A Gauge O Steam Loco for Beginners.

Part 3.

By "1121."

Cross-stay.

The flat plate which goes across at the junction of the main and rear frames (Fig. 7) is built up with its two brackets on each side in exactly the same way as the buffer-beams, and calls for no further instructions.

Frame Assembly.

Clamp the front end of one mainframe on to its appropriate bracket on the front buffer-beam, with the toolmaker's clamp, making sure it is the right frame, the right way round, and that the buffer-beam is the right way up, also that the top edges of frame and buffer-beam are level. Gently tap the front of the buffer-beam, to make sure it is truly in position against the end of the frame, before finally tightening the clamp. See that one of the screw-holes is showing, and just touch the No. 43 drill through it to make a small dimple in the right position on the angle-bracket. Rest the underside of the bracket on the corner of a piece of thick plate to do this, with the table of the drilling-machine swung round so that the buffer-beam can hang down beside it. (Fig. 8). If you haven't a drilling machine you will hardly be able to do an awkward job like this in the lathe—you will have to

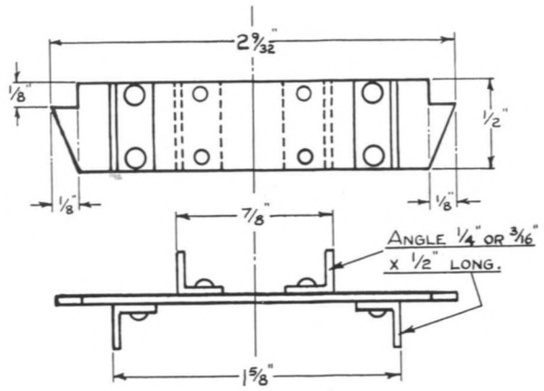

Fig. 7. Frame Cross-stay.

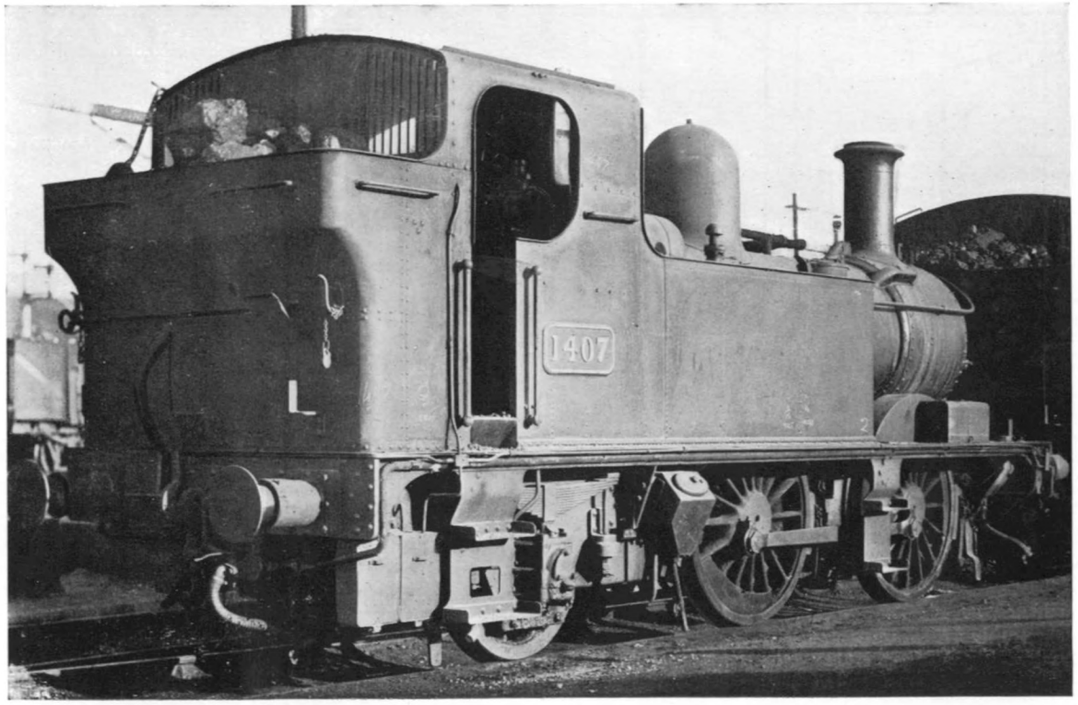

Photo: M. W. Earley.

use a hand-brace, but make sure you keep it truly perpendicular to the job.

Remove the frame, drill the bracket No. 51, tap 8B.A., and remove burrs from surface of bracket.

Tapping Without Tears.

The tapping of these brackets forms a useful exercise in preparation for more difficult jobs to follow. Hold the buffer-beam up on end in the vice, and start putting in the taper tap, squinting at it from various directions to make sure it is vertical. (Fig. 9). If you are using brass angle-brackets, the tap will probably stand being screwed straight in, but if they are steel it may need to be "cleared" occasionally by being turned backwards half a

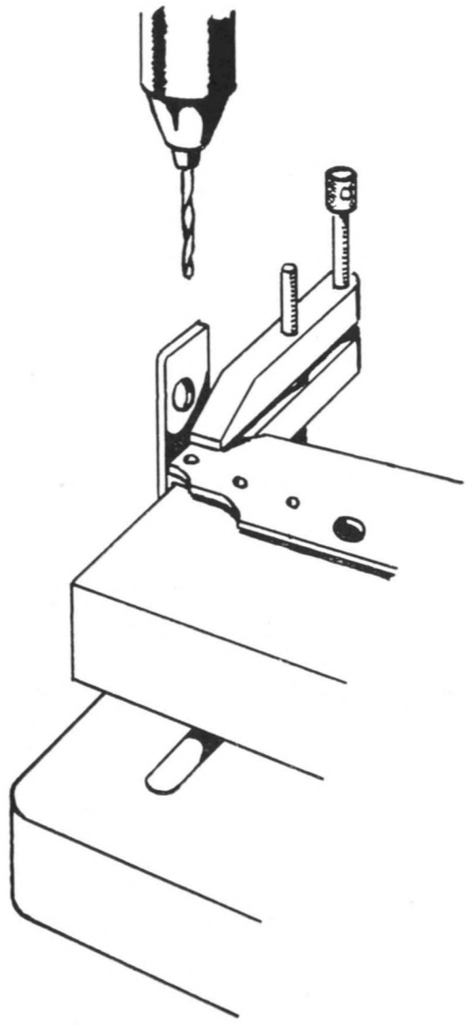

Fig. 8. Transferring screw holes from frame to angle bracket.

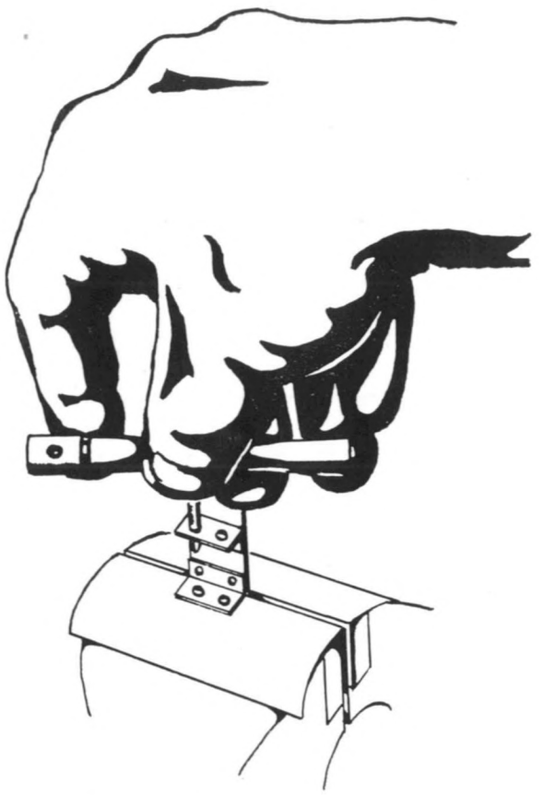

Fig. 9. Tapping the angle brackets.

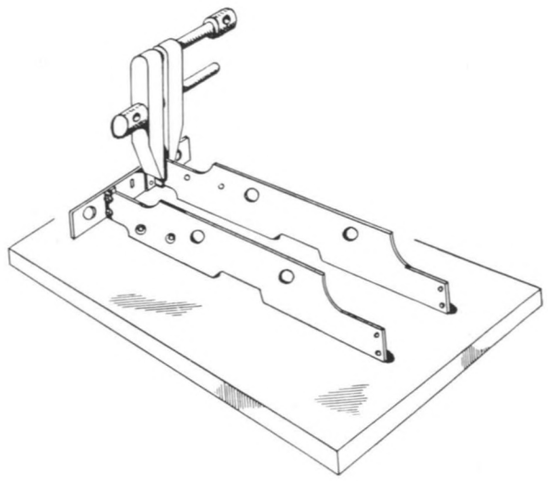

Fig. 10. Square up the frame assembly on the surface plate at all stages.

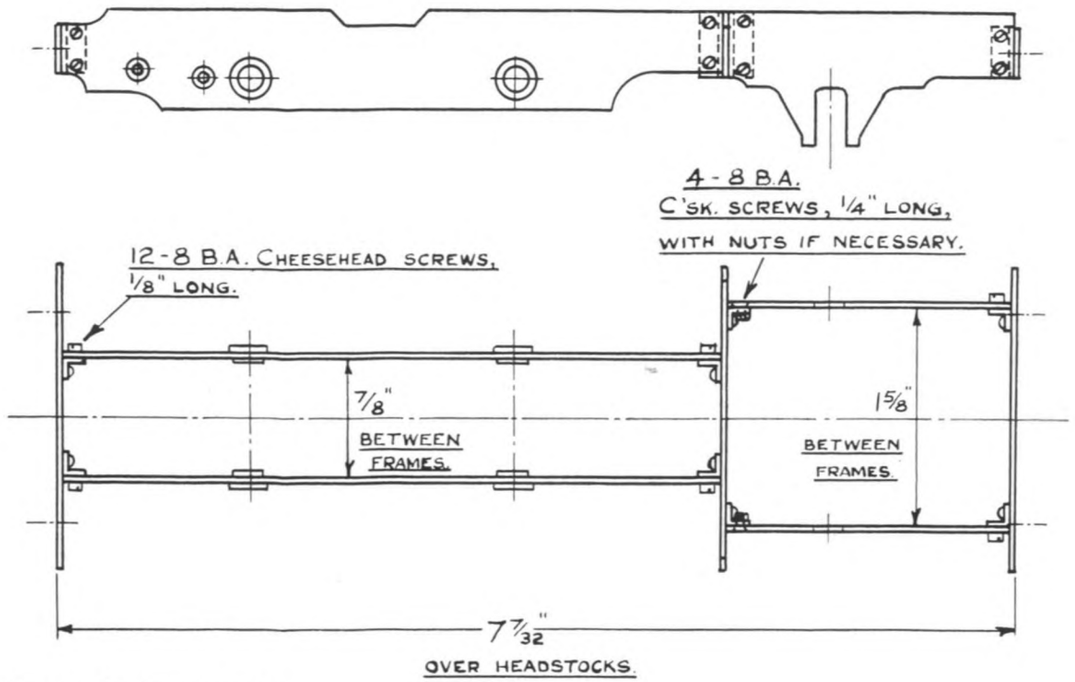

Fig. 11. The Frame assembly.

turn or so for every bit of inward cutting. Unfortunately this is not a process for which we or anybody else can give very definite instructions—on paper, at any rate. It is just necessary to learn from experience how much a little tap will stand before breaking. One thing we *can* tell you, however: lack of *concentration* breaks more taps, and other tools, than anything else. Keep your mind on the job. When you glance up to see the time, that's when the tap snaps off. When you look round to see who's walked into the workshop—that's when you twist your last hacksaw blade in the cut and break it in half. When you look out of the window to see if it's raining—that's when the end falls off that $\frac{1}{16}''$ drill.

Some sort of lubricant is definitely essential for most tapping jobs, particularly deep holes in steel; the best we have struck being an animal fat. Cadge a small pot of old fat from the kitchen when you come to this sort of work, but kindly note that we, and "The Model Railway Constructor," disclaim all responsibility for and knowledge of the idea in the event of domestic strife resulting from the pilfering of large portions of the weekly lard ration.

In the case of thin brass, little lubricant is likely to be needed, an occasional small application of lick usually being sufficient.

Screw the frame to the bracket with a short 8B.A. cheesehead screw, and put the clamp on again over the furthest corner of the bracket and spot through the other hole with the No. 43 drill in the same way, remove frame, drill bracket No. 51, tap 8B.A. and remove burrs as before.

Do exactly the same with the other frame on the other bracket, but before you clamp up finally for transferring the second hole, screw the first frame on again with two screws and lay the whole thing on a surface-plate on the top edges of the frames—the assembly upside-down, that

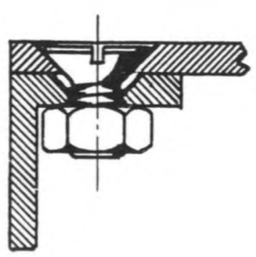

Fig. 12.
The tapped hole in the bracket may need countersinking to allow the head of the screw to come through, in which case a nut would be advisable.

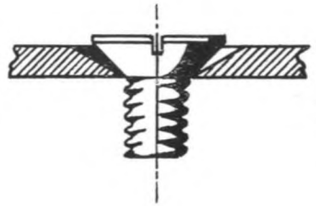

Fig. 13.
The screw-head will not seat down into a countersink made with an ordinary drill point.

is to say. If you haven't a surface-plate, a piece of plate glass is a very good substitute, or failing that use the table of the drilling machine, or the bed of a flat-bed lathe. Make sure the two frames bed down firmly, with no rocking, and tighten up the clamp on the second frame. (Fig. 10). Now transfer with No. 43, dismantle, drill bracket No. 51, and tap as before.

Fit the cross-stay to the rear ends of the main frames, by its front two brackets, by exactly the same process, and then add the rear frames and rear buffer-beam. Note that the top of this comes $\frac{1}{8}''$ below the tops of the frames, to bring it level with the front beam. Make sure the whole thing beds nicely down on your surface-plate—you don't want a sagging engine.

You will note that we have shown countersunk screws at the front ends of the rear frames, on the frame assembly drawing Fig. 11. You can countersink *all* the holes if you like, should you prefer to use countersunk screws throughout, but it's not *necessary* elsewhere, as the screw-heads won't show when the engine is finished. These two on each side, however, *must* finish flush to allow the two little dummy angle-brackets to be added later on, as seen on the outline drawing given previously. We can't have any "super-detail" people complaining that our "steam" construction is cramping their style! Make sure that you countersink these holes sufficiently deeply to allow the screw-heads to go right down flush.

The dimensions of the heads of commercial screws sometimes vary a bit from batch to batch, so you *may* find that the heads come right through the frame and down on to the bracket. In this case, depending on the thickness of the brackets, the process of slightly countersinking the tapped hole *may* leave rather less threads than is desirable for a firm hold on the screws, and it may be advisable to add 8B.A. nuts inside the brackets. (Fig. 12).

A good countersinking bit, if you haven't got one, can be made from the stub end of a broken drill, say about $\frac{1}{4}''$ diameter, by grinding the point to a 90-degree included angle. (You can check this with your square). The ordinary drill-point is too obtuse, and a hole countersunk with an ordinary drill won't let the screw-head go right down. (Fig. 13).

Loco Underframes on Buckinghamshire Branch Line.

By **PETER B. DENNY, B.A.**

Locomotive underframes can be, I believe, comparatively expensive items in the model railway builder's budget, but also somewhat difficult to construct accurately at home when one possesses neither drilling machine nor much experience in metal work. The following method is an attempt to find a way around this problem. Briefly it consists of replacing the usual threaded stretchers, to which the side frames are screwed, by a solid lead casting, the side frames being held in position with nuts and the problem of tapping thereby eliminated. I first used this method five years ago and it has proved so successful that, with certain modifications, it has been used ever since. As so much has been written about locomotive construction I shall limit myself to describing my method of (a) drilling the side frames; (b) constructing the underframe; and (c) assembling two-rail pick-up gear.

DRILLING THE FRAMES.

While it is, I believe a comparatively simple matter to drill side frames out accurately on a drilling machine, my attempts to do this with a hand brace have not been too successful. I have found it impossible to keep the brace at right angles to the work with the result that the holes were either crooked or had become enlarged owing to the lateral movement of the brace, and such holes are completely useless for axle bearings. A simple contraption has been devised therefore which holds the hand brace in the correct position while the holes are being bored—Fig. 1. It consists of two wooden uprights "A" screwed to a base and joined at the top with a piece of wood "B." These uprights must be braced "C" and "D"—"Meccano" strips are useful here—so that they are held at right angles to the base from all directions. A further piece of wood "E" fits in between the uprights "A" and is arranged so that it can be held in position at various heights with screws "F." A hole should be cut in this piece of wood large enough to take freely that part of the drill brace shaft between the pinion gear and the chuck. The purpose of making this part movable is so that drill bits of various lengths can be used and on most drills the length of shaft here is not great enough to permit any extensive vertical movement. A small recess "G" in the cross member "B" is arranged to take the upper part of the brace between the wheel pivot and the top handle, care being taken to see that the centres of (i) this recess and (ii) the hole in "E" are in a line that is at right angles to the base from all directions. It may not, of course, be possible to fix all types of drill braces into a frame like this (actually the drill I used was one from Messrs. Woolworths costing the moderate sum of 5/-), but various adaptions of the principle will no doubt suggest themselves. I need hardly add that obviously the frame must be built up around the drill. The drill is inserted by removing the chuck, passing the shaft through the lower hole and replacing the chuck. The top part is then fitted into the recess and held in place with a "Meccano" strip "A"—Fig. 2—the end holes of which have been opened up to slip over screws. If a hole is drilled right through the base it will be found quite easy to pass the drill bits through here and secure in the chuck. Perhaps I should add that this is not a contraption which could be used extensively since in time the wooden bearings will wear away, but for the few occasions when it is required to drill locomotive underframes it has proved itself extremely useful.

The frames can now be drilled out in the normal way. Very briefly my method is to solder two pieces of 1/16" brass strip together and mark out and centre punch the position of the axle holes. A pilot hole is then drilled with a number 60 drill and this is gradually enlarged until $\frac{1}{8}''$ in diameter is reached and which can then be reamed with $\frac{1}{8}''$ steel rod. Additional holes 1/16" diameter must be drilled for holding the frames together and in this particular method it is important that these should be clear of all the wheels—see Fig. 3 where these holes are indicated at "A."