17. Different forms of aerials are used, and can be classed as follows :—

A.—The Simple Straight Wire.

B.—The Fan Aerial (Fig. 19).

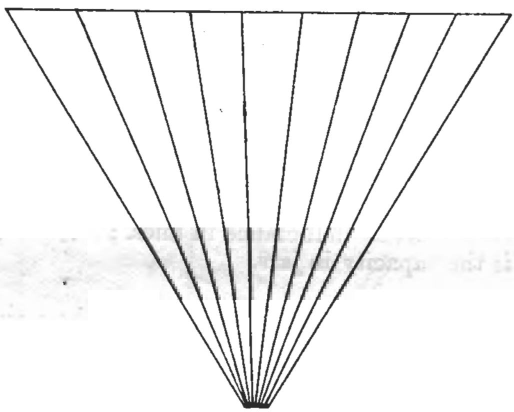


Fig. 19.

This form has the disadvantage of an uneven distribution of current. The outer wires take a great deal more than their fair share, as they only have the back E.M.F., caused by one proximate wire to deal with, whereas in the centre wires the back E.M.F.'s of two proximate wires must be overcome.

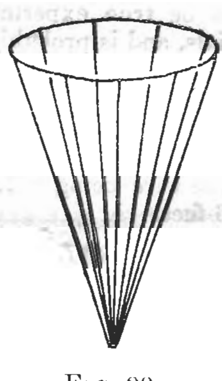


Fig. 20.

C.—The Cone Aerial.

This obviates the defect in the fan aerial, D.

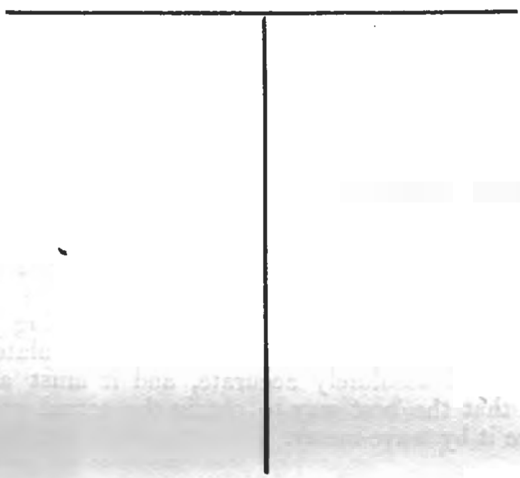


Fig. 21.

The **T** aerial. This is perhaps only a special form of Roof Aerial.

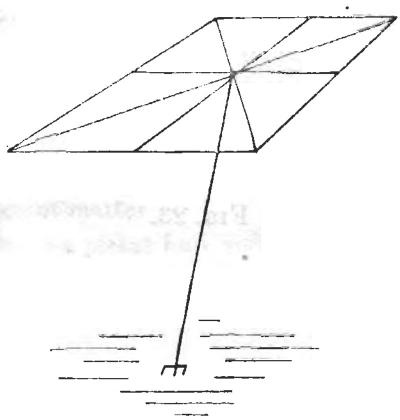


Fig. 22.

E.—The Roof Aerial.

This is undoubtedly the best form of aerial.

All aerials in use come under one of these forms. The Poldhu aerial, for instance, consists of four fan aerials in a square, the top of the fans being brought down again forming a roof. Thus it is a mixture of types B, C, and E.

Roof Aerials.—Roof aerials are principally used for sending and receiving long waves. They can also be well adapted for shorter waves, by introducing suitable tuning devices in the circuit. (*See* Tuned Shunts.)

The object of using an aerial in the form of a roof is to obtain in the aerial as large a capacity to earth as high up as possible. This object must always be borne in mind when fitting a roof aerial. It is thus clear that any earthed body, such as a triatic stay, not insulated, near the roof, will be very disadvantageous, as this practically amounts to raising the earth. Similarly if the triatic stay be above the roof the conditions will be still worse. Again, a double roof, having a larger capacity, will be superior to a single wire roof. It is immaterial whether the wires forming the roof are joined at their ends or not.

The feeder for the roof is connected from the centre of each of the roof wires to the office as directly as possible. If used for sending as well as receiving it must, of course, be as far as possible from earthed objects such as stays, &c.

Fig. 75 shows a suitable roof aerial for a ship when receiving long waves. The ends of the roof could with advantage be extended down to within about 30 feet of the ensign staff, provided they were well clear.

To facilitate the fitting of roof aerials ships will be fitted with double blocks on the fore and main mast and with an insulated triatic stay for signalling purposes lower down.

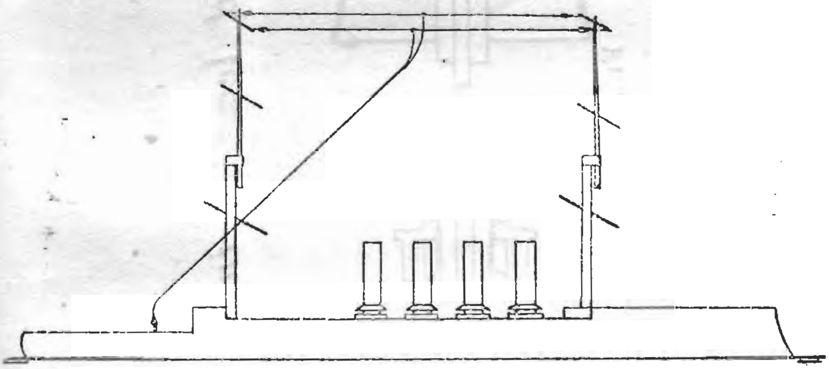


FIG. 75.

The aerial will be improved by using more than two parts, but it must be remembered that the more wire in the aerial the worse will be the effect of atmospheric disturbances.

If smoke from the funnels is found to weaken signals being received, the aerial, or at any rate the feeder, should be of insulated wire.

Insulators.

Deck Insulators.—Ships will be fitted with two "Leading-in Insulators," shown in Fig. 76. The insulator consists of a steel rod passing through an ebonite tube; the rod screws into a metal flange at each end. The ebonite tube passes down through a metal flange bolted to the deck. Between the tube and the metal flange are rings of asbestos packing, which are compressed by screwing down on the nut on top of the flange. The upper part of the tube is protected by a hood. The aerial should be twisted round the rod at *a*, so as to take the strain off the connection at the nuts at *a*. The aerial in the office is secured to the rod by a butterfly nut.

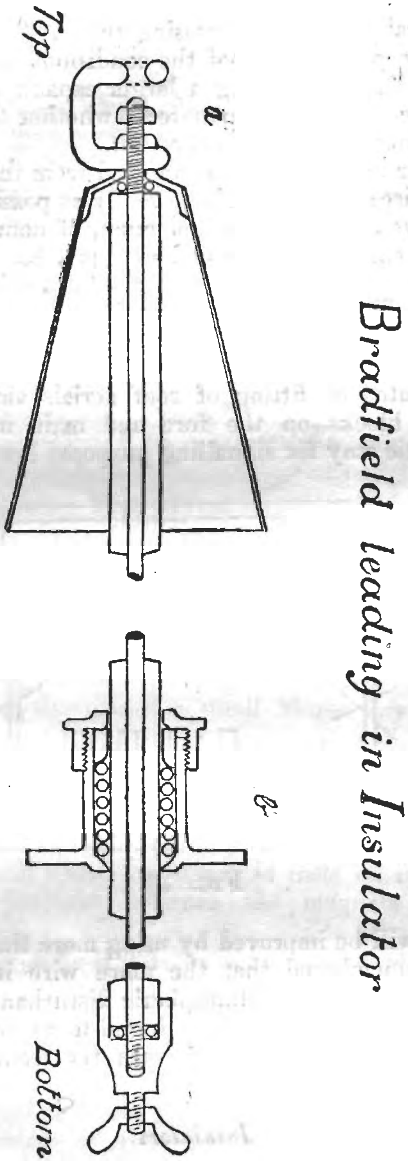


Fig. 76.

At present many ships are fitted with the "Deck Tube" shown in Fig. 77.

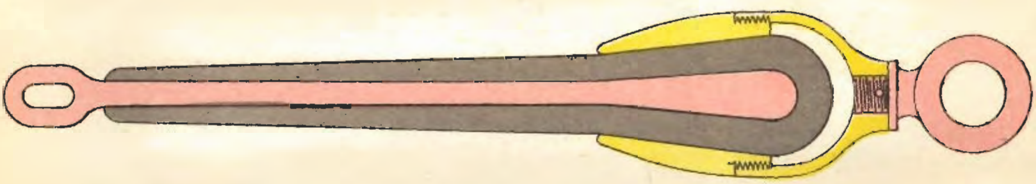
Cowtails, 10, 20, or 30 feet long, were used with this fitting.

The diver's canvas cone is to be quite watertight, the joint to the cowtail being made of tape and solution. The lower part of this cone is to be lashed round the top ebonite plate and an inch or two left over to cover the flange of brass. The cone should be a neat fit, and the surface should be taut.

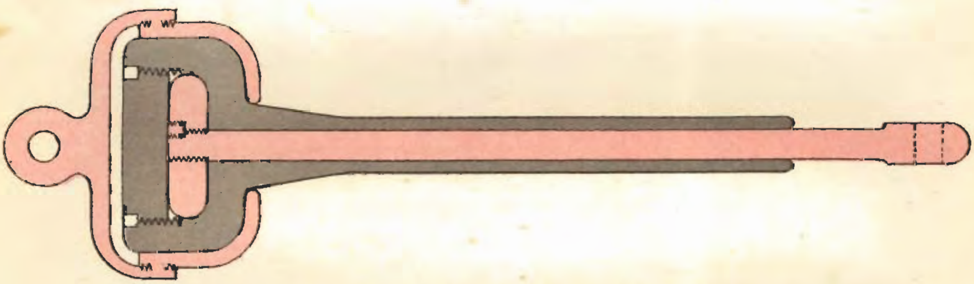
INSULATORS,

MARCONI.

BULBHEAD.



PORTSMOUTH DESIGN.



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Weller & Graham. L^td Litho. London.

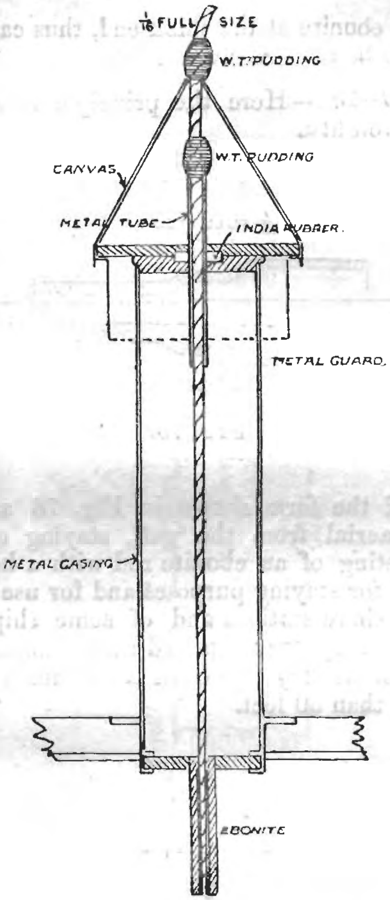


FIG. 77.

Strain Insulators, Turnbull Pattern.—Two patterns are used, one for strains up to 5 cwts., the other up to 2 tons.

They are precisely similar, except that the stronger one has bronze where the other has aluminium.

The insulator consists of a grummet strop, made up of a number of cords, which is enclosed in an ebonite tube. Two metal cones, screwing into one another through the ends of the strop, take the strain. The insulator is just over 1 foot in length. It is easily parted by taking out the small split pin at each end, knocking out the axis pin, and unscrewing one cone with one of the special implements provided, holding the other cone with the other implement.

Bulbhead Pattern (Plate III.).—This pattern is made to stand a strain of 2 tons. It consists of a steel rod in the shape of an elongated pear over which ebonite has been moulded. A brass cap fits over the ebonite at the thick end, thus causing the strain on the ebonite to be compressive.

Portsmouth Design.—Here the principle is similar, but the insulator is too weighty.

Hooded Insulators.

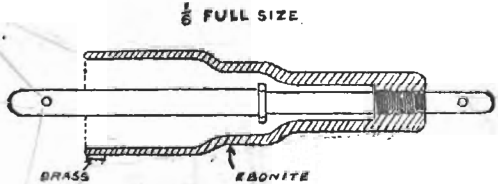


FIG. 78.

Insulators of the form shown in Fig. 78 are supplied for insulating the aerial from the gaff, staying out, &c. Short insulators, consisting of an ebonite rod with a hole at each end, are also supplied for staying purposes and for use in the office.

The stays of shore stations and of some ships are insulated by lignum vitæ deadeyes and tarred hemp lanyards. In future ships there will be no stay above the lower mast uninsulated for a greater length than 30 feet.

Instructions for Fitting Roof Aerial and Oscillator.

Roof Aerial.—Fig. 1 shows in a diagrammatic form the roof aerial and oscillator.

The dimensions of the roof and feeder for this aerial are taken for a ship of the "Exmouth" class.

Details of its $\lambda\sigma$ value, arrangements of turns on oscillator for different wave lengths, &c., are given in Table, page 198.

The length of the roof and feeder must be arranged to suit each individual ship, but the total $\lambda\sigma$ value of the aerial must not exceed 68. A point to be noticed in Fig. 1 is that the feeder has not been placed exactly in the centre of the roof. The object of this is to draw attention to the fact that it is important to give the feeder as clear and direct a lead as practicable without paying too much attention to the exact centre of the roof (30 feet from centre will make no difference).

With this form of aerial it is recommended to top the W.T. gaff as vertically as possible, so as to get an increase in height of the roof.

The aerial wire should be secured to the long insulators of the spreader for the top of W.T. gaff in order to keep the feeders in their correct relative positions.

The spreader is triced close up to the gaff end and kept square by means of the roof legs leading forward and aft. The after legs of the roof are hauled out aft to, say, the after awning stanchions on either side of the quarter deck.

The aerial when it reaches the W.T. office terminates in a plug for connecting to one of the three plug-holes shown in Fig. 1.

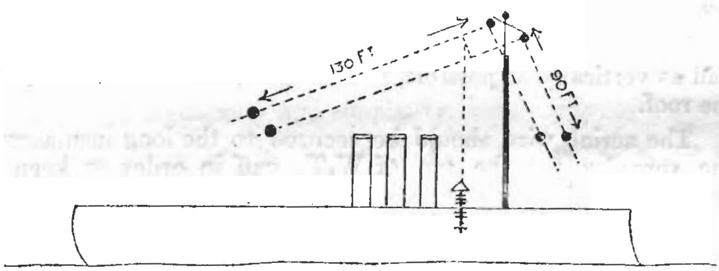
In deciding on the most efficient form of roof aerial for a ship the following points must be considered: the mean height of the roof and its length; the arrangement of the feeder, whether double or single.

The greater the mean height of the roof the better, and the greater the length of the roof, consistent with this, the better. A double feeder (two parts separated) has a smaller $\lambda\sigma$ value than a single feeder, accordingly where a double feeder can be used more roof can be carried.

Taking two types of vessels, "Good Hope" and a scout class, we will consider the best form of roof aerial for each ; the only limit being the $\lambda\sigma$ value, which must not be greater than 68. In the case of the "Good Hope," whose office is an upper deck one between the third and fourth funnels, a double feeder can with advantage be used, one part being taken up on either side of the ship and then vertically to the roof. The length of these feeders will be approximately 160 feet each, therefore in order to bring the $\lambda\sigma$ value to 68 a 250 feet roof (approximately) can be carried. To get the mean height of this roof as great as possible, one would naturally choose the lead from the fore truck to the W.T. gaff, and as this distance is approximately 260 feet, the whole of the double roof can be carried there.

Should, however, this distance have been, say, 200 feet, the extra 50 feet of roof would be taken from the top of the wireless gaff towards the stern, as the mean height of the roof would in this way be greater than if the roof had been continued forward.

Next, to consider a ship of the scout class, for example, the "Patrol." In this ship height is of the greatest importance, and none must be wasted. So to start with, the W.T. gaff would be topped as vertically as possible. The lead for the feeder would then be selected. A single feeder will be found the most suitable, as this can be led up vertically from the wireless office and forked into the roof at a distance of approximately 15 feet abaft the wireless gaff.

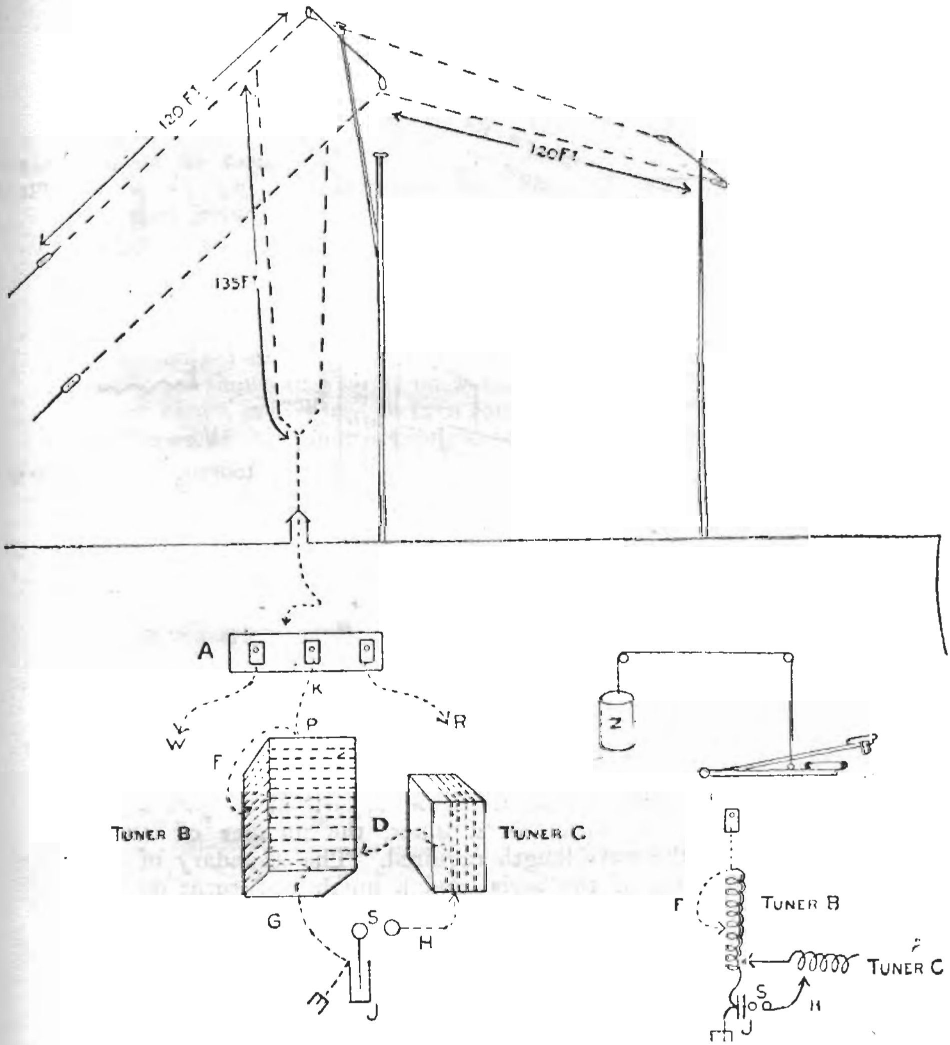


The length of this single feeder will be 110 feet approximately ; therefore, to make the $\lambda\sigma$ value of aerial 68, a double roof of approximately 270 feet could be carried. The mean height of the roof, however, must be considered, and in this class of ship the mean height is greatly reduced amidships by the funnels; accordingly it will be found detrimental to the range of signalling to continue the roof further aft than a distance of 130 feet (approximately) from the top of the gaff, and forward more than 90 feet, on account of leakage due to spray, so that 220 feet of roof only can be carried, and to bring the value up to 68 some turns on the B tuner in the wireless office will have to be used in series with aerial.

Instructions for fitting deck insulator are given on page 202.

FIG. 1.

SKETCH OF ROOF AERIAL AND OSCILLATOR.



A.—Plug board for connecting aerial to tuner B, or to receiver R, or to two jars in series for short wave tune by lead W.

Tuner B.—1 foot square wooden former wound with 60 turns 611 wire.

Tuner C.—1 foot square wooden former wound with 10 turns 611 wire.

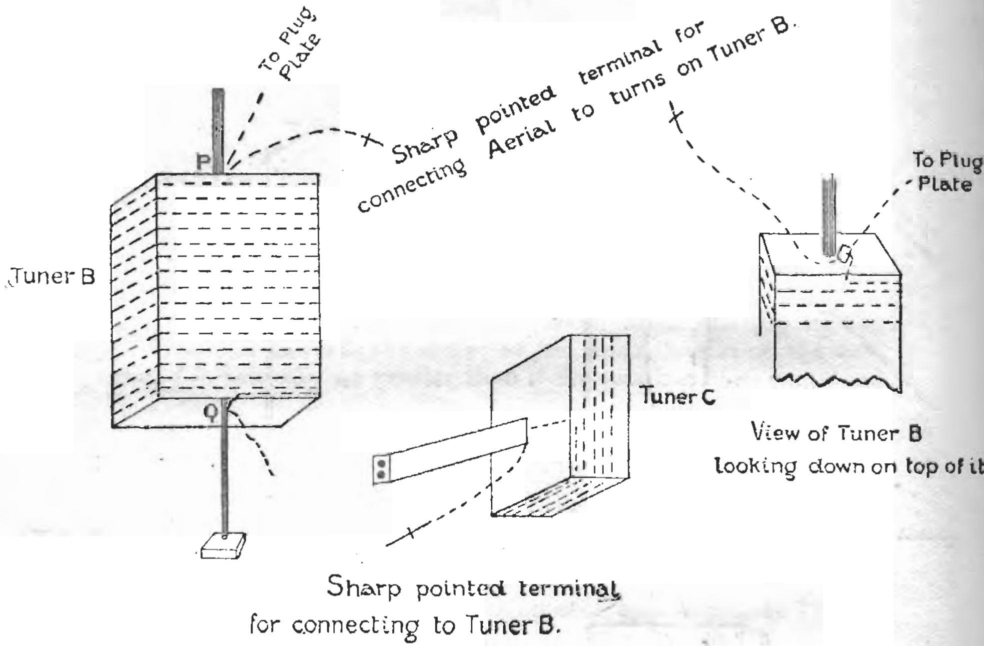
J.—21 Leyden jars in parallel.

S.—Spark gap.

P.—Terminal for connecting top turn of tuner B, leads F and K, together.

Z.—A weight for lifting safety lever of signalling key.

FIG. 2.


To Plug Plate
Sharp pointed terminal for connecting Aerial to turns on Tuner B.
P
Tuner B
Q
To Plug Plate
Tuner C
View of Tuner B looking down on top of it
Sharp pointed terminal for connecting to Tuner B.