CHAPTER IV

THE AERIAL AND FITTINGS

The Aerial

Serving the double purpose of radiating and receiving the electric waves, the aerial is a portion of the wireless installation which requires particular attention. It takes many forms, some of the most important being the "T," inverted "L," "Umbrella," "Fan," and "Tubular." On board ship various modifications of the "T" and "L" type are used, the most usual form on board commercial vessels being the twin wire "T" form. The "L" type is used where it is inconvenient to bring the down leads from the centre of the horizontal wires.

The accompanying diagrams show clearly the structure of two typical aerials, one of the "T" form and the other of the inverted "L" type. When of "T" form the two arms of the "T" must always be of equal length. The wires of the aerial are carefully insulated where they enter the wireless cabin and at all points of support. This is very necessary, as when transmitting the aerial is the seat of a very high voltage charge of electricity, which if it were to leak to earth

would prevent proper radiation. Similarly in receiving

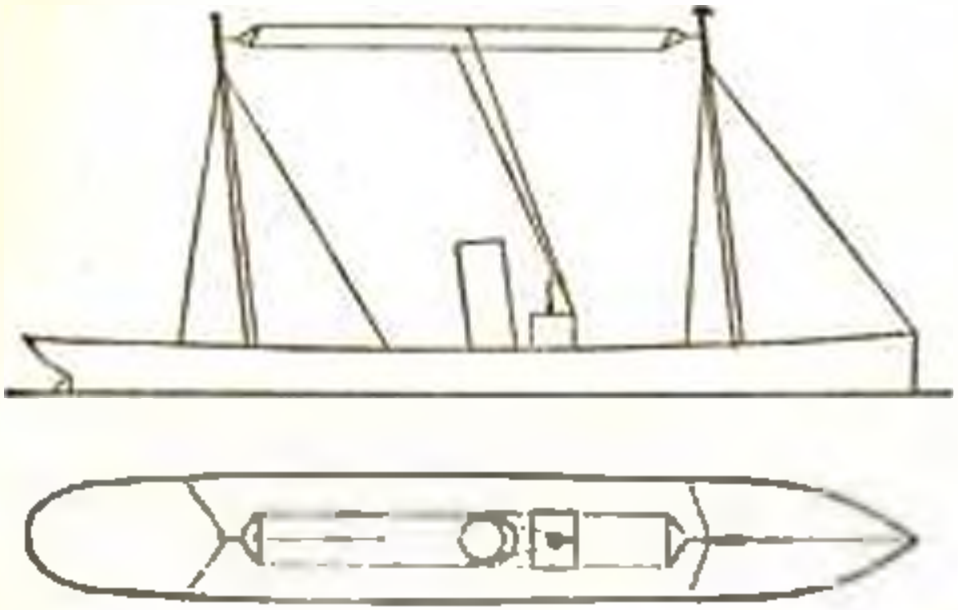

FIG. 44.—"T" Aerial.

FIG. 45.—"L" Aerial.

the feeble current generated in the aerial must be led

to the receiving instruments, any leakage by other paths representing so much loss in efficiency.

The necessity of always keeping the aerial efficiently insulated must always be borne in mind by the wireless operator. It is useless having everything inside the cabin in perfect order if the aerial insulator is bad. In the case of a leak occurring it will be found at one of the following places :—

(1) At the extremities of the horizontal portion of the aerial, i.e. near the mast heads. This will be found at one or more of the insulators at these points. The leakage may be caused by a coating of dirt on the surface of the rubber, ebonite or porcelain, which can be removed by carefully cleaning the insulator. Or it may be due to deterioration of the insulator, which will make necessary the substitution of a spare. Notes on the care of insulators will be given later.

(2) At the point where the aerial leads enter the wireless cabin. Leakage here may be due to the leading-in insulator being covered with dirt, such as deposited carbon from the smoke of the funnel; to a cracked insulator allowing sparking to the framework of the ship; or to some object having fallen against the lead-in and offering a conducting path. This fault may be removed by cleaning the insulator, replacing the broken insulator with a spare, or by removing any object which may be offering an alternative path to the current.

(3) At a point where the aerial wires may be held in position by a strain insulator. Such insulators are used where it is necessary to keep the aerial wires clear of some obstacle, such as a rope or guy; a dirty or faulty

insulator causing this defect should be cleaned or replaced as may be necessary.

(4) At the point where the aerial wires may have sagged and come into contact with, or approached sufficiently close to spark across to, a rope, guy or other object. This can be remedied by seeing that the aerial is suitably tightened or stayed back.

So far it has been assumed that the aerial wires themselves are in good order. This, however, may not always be the case, as there may be considerable loss in resistance at faulty points of contact. Thus if the aerial has broken at any time and has been carelessly repaired by loosely twisting the wires together, a film of corrosion and non-conducting material may form where the wires come together, creating a very high resistance at this place, which although not hampering transmission to any great extent (such high-voltage current can spark across the non-conducting space), may yet seriously affect reception. Again, a similar fault may occur where the down lead is connected to the leading-in insulator.

Faulty aerial joints have frequently been caused by the operator entrusting the repair to the bo'sun or some of his crew and not properly supervising the work himself. Sailors have to be made to understand that a good strong mechanical joint is not necessarily good electrically. Before being joined the wires must be carefully cleaned with sand- or emery-paper, each separate strand being cleaned, the wires then being tightly spliced and bound with thin copper wire. It is essential that a good splice be made and not merely a looped joint, as this latter, by being loose, will not give a proper electrical contact.

The method of joining the down lead of a "T"

aerial, so as to avoid strain on the joint, is depicted in the accompanying diagram.

Whenever the aerial is removed the wire should be carefully inspected, parts which are bad being renewed. It should be noted that because the wire is in good condition in one part, it does not follow that it is good throughout. The down lead behind the funnel will always be the weakest part, as at this point the aerial

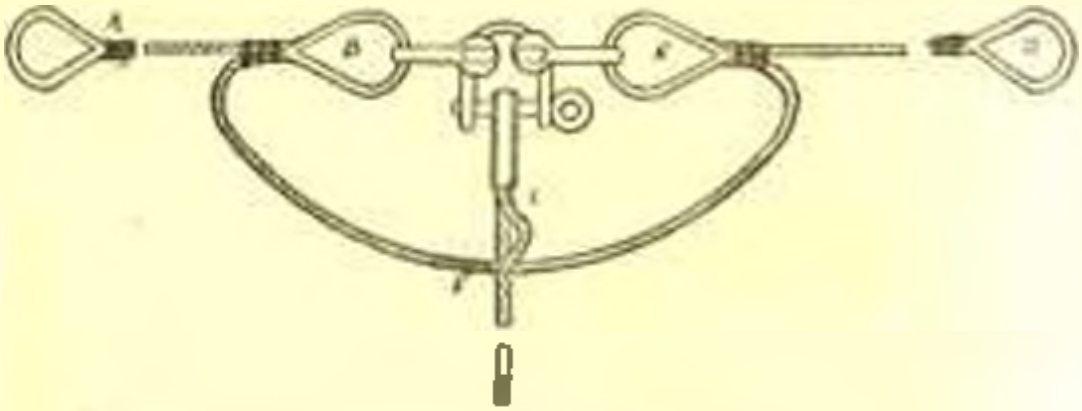

Fig. 46.—Method of joining Aerial Downlead.

becomes heated by the funnel gases. The horizontal wires above the funnel will also suffer from the same cause.

If the wire is good, it should be possible to give it a couple of turns round a lead pencil without any of the strands breaking. If a crackling sound is heard on bending the wire, this should be taken as a sign that it is decayed and requires renewal. Bad wire should be cut out and new wire carefully spliced in its place. Where new wire is inserted, care must be taken that both sides of the aerial are kept the same length. It is advisable to keep a complete spare aerial ready to run up at a moment's notice.

The spreaders must also be examined when the

aerial is removed to see that the fittings are secure and that the wood is sound and free from splits. An occasional coat of paint assists in preserving the wood.

Care of Aerial Insulators.—Whenever the aerial is lowered, which should in normal circumstances be not less frequently than once a month, the whole of the insulating gear should be carefully overhauled. The flexible strop insulators, which are made up of a hemp core covered with indiarubber, should be changed each time, those removed being replaced by a set from spare stock. When the strops are removed they must be cleaned with cotton waste dipped in paraffin or methylated spirit, then wiped dry, and finally given two or three coats of Bitumastic solution. The strops must then be hung up vertically in some suitable place which is free from dust, so that the coating may harden.

The type of aerial insulator known as the "Turnbull" is really a special form of ebonite insulator, the ebonite being of tubular form with a cord core to take the strain. This cord is never exposed, and any stretching which may occur is allowed for by two sliding sleeves at the extremity of the main ebonite tube. Turnbull insulators can readily be cleaned by rubbing with paraffin-soaked cotton waste, and with this type Bitumastic solution must not be used. Should they be extremely dirty it may be necessary to use sand-paper, but this should only be done when the dirt cannot be removed in the ordinary way. After cleaning, the Turnbull insulator should be wiped perfectly dry and a smooth polished surface obtained. When the aerial is lowered great care must be taken that these insulators do not strike against hard substances, such as the mast,

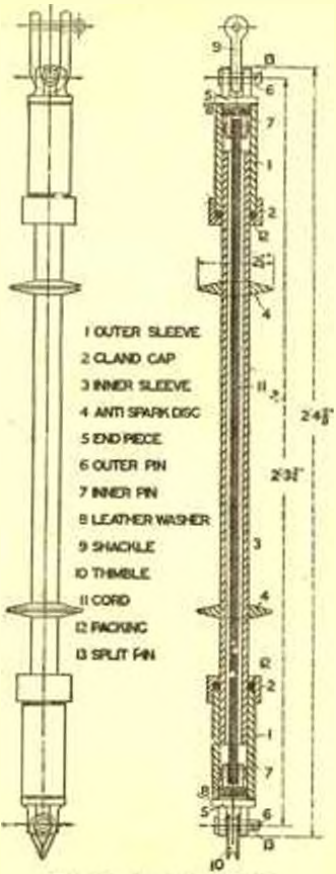

Fig. 47.—Turnbull Insulator.

blocks, deck houses, etc., or the ebonite tubes will be fractured.

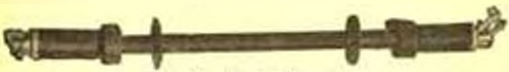

Fig. 48.—Turnbull Insulator.

Ebonite Rod Cone Insulators.—The ebonite portions of these insulators should be cleaned in the same way as the Turnbull insulator, and the metal cones occasionally painted with Bitumastic solution. The Bitumastic solution must not be allowed to touch the ebonite portions.

Porcelain Rod Insulators can readily be cleaned with a damp cloth.

The Bradfield Insulator must be taken to pieces and thoroughly cleaned at frequent intervals—preferably at least once a month. The process of dismantling may be carried out as follows :—

First disconnect the aerial wires, next remove the lead from the aerial tuning inductance to the lower end of the insulator, after which the brass capping piece at the lower end may be removed. The gland gap should then be unscrewed by means of the gland key, after which it should be possible to remove the insulator bodily. The asbestos rings which serve to make a watertight joint in the gland must be taken off the ebonite rod, thoroughly dried and afterwards soaked in thick oil. Next unscrew the hexagonal nuts and remove the brass plate from the upper end, when the metal core will be released and can be slid out of the tube. The metal rod must be thoroughly cleaned, particularly at the threaded ends, after which it should be given a

thin coating of vaseline or thick oil. The ebonite tube of the Bradfield insulator should be cleaned in the manner described under the heading of the Turnbull insulator and rubbed perfectly dry. Bituminastic solution must not be used in this case, although it may be painted on the metal cone to prevent corrosion.

Special attention should be given to the screw threads

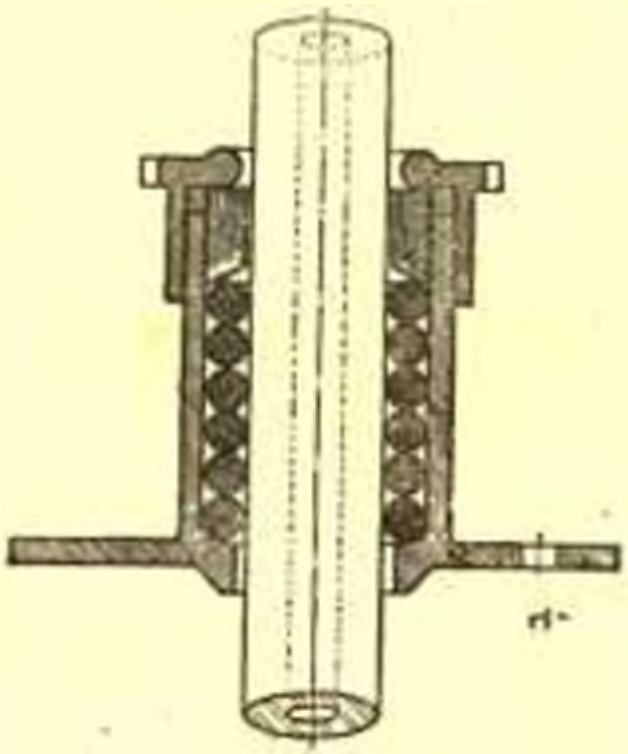

Fig. 49.—Bradfield Gland.

of the rod gland and gland cap and any trace of rust or corrosion removed. The thread should be rubbed over with a very slight coating of oil before reassembling. Spare Bradfield tubes should be stored in a horizontal position, as if they are kept vertically they are liable to bend, thus making the insertion of the rod practically impossible. A bent Bradfield tube may sometimes be restored to its original shape by being kept under weights

in a warm place, in such a manner that when the tube softens the weights will tend to straighten it out.

In the event of a new tube having to be fitted the anti-sparking rings should be carefully removed from the old tubes and fastened to the new one with pitch. If the rings are subjected to a number of taps with a piece of wood they will usually loosen quite readily and can be removed without difficulty.

When connecting up the tension of all the aerial wires should be so arranged that there is no strain upon the Bradfield insulator, or it will be bent and perhaps broken.

Porcelain Leading-in Insulators.—These are readily disembled and cleaned. As in the case of the Bradfield insulator, careful attention must be given to the metal rod and its screw threads. On reassembling and connecting up the aerial wires the same care, to avoid strain, must be exercised. With all porcelain insulators great attention must be paid to preserving the surface glaze. If this is injured the insulating properties are largely lost.