

## BEGINNERS WORKSHOP

These articles by Geometer (Ian Bradley) were written about half a century ago. While they contain much good advice, they also contain references to things that are out of date or describe practices or materials that we would not use today either because much better ways are available or for safety reasons. These articles are offered for their historic interest and because they may inspire more modern approaches as well as reminding us how our hobby was practiced in the past.

# JOINTS AND WASHERS

The main methods of sealing various types of mating faces and joints are described here

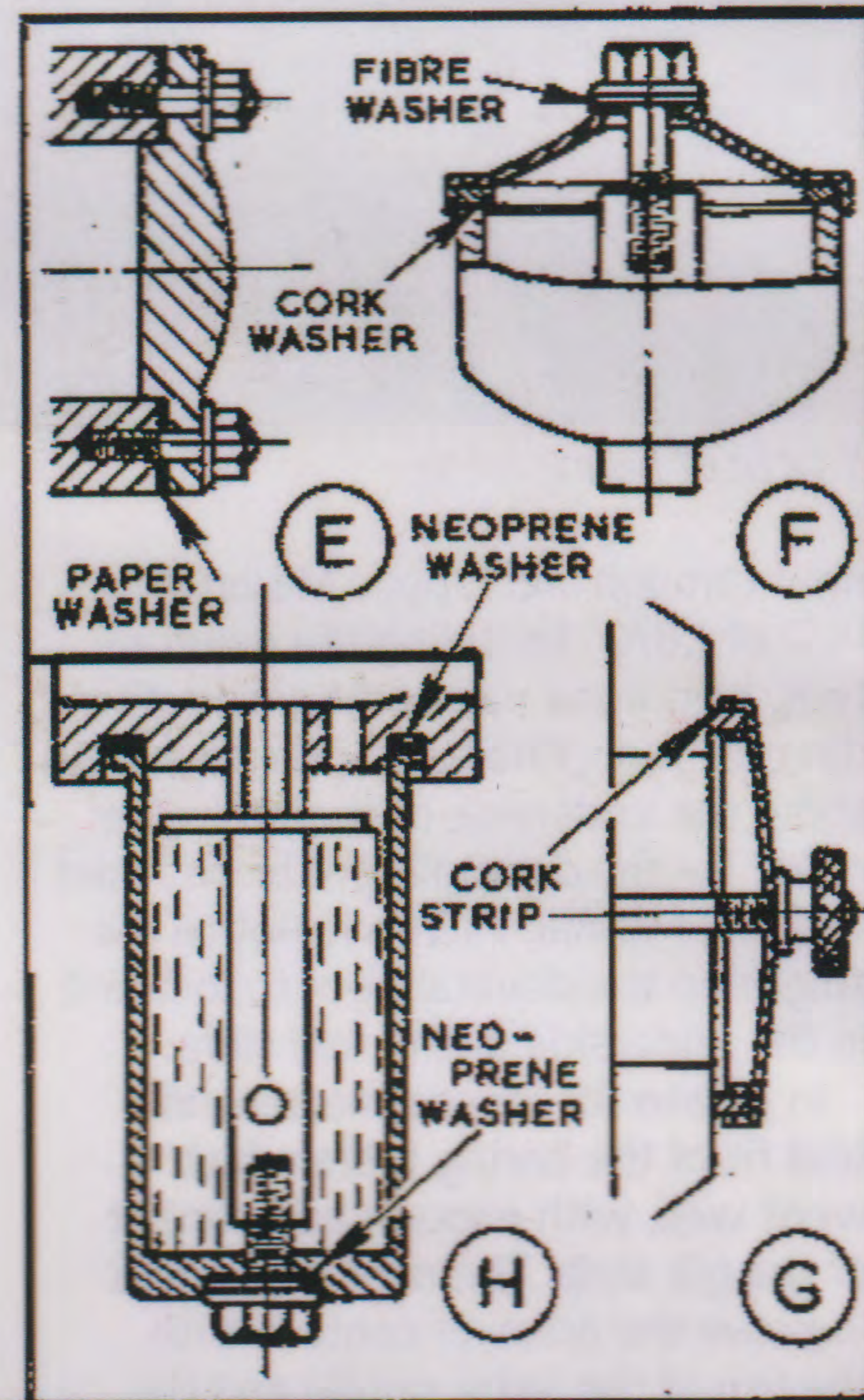
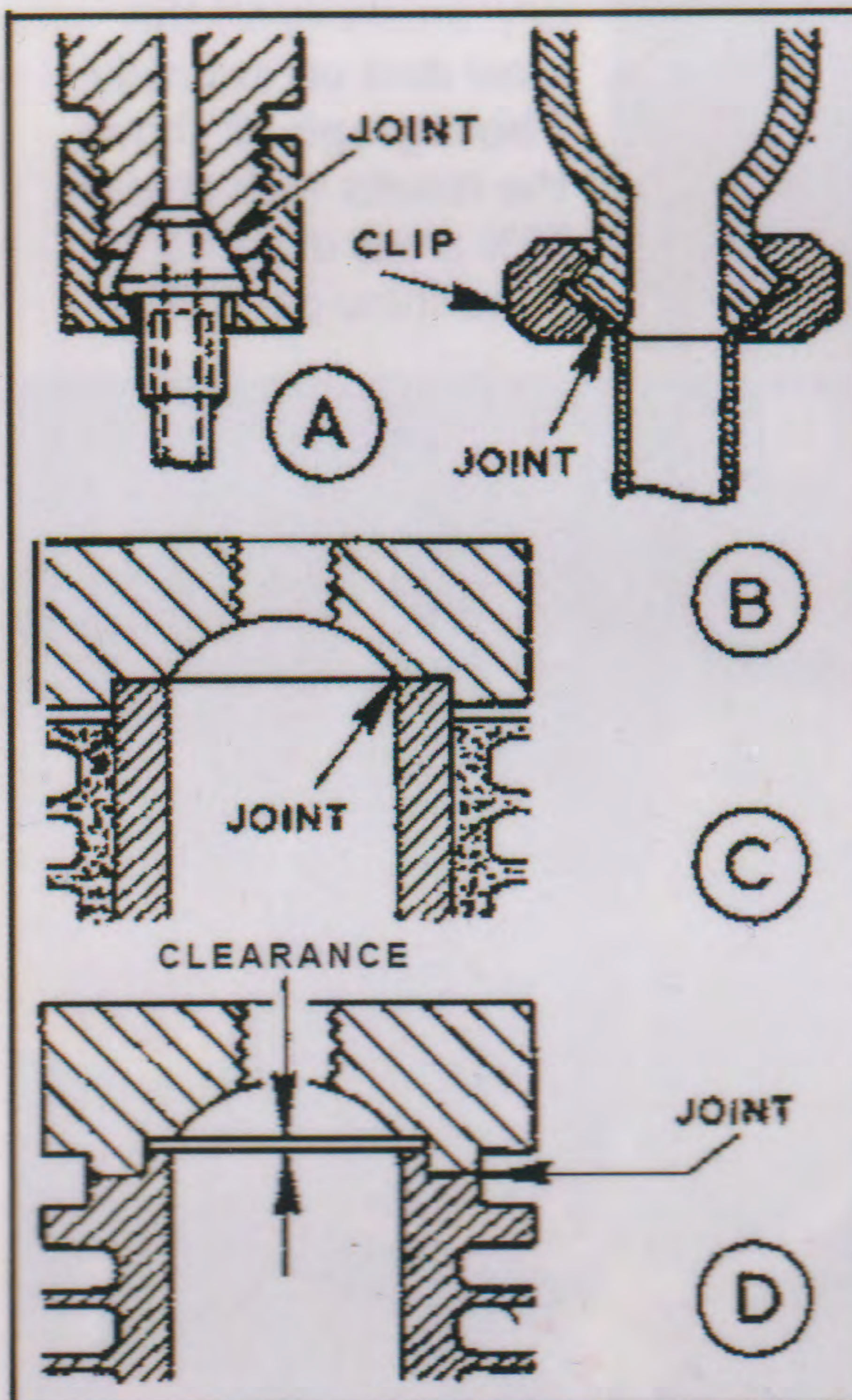
By GEOMETER

**W**HETHER MODEL or full size, it is essential for many pipes and joints to be proof against leakage of pressure and liquids and, at the same time, it must be possible to dismantle and reassemble them. Meeting the different conditions calls for a variety of joints and washers, since what is acceptable in one application may not be suitable in another.

Some joints need to be pulled very firmly together and withstand considerable heat, for example, motorcycle and car cylinder heads, the former using thin annealed copper joints, the latter copper-asbestos gaskets. Other joints require to be pulled firmly together and withstand the action of petrol or oil, for which reason taps and union fittings usually seat on a thin fibre washer.

Where there is less pressure, cork washers can be used and these admit of a degree of compression compensating for irregularities in surfaces. Where both pressure and oil have to be resisted, as on oil filters, special rubber washers "Neoprene" are used with the housing arranged so they cannot be blown out.

Ordinary joints which may need to be simply leakproof or to withstand a moderate degree of pressure and heat can be made by coating the



surfaces of components with jointing compound, or by employing a thin paper washer, this sometimes being treated with compound or oil.

When dismantling, the types of joints should be noted and similar material used in assembly—or if the work is commercial, the proper joints or gaskets obtained.

Many joints are satisfactory with merely a metal-to-metal fitting, where accurate machining is possible. The most common joint of this type is the ordinary coned union, A, the pipe being soldered in, and the joint pulled tight with a gland nut. The cone should be clean and fit snugly. Another type of fitting employs a loose cone or "olive" which is slipped on the pipe and compressed with the gland nut; after tightening a few times, this fitting may give trouble and necessitate renewing.

A larger coned fitting, B, is used for exhaust pipes on cars as an alternative to a flat joint with copper-asbestos washer. The end of the manifold is coned, the pipe flanged, and the two gripped together by a clip having two bolts.

This joint avoids the trouble of burnt gaskets and seized nuts. The faces should be free from scale, and it should be observed that the clip is clear on the neck, so as to grip on the cone.

Model i.c. engine cylinder and head joints are often the metal-to-metal

type. If the cylinder is lined, the joint can conveniently be an internal one, C, made on the end of the liner; a solid cylinder can have an external joint, D. In each case, slight clearance is necessary for the faces to butt up. Sealing on such a joint can be made by light grinding with a smear of paste, working head and cylinder together with a twisting action.

**Imprisoned joints**

The ordinary cover plate joint, E, is flat and made with a paper washer. Where there is pressure, as on a model steam cylinder, slight roughness of the surfaces (obtained by machining with a round-nosed turning tool) assists in gripping the washer.

Washers and joints, however, may be imprisoned so as to resist splaying on tightening, or to prevent blowing out under pressure. Common examples of this practice appear at F, G and H.

On a car petrol pump or filter, F, the cap is sealed with a cork washer and a fibre washer backed by a steel washer is used for the holding set-screw—where the pressure is greater. On a valve cover, G, a cork or rubber strip is often used, placed in a groove, with the gap at the top. This type of joint permits of considerable compression, and allows for distortion of the cover—though if the cover is bent it should be straightened. An internal oil filter, H, usually employs two "Neoprene" washers as shown, both imprisoned to resist pressure.