

adjustable, both for initial setting to get *C* tight on the work, and for taking up subsequent wear. In the fixed-size device mentioned, the links were firmly secured to the pivot pin, *G*, and were free to rotate on pin, *F*.

This is the better arrangement. Adjustment for centres of *A* and *C* was provided by means of eccentric bushes in the links, *E*, for the pin, *F*; these bushes being fixed by set-screws after adjustment. In the present arrangement, the adjustment can be met by that for different sizes of the block, *A* (the radii of bend), which is of much greater range and is given by mounting the pin, *G*, in the slots, *H*, in the links, *E*. This obviates the eccentric bushes, but makes it necessary to fix the links to the pin, *F*, which must then be a very close rotating fit in the base, *B*, as the latter is off the centre line of the rollers, where the strain comes.

Use of the vice

The work is held in a vice which has facing semi-circular grooves in the jaws. The fixed jaw, *J*, is mounted on a plate, *K*, which is adjustable on the base, *B*, to allow for different diameters of the block, *A*. The jaw, *J*, while being wide enough where fixed to the base, *K*, to give sufficient support to prevent tilting, is cut away to clear the work which is bent to a small radius through 180 deg. or thereabouts.

The moveable jaw, *M*, is forced towards the fixed jaw and against the work by means of a lever-operated eccentric cam, *N*. The jaw, *M*, is cut away at *M1* to clear the roller *C* while enabling the work to be gripped as close as possible to the bending point. The grooves in the faces of the jaws are made to fit the largest size of tube to be taken; smaller

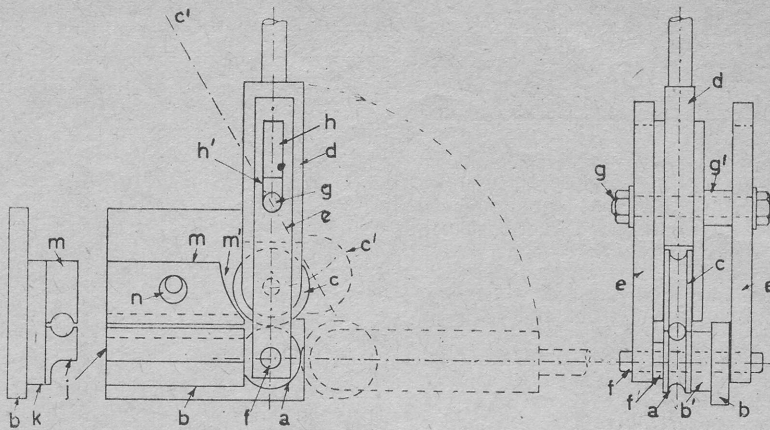


FIG. 1

Fig. 1: Construction of the unit. The keyed parts are referred to in the text

sizes are accommodated by means of split sleeves in the vice.

The main base, *B*, is shown in Fig. 2. It has a projection, *B1*, of the same thickness as the vice base, *K*, to bring the cylindrical block, *A*, into line with the vice. First drill the holes in *B* and *B1* for the pin, *F*, undersize. If a 7/32 in. parallel reamer is available, drill them Morse 3; if not, leave them 5/32 in.

With an aluminium plug to align the holes, set the straight edge of *B1* square with the edge of base and solder the block in place with a blowpipe. Then drill and countersink the two small holes for 1/16 in. rivets a tight driving fit for the latter, hammer up both sides, and file flush. Then enlarge the hole for the pin, *E*, to size with a reamer or drill, taking great care that it is square with the face of base. It should be made a tight push fit for the pin, *F*, and the

same fit for this pin should be observed in due course for the links, *E*, and the block, *A*.

As the pin is a plain piece of rod, it is not separately illustrated; it is preferably a piece of silver steel. The slots in the base are to allow adjustment of the vice into alignment with the block, *A*, in accordance with the radius of the bend. The easiest way to do this is to clamp a piece of work in the vice and bring it into contact with the groove in *A* and then tighten the nuts on the studs under the vice base.

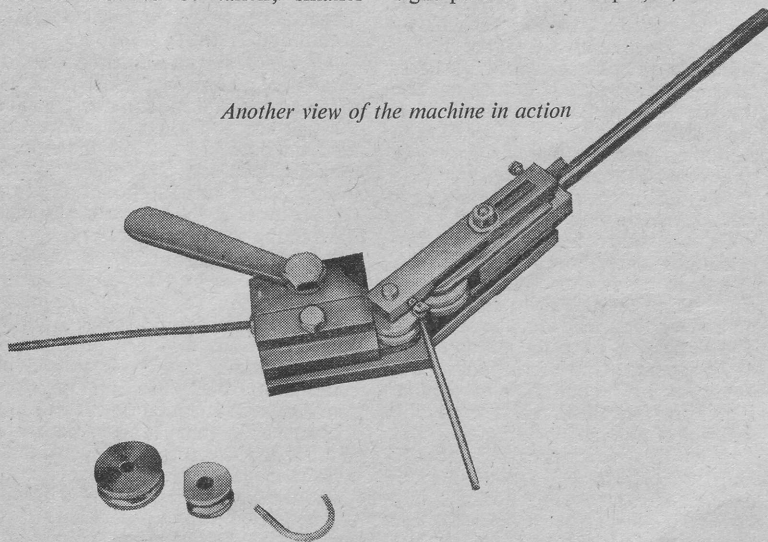
Details of the vice

Fig. 3 shows details of the vice, which are sufficiently apparent without description except for the method of producing the two semi-circular grooves. It should be noted that these are about 1/64 in. less in depth than a full semi-circle in order that a gap between the jaws shall allow them to be fully tightened on to the work.

After drilling and tapping the two 2 B.A. holes on the centre-line of the base, *K*, cut two pieces for the jaws out of 3/4 in. x 3/8 in. stock and clamp one (*J*) into position 1/64 in. from the centre line. A good way to do this is to set the outer edge by feel in line with a piece of 28 s.w.g. strip held against the edge of base. Then drill and countersink the holes for 9/64 in. headless rivets a tight fit and file them flush both sides after riveting.

Clamp the moving jaw, *M*, against the fixed jaw, *J*, with a piece of 20 or 21 s.w.g. soft brass interposed. Set up some packing on the cross-slide of the lathe to be 7/16 in. below the line of centres. On to this, clamp the vice assembly with the brass division parallel to the line of centres and feed across until it is centrally in line with them.

Put a short stump drill in the head-



Another view of the machine in action