not been found possible to completely eliminate a brown funnel haze at full power and it is understood that this is a common failure with this type of boiler and the combustion equipment fitted. It is hoped that the A. and A. to fit Pattern 6300 sprayer bodies will improve the combustion at high powers.

Comment

It is known that at high powers ships of this Class have difficulty in eliminating a brown funnel haze. The fitting of Pattern 6300 sprayer bodies should improve combustion.

Valves H.M.S. ' Undaunted '

(*a*) Constant refitting of leaking steam valves involves a disproportionate maintenance effort, and it is not understood why A. and A. item No. 236, to fit steam valves with stellited seats, is a Class B item. The situation is aggravated by the fact that very few turbo auxiliaries are fitted with master valves.

(*b*) The manœuvring and main turbine nozzle valves appear to be in good condition.

(*c*) The ' Arca ' type exhaust range control valves to the port L.P. and starboard condenser are frequently erratic in operation. Both have been completely overhauled and can be made to work with some difficulty but they need frequent attention to keep them in working order. The result of this lack of reliability for a steady exhaust range pressure is that the evaporators cannot always be run on closed exhaust as often as they should be.

(*d*) Dewrance type cocks are being replaced as leakage occurs by klinger sleeve packed cocks, and in this way it is hoped to reduce the maintenance effort usually required by this item.

Comment by F.6

This is a major problem in all Type 15 frigates.

It is for consideration that early action should be taken to implement A. and A. 236, upgrading it to Classification ' A ' and failing this, ships should be supplied with valves in order that ships staff, assisted where necessary by Fleet support, might progress the item as and when time permits or defects demand.

Comment

(*a*) The use of Rate Book valves Patt. Nos. 10037 and 10040 may prove practicable where complete replacements are considered justified.

(*c*) Reports from many 'Conversions' have been encouraging with oil-operated Arca systems. It is known that the correct valve clearances and dimensions are vital to good operation. There are also cases where the initial fits in manufacture make assembly difficult to ensure accurate alignment of the spindle, guide and cage ; uneven cover joint compression can easily influence this alignment.

Main Engines—H.M.S. 'Bulwark'

The starboard turbine suffered a temporary seizure on one occasion when returning to anchor from sea ; after stopping the shaft the usual amount of steam failed to move it astern. It was allowed to stand for about five minutes, when the application of ahead steam at low pressure resulted in slight movement. Turning gear was then engaged and engine moved one complete revolution with no more than normal load on the motor. The cause of this seizure is likely to be due to the temperature (300 degrees F.) of the saturated gland steam supplied from the desuperheater being too low and the gland collector filling with water, resulting in water filling the turbine glands and causing contraction of the gland rings. The gland collector drain pipes were subsequently removed and descaled, and the saturated gland steam temperature maintained at 400 degrees F., since when no further trouble has been experienced. A 'full' vacuum continues to be achieved without difficulty.

When at short notice for an extended period and turning main engines, either every few minutes or continuously, the 9th stage of the forward length of the L.P. turbines are prone to reach the critical temperature of 320 degrees F., whether cruising or ahead throttles are in use, although it appears that the rate of increase is less with cruising throttles and minimum nozzles.

On occasions it has been necessary, in order that this figure of 300 degrees F. is not exceeded, to engage turning gear and move main engines by turning motor. This has proved effective but in order to remain at short notice main stops require to remain open with steam up to the throttles contrary to B.R.16, Article 122(4). When this was necessary all throttles were lashed shut and all nozzles shut.

Comment by C.-in-C., Far East Station

Short notice for an extended period may be a requirement in the typhoon season on the Far East Station. The procedure reported of using turning gear to keep down the L.P. induction temperature is considered to be sound and acceptable, providing scrupulous attention continues to be paid to lashing throttles and closing nozzle valves.

ORDNANCE ENGINEERING

6 in. Mk. 26 Mounting—R.E.P.S. Air Stop Valve—H.M.S. 'Tiger'

The main air isolating valve was found to be leaking at the sweated connection to the delivery pipe from two air bottles. Three attempts at repair on board were unsuccessful, and the valve was eventually taken in hand by H.M.S. *Ausonia* ; again attempts to re-sweat the connection failed, due to the high oil content in the porous metal casting. In the end a new unit had to be fitted.

It is clear that either the initial sweating of the connection was poorly done, or the connecting pipe was incorrectly set, causing undue stresses. It is understood, however, that a modification is being considered to alter the material of the items to facilitate sweating of the connection.

Comment

Leakage from sweated joints is one of those difficulties that can never be entirely eliminated, however much care is taken during production and subsequent testing. In this case, however, there is a further possible cause of the defect : there is an added risk of leakage due to unequal expansion of mating parts, since the stop valve body is manufactured from H.S. Brass, whereas the pipe adaptor is of Steel Group 3. The modification referred to by the ship is to change the adaptor material to H.S. brass and instructions to do this have been issued to the manufacturer, but in view of the limited occurrence of such failures the work is being progressed at a low priority.

This modification will not, of course, affect the possibility of oil impregnation of the valve body casting, and re-sweating of the joint will still be difficult under these circumstances. The answer to this problem is the elimination of oil from the air system —a design intention not adequately fulfilled due to leakage of oil past the R.E.P.S. accumulator glands. Another modification is under consideration to improve the glands (possibly by using a different material for the seals).

6 in. Mk. 26 Mounting —Mantlet Weathering —H.M.S. ' Tiger '

The pneumatic weathering tube was found to be torn, and failed to hold air pressure. The replacement tubing supplied in A spares was too long, and some ten inches had to be removed. The tube end than had to be re-plugged and vulcanized ashore; this process was not entirely satisfactory. There seems to be no point in carrying spare tubes plugged at both ends unless they are of the correct length.

Comment

With the structural tolerances involved, it is impossible to specify a standard length for the tubing. The provision of tubing cut to, and plugged at, the maximum length expected to be required may not be the ideal solution, but at least it is better than the arrangements made (or perhaps more correctly not made) for the weathering on some earlier mountings. Nevertheless, the criticism has been accepted, and vulcanizing sets are being ordered for inclusion in sets of A spares provided to *Tiger* Class ships, so that the lengths of tubing may be cut to length and re-plugged.

4.5 in. Mk. 6 Mounting Tachogenerator Gearcase —H.M.S. ' Dainty '

During routine maintenance work, the drain plug was removed from the elevation tachogenerator gearcase and when old oil and sludge had been drained off, the plug was replaced. On elevating the guns in power to obtain access to the gearcase oilers, the gearcase shattered, fragments falling among other moving parts and causing extensive damage.

It was found that when the drain plug was removed, the bush carrying the female thread had unscrewed with it. The bush is itself screwed into the case and secured by centre-punching. On replacement, the bush had been screwed in beyond its correct position, allowing the end of the plug to interfere with the gear teeth. It was found that on a second mounting the bush and plug unscrewed as an assembly.

It is suggested that the bush and plug arrangement should be discarded, and a simple $\frac{1}{2}$-in. diam., $\frac{3}{4}$-in. deep B.S.F. plug be substituted.

Comment

Probably the most remarkable feature of this defect is the fact that it had not happened before. It is certainly unsatisfactory that the bush should only be

prevented from screwing into the case by centre punching, though it is not accepted that a simple plug screwing into the case should be substituted, since frequent removal and replacement of the plug would soon wear away the thread in the aluminium alloy case. The best solution is considered to be replacement of the bush with a similar item, but including a shoulder to restrict movement of the bush into the case, and retaining centre-punching to prevent movement out of the case. Such action is unfortunately not practicable at present, since other redesign work is being undertaken that may considerably change components of the gearcase ; the new bush will be included in the more general modification when this is finalized. In the meantime, all ships concerned have been warned of the possibility of defects such as those reported by *Dainty*.

4·5 in. Mk. 5* Mod. 1 Mounting Loading Tray Buffer—H.M.S. ' Cavalier '

The loading tray operation was successfully tested during preparations for firing, but during the subsequent firings the tray persistently ' bounced ' slightly at the end of swing-out. The left hand release bolt was not allowed to engage correctly against the end of the automatic throw-over spring assembly, and in addition the breech block was allowed to jam against the loading tray/breech closing interlock.

After considerable investigation, it was decided to examine the swing-out buffer, although this appeared to be operating correctly. The buffer was in good condition internally, but it was noticed that the liquid was far more viscous than that used for topping up. The buffer was re-assembled and was tried out using various buffer liquids and the best results were obtained using Oil OM 33.

There were two possible causes for the defect : over-zealous application of grease to the buffer piston nipple may have resulted in contamination of the liquid : or the tally plate filling instructions may have been mis-interpreted. (These state that the liquid should be ' equal parts of Torpoyl and S.M.O.', both terms have been superseded for over ten years). It is suggested that lubrication of the buffer piston should be by oil and that the filling instructions be amended to read ' Oil OM 33 '.

Comment

It is agreed that the filling instructions should be amended and this is being done. The buffering medium should, however, be Oil OM 65 but it is not stated by the ship if this was used in the comparative trial using various buffer liquids.

Concerning lubrication of the buffer piston, the nipple supplies lubricant to the conventional ' scroll' type grooves, which are not particularly suitable for carrying oil, especially in this case where the piston rod is not a close fit in the bush. Oil applied at this point would quickly drain away, and would eventually find its way to the buffer cylinder. Since the cylinder is not intended to be completely filled with oil, this would change the characteristics of the buffer. As seems to have been appreciated by the ship, grease would have to be applied under considerable pressure before it would enter the buffer cylinder; or alternatively the grease would have to be very thin. It is further observed that a mixture of Oils OM 750 and OM 65 could, under certain circumstances, have a very similar appearance to a mixture of oil with Grease LG 280. No change is intended in the lubrication instructions, therefore it can only be advised that over-zealous application of grease, a more common fault with the pressure grease guns now in use, should be discouraged whenever possible.

4·5 in. Mk. 6* Mod. 1 Mounting G.P.I. Drives H.M.S. ' Blackpool '

The training gun position indicator fine pointer drive shaft fractured without warning during post-refit trials. The Dockyard Metallurgical Laboratory was consulted and as a result of the report on the failed shaft, the drives were

carefully examined and a misalignment of 1/16-in. was found between two of the shafts. It is assumed that this misalignment was introduced during initial erection, and the subsequent overloading ultimately caused failure after two years service.

Metallurgical Report

The material of the shaft was as specified (Steel En. 3), with a normal ferrite plus pearlite structure of a 0·2 per cent carbon steel. Fracture had occurred at a sharp change of section of the shaft ; there was no radius at this point, indeed it was undercut as are all other changes of section on the shaft. Fracture was of the fatigue type. Hardness tests gave values of 175-190 V.P.N./30, suggesting the material had been cold drawn.

The shaft is understood to be lightly loaded. No fault could be found with the material, which is not of the notch sensitive type, and the lack of a root radius at the point of failure should not have been a contributory cause. It is suggested that associated parts be examined for possible causes of overloading, such as misalignment or partial seizure.

Comment

There is no evidence to show that this particular shaft is susceptible to failure, so that misalignment of the shafts is unlikely to be common. The method of approach to the defect was commendable, and more important still the value of a metallurgical report in such cases is clearly shown.

4·5 in. Mk. 6* Mod. 1 Mounting Shell Hoists—H.M.S. ' Lynx '

There has been a long history of accidents with these shell hoists, due to the hoist doing an up-stroke with a shell already at the top. The incidence of such failures has been reduced by the introduction of modifications to the pilot valve and associated hydraulics, but two accidents have occurred subsequent to this. In each case the hoist concerned had been running normally for some time, and investigation showed that all the valves were correctly positioned and adjusted, and were free ; starting and spindle valve spring loadings were adequate ; there was no sign on any of the components of anything that may have caused sticking, apart from minor marking on one side of the pilot valve piston and remains of machining marks on its cylinder. On reassembly, the hoist worked correctly and during a three-hour test with a shell at the top and the clear hoist lever pinned to 'clear hoist' the defect could not be reproduced.

It is considered that the failures were caused by the control valve moving across to admit pressure to the underside of the lifting piston and, from the evidence available, it seems that the accidents were a result of the pilot valve sticking in the down position. The latter may have been caused by the effect of the oil temperature (136 degrees F.), since in view of the relative masses of the valve and its body the expansion rates could be sufficiently different to reduce the clearance between the components. This seems improbable, but is the only possibility that can be suggested.

Whatever the cause of these accidents, it is clear that further modification is necessary to ensure that the hoists fail to ' safe ' (i.e. stop stroking) rather than to ' danger'.

Comment

Two possible solutions to the problem were suggested by the ship. The first entailed fitting an additional valve underneath, and operated by, the starting valve, in the pressure line to the control valve, so that supply to the control valve would become alternate pressure or exhaust, depending entirely on the

condition at the top of the hoist. The second solution was similar in principle, but would in some respects have been simpler to instal ; it involved re-designing the starting valve to combine its present function with that of providing alternate pressure or exhaust to the control valve.

It was accepted that, although there had been no other reports of similar failures after the modifications to the pilot valve had been completed, the introduction of a further safety device to positively prevent double deliveries was necessary. It was thought, however, that the methods of achieving this could be improved, particularly since both proposals involved changes that would to some extent alter the characteristics of the control valve. The idea of locking the control valve in the ' lower ' position whenever there was a shell at the top of the hoist was then considered, and it was seen that this could be done by a spring-operated plunger engaging in a detent in the control valve rod extension. It would then be easy to use the pressure supply from the starting valve when the shell was removed, to withdraw the plunger against the action of the spring and since there would be negligible oil flow required for this, the existing starting valve could be used. This was discussed with the ship and one of the hoists in *Lynx* was modified accordingly. At the time of going to press, this modification appears to have been successful.