JACKSON COUPLINGS

Despite the best efforts of many small suppliers, nobody has yet invented a reliable low-visibility coupling to beat the late Alex Jackson's device, which was and remains as brilliant as it is simple, at least in concept. Members of Manchester Model Railway Society, Alex's old club, retain custodianship of the coupling and are still improving it to this day. Here three of them, JOHN LANGAN, NORMAN WHITNALL and DAVE BOOTH, give the definitive explanation of how the basic AJ couplings work, how to make them and how to set them up. A second article will deal with modern developments making them simpler still:

The comments of Ray Hammond in MRJ No. 49 about the usefulness of Alex Jackson couplings seem to have caused our editor to receive many requests for an article about the coupling – 'inundated' was the word he used! As an interim measure, 'Misc' in MRJ No. 50 carried an offer from Manchester Model Railway Society to provide a small information leaflet to those who sent an SAE; the response was quite astounding and confirmed that publication of the relevant information was indeed required.

Although some work had been done on a Scalefour Society 'Digest' sheet covering modern developments on the coupling, it was fairly obvious that many young modellers had no knowledge of the Alex Jackson coupling and that basic details were sorely needed. What follows, then, is a combination of two sets of words – those first published in *Model Railway News* (January 1960) and the old *Model Railways* (August 1977), written by John Langan and Norman Whitnall and, slightly modified, republished here as the definitive text, and a description of the modern developments in the detail of mounting and making the coupling (originally the basis of a Scalefour 'Digest' sheet) written by Dave Booth and Norman Whitnall.

The team responsible for this article model mainly to EM or P4 standards; accordingly, drawings and dimensional details in the following text are for models built to 4mm to 1 foot scale. We know the coupling to be in use in all scales from 2mm to 7mm but, as our experience is confined to 4mm scales, we feel it unwise to give details for other scales. However, there is no reason to doubt that modifying dimensions in accordance with the ratio of the scales will produce satisfactory results; e.g. for 7mm scale multiply our quoted dimensions by 1.75 (i.e. 7mm/4mm). Of course, all angles should remain unchanged.

ALEX F. JACKSON, B.Sc.

The late 1940s and early 1950s was a period when many developments were taking place in the hobby following its revival after the war. At that time, Alex F. Jackson, despite poor health, gave much encouragement to many fellow modellers by his brilliant approach to the problems of mechanisms, good running, trackwork, and true scale modelling. He first worked in a scale of 3/8in to 1ft and his garden railway, running off 100 volts AC supply, was a source of enjoyment to all who visited him. Many also remember his unfortunate cat which never seemed to learn to keep off the track when a running session was in progress – with surprising results!

A fine example of one of his locomotives in 3/8in scale may be seen in the *MRN* for March 1948. Later, Alex changed to 4mm scale and immediately adopted EM two-rail, using split axles, metal wheels and insulated frames for locomotives, with hub insulation of metal wheels and axles for rolling stock. Here again, we were shown the advantages of using the higher than usual voltage of 24V DC, which was quite revolutionary at that time. This, of course, meant home-built motors which he used with heavy flywheels to obtain smooth and controllable running, which can still be compared with the best of today. No gimmicks in the controls either, just a plain resistance wire controller. His attitude to modelling and an example of his construction methods may be seen in the description of his 4mm scale LNWR 0–6–2 side tank locomotive in the *MRN* for June 1950. The photograph clearly shows the early version of his coupling for which he became so well known. Alex died in October 1952 after a serious operation, when he was in his early thirties, and the hobby lost not only a most distinguished exponent of our craft, but an enthusiastic leader who by his example helped to raise the standard of modelling to that which we still appreciate today.

THE COUPLING

Alex first demonstrated the coupling at a meeting of Manchester Model Railway Society in February 1949 some 43 years ago. We still receive enquiries for information about the coupling, and although very little change has been necessary on the magnetic version, we now present a revised description of this ingenious mechanism. Let us emphasise that we, following the traditions set by Alex, truly believe that our hobby is about *making* models rather than purchasing them; this coupling is very much a 'home-made' item and is not available for purchase.

The coupling is in regular use – we know that it works for us and many others and that our claims for it are justified, but it must be emphasised that whilst it is capable of satisfactory operation in the hands of careful modellers it is not suitable for very rough handling, and accurate maintenance of all angles and dimensions is essential for faultless operation.

By accurate setting in the first instance, using the simple aids to be described, and maintaining this setting from time to time, the coupling will operate faultlessly and indefinitely. Its main advantages are:

- It is unobtrusive
- It is quiet in operation and very mysterious to the onlooker.
- It is reliable if properly made.
- It is extraordinarily cheap.
- Couplings are identical at each end of the vehicle, so that turning a vehicle end for end does not affect performance.
- No mutilation of wagon headstocks or attachment to buffers is necessary.
- The pull for uncoupling, being downwards, ensures that the vehicle is kept upon the track.
- The electro-magnet may be energised by a push button on the control panel before a wagon reaches it with the certainty that it will uncouple as the wagon passes through the magnetic field.
- Uncoupling while moving, with the loco pushing and buffers under compression with couplings slack, is positive and the magnet will operate only one coupling at a time.
- Only one uncoupler is required per fan of sidings.
- After being uncoupled at the magnet location, vehicles may be parted and left at any position on the layout. This allows realistic shunting to take place.

The Hook

The ingenuity of the coupling lies in the design of the hook shown in *Fig. 1*. Each feature of this is important and plays its part in the action of coupling and

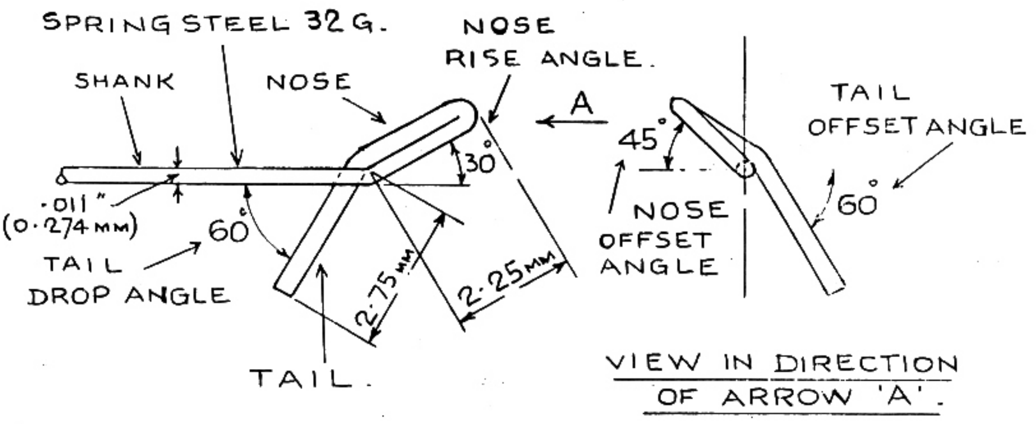


FIG. 1. THE HOOK.

uncoupling. The method used for forming the hook was devised by Norman Whitnall and referring to *Fig. 1* it is essential to bend the wire back along the top of the nose with the tail coming down on the right side of the shank when the coupling is viewed end on. This 'handing' is important so that wagons will couple with each other and also with those already in existence. This way of bending the hook shape produces a strong hook which tightens upon itself when under load and is therefore capable of handling long trains. The hook does not require to be soldered but the tail should be stoned smooth to ensure that it is free from burrs.

The material used to form the hook is 0.011in diameter spring steel wire (32SWG or 0.274mm) sometimes referred to as music wire.

Bending the Hook

At first sight it might appear a difficult task to bend the special shape of the hook consistently but by the aid of a simple jig, as shown in *Fig. 2*, this can be performed easily. *Fig. 3* shows the sequence for forming the hook.

First cut a piece of .011in (0.274mm) diameter spring steel wire about 90mm (3.5in) long, making sure that it is quite straight. Insert one end into the 5mm deep hole of the jig and bend the wire at right-angles. Fold this bend tight upon itself using pliers or the jaws of an instrument vice. Now insert the doubled end into the 2.25mm deep hole in the jig and bend the projecting long wire to the combined angles of 30 degrees and 45 degrees as in *Fig. 3* (bend No. 3). A simple template may be made to check this, but with practice it can be judged quite well by eye. With the double

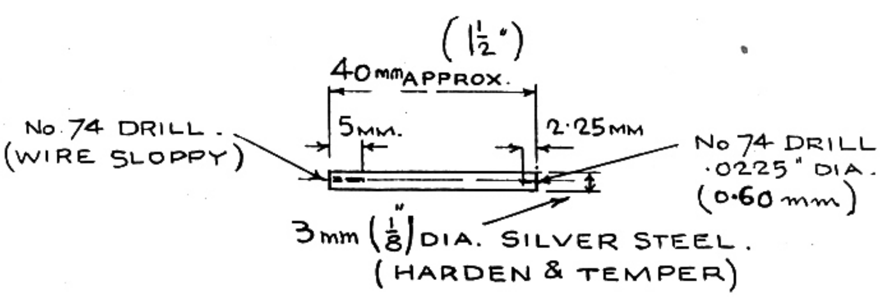


FIG. 2. HOOK BENDING JIG.

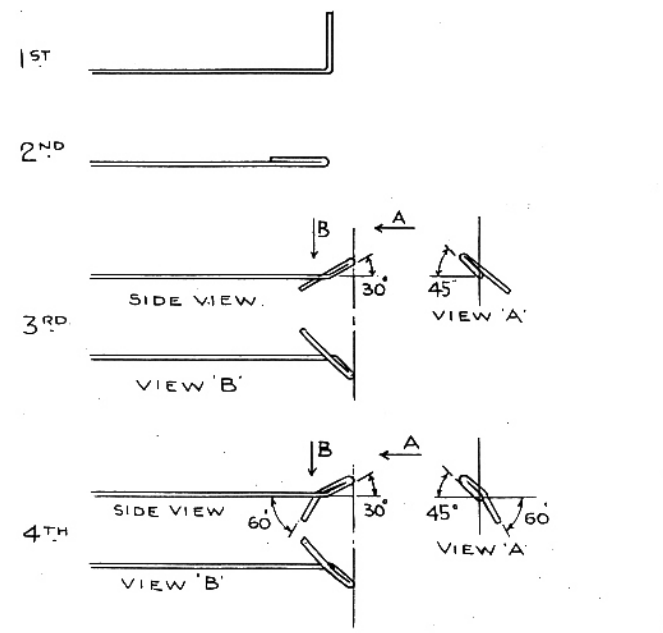


FIG. 3 BENDING THE HOOK.

portion still in the jig, bend the tail to the combined angle of 60 degrees and 60 degrees as shown in *Fig. 3* (fourth bend). These angles do not have to be accurate to the last degree – it is sufficient to judge bends of 1/3rd, 1/2 and 2/3rds of a right-angle.

Flexibility

To obtain the required flexibility for positive operation within the magnetic field, the coupling wire is only 0.011in. diameter and needs an optimum length of 65mm (2.5in). It is anchored at the end of the wagon farthest from the hook, as shown in *Fig. 4*. The fact that the vehicles are really pulled from the end remote from the coupling makes it desirable to fix the end of the coupling wire as near to the centre line of the vehicle as possible in order to minimise the turning moment.

With all this in mind, let us examine in detail the action which takes place when coupling and uncoupling.

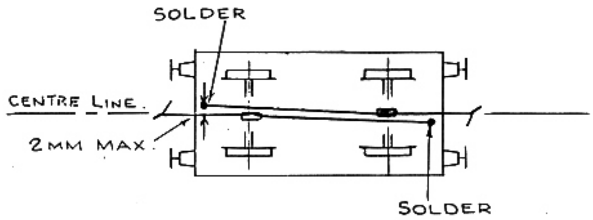


FIG 4 FLEXIBILITY.

HOW IT WORKS – COUPLING

The action of coupling may be followed by reference to *Fig. 5* in which wagon 'B' approaches wagon 'A' and the noses of the couplings slide against each other. Further movement of 'B' leads to contact of the tails of the couplings and a gradual sliding movement in the horizontal plane takes place until the tails pass each other. The wires then spring back to the central position with the shanks in line. The coupling hooks are now in the correct relationship for engagement and at this point the buffers should make contact. Upon reversing the motion of 'B', the tails of the couplings slide along the shanks and engage, whereupon wagon 'A' is also drawn along with wagon 'B'.

It is important that the couplings spring together before the buffers make contact, and to ensure this, the end of the hook tail should be 0.25mm (0.010in) from the buffer face as shown in the drawings. There should not, however, be excessive clearance, otherwise, when the locomotive is pulling a train, the gaps between the vehicles will be unrealistic. Note that it may be necessary to add weight to a free-running vehicle of light construction in order to provide enough inertia to allow the springing of the coupling wires to take place, otherwise wagon 'A' might simply be pushed along by the friction of the coupling tails.

From the foregoing it will have been seen that two wagons may be coupled simply by bringing them together and that the magnetic field plays no part in the operation. Coupling may therefore take place anywhere on the layout, except on sharp curves (a problem which will be discussed later). It will be realised that for two vehicles to come together and the coupling hooks to engage correctly (i.e. centrally), sideplay of the vehicle on the track must be small. The wheel and track relationship of P4, EM or OO finescale (but not necessarily proprietary) is satisfactory; however, side-play of axles in their bearings must be held to a minimum. Greater offset than 1mm from centre line may cause the tails or noses of the hook to pass without making contact.

HOW IT WORKS – UNCOUPLING

Referring to *Fig. 6* we see that wagon 'B' is pushing wagon 'A' by contact of the buffers and the couplings are therefore slackened off. Vertical movement of either coupling will disengage the hook, and in the electro-magnetic system we arrange for one coupling to be pulled downwards by arranging an electro-magnet between the rails (see *Fig. 8*). After having passed through the magnetic field, the coupling springs back upwards but now the tail is on the opposite side of the

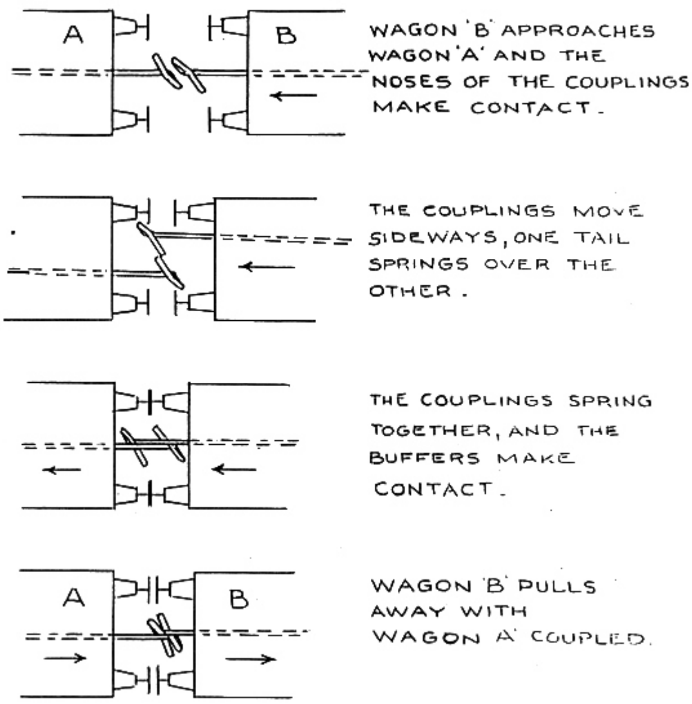


FIG. 5. COUPLING

shank. Upon reversing the direction of motion of wagon 'B', the tails slide past the noses of the hooks and wagon 'A' is released. It will be found that one gets a less jerky action if the coupling of wagon 'B' is pulled down to release wagon 'A'. Note that the path of coupling 'B' is downwards with a slight horizontal movement, and that of coupling 'A' mainly horizontal.

After uncoupling in the magnetic field, the wagons may then be pushed along until a desired location is reached, at which they may be parted without further ado. Uncoupling and parting of vehicles are therefore separate and distinct operations which take place at quite different locations. This means that one electro-magnet positioned at the start of a number of sidings, as at *Fig. 7*, is all that is required to split a whole train. Herein lies the ingenuity of the original design, which distinguishes it from most other types of coupling device. By leaving the magnet energised, the whole train would of course become uncoupled as it passed over the magnet position. If wagon 'A' is of light construction and free-running, it can happen that as wagon 'B' draws away from it, having been uncoupled, the friction of disengaging may draw wagon 'A' along. As mentioned earlier, the inertia of wagon 'A' should then be increased by adding weight to it.

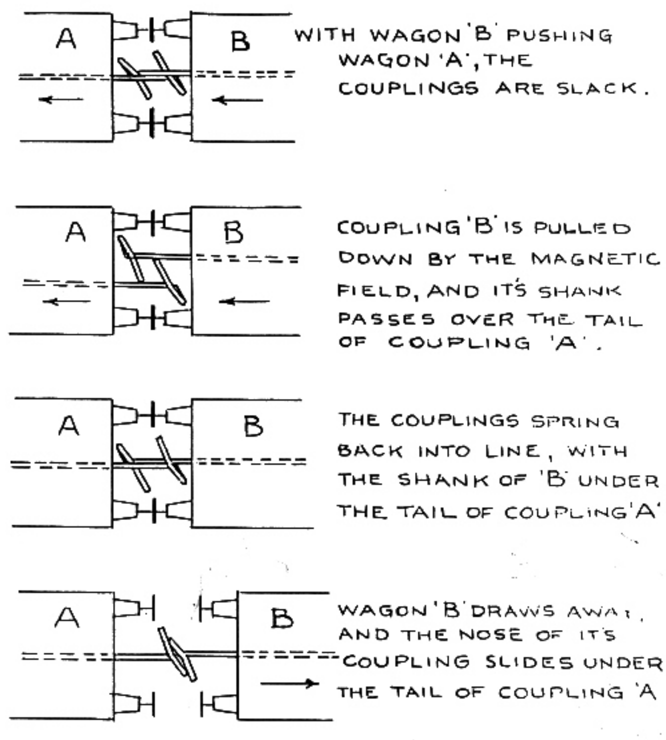


FIG. 6. UNCOUPLING.

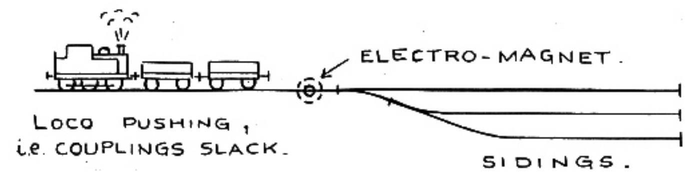
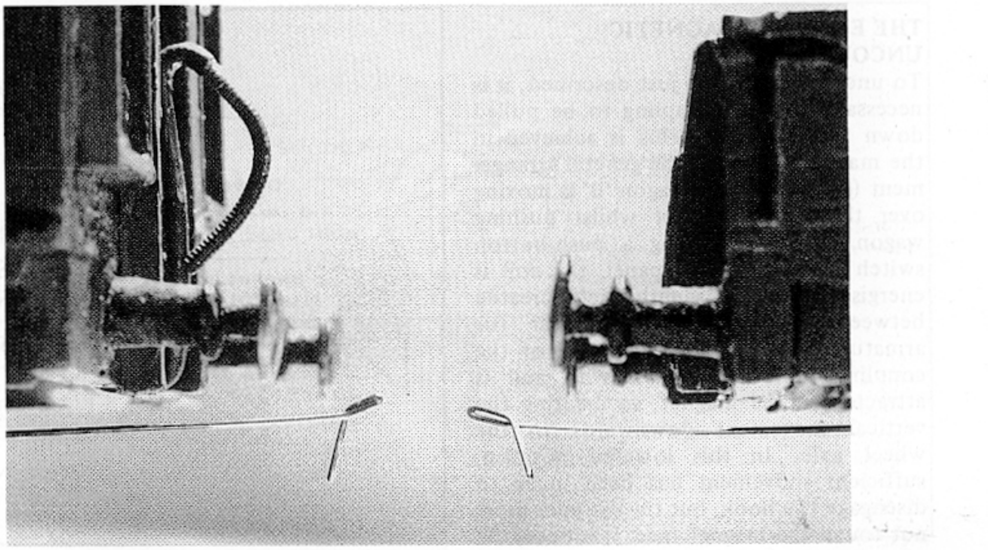
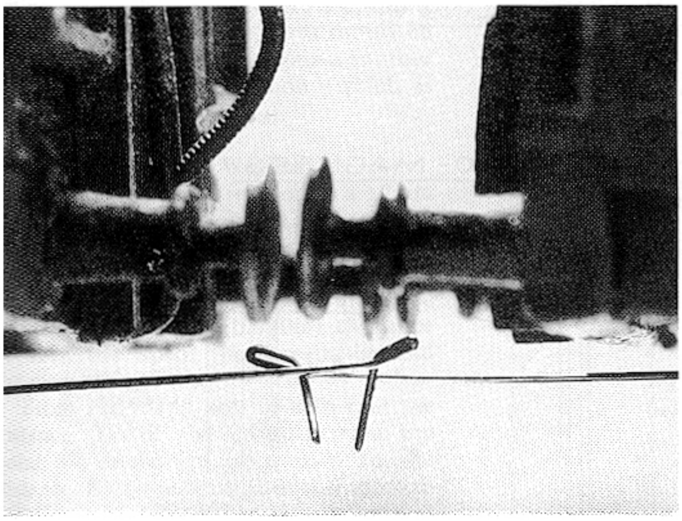


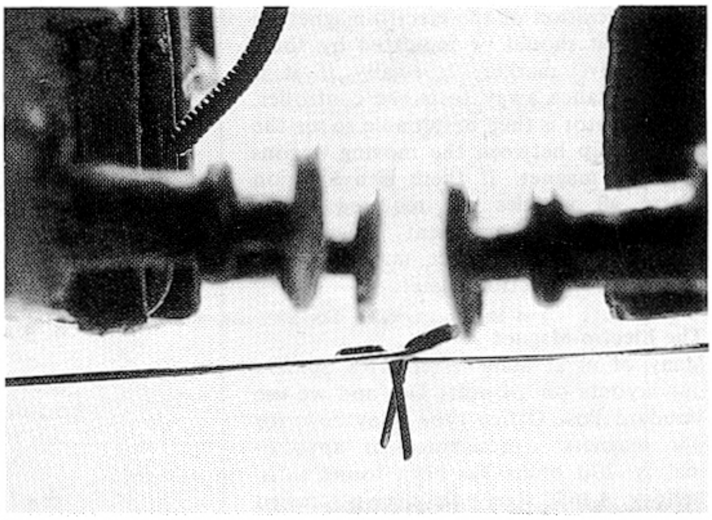
FIG. 7. POSITION OF UNCOUPLER.

A lot of history! The GN wagons were originally built by our dear departed friend Norman Dale and are in the process of conversion from EM to 18.83mm by Norman Whitnall. The layout, of 1970 vintage, was a 'OO' model of Birch Vale (GC & MR Joint) by Maurice Daniels with backscenes painted by Ken Ball, both of Macclesfield MRC. Dave Booth is slowly converting it to P4. The brake is a D & S etched brass kit included to say thanks to Danny Pinnock for his help in producing the etched hinge plates.

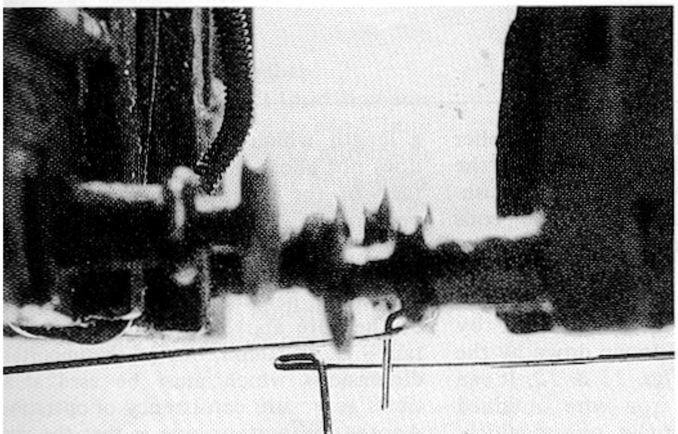


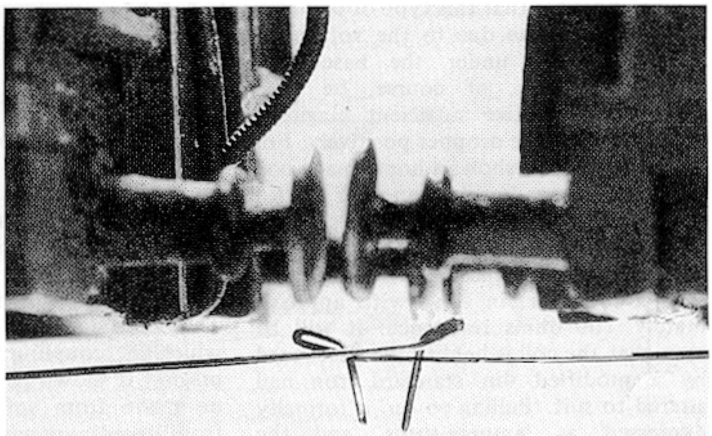
Wagon 'B' approaches wagon 'A' (see also Fig. 5).





Left: ***The couplings spring together, and the buffers make contact (see also Fig. 5).*** **Right:** ***Wagon 'B' pulls away with wagon 'A' coupled (Fig. 5).***





Left: ***Coupling 'B' is pulled down by the magnetic field and its shank passes over the tail of coupling 'A' (Fig. 6).*** **Right:** ***The couplings spring back into line, with the shank of 'B' under the tail of coupling 'A' (Fig. 6).***

Photos: BILL RICH

THE ELECTRO-MAGNETIC UNCOUPLER

To uncouple as we've just described, it is necessary for one coupling to be pulled down vertically, and this is achieved in the manner shown in the general arrangement (*Fig. 8*). Again, wagon 'B' is moving over the electro-magnet whilst pushing wagon 'A'. By pressing a push-button switch on the control panel, the coil is energised and a magnetic field created between the rails. The dropper (or armature) attached to the shank of the coupling, is of soft iron wire and is attracted to the magnet, so creating the vertical movement downwards to the wheel axle. In this lowered position, sufficient movement has been made to disengage the hook, but the dropper must not touch the magnet face. If it does, the likely result is a large pile-up.

The position of the electro-magnet on the layout should be indicated by some unobtrusive marker, especially if it is some distance away from the controller. The operator is then better able to see the relationship between the moving wagons and the magnet. If there is a location where all vehicles are required to be uncoupled, a permanent magnet of suitable size and power may be fitted instead of an electro-magnet.

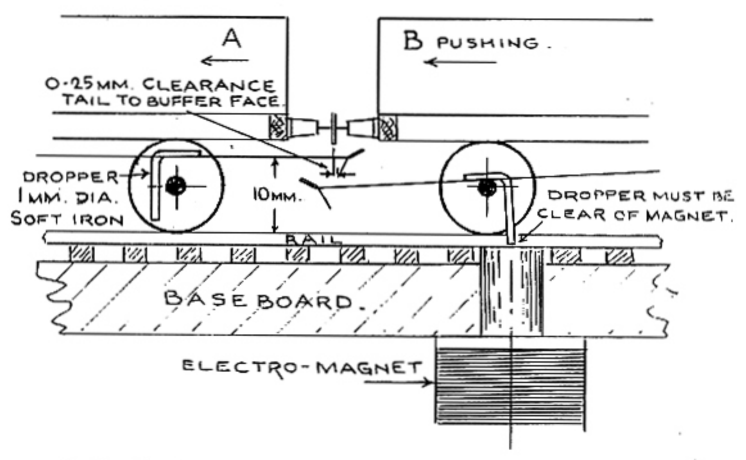


FIG. 8. UNCOUPLING WITH ELECTRO-MAGNET.

ELECTRO-MAGNETS.

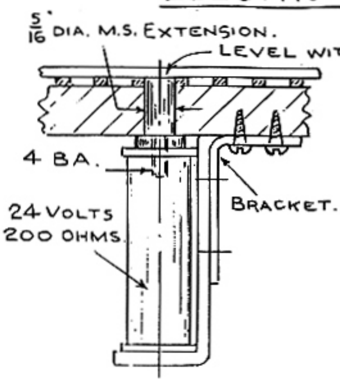


FIG. 9. EX P.O RELAY COIL.

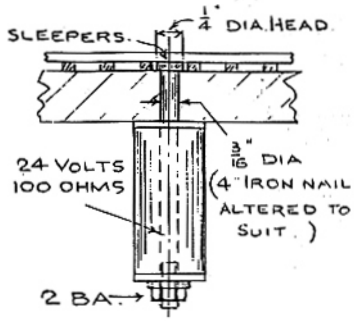


FIG. 10
HOMEMADE COIL

The Electro-Magnet

Many of us at Manchester MRS operate our layouts on 24 volts DC, and we use standard Post Office type relay coils for our magnets; a resistance of approximately 200 ohms has been found satisfactory. A mild steel pole piece is screwed into the coil core and made long enough to project through the baseboard to the top of the sleepers as shown in *Fig. 9.*

It is possible that this type of coil may not suit everyone due to the voltage or space available under the baseboard. Other coils can, of course, be used provided they give sufficient magnetic pull to attract the dropper positively. For instance, *Fig. 10* shows a home-made coil designed and produced by another MMRS member, Sid Stubbs. For 24 volts operation, he used 5,000 turns of 36 gauge enamelled wire, making a coil 0.75in diameter and 1.5in long with approximately 100 ohms resistance. It will be seen that the coil is held to the baseboard by a modified 4in standard iron nail altered to suit. 'Pulling power' is formally expressed as 'ampere-turns' and the easiest way to increase this for a given coil is to increase the operating voltage. It is usual to have the electrical supply for the electro-magnets separate from the traction supply, therefore such an increase in voltage will not affect controller outputs. The operating switches for the uncouplers should always be of the push-to-close type so that the uncoupler coils can never be left permanently energised.

The Dropper (or Armature)

The finished form of the dropper by which the coupling is drawn down by the magnet is shown in *Figs. 11 & 12*. It can be made from soft iron wire obtained from an ordinary paper clip, one of which, when straightened, will make several armatures (a new method is discussed later). Solder each armature in a position, as shown in the drawing, with the vertical arm on the inside of the axle, trimmed to a length which suits the rail height and does not allow the armature to touch the face of the magnet when in the lower position.

Hook Setting Gauge

The shank height – i.e. the normal height of the wire above the top surface of the rail – is, at 10mm, one of the important dimensions which must be used at all times to ensure consistency of operation. Another important rule is that the wire must lie along the centre line of the track; it therefore follows that it must lie along the longitudinal centre line of the vehicle. Both conditions can easily be set and maintained by use of the simple hook

THE DROPPER. (OR ARMATURE)

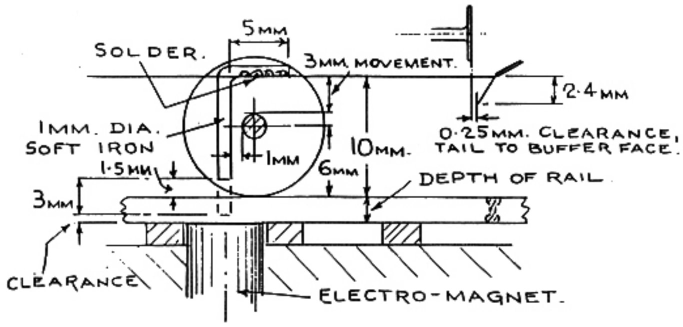


FIG 11. WAGONS. (12MM. DIA. WHEEL.)

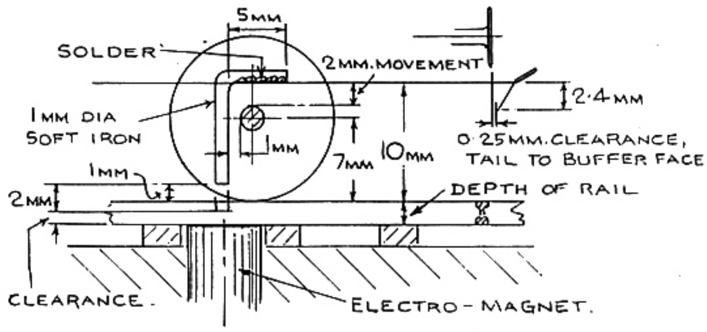


FIG 12. COACHES. (14MM. DIA WHEEL)

setting gauge shown in *Fig. 13* and this is the only way that such a check should be made; setting one coupling against another will only lead to confusion (which is surely true of any coupling).

Ratio of Movement — Wagons

Fig. 11 shows that in relation to a 12mm diameter wheel there will be a permissible downwards movement of 3mm, the axle acting as a stop when the coupling is in the lower position. There should be a minimum of 0.5mm (0.020in) clearance between the tip of the dropper leg and the magnet face.

From *Fig. 14* it will be seen that the distance 'D' of the dropper from the point of anchorage in relation to the distance 'H' to the hook, is in the approximate ratio of 2:3, so that for a movement of 3mm at the dropper, the vertical movement at the hook will be 4.5mm, which is ample for disengagement of the coupling hooks.

Ratio of Movement — Coaches

In this application, using 14mm diameter wheels, the movement is reduced to 2mm (see *Fig. 15*). With the ratio of movement between the dropper and the hook being approximately 4:7, the movement at the hook would be 3.5mm, which is satisfactory. These dimensions vary with varying applications but it is desirable to have 3.5mm downwards movement at the hook to obtain satisfactory operation.

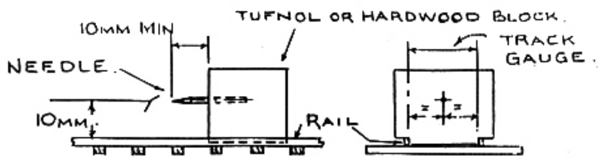


FIG. 13. HOOK SETTING GAUGE

NB. NEEDLE SHOULD BE NON-MAGNETIC AND POINT SHOULD BE ON ℄

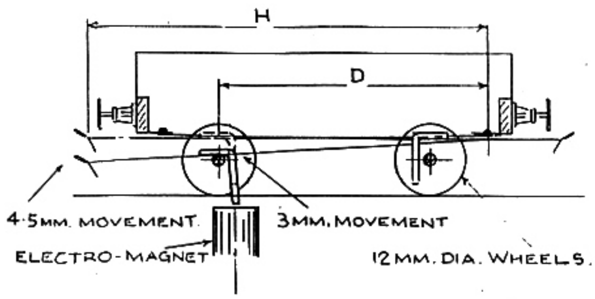


FIG 14. RATIO OF MOVEMENT. - WAGONS.

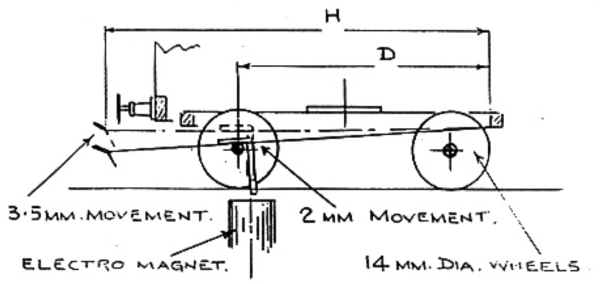


FIG 15. RATIO OF MOVEMENT. 4W BOGIE

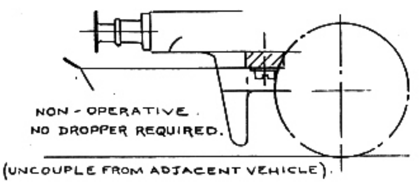


FIG. 16. LOCOMOTIVE COUPLING.

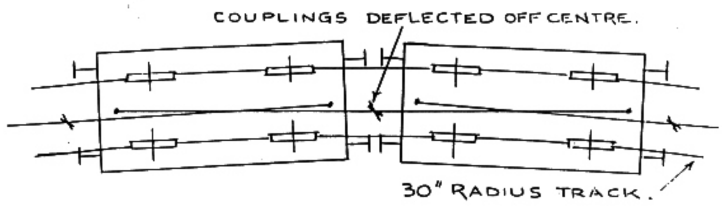


FIG. 17. MINIMUM TRACK RADIUS.

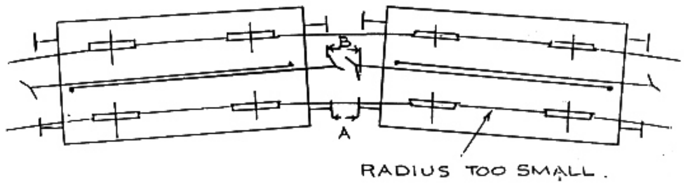


FIG. 18. FAILING TO COUPLE.

Locomotives
Because of fitting difficulties, it is our general practice to have the coupling at each end of a locomotive non-operative, as shown in *Fig. 16*. No dropper is therefore required and uncoupling is performed from the coupling of the adjacent vehicle. This does create minor difficulties with double-headed trains and if the fitting difficulties can be overcome (somewhat easier with the new method later described) then an operative coupling should be fitted.

Coach Sets
Coaches permanently coupled in sets can be arranged to have an operating coupling at each end of the set.

Minimum Running Radius
Simple pulling of a coupled train is permissible on quite small track radii. It will be seen, however, that two wagons being pulled around 30ins radius, as in *Fig. 17*, causes the coupling wires to be offset from the centre. This results in undesirable side force which increases as the radius gets smaller. For reliable running we keep our minimum radius curves at 30in. Pushing loose vehicles around a small radius is, of course, possible; however, the coupling cannot in any way act as a centre buffer – the vehicle buffers must fulfill their proper function on curves.

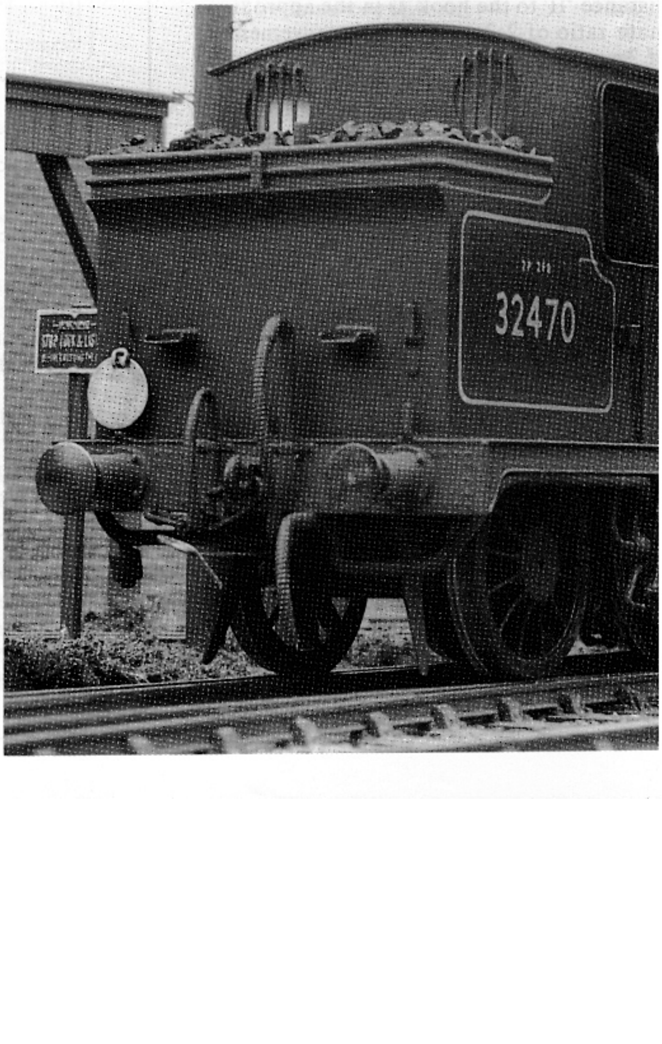
Minimum Radius for Coupling and Uncoupling
Coupling will not occur reliably if the vehicles are brought together on a track radius of less than 48in due to the relative angles of vehicles. *Fig. 18* shows that as two vehicles come together on small radius track, the buffers will meet at A before the coupling tails have passed each other to engage at B. If possible, therefore, always leave vehicles for recoupling on straight track.

Uncoupling should be arranged on a length of straight track if at all possible. It is certainly not desirable to have the uncoupling electro-magnet positioned on track of a radius of less than 48in.

Buffer Stops
The precise nature of the setting of the coupling wires does not take kindly to harsh handling, and being rammed up against a solid object like a buffer stop is quite likely to disturb the setting. Rail-built or other types of buffer stop should be made so that the cross beam is high enough to allow the nose of the coupling to pass under it.

Height Bar
Though not essential with the hook fitting so far described, a number of modellers have adopted the fitting of a height bar, being a simple stirrup of 0.015in wire fastened transversely across the underside of the vehicle and of such size that when the coupler shank is lightly sprung up to it, the required shank height of 10mm above rail level is obtained. If this fitting is adopted, care should be taken to see that the shank does not bear too hard on the height bar or the magnet will be unable to pull the armature down when required.

Next issue: Modern Developments.



When this picture of Gordon Gravett's magnificent 7mm 'E4' Class loco appeared in full in the 'Ditchling Green' feature, MRJ No. 50, hands up everyone who spotted that it was fitted with Jackson couplings. Well, we certainly can't find many who did, which says much about their discreet qualities. It also shows that Jackson couplings are successful in scales other than 4mm.
GORDON GRAVETT