the wood. A couple of bicycle hand grips will finish them off.

The next section is the actual bending edge and this needs to be as rigid as possible with a sharp, clearly defined edge if it is to produce a sharp accurate bend. We used a length of 1½in x 1½in x 1-8in angle iron, and this provided all the rigidity required, as well as a good edge.

BENDING EDGE

At this point we must once again consider whether we are likely to handle springy metals like mild steel. Due to the springiness it is usually necessary to take the bend a little past the required angle, since the work will spring back several degrees when the pressure is released.

For this reason the right angle formed by the angle iron would not be ideal for such work, though we found in practice that no such difficulty is experienced with aluminium.

The angle iron is held on the face of the lower wooden portion by means of two ¼in steel bolts and two brass wing nuts. These are located at each end of the angle iron, remembering that the distance between the inside edges is the maximum length of metal that can be held.

As well as the two end bolts we drilled two more holes closer to the centre, and so spaced as to provide a variety of distances between them. This makes it possible to apply pressure at points fairly close to each edge of the work, regardless of the width.

POSITION OF EDGE

The location of the bending edge, relative to the moving portion, is fairly critical and, to ensure that this position is always maintained without the need to set it by hand, the mounting bolts should be a neat fit in both the wood and the metal. The best arrangement is to locate the angle iron correctly, secure it firmly in place with vice or clamps, and drill both iron and wood in the one operation. Use a drill which is no larger than necessary to take the bolts.

Assuming an ideal placement of the hinges the bending edge should be below the junction of the two pieces of wood by the thickness of the metal to be bent and should, ideally, be adjustable to suit different gauges of metal. In practice it appears that a setting of 1-16in is close enough to accommodate the three most popular gauges: 16, 18, and 20.

If a wider range of gauges is likely to be encountered it will be necessary to adopt a slightly different approach, either using larger holes in the angle iron and setting the edge each time by hand or providing several sets of holes in both the wood and angle iron, each set designed to suit a particular range of gauges.

FOLDING ENDS

At this stage the bender may be regarded as complete as far as the main portion goes, since it is now capable of making simple bends up to its maximum length. However, the really difficult problem with any bender is to devise some method whereby the ends of a chassis may be bent after the sides are already bent, since these latter would, in the normal way, foul the bending edge.

Commercial machines adopt a number of solutions to the problem, many of them extremely ingenious but they do not lend themselves readily to a simple design of this nature.

After many suggestions had been put forward and duly considered we finally adopted a design which appears to be a reasonable compromise between simplicity and efficiency, though there is no reason why other ideas could not be employed. In fact, it may well be that the choice of several different systems is desirable to suit individual problems.

OUR SOLUTION

We based our method on the assumption that it is sufficient to bring the bend to within 10 or 15 degrees of the required right angle, it being comparatively easy to complete the bend by hand methods without adversely affecting the quality of the job or the accuracy of the bend. Once again the use of aluminium is assumed.

We, therefore, replaced the angle iron bending edge with a length of mild steel strip, 1-8in thick, 1¾in wide, and the same length as the angle iron. This was drilled identically with the angle iron so that the same mounting holes could be used, though we found it desirable to add at least one more hole near the centre to provide an additional pressure point, since it is much less rigid than the angle iron.

The next stage was to file a number of grooves in the bending edge to accommodate the chassis sides already bent, and these were so spaced as to suit a reasonable variety of sizes. Two grooves were located near one end of the metal strip and were spaced ¼in apart. One was ¼in wide and the other 1-8in. Another group, 1-8in wide, was cut at one-inch intervals and commenced at 6in from the farthest of the first two.

In this way a range of sizes commencing at 5½in and progressing in ¼in steps may be handled, the maximum width being limited only by the number of grooves one is prepared to file. It seems quite likely that additional grooves will be required in our case, but it is proposed to leave these until the requirements can be seen more clearly.

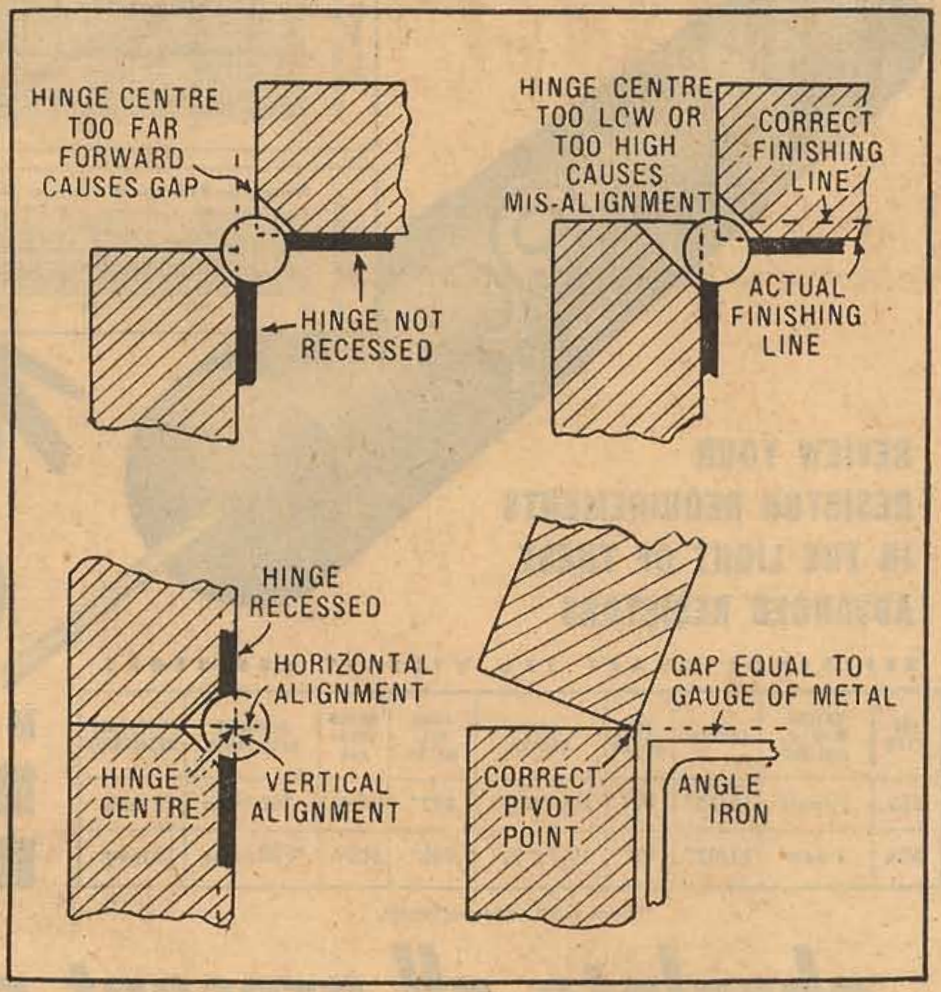
THE GROOVES

The grooves are filed at an angle to the face of the strip so that they vary in depth from nothing at a point ⅜in from the edge to almost the full thickness of the material at the edge, thus leaving only a knife edge to meet the other fold which would otherwise be fouled.

Where only a narrow piece of metal is to be clamped under the

(Continued on next page.)

HOW TO MOUNT TWO HINGES



These diagrams show how the hinges are correctly mounted in place.