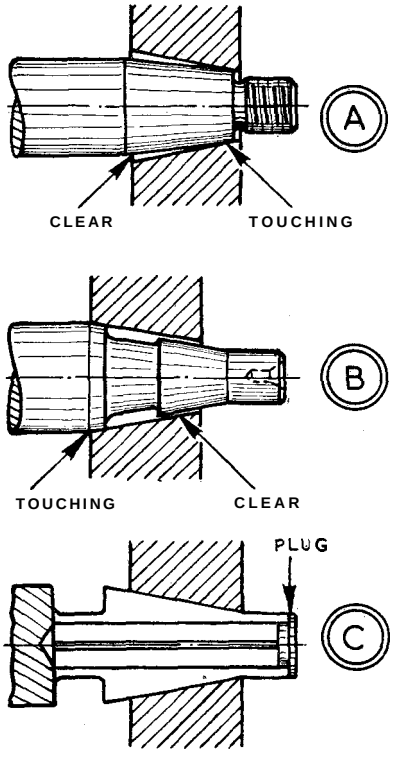
Lapping tapers and seatings

WORKSHOP HINTS AND TIPS

By Geometer

BECAUSE of the manner in which tapered and conical surfaces fit together, lapping to improve the finish or fitting is often not so straightforward as for other parts.

When two tapers or cones, external and internal, of corresponding angles are brought together, the two components are inevitably in a close endwise relationship. Thus; any relative movement is constrained to the oscillating or rotational variety- and when lapping it is virtually the same, with the result that a definite ring pattern is set up on the surfaces, quite different from the multi-directional or haphazard pattern produced in other varieties of lapping.



In some instances, this ring pattern need not be condemned, though it is never desirable. For components like poppet valves with true faces mating to true seatings, lapping (ordinarily called grinding-m) has the function of bringing the surfaces into ultimate gas-tight contact.

Using a fine grade abrasive bearing lightly on the valves while employing an oscillating action and frequently changing position, the ring pattern can be kept to a mmimum. But should considerable lappmg be necessary, definite rings and deformation of the surfaces will occur-which must be regarded as very undesirable.

The same is true-only the defects may be more apparent-in the case of taper plug cocks, on which ringing will permit seepage of thin fluids, or dribbling under pressure, to say nothing of, the unpleasant effort required to operate them. In the case of components like hubs and axle shafts, ringing reduces the surface area in contact and the ability to transmit torque-with or without keys.

Ideally, of course, tapers should be machined as accurately as possible, to avoid lapping in many instances, and to keep it to the minimum in others. But not infrequently, a situation which is not ideal arises, as at *A,* where fitting tapers are of different angles.

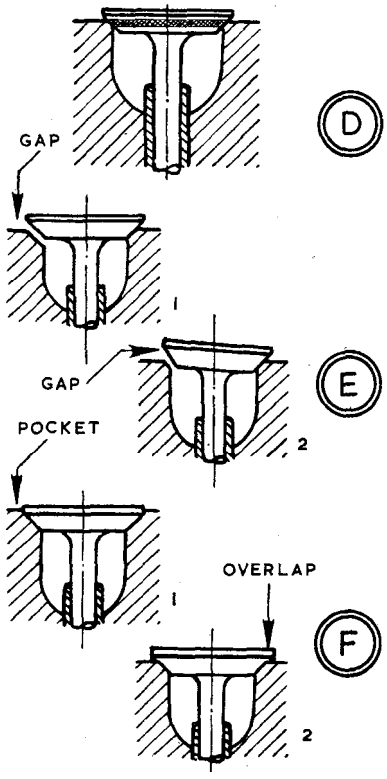
Only if the error in angle is quite small can lapping correct it, using a fine grade abrasive, smearing it initially in the touching area (finally all over) and employing throughout an oscillating movement. With any considerable error, which, in practice, can be quite small, the effect in lapping is often for the abrasive to be speedily crushed in the touching area while remaining active in the clear areas- the reverse from what is required. And the harder the parts are pushed together, the more likely this is.

In such an instance, if the shaft cannot be adjusted (by careful filing in a lathe, for example) a relieved lap is helpful in the early stages, as at B. It can be turned in the lathe and the touching area kept adjusted by filing according to how lapping proceeds at the clear area. Lapping should be by hand with the lathe stopped, and the fitting shaft frequently tried, and then itself finally lapped in.

When exceptional finish is necessary -and to avoid jamming a taper lap -a split type can be employed, as at C. This is turned with a reduced diameter each end, and has a hole drilled with crosswise saw-cuts made full length, which leave four " blades." For support at the open end, a plug is soldered in, so material must be steel or brass. Springiness, good " feel " and small endwise movements are gained during use.

Lapped in, a poppet valve and seating should be as at *D,* angles in agreement. Both surfaces should have a great matt appearance, and that on the valve should be low down or central. A screwdriver or suction cup can be used for the work with a light spring under the valve head.

Typical valve and seating defects appear at *E* and *F.* With a faulty



seating El the valve nevertheless shows a continuous seating. A good seating E2 is marked all round by a faulty valve, while a faulty seating and faulty valve may be misleadingly well marked.

A seating may be pocketed Fl or a valve acquire an overlap F2 from use or excessive lapping. ❑