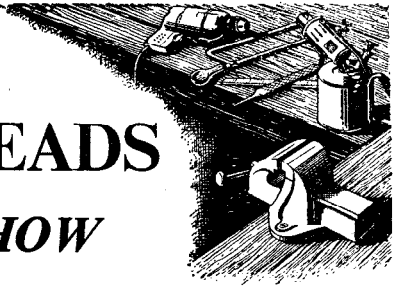


The first steps in tapping internal threads and some of the technical terms used are explained by GEOMETER in ...



# BEGINNER'S WORKSHOP

# THREADS AND HOW TO MAKE THEM

**S**CREW THREADS IN nuts are, in most instances, produced by taps, though large threads and those which do not come within a recognised rate are produced on machines such as lathes, that is they are screwcut.

Over a wide range of sizes, the production of threaded holes in metal is not in itself a difficult operation, as it demands only suitable drills, taps, wrenches, and some knowledge of threads to be produced-plus the skill which comes with practice.

Standard taps are shown in Fig. 1. The taper tap has a long taper at the end for starting easily in a hole. The second tap is less tapered to follow behind the first one, and the plug, or third tap, is parallel down to the end

### Proportions of a thread

The main proportions of a thread are the pitch, angle, and depth. The pitch is the distance, advanced by the thread in one complete turn. In many instances a pitch is chosen which results in complete numbers of turns in 1 in. Thus, pitch is expressed as the number of turns per inch, or t.p.i.

The angle of thread is chosen according to design requirements, and is standard for different rates; common angles are 60 deg., 55 deg. and 47-1/2 deg. The depth is governed by the angle, and by the radius at the top and at the bottom, though threads can be sharp or flattened at top and bottom. The depth, however, is always the same proportion of the pitch for a particular rate of thread.

### Rates of threads

The different rates of threads, are given in text books, but the newcomer to practical work need be concerned with only three. These are the British Standard Whitworth (B.S.W. or Whitworth), the British Standard Fine (B.S.F.), and the British Association (B.A.). In the two first rates, the diameter of the thread is given as a fraction of an inch, and the pitch or

t.p.i. is related to the outside diameter.

B.S.W. is a coarser rate than B.S.F., and has fewer t.p.i. for a given diameter; at present it is used in general and agricultural engineering, while B.S.F. is common on cars and motor cycles, though for special purposes, one or other rate may be used. The angle of both threads is 55 deg.

The B.A. rate is a small millimetre thread, used in electrical, instrument,

drill sizes-obtainable from tables. The angle of this thread is 47-1/2 deg.

The tapping drill size produces the core diameter of the hole, and this must be suitable for the particular rate of thread, so that a full thread is produced, and no more. If the hole is small, too much metal will be left, and it will be difficult or impossible to produce a thread, or in small sizes, the tap may be broken.

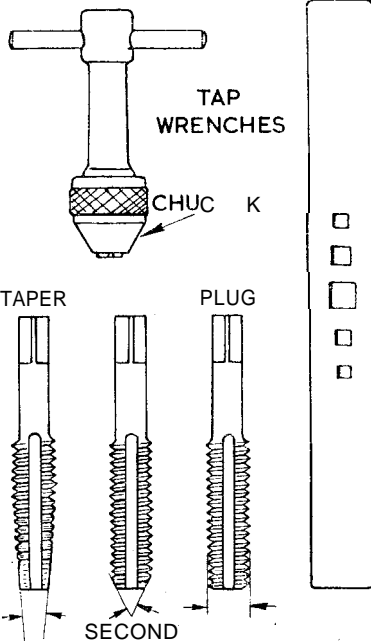


Fig. 1. The standard taps and wrenches used in making threaded holes

and model work. Outside diameters are given in millimetres and fractions of a millimetre, and the pitch similarly. Thus, the pitch does not produce exact t.p.i. These threads are given numbers from 0 to 25, and to deal with them it is only necessary to know the outside diameter, and the tapping and clearing

### Truncated threads

Alternatively, if the hole is too large, the thread produced will be truncated or flat at the bottom instead of rounded, and such a thread is weak depending on the extent of truncation. If the metal to be tapped is tough, however, a certain amount of truncation is not undesirable.

Tables show the correct size tapping drill for standard rates of thread as mentioned, and these should be followed; it is then only necessary to centre punch the position of the hole in the metal, and drill the hole squarely.

If the hole goes right through the metal, a taper tap can be used, followed by a second or plug. If the hole is "blind" however, the taper tap will not bite, and a second tap is required for a start, with the plug tap to finish the thread to the bottom of the hole.

### How to tap

When tapping, work should be mounted firmly, the tap presented squarely and rotated by means of the wrench. After a turn or two, resistance will increase and it is necessary to ease the tap back carefully, then advance again as far as possible, the process being repeated until the hole is tapped; complete withdrawal and cleaning of the tap is also necessary on occasion. For lubrication, thin oil may be used for steel, and paraffin for duralumin and aluminium. Worn taps, like worn dies, produce threads tight in the core or on the outside diameter, due to loss of radius.