

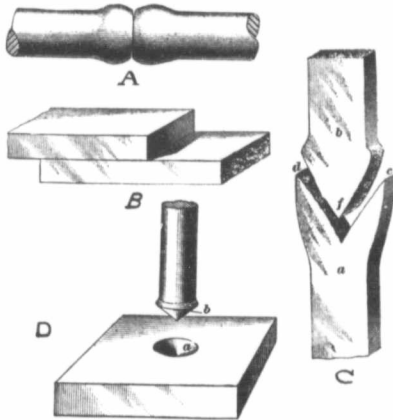
## The Art of Blacksmithing as Applied to the Trade

In the butt weld shown in Cut A, the two pieces are generally upset a little at first, and then welded together as shown. They are hammered on the end to bring them together, and as this tends to upset the pieces still more, they are drawn out to the required size after the weld has been made. In preparing the ends, the surfaces to be welded are made convex, as in the scarf weld, in order to allow the slag to work out.

shown at b. The conical surfaces must be so formed that the parts will come together at the point first, so that any slag will be squeezed out as the piece is driven, or jumped, into its seat. This form of weld is frequently used for quite large work, the bar being driven to place under the steam hammer.

### Building Up

It is frequently inconvenient or impracticable to make a forging



### Lap Welding

In the lap weld, the two pieces are laid together face to face as shown in Cut B, and welded. As the faces are not rounded, the hammering is started at the centre, gradually working toward the edges in order to work out all the slag. If the edges are welded up and any slag remains between the faces, it will keep the metal from uniting in the centre.

### Cleft Welding

When a weld is required to stand considerable strain, such as is caused by prying and bending, the pieces are generally joined by the cleft weld, shown in Cut C. One of the pieces, A (Cut C) is upset to gain width and thickness, and is then split open on the end as shown at a and the two cheeks c and d spread apart; the other piece is then scarfed on both edges, as shown at b. In welding, the pieces are first hammered on the end to get the weld to stick and then hammered on the edges to close the weld. The pieces should be so formed that the weld will start at the point f and the slag be forced out as the sides c and d are closed down.

### Jump Welding

The jump weld is really a special form of cleft-weld. If it is desired to weld a bar to a flat plate, a conical depression is made in the plate, as shown in Cut D. The bar to be welded is pointed, as

out of a single piece because of the shape it is to have. In such a case the forging is built up; that is, it is made of a number of pieces that are forged to their approximate shapes and then welded together. Cut E shows a built-up forging in which the welds are designated by the letters a-a.

### Work Involving Scarf Welds Making a Corner Plate

In order to illustrate some of the applications of the scarf weld, a few simple cases, in addition to the one already given, involving the various principles of welding in general and of scarf welding in particular, will be described.

If a corner plate, like the one shown in Cut F is to be made, two pieces of  $\frac{3}{8}$  in. x  $1\frac{1}{4}$  in. iron, each about 15 inches long, are heated at one end, keeping one of them near the edge of the fire so as to heat it more slowly than the other. When one is hot enough, it is taken from the fire, and the end upset and then scarfed as shown in Cut G. This is done by striking it, and at the same time drawing the hammer toward the hand, in order to draw the metal that way. The other piece is then taken from the fire, upset at the end, and one edge scarfed as shown in Cut H. When both pieces are ready, they are put into the fire and raised to a bright-red heat, turning them occasionally to get the heat even. They are then

dipped into the flux or the flux is sprinkled over their surfaces and they are then returned to the fire and raised to a good white heat on the scarfs. The pieces are turned occasionally to prevent the slag and flux from dropping off. As soon as both pieces begin to approach a welding heat, the blast is turned on stronger in order to raise the final heat rapidly; and if it is thought necessary, a little more flux is thrown on the pieces while in the fire. When hot enough, the pieces are brought to the anvil and put together. In doing this, the pieces are held against the edges of the anvil, care being taken not to touch the cold anvil with the heated portion. When the scarfs are in line, the pieces are brought down flush on the anvil, having the pieces in the right hand below the one in the left hand, so that the left-hand piece will be able to hold the other down while the right hand does the hammering. A few rapid blows will make the pieces stick; they are then turned over to bring the other face under the hammer.

The form of the scarf should always be such that the centres of the surfaces to be welded come in contact first; this will cause the slag to squeeze out as the pieces are hammered together. As soon as the pieces cool to a cherry red, they are reheated and the weld finished. When black hot, both sides of the piece are struck against the horn to make sure that the weld is well made. A good weld will not open on being bent and then straightened. If the weld is good, the corner is tried with a try-square and finished perfectly sharp and square, on the edge of the anvil, as shown in Cut F. The ends are then cut off, making each arm 5 inches on the long edge. When cold, it will be seen that the weld is perfectly tight, the slag having all been squeezed out in hammering.

### Making a T Plate

A T plate like the one shown in Cut J can be made in nearly the same way as the corner weld. The cross-piece a is upset in the centre and the edge is scarfed as

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