14th June, 1918.

SMALL COASTAL STEAMERS.

By Wm. SINCLAIR.

The machinery for small coastal steamers in N.S.W. possesses several features which do not strike engineers who are constantly in touch with them as unusual, but to anyone accustomed to larger and "blue water" vessels, many of the details are worth noting, and it is in this spirit that these notes are written.

The engines are almost invariably twin-screw compound, placed aft. This arrangement is brought about by various causes, such as the shallow draft and large beam of the vessel, the importance of having good manoeuvring power in the machinery, and the fact that less fore and aft room for a given power is taken up by this arrangement, as the fore holds have a clear run for long timber cargoes. The engines must be of that design known as "sturdy," for they require to stand up to exceedingly hard spells of work, in fact, steam is seldom off the ship for five or six months on end, and they have frequently to do long, hard manoeuvring on river bars. This plan shows the usual arrangement of the engines exhausting into a common condenser, placed 'thwartship, space for drawing tubes being allowed for by putting the condenser slightly over to one side. Each engine has its own air pump, and, in addition, there are the usual feed and bilge pumps on the main engines.

The boiler used is of the marine or Scotch type. One or two vessels have the underfired multitubular type, but as it is not an easy matter to guarantee a continuous supply of fresh water, this type of boiler is badly handicapped.

In some vessels the single marine type boiler weighs 28 tons empty, and probably over 40 tons full, and this dead load requires to be efficiently carried on long bearers so as to distribute the weight more evenly over the flat floors of these vessels.

Most engineers are familiar with machinery which vibrates considerably, but I venture to say that no one has seen anything approaching the amount of vibration on any deep water vessel that obtains in these craft, and it is more or less continuous. The vibration is more a rocking movement, and stays are not only of no use, but have been found unsafe. All this sets up vibration in the various pipes and connections, and provision has to be made to meet this. One vessel I saw had ordinary Pickering governors fitted to minimise the vibration, due to racing as the vessel rolled in the sea-way.

The principal stresses come on the connecting pipes between the boiler stop valve and the main engines, and between the condenser and main engines, and it is the custom to make these pipes, as shown, with very large sweeping bends, so as to give the requisite amount of play between fixed points.

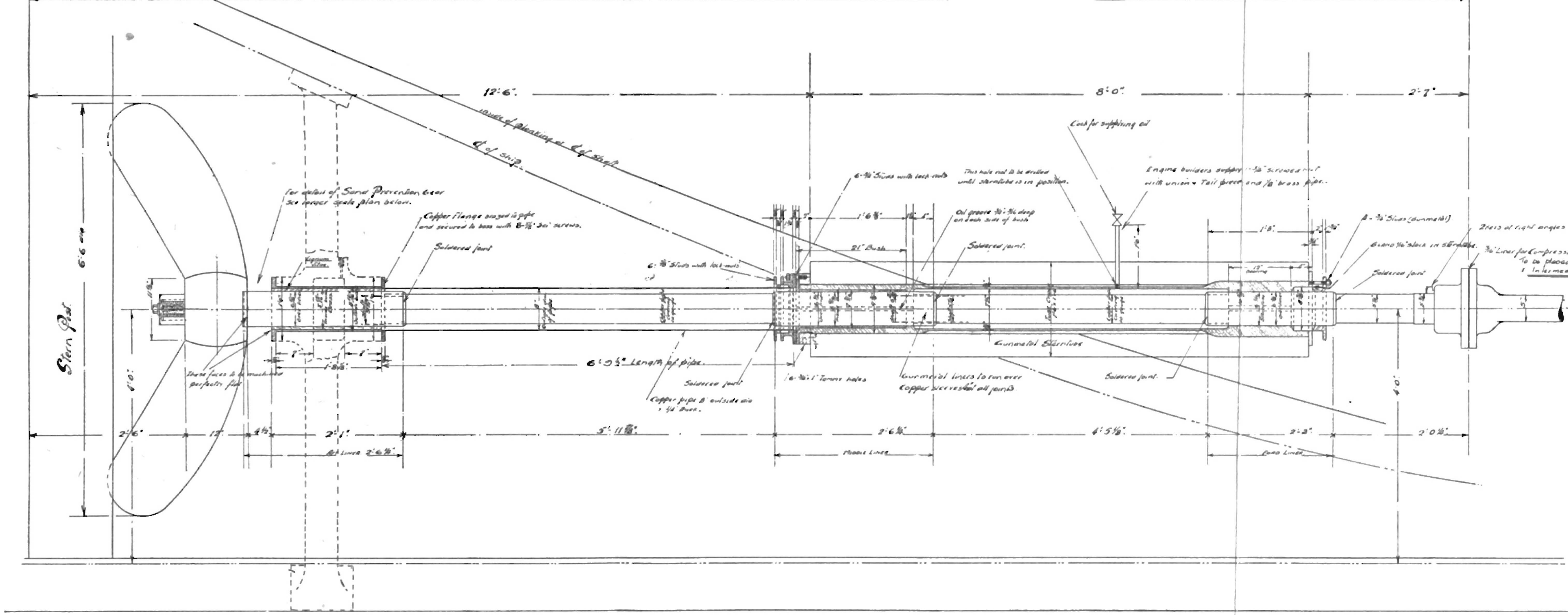
The exhaust pipes also require provision made against movement, and, owing to the relative positions of engines and condenser, a long straight length comes at this point, which prevents the use of sweeping bends, and stuffing-boxes have been fitted in recent vessels, in which the pipes sometimes move $\frac{3}{4}$in.

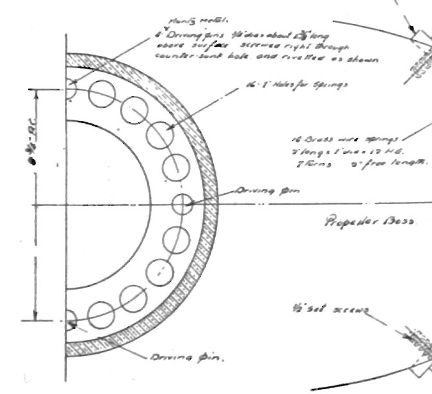
Condensers are divided into two, putting in a semi-division by making the centre supporting plate water-tight. Each air pump then gets its fair share of water should the vessel be rolling.

Circulating Water.—It will be seen that the centrifugal type is used, with two outboard suction roses. The upper injection at the turn of the bilge is used in shallow, muddy

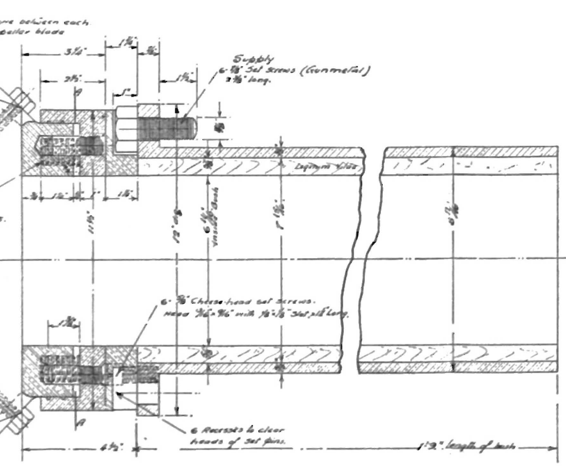
Arrangement of Tail Shaft & Stern Tubes

Plan No 14443 1½" Scale

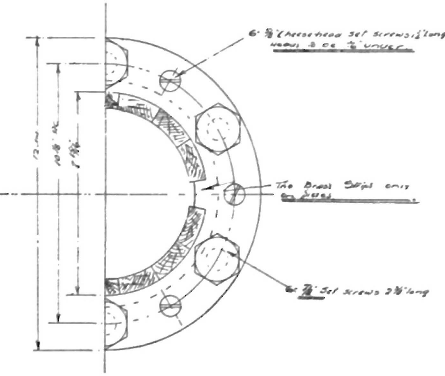




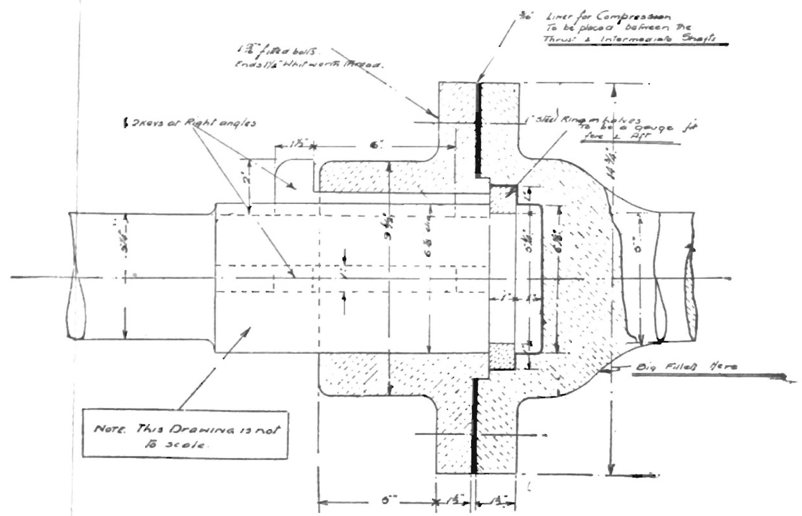
Section AA.



Detail of Sand Prevention Gear and Bracket Bush



Stern Bush Flange.



Detail of Coupling.

To be approved by BOT Surveyor.

or sandy water, and the bottom injection in "blue" water. The bilge injection is, fortunately, a seldom used fitting on ship-board, but on these vessels it is an invaluable stand-by, as there have been several instances of its use when, through heavy straining, the timbers have opened up, and the ship has made more water than the usual pumps could handle.

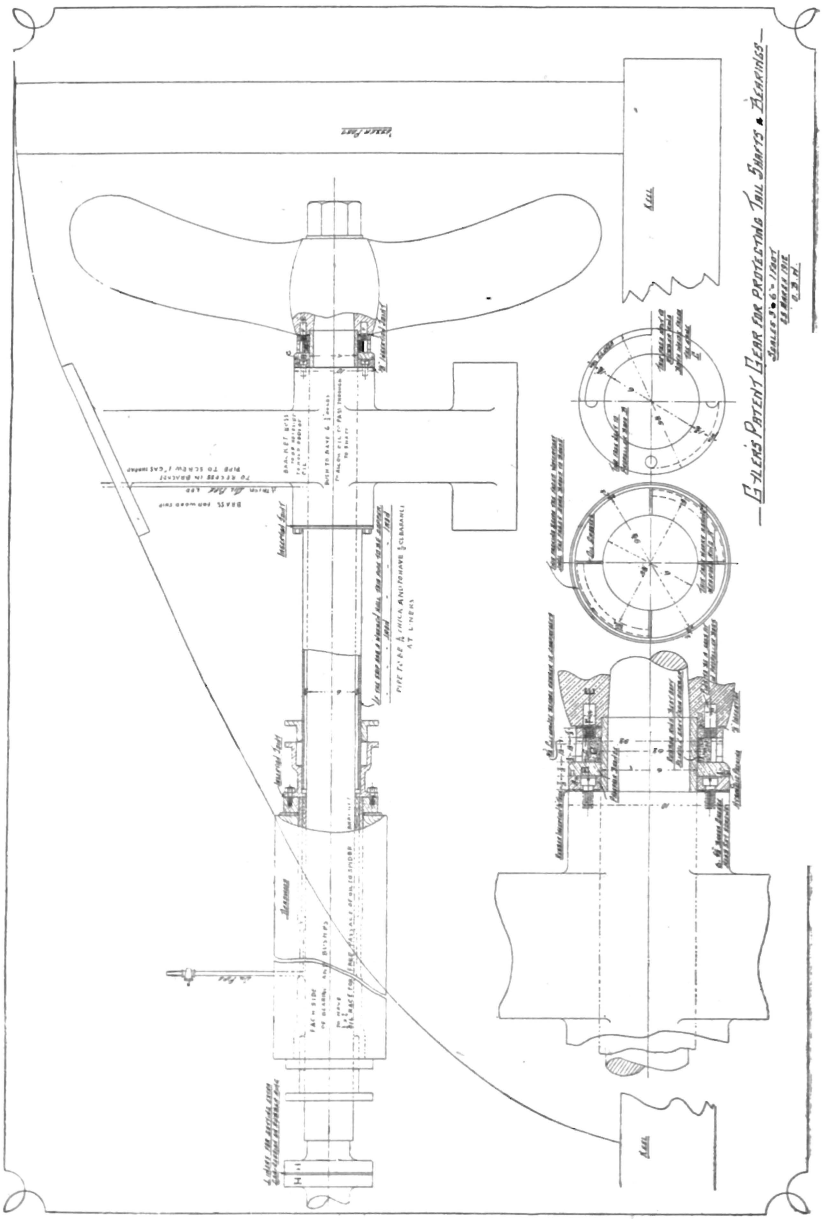
Shafting.—The tail shafts have given engineers considerable thought in designing. Their long length, and the fact that they often work in sandy water, makes the usual style of tail shaft of little use.

First of all they require to be drawn out-board, and this necessitates a loose coupling. The old style was to screw and key on a coupling, but the difficulty of starting these screwed couplings made some other design preferable.

Fig. 2 shows the tail shaft in detail. It will be seen that the flange next the tail shaft is swelled out to receive the end of the tail shaft, and a loose steel ring in halves fitted in to prevent the tail shaft drawing out. The tail shaft loose flange is then keyed on, and the whole design allows of easy uncoupling and drawing. The space in between the liners is covered with copper pipe, and all joints are soldered.

Outside the stern tube nut there is provided what is practically a continuation of the stern tube right through the stern bracket, and this space is kept filled with oil, fed in under a slight pressure to counteract the water pressure.

There are several methods of retaining the oil in the system, which are covered by patents. The idea in these appliances is to have a perfect oil-tight, yet easy fitting, placed between the propeller boss and the stern bracket bush. Some makers use a metal to metal surface, and this is shewn in detail on Plate 2. Here it will be seen that the rubbing ring is driven by lugs secured to the propeller


GILES'S PATENT GEAR FOR PROTECTING TAIL SHAFTS & BEARINGS

boss, and the standing ring secured to the stern tube flange. This form was introduced by the late James R. Thomson, who was a familiar figure in Sydney marine engineering circles a few years ago.

Fig. 3 shows another pattern, and one which, I believe, is practically universal. This is a patent taken out by Mr. Gyler, Sup. Engineer for Messrs. Allen Taylor & Co. Here it will be seen the springs give place to a ring of compressed rubber "C," and the rubbing surfaces "A" and "B" are provided with a groove in which is fitted a rubber ring. The driving is done by a clutch surrounding the spring rubber ring.

The effect of these methods of lubricating tail shafts has been to practically eliminate wear on the liners.

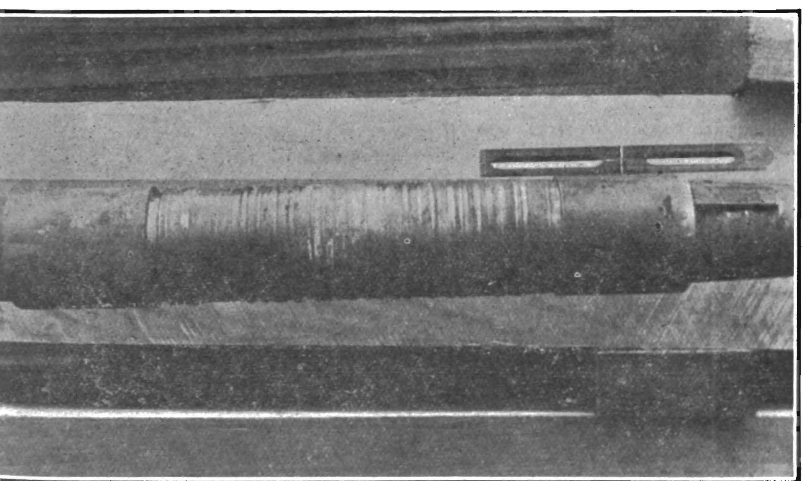


Fig. 4.

Fig. 4 is a photograph I took some years ago of a tail shaft from the steamer "Our Jack," showing the effect of about two or three trips crossing sandy river bars.

With regard to auxiliary machinery—the pumping equipment is generally two donkey pumps, one a feed pump and the other a general service. This latter is used for the multitude of duties that even a small vessel finds imperative. One connection that may be mentioned is that which allows of transferring water from the fore peak to the aft peak tanks.

These vessels are essentially timber carriers, and all deck machinery is installed with this in view. The winches are all fitted with slewing barrels, which permits of one man doing the two operations of lifting and slewing. The later vessels have electric light, and small refrigerating machines have also been installed for handling perishable produce.

Discussion.

The President called on Mr. Shirra to propose a vote of thanks to the authors of the paper.

Mr. Shirra said it had been a great pleasure to him to have heard the papers read that evening, and he considered it a very good thing to have put on record the experience of shipbuilders. He had a few remarks to make, but was speaking from general knowledge only.

With regard to sections shown in Fig 1, he considered they looked rather weak. Referring to the heavy wooden knees introduced in this type, he understood they required a great deal of labour to fashion, and were very difficult to procure at the present time, they must certainly be very carefully selected "crooks," and as such were hard to handle when of any size, and he thought it a very difficult thing to obtain a proper frame, as the fastenings were not always good. Sometimes iron knees with galvanised iron bolts were used as stiffeners. He preferred the design in Fig. 1 to that in Fig 2. The lattice girders certainly appeared efficient, but as they appeared to be shown for use in a cargo carrier they took up too much space. It would be far better if they could be built into the ship's side. The placing of longitudinal