By GEOMETER

Thread backlash

THE fine feed and progressive action that are characteristics of screw threads, combined with the change in motion which they provide from rotary to straight-line type, fit them for applications in machines and mechanisms where accurate adjustment or precise measurement is the function. Thus, they are used on lathes for controlling slides, and in micrometers to give accuracy.

Another characteristic of a threaded pair-as a screw and nut are called-is backlash, which may or may not have an influence on their function that calls for elimination. On a lathe, one is always careful after retraction of a slide to take up backlash against the pressure of the cut. But that procedure would not be acceptable for a micrometer-on which, too, a certain degree of smooth friction is essential. So here there is means of adjustment, the nut having an external taper thread, being split and contracted to the screw by a ring nut.

Besides this form of adjustment, which is particularly suitable to the barrel shape of a micrometer, there are several other devices that can be usefully employed for adjusting threaded pairs in light slides, tools, jigs, and so on. All are applicable to threads of V-profile? and some to threads of square section, on which contraction of a nut does not eliminate backlash. In some, thrust can be applied equally in either direction, while in others the intention is to take thrust one way, and eliminate backlash and provide a smooth action the opposite way. They are points of course, that influence choice' of a device for an application.

An easy-to-accommodate device-in the bottom of a small slide, for example-is a plate, as at *A*. It can be a disc, held by countersunk screws in its recess, which, being circular, requires only a turning operation. The hole for the screw is drilled and tapped on the joint line, and thereafter adjustment is made by draw-filing the face of the plate.

A cotter, with a nut either side of a slide, eliminates backlash on a screw by wedging it to the bottom half of the thread. Alternatively, it can provide locking if the application demands it.

Either of these functions can be obtained with a drawbolt, as at *B*, where two locked nuts retain a fine adjustment setting. Together with the slide, the head of the drawbolt is drilled and tapped when tightened down to a washer in its recess. Likewise, a cotter is drilled and tapped in its slide when secured firmly by its nuts and washers.

Split nuts, as at C, are other devices of general application. A circular one, fitting in a smoothly-drilled or tooled bore, can be adjusted either side by screws and locknuts, W, X. One made from rectangular stock, and attached beneath or outside the part which it moves, can be held firmly by the nut on one stud, and adjusted by the other; or a piece of packing (which can be filed) can be fitted in the slit for both nuts to be firmly tightened.

Plain plugs adjusted by cap screws, their inner ends conforming to the radii and thread profile of the main screw, can be used in pairs or singly, as at *D*, in plain or threaded holes. Reaming or milling provides the radii, and threads follow from adjusting the plugs to a tap. With a single plug in a threaded hole, this should be done as the main thread is being tapped.

A circular plate or auxiliary nut, as at *E*, fitted to the main one, or at the end of a slide, offers a two-way setting to eliminate backlash in the opposite direction to that in which thrust is taken. It is a device, too, that eliminates backlash on a square thread.

Automatic taking-up of backlash, and preservation of a nice degree of working friction, are possible with a spring-loaded double nut, as at *F*. The spring-loaded portion, Y, is keyed for alignment to the main part, Z, which can be flange-fitted by countersunk screws. With such a device, the feedscrew should be through both nuts in assembly-to obviate damage to threads. 13