

ANNEALING DIES AND TOOLS.

When dealing with cutting-dies, punches, stamping-dies, or any piece of steel which has to be worked or shaped by the action of cutting tools when in the cold state, previous to the tool being hardened, it is desirable that the steel be carefully annealed. Particularly is this necessary when stamp-dies of some peculiar and difficult shape have to be worked and finished in a first-class manner. When a die or punch, after having been forged, is thrown down upon the floor of a smith's shop to cool, thereby being exposed to cold air, especially in winter time, it frequently results in the steel being in an unequally hardened condition, which may also be partly caused by the hammering process. Annealing will generally remedy this defect, as the process of annealing reduces the steel to its softest and most uniform condition. The ease with which steel may be worked by the various cutting tools in a lathe, planing, milling, or drilling machines more than repays the little trouble that is necessary for annealing. Small articles, for instance, as delicate tools, cutters, reamers, punches, and dies, may be placed in an iron box, surrounded or buried in powdered charcoal, the charcoal prevents the steel from losing its carbon and assists the uniform heating of these small tools, at the same time preserving their shape and preventing any damage being done to their cutting edges. After be-

ing heated the box is placed somewhere to gradually get cool before the small tools are removed. The larger tools can be successfully annealed by moderately and uniformly heating them in a muffle, then allowing them to cool slowly. This is sometimes done by burying them in ashes to retard the cooling.

The annealing is usually done before the forgings leave the blacksmith's shop, a good method being to carefully re-heat them after forging to a dull red and place them into an iron box containing slaked lime, where they should remain until cold, which frequently takes a whole day. They are then taken out of the lime, and will be found to be more easily worked into shape, and are not so likely to leave their shape when undergoing the hardening process. There are instances when dies and punches are annealed, roughed-out, and annealed a second time before being finally shaped to their finished outline with beneficial results. But this is not advisable if the tool can be readily worked fairly easy after one annealing, since too much heating may removed the nature from the steel.