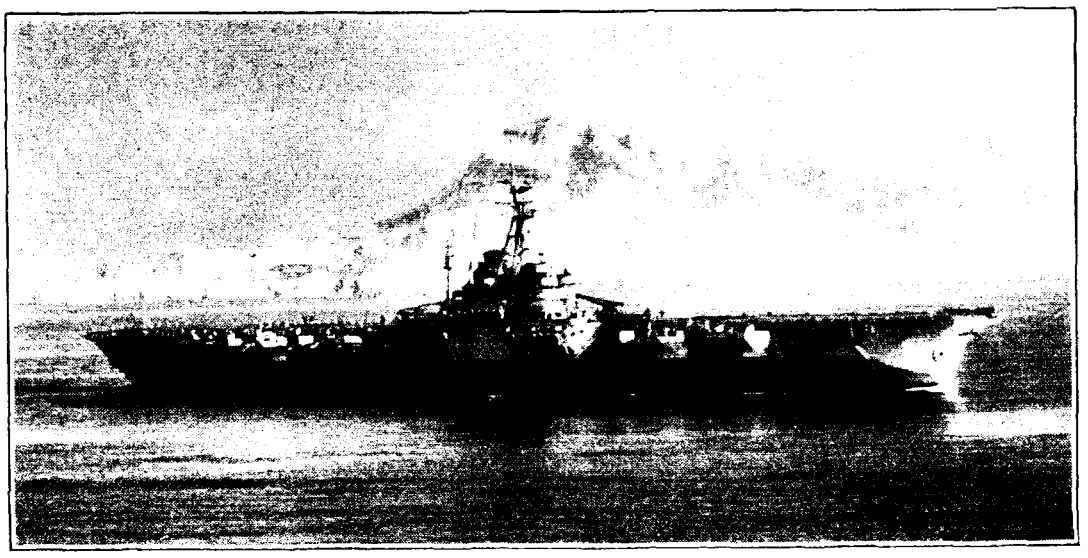

NOTES FROM SEA

The following are extracts from letters received from Engineer Officers of sea-going ships, together with remarks by the Engineer-in-Chief's Department or the appropriate authority.

Flexible Bulkhead Glands Fitted to Propeller Shafting—H.M.S. " Anson "

Each outer shaft was fitted with one Vickers type and four John Brown type glands, whilst each inner shaft was fitted with four Vickers type glands. No trouble has been experienced with the Brown type gland.

One Vickers type overheated and wiped. The cause could not be fully ascertained, but was either due to lack of sufficient attention or to dirt in the lubricating grease being used. Enquiry at the time showed that both had played their part, and since then three shaft passage watchkeepers per watch are always employed instead of two, and all lubricants used are kept continuously in closed cans.

The subsequent work of re-metalling and machining the spherical housed bearing brought to light the following features :—

(i) To remove the bearing the whole gland housing must be removed from the bulkhead—an operation that took some considerable time.

(ii) To metal and machine the bearing special equipment must be made to avoid distortion whilst metalling, and to hold the bearing in the machine whilst boring.

(iii) An emergency closing device must be made for the bulkhead from which the gland is removed if watertightness is to be preserved whilst the work of re-metalling is being carried out.

Operation (i) could be avoided by making the top half of the tubular houings in two parts with a vertical joint. This modification is recommended for all future glands of this type. The necessity for (iii) and the time lost due to (ii) could be avoided by providing spare bearings with allowance for final machining of the bore to size, and boring equipment.

It is recommended that one bearing of each type be provided. The relative merits of the two types cannot be assessed and with the end of the war it is most unlikely that they will be assessed. The Vickers type is the more difficult to handle when adjustment or examination is required and care must be taken to ensure that the supporting spring load is correct.

The grease gun lubricators of the Vickers type require extension at certain positions depending upon the situation of the gland as these are inaccessible when the shaft is revolving without danger to the man attending the gland. These extensions have been fitted in *Anson*.

Remarks

The difficulties experienced in re-metalling and machining the spherical bearings of the Vickers type gland are noted with interest and it is agreed that one spare spherical bearing for each type of gland is necessary in each ship so fitted and action will be taken to implement this proposal.

This is the first report we have received dealing with defects in the Vickers type gland but, as you are aware, trouble has been reported from *Duke of York* and of a more serious nature from *Indefatigable* and *Implacable*. We are of the opinion that most of the difficulties could be eliminated by improved lubrication, always, of course, assuming that the spherical bearing is fitted efficiently to the housing and so permitting the bearing to accommodate itself effectively to the run of the shafting.

It does appear, however, that very little consideration was given to the coach springs in the designed stage. Ships in service have found that the coach springs weaken, and after a time they do not adequately support the bearings, but against this experiments have been carried out at the Firm's works, which proved that the coach springs can be dispensed with and the bearings continue to run satisfactorily. This makes one suspect that the vibration in the shafting may have affected the spherical mating surfaces to such an extent that they do not, after a while, accommodate themselves to the alignment of the shafting.

The present policy is to fit only the John Brown type of flexible gland in the ships in construction and probably the same procedure will be adopted when the existing ships are modernised.

Haslar Boiler Fronts—H.M.S. " Anson "

The fronts have distorted slightly throwing the registers out of truth with the air casing so that gaps appear between front flange of registers and the air casing through which air at boiler room temperature passes. It is not considered that these gaps are sufficiently large to be of importance although they must have some small adverse bearing on the boiler efficiency.

The distortion is also considered to have a bearing on loosening of bonding between anchor bricks which has been experienced.

" Glenboig " quarl bricks have a tendency to crack on their inner surface about one third of the way along from the furnace face of the brick. These cracks spread across the section of the brick and the furnace face is then loose and liable to drop off into the furnace. Patching with plastic brickwork has not proved as satisfactory as was hoped so that renewal of quarl bricks has been fairly frequent. The " Foster " quarl brick with more rounded corner between cone surface and furnace face has proved much more satisfactory in this respect, although it is probable that their virtue lies more in their composition and firing than in the small difference in shape.

The following table (Page 89) gives the consumption of anchor and quarl bricks in six months during which period the ship steamed 25,400 miles using 22,570 tons of fuel.

It is considered likely that patching will be more successful as experience is gained ; further that there will not now be the same urge always to be in the best state for whatever operation may be ahead which dictated the policy of renewal rather than patching whenever opportunity offered.

		Fitted per Boiler	*Total Fitted*	*No. Used*	*Percentage Used*
Anchor Bricks	Type I ...	19	152	264	174
	Type II ...	13	104	130	125
	Type III ...	10	80	63	79
	Type IV ...	10	80	63	79
	Total ...	52	416	520	125
Quarl Bricks	Key	9	72	72	100
	Tapered ...	45	360	303	84
	Total ...	54	432	375	87

Four Patt. 3W bricks (18 in. by 9 in.) were used in each boiler in the front surround to the bow front. These were insufficiently supported by their one bolt and loosened and cracked. This has been overcome by using two 9 in. by 9 in. bricks suitably cut to shape with a bolt for each.

Little trouble has been experienced with air shut off tubes, and there is undoubtedly much less tendency to jamb under the effects of heat as was frequent experience with the earlier type closed fronts.

Remarks from Admiralty Fuel Experimental Station

The Haslar Experimental Fuel Station were asked to remark and Engineer Captain Gray has sent the following reply :—

Slight distortion between the front flange of the register and the outer air casing is not surprising when considering the welded hexagonal construction necessary in this case. The air pressure drop across the gaps so formed would not be likely to exceed $1\frac{1}{4}$ in. and therefore the proportion of cold air entering the trunk would be small.

In the earlier " Glenboig " throat bricks this spalling and cracking was experienced generally. It is thought that the improvement with the " Foster " brick can be attributed to a better made brick and better material and not to the rounded furnace lip.

Renewal of Bricks. The necessary renewal of Anchor bricks is disappointing but this may be attributed to the fusing of the mild steel bolts. Less than one complete renewal of quarl bricks in 25,400 miles steaming would appear to compare favourably with experience of former types of registers. This should be improved upon when the better class of quarl bricks are in general supply.

Carbon rings of Turbine Glands—H.M.S. " Indomitable "

The carbon rings of turbine glands continue to give trouble. There have been further cases of butts of carbon segments riding over each other, which can only be due to weakening of the garter springs. The springs fitted have been of the continuous type, supplied in U.S.A. Other springs have now been obtained and fitted, in the form of four separate springs linked together to form a complete circle.

On the port engine a shut-off valve has been fitted on the gland steam lead to the outer pockets, and appears to be satisfactory. Steaming at low speeds this valve is kept shut, there is no drop in vacuum, and a better supply of saturated steam is obtained from the boiler room. It is, however, too early to say that the effect on carbon rings is beneficial.

Remarks

It is not recommended to fit individual control valves to the gland steam lead to the outer pockets, because it was to avoid individual shut-off valves the pot system was introduced. It is, however, intended to modify the gland steam arrangements when the ships of the *Illustrious* Class and *Indomitable* are taken in hand for modernisation. The gland steam evacuation system will be fitted to all main and auxiliary steam-driven turbine machinery units, and in conjunction with this work, it is intended to remove the carbon glands at present fitted in the main engines and, possibly, those in the auxiliary engines, and replace them with labyrinth packed glands.

Firefighting and Damage Control—H.M.S. " Indomitable "

The existing type of fixed foam generator is considered to be quite unsuitable for use on the flight deck of a carrier. It requires continual maintenance, and even then almost invariably fails to produce foam when called upon. However much the mechanism may be simplified in later Marks, the fact remains that corrosion, both internal and external, destroys the drums and the moving parts in a very short time, and produces scale which instantly chokes all small holes and strainers. Inquiries have been made of the Engineer Officers of Light Fleet Carriers, and have produced the same answer.

It is considered that the pick-up nozzle, Type F.B.10, of which seven are available on the flight deck, is very much superior. It never fails to produce foam, is light and easily handled, and is fully capable of putting out serious fires, as has been proved by experience. Moreover, it can be used anywhere in the ship, an example being the cable deck when embarking petrol at sea.

" In-line " inductors, 8 in No. are also fitted round the flight deck, and these too are superior in every way to the fixed foam generators for prolonged foam making.

Remarks

With regard to the fixed foam generator, remarks in paragraph 1 are fully concurred in. This type of generator will be replaced shortly with an F.B.10 foam branch piece, with pick-up assembly.

In-line inductors for generating foam have been throughly tried at the Fire Testing Ground, Haslar, with a view to their replacing the twin tank generators. Trials were not altogether satisfactory, however, and it has been decided that the pick-up assembly, mentioned above, will be supplied instead.

Auxiliary Machinery—H.M.S. " Indomitable "

Considerable trouble has been experienced in obtaining a suitable packing for auxiliary feed pumps. Packing recommended in Admiralty Fleet Order 4109/43 has not been obtainable, but " Rover " Rotary Packing supplied by Walkers of Sydney, has now been found very satisfactory, and this packing has also been found to be superior to Cranes or " Allanite " packing for fire and bilge pumps and evaporator pumps.

Remarks

The remarks on the gland packing for the auxiliary feed pumps are noted with interest, and attached are extracts from recent comments made by Messrs. Drysdale's and Weir's and their respective recommendations for gland packing in all pumps.

Messrs. Drysdale, Ltd.

I have examined the lists of spare gear and special stores prepared by us for the information of the M.M.C., and have ascertained that, whereas these

lists clearly specified Allanite " Leafoil " packing for the fire and bilge and saveall pump for hydraulic fluid drain, they are not specified in the case of the other pump services. The lists merely refer to the packing as " Allanite." This is explained by the fact that, at that time, namely 1943, no other brand of " Allanite " packing was in use in these Works, and within our organisation " Allanite " essentially conveyed the interpretation of " Leafoil " packing. During scrutiny by Admiralty this incomplete description has undoubtedly been amplified to " Alpha."

The matter has been fully explained to our Drawing Office and the greatest care will be taken, in the future, to avoid such misunderstandings.

It is our recommendation that Allanite " Beta " packing be utilised for the hot fresh water de-aerator extraction and evaporator fresh water pump stuffing boxes. Allanite " Leafoil " packing is recommended for all stuffing boxes on the fire and bilge pumps, hull and fire pumps, and the evaporator sea water circulating pumps, also for the saveall pumps, but it should not be overlooked that the fire and bilge, hull and fire, and evaporator sea water circulating pumps can be modified to grease packing with still further advantage.

While on this subject, it should be borne in mind that Allanite " Beta " packing will probably be superior to " Leafoil " packing in the stuffing boxes of the feed heater drain pumps.

Messrs. G. and J. Weir, Ltd.

It is observed that one Engineer Officer has found that the " Alpha " semi-metallic packing is not very satisfactory as the grease in the packing comes out and chokes the lantern rings and that the asbestos is soon chewed up in fast running pumps. This is probably caused by extrusion at the lantern ring due to excessive clearance. It is further observed that he has tried Allen's " Leafoil " packing and this has proved much more satisfactory.

So far as the feed pumps are concerned this is contrary to our experience. The spare gear list for the feed pump called for Allen's metallic packing " Leafoil " quality, but, subsequent to that time, experience has shown that " Leafoil " packing or any other foil packing tends to harden under working conditions and there is difficulty in keeping leakage from the gland to a reasonable amount.

Over a period of several years now " Alpha " packing has been recommended and has proved satisfactory. In all our units now we fit " Alpha " packing and in a number of cases of existing machinery " Leafoil " has been replaced by "Alpha" packing. During the war some of the asbestos used in "Alpha" packing by the packing manufacturers was of inferior quality and it was difficult to maintain consistency in the quality of the packing supplied.

We have had discussions with the packing suppliers and have insisted that they must adhere to our specifications and use only the finest quality of asbestos fibre. One source of trouble is extrusion of the packing between the lantern ring, or the gland, and the shaft, and where this occurs a turn of hard packing, such as " Leafoil " should be used adjacent to the gland and/or lantern ring with turns of " Alpha " packing behind to complete the stuffing box. The hard turns prevent extrusion and the softer turns behind seal the gland and minimise water leakage. Both " Alpha " and " Leafoil " packing are now in plentiful supply.

Air Conditioning Plants—H.M.S. " Glasgow "

The Hallmark glacial seal type gland is inclined to leak when the machine is stopped for long periods. This is remedied by running the machine for a short period daily.

Remarks

The makers recommend that standing plants should be run once every three days to prevent the gland, which depends on an oil seal, from drying out.

Arrester Gear

Glory reports continuous trouble with corrosion and failure of the wires operating the rope supports despite frequent lubrication to resist the attacks of spray and rain-water.

F.E.O.'s Comment

This is an old and well known " sore " in Carriers. It is believed that a modification in design was, if not is, contemplated.

The fitting of canvas " gaiters " was only partially successful in the Fleet Carriers lately in the B.P.F.

Remarks

The remarks on the corrosion of the wires has been passed to D.N.C.

It is now understood that in new construction carriers these wires are being replaced by galvanised steel chain.—Editor.

Recovery of H.M.S. " Thracian "

This destroyer which had been run aground and captured by the Japanese at Hong Kong was found at Yokosuka and an enthusiastic attempt was made by H.M.S. *Trafalgar* to steam her to Hong Kong.

Excessive stern gland leakage however compelled her to return to Yokohama where she was eventually taken over and refitted by H.M.S. *Tyne*.

Her messdecks were filthy, boilers were full of contaminated salt water as a result of the previous attempt at steaming, stern glands were leaking badly and the evaporator required complete overhaul. The usual adjustments were also required to shuttles and auxiliaries, but on the whole the hull and machinery were in excellent condition. Three weeks were spent fitting out living quarters, cleaning boilers, refitting machinery and supplying sea stores and after a trial in Tokyo Bay at speeds up to 22 knots she sailed to Hong Kong escorted by a sloop.

Liberal estimates of probable fuel consumption had been made based on trials carried out off Tokyo, but even these fell short of the actual achievement which was hardly surprising as the last recorded docking was November, 1941. On arrival in Hong Kong she received an enthusiastic greeting from her old Chinese side party.

Perkins P.6M. Motor Boat Engines—Failure of Valve Springs.

Since the introduction of these engines in 1937 numerous complaints have been received from sea on the performance of the valve spring fitted to Perkins P.6M. engines.

Investigations into the cause of failure of these springs at the Admiralty Engineering Laboratory showed that a large proportion of the valve spring failures in Service are attributable to corrosion-fatigue effects arising from the salt laden atmosphere in which the springs work. Only in rare instances have broken valve springs shown evidence of failure due to faulty design or material.

From tests it was found that springs capable of operating at least 2,000 hours in a normal atmosphere would fail in approximately 100 hours in air containing small quantities of sea water. Further, springs made from the best quality

spring steel wire showed no greater endurance in a sea water contaminated atmosphere than did springs of inferior quality.

It was evident that if the endurance of valve springs was to be substantially improved, some means must be found to protect them against the corrosive effect of sea water and it was established that following treatment carried out as a continuous process, with as small an interval as possible between operations, gave almost complete protection from corrosion fatigue.

(i) Springs are cleaned and all traces of oil removed.
(ii) They are lightly shot blasted to increase fatigue resistance by peening and roughening the surface.
(iii) The springs are zinc spray coated to a depth of from two to five thousandth of an inch, the roughened surface assisting adhesion.
(iv) Finally, they are dipped in Duckham's Immutol Slush or Bakelite varnish and air dried for 24 hours.

Due to production difficulties and shortage of materials it has not been possible to make wholesale replacements of Perkins P.6M. valve springs, but replacement springs are now protectively coated.

This type of failure is not, of course, confined to Perkins engine but is common to all valve springs working in salt laden air. Motor boat engines are the most likely to be affected and generator engines to a less extent. It is the intention therefore to ensure that all valve springs supplied to the Admiralty are protected in this way.

It was noted during tests that in certain spring designs where flexing was severe the varnish tended to crack and flake off. Interference between inner and outer springs, too, may cause the removal of the coating with consequent failure. Provided that the zinc coating remains in good condition, however, there should be no reduction in the life of the spring because the pores in the zinc normally remain sealed by varnish remaining in the pores themselves. Cases of failure of springs due to such flaking are of interest to the Engineer-in-Chief's Department, and it would be appreciated if any such failures are reported.