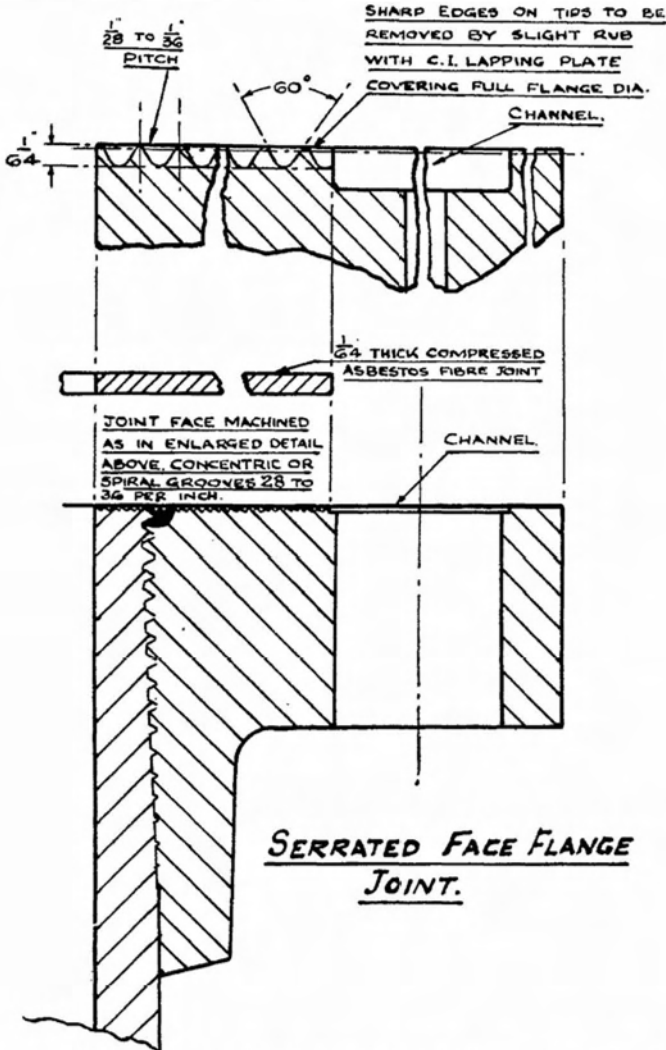


STEAM PIPE JOINTS.

The strength of a flange and its bolting system have to be adequate to withstand the effect of steam thrust on the bore of the pipe and the bending moments imposed; in addition the bolting must also ensure that there is a



residual pressure at the gasket to prevent steam leakage. The effect of steam thrust is readily calculable and does not vary. The bending moments are also calculable if it is assumed that the fixed points of the pipe systems, *e.g.*, bulkheads, are rigid and also that the system is accurately erected with the designed cold pull up given to the joints. Allowance can be made for omission of cold pull up but the extent of the working of the ship can be only a guess. As a result, experience of any particular flange design differs from ship to ship and cases of obstinate joint leakage may occur. The type of gasket is particularly important in these cases. Opinions of the fleet vary considerably, ranging

from no gasket or face to face supporters, to the 'Flexitallic' enthusiasts. Types of steam joints known to be on service are:—

- (a) Face to face—scraped.
- (b) Plain face with compressed asbestos fibre jointing material.
- (c) Plain face with corrugated Monel metal gasket.
- (d) U.S. 'Flexitallic' gasket.
- (e) Admiralty 'Serrated finish.'

(a) A joint of this type has a high resistance to water and has been very satisfactory where pipe lines are perfectly aligned but it is very sensitive to bending moments.

(b) This is a war time relaxation of (a) to save labour. It is satisfactory providing the bolts are evenly tightened and the joints are kept water free. A serious objection is the risk of a major blow-out of the material.

(c) Some joints made with these gaskets have been very successful but disasters have occurred due to the collapse and disintegration of the material under high loading. This type of gasket is not approved for use in the Navy.

(d) Ships which have refitted in the U.S.A. have found the 'Flexitallic' gasket very satisfactory and have recommended its wholesale adoption in H.M. Navy. This gasket consists of an inner disc formed by winding a U. section wire spirally, the wire being interleaved with a strip of narrow asbestos tape. This inner disc is contained in a larger steel ring to prevent the centre unit from blowing out. The resilience of this gasket has made it successful in cases of obstinate leaking joints.

(e) The Admiralty 'serrated' or 'gramophone' finish is now being specified for steam, water, vacuum and oil services. In this type, the joint face within the bolt ring is serrated, a special portable machine being used for carrying out this work afloat. The joint is made with 1/64 in. compressed asbestos fibre. The pitch and depth of the serrations are important but it does not matter whether they are concentric or spiral. A good joint can be made with one flange serrated and its mating flange plain, although it is better to serrate both faces if possible. Details are shown in the sketch on page 67. A serrated joint avoids the possibility of a major blow-out of the jointing material and small leakage can usually be cured by retightening the bolts.

Reports Welcomed.

Some hundreds of joints with this type of finish have gone into service and so far as is known no legitimate failures have occurred. Reports of any are welcomed. Sets of portable machines are held in the major refitting areas in U.K. and at Eastern bases, while repair ships are being supplied with sets. Aircraft carriers of the *Illustrious* class and *Indefatigable* each carry a set and distribution is being extended.

H.T. bolts are being increasingly used for major steam pipe joints as they enable a higher initial bolt loading to be given and also offer resistance to the man who insists on flogging up nuts until the bolt material yields.