Hardening and finishing parts

ALL cutting tools in silver steel or cast steel require hardening-and usually tempering -for good performance; and when these materials are used for parts in machine and engine construction, resistance to wear is likewise improved by heat treatment. For such parts mild steel is often chosen, as costing less and being easier to machine. This can be casehardened for resistance to wear.

Pins, bushes, cams, tappets, rockers, etc., are parts that are usually . hardened, though others like screws

By GEOMETER

and nuts that are frequently loosened and tightened as on lathes, can be advantageously hardened-to reduce wear and retain shape at comers.

In theory, hardening, tempering and casehardening are not difficult processes; and such problems as arise concern details, like application and regulation of heat, avoidance of distortion on parts that are lengthy, of irregular shape, or thin in section.

Silver steel and cast steel are hardened by heating to bright red and plunging in cold (not icy) water; and it is this, or uneven heating, which sometimes causes distortion or cracking. For tempering against fracture in use, the steels are polished with emerycloth, and reheated for the change of colour to be seen. A yellow tint is for a tine sharp cutting tool like a razor; and from this, colours darken progressively-straw, dark-straw (a favourite for cutting tools), brown, then purple, which is too soft for tools. When the particular colour arrives, the steel is again quenched in water.

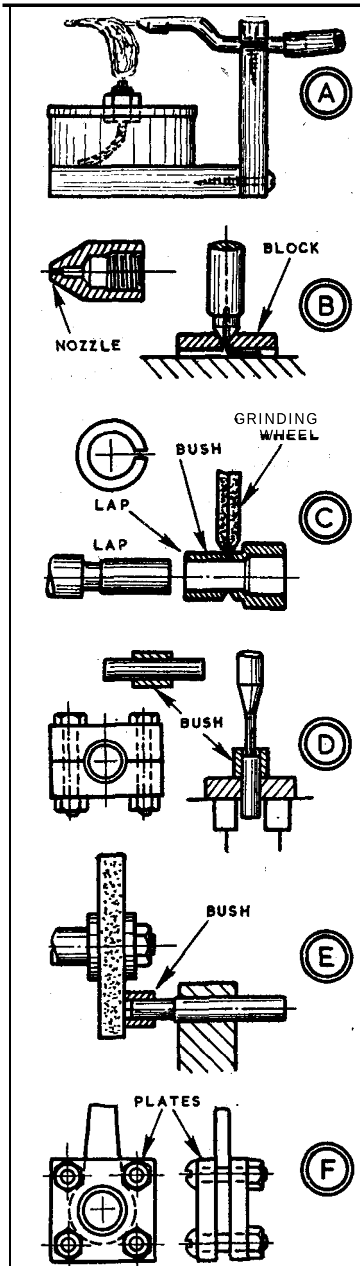
To give mild steel a thin hard casing, it is heated bright red, sprinkled with casehardening compound, or rolled about in it, then reheated bright red and quenched in water. A thicker hard casing requires parts to be soaked in the hardening compound for a much longer period in a metal box, then quenched.

For local heating, as the ends of punches, parts can be held by pliers; but for uniform heating, they can -according to size and shape-be laid on a bed of cinders, suspended on a wire, or laid on a piece of sheet iron and rolled about. This is successful if small parts are casehardened, as the compound can be sprinkled over them, all heated red and quenched. Long parts should preferably be plunged in epdwise.

Overall tempering of parts can be done on a hot plate, or on a bed of sand on the plate; but for tempering a locally-hardened tool, heat can be applied back from the cutting edge for the colours to be seen in motion. For very small tools this requires a tiny flame which can be arranged as at A, with a spirit lamp, and a nozzle on the end of a pipe supplied with air by a pump or other means. Pieces of wood make a suitable holder,. and the pipe can be cranked for height. A tiny nozzle can be made as at B. Brass rod is drilled up and coned at 60 deg., then knocked into a coned steel block in which a strand of stiff Bowden cable is standing. The wire is drawn out of the squeezed-in end, the rod cut off and the nozzle finished from the back.

A way of obtaining a fairly-large but reduced tongue of flame for tempering with a blowlamp is to play it on a piece of thick sheet iron in which a hole has been drilled-the iron being mounted on a bracket in the vice.

Distortion of hollow parts like bushes can be avoided in various ways. As at C, a bush can be left with parent metal for holding after hardening and tempering. Running the bush in the chuck, the bore can be lapped with brass or aluminium rod,. and the outside lapped with a split bush of the same material. Then the bush can be cut off with a V-grinding wheel. Holding a thin bush in a split clamp, or putting it on a piece of rod, as at *D?* from which it can be removed wrlth a punch, assists uniform heating and avoids distortion in quenching. A bush cut off as at C can be ground true as at *E*.



Clamping between thick steel plates, as at is a way of reducing distortion m quenching on the boss of a rod whose bore is to be hardened. If it is casehardened, the compound is only put into the bore, so the outside of the rod remains soft. ❑