

No. 9

NOTES

(a) PUMPING UP BOILERS.

The following notes on methods of excluding air from boilers when pumping up to W.W. are issued for the information of Ships' Officers in amplification of the instructions in Articles 204/5, Engineering Manual, 1932.

1. Where the ship's fittings and circumstances permit, the boilers should be pumped up with deaerated water. It is to be observed however that in the process of filling the boiler, the entering water will become partially aerated and pockets of air will also remain, more particularly in the case of boilers fitted with superheaters, so that the use of deaerated water for pumping up will not of itself ensure absence of air in the boiler.

2. The difficulty referred to above can be overcome to a great extent by putting the boiler under a vacuum while pumping up and the following methods have been employed with success:—

(a) An air valve on the highest part of the boiler was connected by a hose to the suction side of a fire and bilge pump, and a vacuum of 15 in. maintained in the boiler. A similar method, but using the auxiliary feed pump priming pump, has also been used.

(b) An air valve on the highest part of the boiler was connected to the general service air main and the latter to one of the harbour deaerators or to a main condenser. The connections were made by means of 1-in. armoured hoses and in the case of the connection to the air valve, a short glass tube, made from a lubricator sight glass, was introduced in order to be able to observe when the boiler was full. In using this method care is required to avoid getting water in the air main.

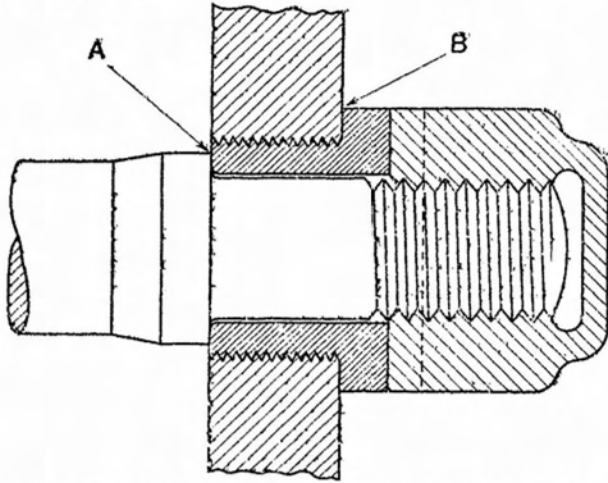
3. Where the methods referred to in para. 2 are not practicable, the quantity of air present can be reduced by heating the water and ensuring that circulation takes place. This can be effected by raising steam in the boiler, keeping the water level high, and using a small amount of steam in a fan engine or other convenient auxiliary. In this case it is to be noted that on shutting down, the steam space and the superheater (where fitted) will be filled with a mixture of steam and air.

4. Another method is to fill the boiler completely, including the superheater, and then circulate by hoses on the drain valves from both water drums and superheater header. The water is heated by passing it through a feed heater on its way back to the boiler, the released air being evacuated through the air cocks.

5. When a ship goes into dry dock for a period, and when no

means are available while in dock for pumping up and excluding air by any of the foregoing methods, the boilers in use should, when finished with, be emptied and kept dry.

(b) **CONDENSER DEFECTS.**

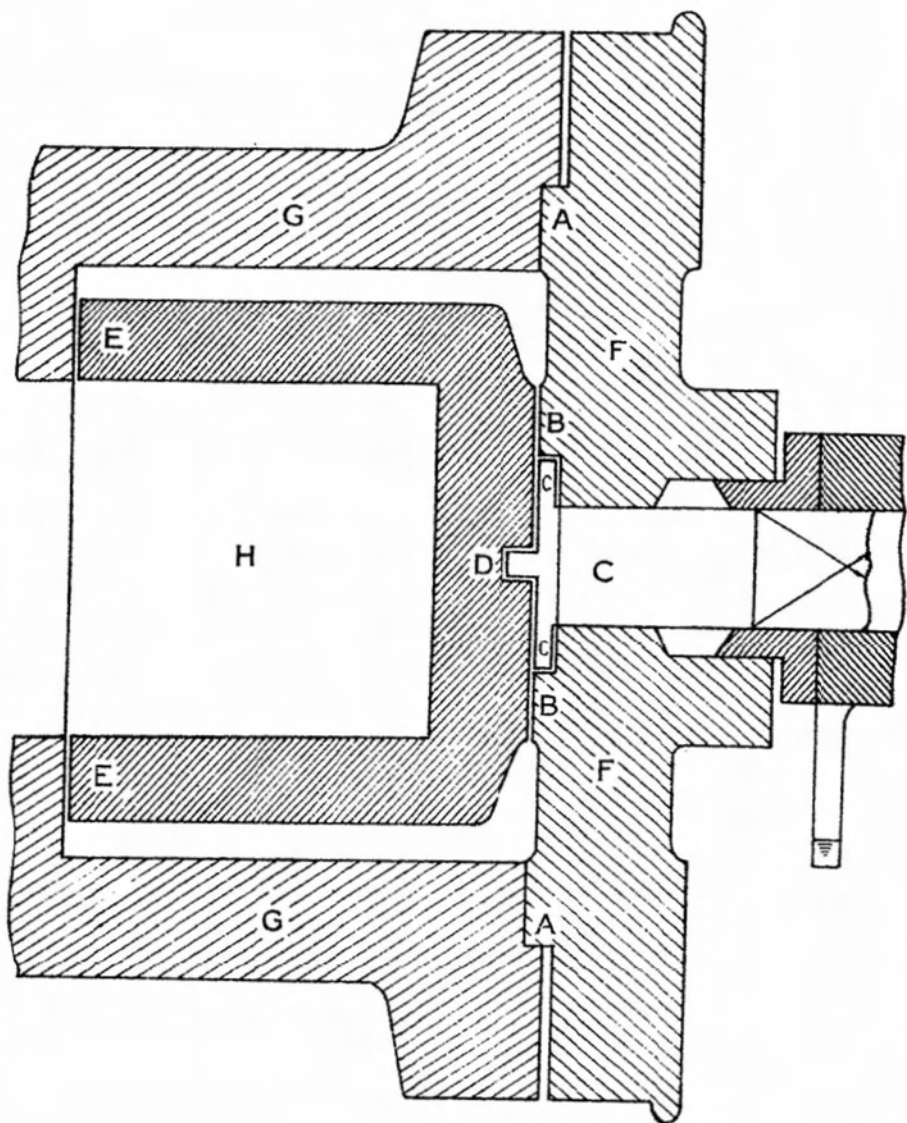


Defects of an unusual nature in a cruiser's condenser were recently revealed after contamination of the condensate had been experienced during high-power steaming.

A Canterbury test was applied in the usual manner with 10³ lb./in.² air pressure in the steam space and the source of leakage was found to be a stay nut, but this was discovered only after the water level in the sea water space had been lowered to within $\frac{1}{2}$ in. of the top of the stay nut. The seriousness of the leak under steam had been such as to make it certain that one defective stay nut joint was not the sum total of the trouble, so that all nuts were removed. It was found that the forward tube plate had been trepanned and screwed shoulder sleeves had been fitted in the tube plate in way of all twelve stays, indicating that at some time the stays had been drawn, though there was no record of this in the ship.

The defects discovered were:—

- (a) In 9 cases, clearance at A varying from $\frac{4}{1000}$ in. to $\frac{30}{1000}$ in. when the sleeve was screwed home. When conditions were such as to cause the stay to expand relative to the body of the condenser a clearance would appear under the nut and leakage could take place through the sleeve. This would account for defect (b).
- (b) In 6 cases, the shoulder of the stay and part of the stay inside the sleeve had corroded away.
- (c) In 3 cases, clearance at B of $\frac{8}{1000}$ in. to $\frac{10}{1000}$ in. when sleeve butted on shoulder of stay. Tightness depended then on the thread of the sleeve.



- (d) Shoulder of screwed sleeve not quite parallel to face of tube plate, indicating that holes had not been tapped truly perpendicular to tube plate.
- (e) Twine gromet fitted between shoulder of stay and inner end of sleeve.

A satisfactory repair was made as follows :—

The inner face of the shoulder on the end of the sleeve was machined so that in each case there was a clearance of about $3/1000$ at B when the sleeve butted on stay shoulder. This clearance was left so that a gromet might be fitted to take up defect (d).

The shoulder and end of the stay, and the inside, outside and ends of the sleeve were coated with red lead and copal varnish. The sleeve was then screwed home with gromet at B soaked in red lead and varnish. The stay nut was also coated with red lead and varnish, and screwed home with gromet under the flange.

It is noteworthy that this form of leakage may not be detected by a standard air pressure test unless a very careful search is made while the water level is gradually reduced, thereby increasing the pressure difference between the two sides of the tube plate.

(c) **WEIR'S PUMP SHUTTLE ADJUSTMENTS.**

It is common knowledge that the faces of the D valve and shuttle valve should be kept true. In quite a number of cases the facing of these surfaces and the lining up of the D valve constitutes the refit of a shuttle.

It is not, however, so generally realised that the easy running and noiseless working of a Weir's pump greatly depends on the fit of the end caps H between the cover F and the chest G (*see* diagram opposite). It is important that this cap H should not be able to cant and jam the shuttle, but it should be free to slide on the surfaces B and E to accommodate itself to the position the shuttle occupies in the chest.

Jointing material is sometimes used for making the end cover joints A, thus leaving excessive clearances at E and B with the consequent possibility of the cap canting and jamming on the shuttle. These joints should be machine faced and made with a slight smear of Belleville grease, or black lead and mineral grease.

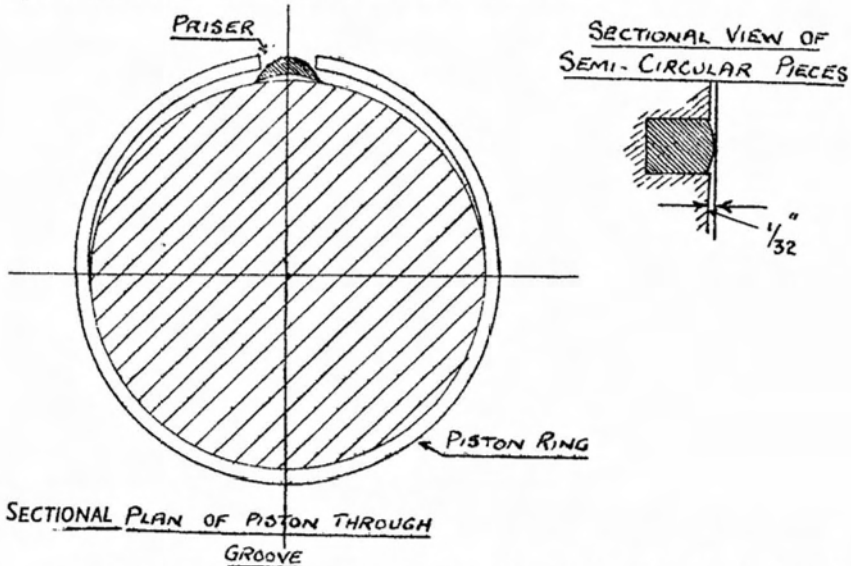
When the joint of the end cover is made with the cap in place, the latter should be so held that it can slide and rotate between the faces B and E, but there should be no rattle. This can easily be tried with the opposite end or bottom cover removed.

It is essential that the turning plate of spindle C should not touch the back of the cap, neither should the cap turning key D bottom or foul the sides of the groove, otherwise there is a further possibility of canting and jamming.

The final test should be with the pump thoroughly warmed through, when the caps should be movable with the actuating spanner through the spindle C and key D.

A little trouble taken in the care of the adjustment of the end caps of a shuttle when refitting a Weir's pump will repay itself, as it will be found that the pump will work silently and the possibilities of the shuttle jamming at one end or the other are eliminated.

(d) **REMOVAL OF DIESEL PISTON RINGS.**



The following method of removing piston rings has been found to be satisfactory in that it avoids either breakage or distortion and consequent uneven wear of cylinder bore on replacement. Four or more prising pieces, depending on the size of the piston, and a set of half-ring groove filling pieces are required (*see sketch*). The prising pieces, about $1\frac{1}{2}$ in. long, should fit easily in the grooves and when in place should stand $\frac{1}{8}$ in. proud of the piston.

The procedure is as follows :—

Insert a priser into the top groove in the ring ; rotate the latter until the leading edge tends to enter its groove again ; then fit another priser and so on until the ring is supported all round. It will then stand clear of the piston and be free to be slipped off. To get all but the top ring off the piston groove filling pieces in halves are inserted in the grooves to be passed. It is important that when in place the rounded surface of the filling pieces should finish just inside the groove.

(e) **GEAR WHEEL CIRCULATING PUMPS.**

The bearings of motor boat and dynamo circulation water pumps are frequently a source of trouble due to rapid wear. Lignum vitae bushes have been found to prolong the life of such pumps.