Signal-box Sub-sectioning

By L. E. Carroll

TOO often, I think, model railway photographs that are otherwise admirable are spoilt by grossly out-of-scale switchboards adjacent to the track and often the accompanying route diagrams merely add to the general clumsiness. No doubt these are intended to be only temporary, but on model railways, real ones too, "temporary" is apt to be a long, long time.

Personally, I do not like cluttering up the line with visible switches of any kind: they seem to me to have such an unrailwaylike air about them. If you are going to install signals sooner or later, as, of course, you are, it is worth considering whether you cannot dispense altogether with a sub-section switchboard and instead do your sub-sectioning through the much neater and more compact lever frame. Obviously, if you have both levers *and* switches to handle for every train movement, you are giving yourself double work and running far greater risk of making mistakes. For you have not only to know the signal-box but to trace out the route on the diagram as well, making sure that all the necessary switches are put on, and later off, each time. One slip and either the right train will stop or the wrong one will start, with awkward results. Even if warning lights are incorporated in the route diagram they are not in the same line of sight as the trains, and, in any case, they cannot normally be seen by a driver bringing a train into your station from way down the line, but a signal arm, working in conjunction with a section-switch operated by the same lever, can.

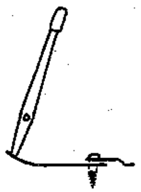

Fig. 2

Overwhelmed by the strength of these considerations (as I hope you will be, too !), I decided to have a real stab at signal-box sub-sectioning, so that only one set of actions was required instead of two. Once the box had been learnt, which was necessary anyhow, the need for a large route diagram would disappear altogether. The lever-frame itself would be the only clutter in view, and even that could be most suitably disguised as a signal-box with access from the rear.

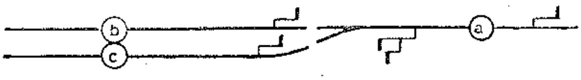

Fig. 1

Perhaps I was also a little biased in favour of this scheme because I was using Linked-Section Control on the main line, and it was natural to wish to make the whole railway signal-box-controlled, if possible. Anyhow, I tried the plan out—and made a go of it.

In working out a scheme of this kind one has first to consider which sections of track can be left permanently "on" and which must be capable of being switched out of circuit except when needed for a particular movement. We will call the former Class 1: they constitute the basic section, and are connected directly to the controller or cab-control switchgear as the case may be. Of the remainder, which are the true "sub-sections," there are four varieties, which we will refer to as Classes 2 to 5. They are:—

2. Those which, especially in two-rail, are fed through points and are, therefore, automatically dead unless the points are set for them. These are, of course, controlled through the point levers.

3. Those (other than Class 2) which are used by traffic under running signals and can, therefore, be energised *via* the home and starting signal levers.

4. Those (other than Class 2) used in shunting movements under the authority of ground discs, and consequently fed through the ground disc levers.

5. Those which cannot be fed (or at least conveniently fed) by any one of methods 1 to 4, and which, therefore, need a separately actuated sub-section switch.

In some layouts it may be necessary for a single sub-section to be fed by more than one method for different movements.

To make all this clearer, let us now look at the very simple terminus shown in Fig. 1. It is evident that track *a*, to the right of the points, can be Class 1, and that sub-section *c* can be Class 2. It will, however, be dangerous to let sub-section *b* remain alive whenever the points are normal, because sooner or later a train will be accepted for *c* before the points have been reversed, and any train standing on *b* will then promptly clout the buffers. Sub-section *b* is, therefore, fed through the corresponding starting and home signal levers, so that it is energised for either departing *or* arriving trains. This is done by feeding the traction current to the lever frame and thence to the sub-sections *via* springy tabs beneath the home and starter levers, as in Fig. 2. If any points or signals are to be relay or solenoid operated, separate contacts must be arranged for actuation by the same lever.

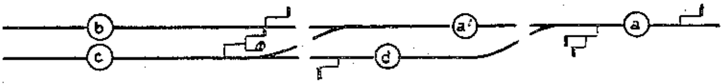

Fig. 3

Of course, Fig. 1 is suitable only for push-pulls or multiple-unit sets, and in practice so small a layout would hardly ever be used. Fig. 3 shows how it might be developed by the addition of a run-round-loop-cum-siding, *d*. This will be fed by reversing the outer points, and is, therefore, Class 2, but *c* can now no longer be fed through the inner points, since it must be energised at certain times even when the crossover is normal. It must, therefore, be relegated to Class 3, and be fed either through the alternative inner home levers or through the shunting disc lever, in accordance with the direction of travel.

The addition of a third platform or

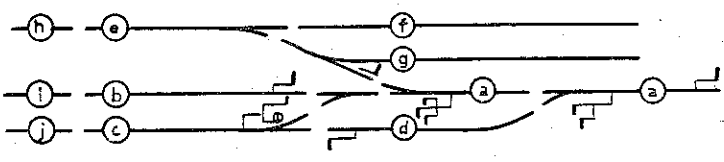

Fig. 4

goods arrival track *e* with sidings *f* and *g* leading from it, as in Fig. 4, will not add to the lever-frame switchgear, since all the required isolation can be secured through the point blades. Sub-section *e* is energised when the point leading to it is reversed, whilst *f* and *g* are fed from *e* in the same way.

Up to now we have not needed any Class 4 or 5 sub-sections, but the normally desirable dead-ends in the platform

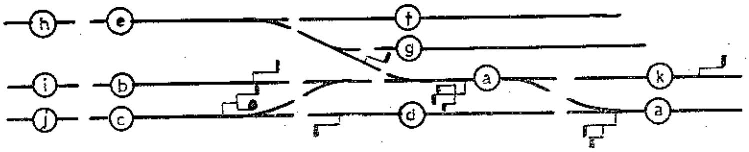

Fig. 5

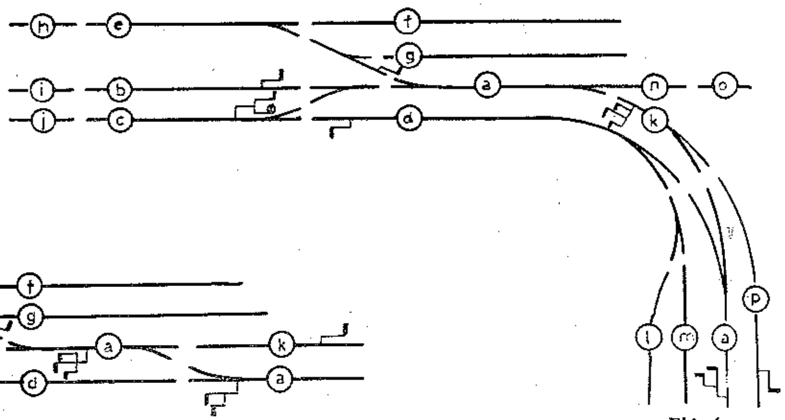

Fig. 6

roads will involve one or other of these types. If arriving trains could be allowed to run on to the dead sections (which would involve a more or less sudden stop) then they could be fed through ground disc levers authorising the outward movement only, but since a controlled inward movement is generally needed, and even if a ground signal were present it would not be used for arriving *trains*, it is best to use special switches for them. Push-buttons are generally recommended, and they *can* be made very inconspicuous, but I use a single-pole seven-way Yaxley rotary switch both for these and for any other Class 5 sub-sections. It is unlikely that more than one of them will need to be energised at the same time, so there is no loss of flexibility. In this case the 11, 10 and 9 o'clock positions of the switch would energise sub-sections *h*, *i* and *j* respectively, and 12 o'clock would represent "off." Any other Class 5 sections would be connected to the 1, 2 and 3 o'clock positions, any one of which might be the normal position of the switch.

Fig. 5 shows the same terminus adapted to a double-track line. A facing crossover now replaces the outer points, and provides a further Class 2 sub-section, *k*. It is, however, no longer possible to energise *d* as a Class 2 sub-section, since we may require it to be dead when the outer crossover is normal. It can now be energised for incoming trains *via* the appropriate outer home lever, but for shunting movements it must be fed *via* the Yaxley or other switch, unless the lever for the disc at the platform end is linked to a two-pole switch feeding *c* and *d*.

Further Additions

Fig. 6 shows the addition of a two-road locomotive shed (*l*, *m*) and a useful spur (*n*, *o*), which was originally to have led to a turntable, and includes a further Class 2 sub-section, *p*. This diagram actually represents my own main terminus in its final form. The three sub-sections *l*, *m* and *n* are all Class 2, but the spur is divided into two sections, the second of which is Class 5, being connected to the 2 o'clock position of the Yaxley, which is normally left at the 1 o'clock setting which feeds *d*, and hence *l* and *m*.

This terminus has been in existence for over four years in the forms shown in Figs. 5 and 6, and has proved entirely satisfactory and easy to work. As the addition of full ground signals would have been of no benefit in sub-section switching in this particular case, and would merely have complicated operations and lengthened the lever-frame unduly, I decided to dispense with them. There would, however, be many cases where they would be needed, especially in larger termini, for movements of locomotives from shed to platform and vice versa, within the area protected by the inner homes. Hence Class 4 sub-sections may often prove useful and avoid the necessity for Class 5.

I have recently had occasion to work out the complete scheme for a 40-odd lever terminus for which only two Class 5 sub-sections were needed (apart from the platform dead-ends), so it is clear that signal-box sub-sectioning is an entirely practical proposition for the average station. It is, moreover, cheap (the switches cost virtually nothing), compact, and railwaylike in action. What more can you want ?

A Stephenson Locomotive of 1836

(*Continued from page 141*)

place by the curved angle-irons shown in the elevation. Between the box-like frames the front of the tender had a floor 1 in. less in height over the beam than the floor of the engine. Having crossed the front beam, the floor sloped downward to the level of 5 in. from the foot of the frames whence it continued to the rear as a 5 in. thick floor, with the drawbar running along it. The well formed by the inner side of the frames and the floor was covered with sheet-iron plating. The mystery is that in the side view there is a cast-iron plate ornamenting the outside of the frames and extending backwards to cover the ends of the back buffer beam. Yet in the plan there is a buffer beam shown projecting beyond the width of the frames. These are incompatibles, and that looks like a possible modification in the building of more than one locomotive. The tender has brakes on one side only. There are three lids on the raised portion, the centre one containing a 12-in. square access to the tank, the two others being toolboxes. That raised portion is covered top and front with wood, and so is the rest of the water tank top. The taps shown from tank to feed pipes are just under tank floor level. In the view of the firebox are seen two long angle-irons, which with two joining their ends and all projecting 7 in. back towards the tender, house the pin and double arm coupling from engine to tender. The cylinder drain cock under the smokebox is on the centre-line. I have not put the bolt-heads on the plan view of the engine frames.

The tender, weighing 3¼ tons empty and 7 tons full, held about 700 gal. of water and 8 cwt. coke—enough for about 30 to 40 miles according to load. The engine was reckoned to evaporate about 77 cu. ft. per hour or 8 gal. per min., taking about 8 lb. of fuel to evaporate each cubic foot. It must have been fun to travel on the ballast engine—so long as there was no reason to stop in a hurry.