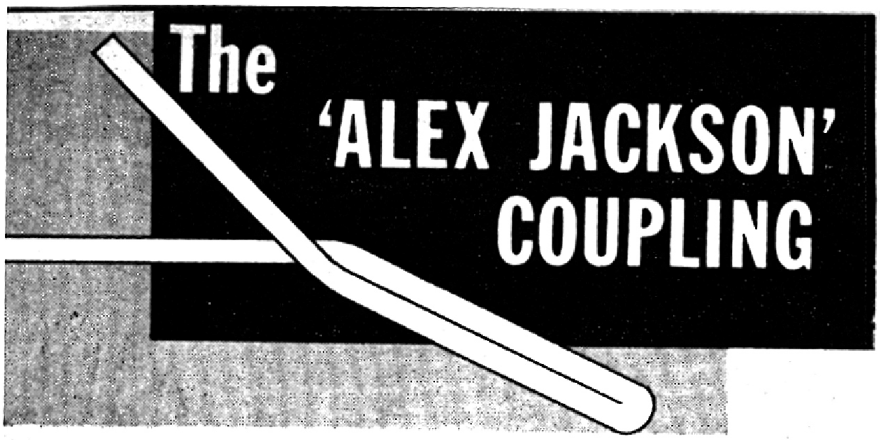
The 'ALEX JACKSON' COUPLING



By John Langan, A.M.I.Prod.E., and Norman Whitnall

THE "Alex Jackson" coupling was demonstrated for the first time in public at a monthly meeting of the Manchester Model Railway Society in February, 1949. Since then it has appeared at all exhibitions of the society in Manchester, and has been adopted by many modellers throughout the country.

Its main advantages are:—

1. It is unobtrusive.
2. It is reliable if properly made.
3. It is extraordinarily cheap.
4. Only one uncoupler is needed for a fan of sidings.
5. Vehicles can be parted when away from the uncoupler.
6. Couplings are identical at each end of the vehicle, so that turning a vehicle end-for-end does not affect performance.
7. No mutilation of wagon headstocks or attachment to buffers is necessary.

It must be pointed out at once, however, that this coupling whilst capable of satisfactory operation in the hands of a careful modeller is not suitable for the rough handling of a junior model basher.

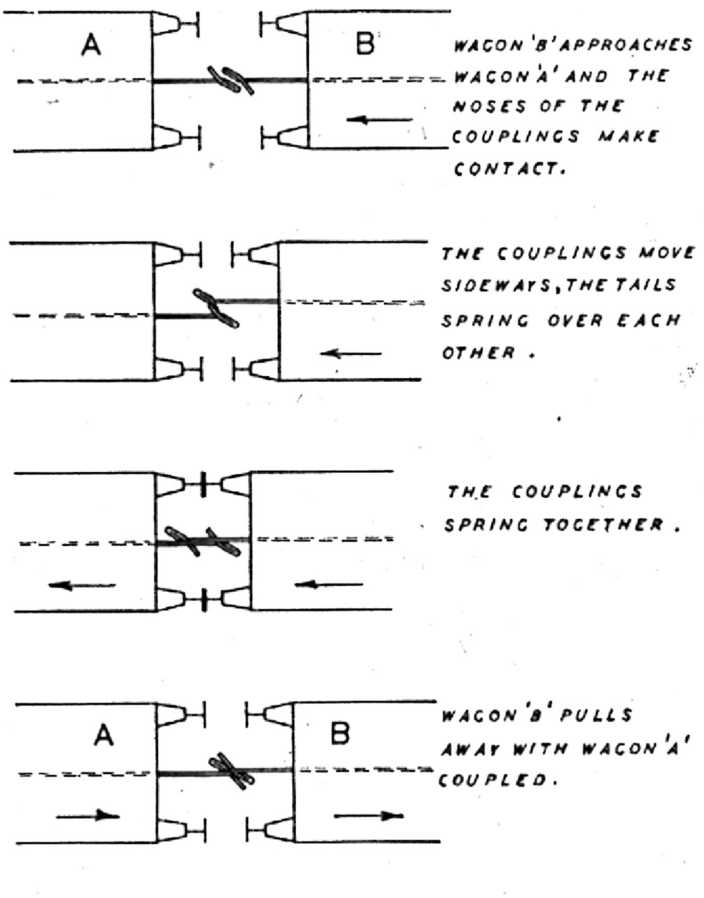


FIG. 1. COUPLING.

By careful setting in the first instance, and maintaining this setting from time to time, using the simple aid to be described, the coupling will operate faultlessly indefinitely.

The basis of the coupling is 0.011 in. diameter spring steel wire (32 S.W.G.) sometimes referred to as music wire, the end of which is bent to form a special shape of hook (Fig. 7).

Coupling

The simple action of coupling with such a device may be studied from Fig. 1 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 side movement of the wires takes place until the tails pass each other, then the wires spring back to the central position with the shanks in line. The coupler 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 couplers slide along the shanks and engage, whereupon wagon "A" is also drawn along. 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 ¼ mm. from the buffer face as Figs 4 and 5. There should not, however, be more wagon movement than is necessary for the engagement of the couplings, otherwise when the loco is pulling a train the gaps between the vehicles will be unrealistic.

If extremely close coupling is required this may only be accomplished by the use of very slightly sprung buffers. The buffers then compress a small amount before coupling can take place. The standard sizes as given in the diagrams, and found to give satisfactory working, are, however, recommended to be followed. This will ensure that vehicles made by different constructors will always work together, when, for instance, one is visiting a colleague's layout.

Note that for coupling, the movement of the wires is in the horizontal plane.

Uncoupling

For this purpose (Fig. 2) with wagon "B" pushing wagon "A," the couplings are slackened off. At a definite position on the track it is necessary to either lift or lower one of the couplers. In the mechanical system the movement was up, and in the later electromagnetic system the movement is down. With this vertical movement of the coupler the tail falls on to the opposite side of the mating shank, and upon withdrawing wagon "B" the reverse sides of the nose pieces slide past each other and wagon "A" is released. When using the electromagnetic system it will be found that a less jerky action takes place if the coupling of wagon "B" is pulled down to release wagon "A."

When the coupler on wagon "B" has travelled beyond the influence of the electromagnet it springs up again, but this time it is on the opposite side of the tail on coupler "A." Wagon "A" is released when wagon "B" reverses and the nose of coupler "B" slides under coupler "A." Note that the movement of coupler "B" is mainly vertical with a slight horizontal movement, and that of coupler "A" is almost wholly horizontal. It will now be seen that the *uncoupling* and *parting* of vehicles are separate and distinct operations which may take place at quite different locations.

When uncoupling, a single wagon or a number of wagons may be released from a train being pushed along by a loco, but they may continue to be pushed along until the desired location, at which the wagons are to be left, is reached. This means that one uncoupler positioned at the start of a number of sidings, as at Fig. 3, 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 devices. Two wagons may be recoupled by simply bringing them together.

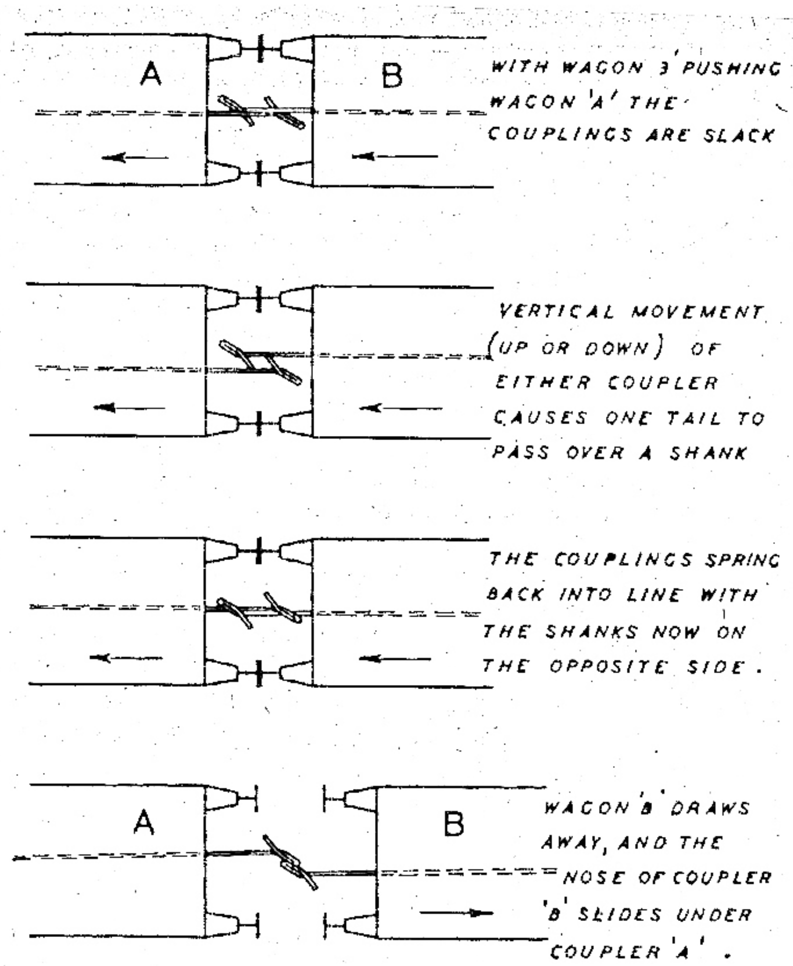


FIG. 2. UNCOUPLING.

The original mechanical system

The original operating mechanism of the "Alex Jackson" coupling was of an electro-mechanical nature. This is shown in Fig. 4 and consisted of a ramp, situated between the tracks, which moved sharply in a vertical direction a fixed amount, to lift the wire loop attached to the coupling wire on the wagon. Uncoupling would then take place in the manner already described.

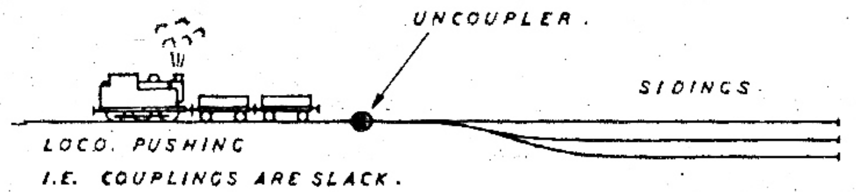


FIG. 3. POSITION OF UNCOUPLER.

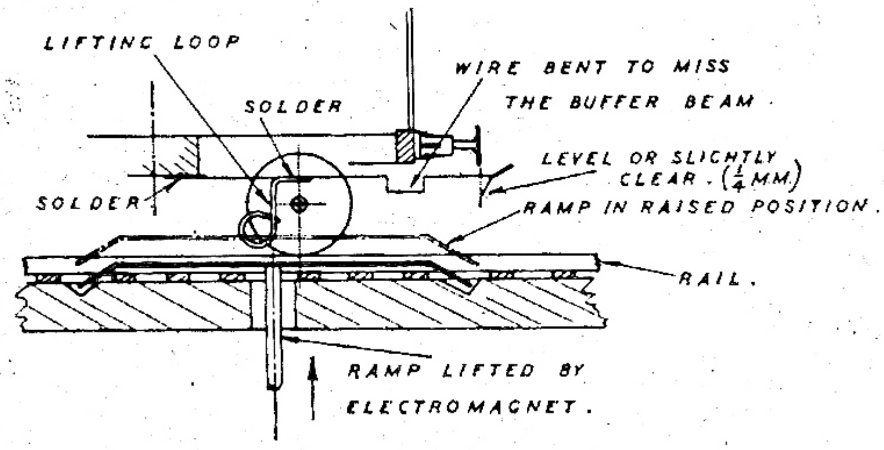


FIG. 4. UNCOUPLING, WITH MECHANICAL RAMP.

The vertical movement of the ramp was obtained by a lever motion attached to an electromagnet. In most cases these were Post Office type relays adapted for the purpose in the way that they are sometimes used for operating the blades on model railway pointwork. A push button made the connection for the electromagnet to be energised instantaneously, causing the ramp to jump up.

The disadvantage of the mechanical ramp system was that the time allowed for operating the ramp as the stock passed over was limited, with the possibility that the wrong coupling would be moved. Also with a badly adjusted coupler there was always the risk of lifting a vehicle from the rails. Some operators considered objectionable the noise of the click as the ramp was lifted rapidly to a stop, but in spite of these possible complaints the coupling won favour by its superiority over anything available at that time.

The electromagnetic uncoupler

In March, 1955, a member of the M.M.R.S., Mr E. Withnell, in a short article in the society's journal, described

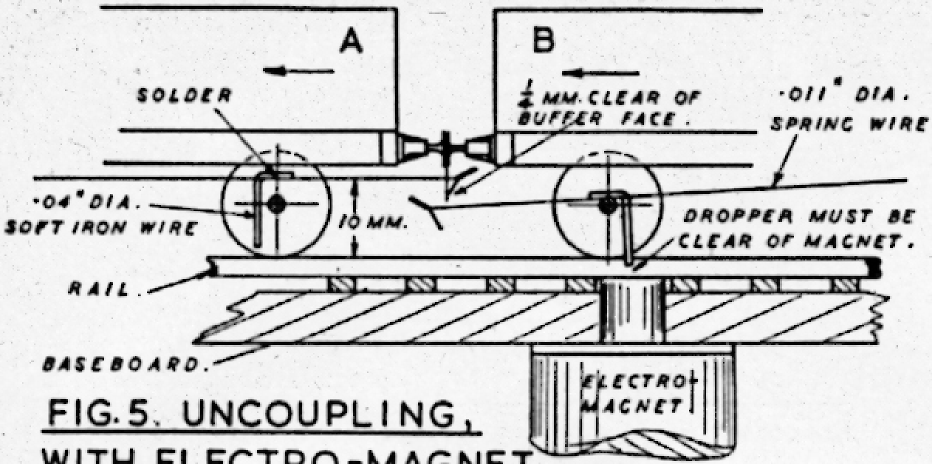


FIG. 5. UNCOUPLING, WITH ELECTRO-MAGNET.

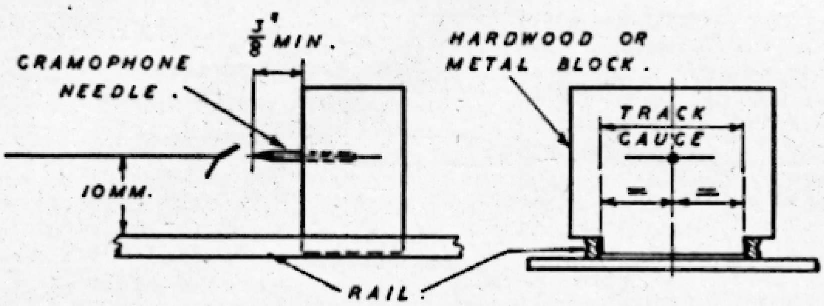


FIG. 6. COUPLER SETTING GAUGE.

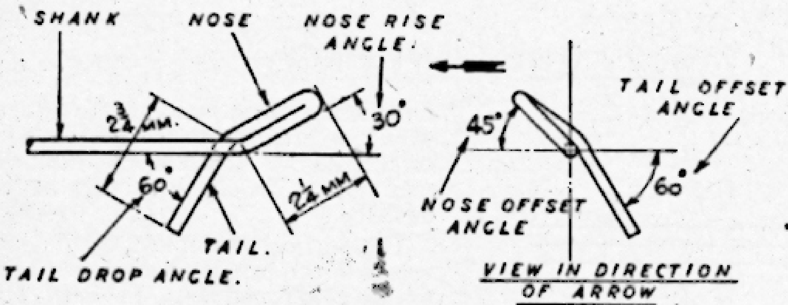


FIG. 7. NORMAN B. WHITNALL'S TYPE OF HOOK.

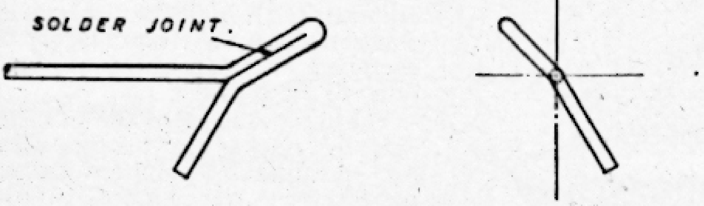


FIG. 8. ALEX. JACKSON HOOK.

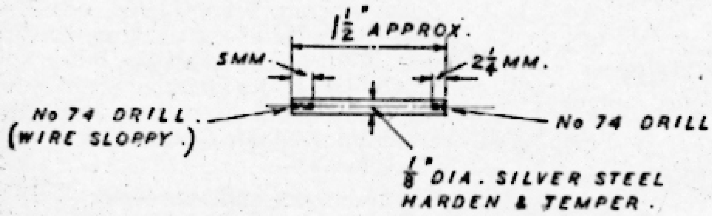


FIG. 9. HOOK BENDING JIG.

a method of uncoupling by drawing down one hook instead of pushing it up as in the case of the mechanical ramp just described.

Mr Withnell's experiments, conducted in 7 mm. scale narrow gauge, consisted of a small piece of soft iron attached to the shank of the coupling, which when attracted by the pull from the magnetic field of an electromagnet caused the coupling wire to deflect downwards to uncouple the hook. The advantages of such a scheme are that:—

1. The pull for uncoupling being downwards ensures that the vehicle is kept upon the track.
2. The installation of a simple electromagnet is much easier than the ramp mechanism.
3. Apart from the spring of the wire the action of uncoupling is noiseless —and therefore very mysterious to the onlooker.
4. The electromagnet can be energised by the push button before a given wagon reaches it, with the certainty that the coupler will be drawn down when it comes within the magnetic field.
5. Uncoupling whilst moving is positive. The magnet will operate only one coupling at a time.

With these advantages in mind the writers began experiments to establish a suitable arrangement of the coupling to meet the requirements of 4 mm.

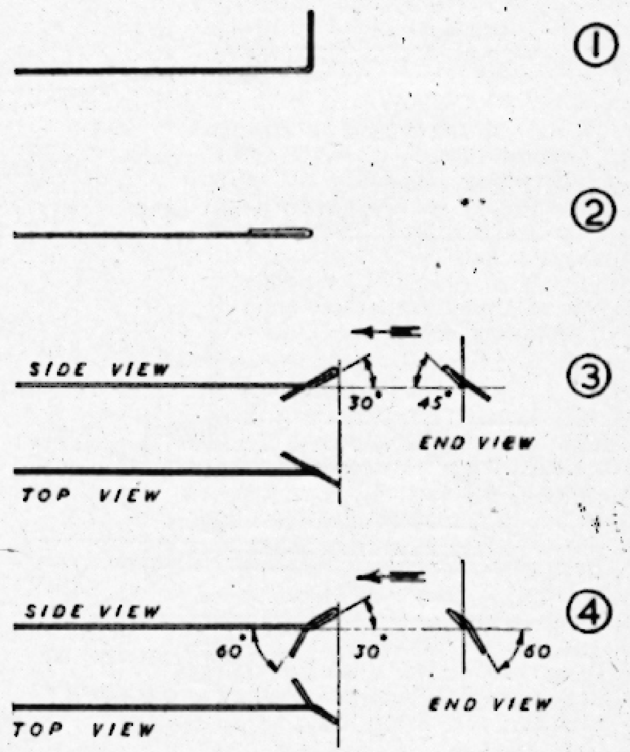


FIG. 10.

BENDING THE HOOK.

scale, and the result which we obtained was demonstrated at the Birmingham Conference in 1956.

One of the first tests was to solder a soft iron plate at the bottom of the lifting loop of the existing mechanical coupling. It seemed desirable at the time, since so many were using the coupling, that a universal up and down combination might be achieved. This, however, was not very successful, and although different shapes and sizes of "armature" plates were used at various points along the shank of the coupler there was not the reliability of operation which we required.

Bear in mind that at this time we were experimenting with the coupler wire fixed near the transverse centre line of the vehicle as used for the mechanical coupler, the wire being therefore about 40 mm. long. It became obvious that the double purpose coupling could not be achieved, and that to make the magnetic type work, greater flexibility would have to be obtained. To do this either the wire had to be thinner, and surely the 0.011 in. wire is thin enough already, or else the overall length had to be increased. We decided on anchoring the wire at the end of the vehicle furthest from the hook giving an overall length of about 65 mm., and further experiments showed that flexibility of this order was satisfactory. A simple piece of iron wire, bent to a right angle and attached to the wire shank of the coupler behind the wheels where it was most inconspicuous (Fig. 5), gave successful vertical movement every time the vehicle was passed over the electro-magnet. It will be apparent that this meant a complete break away from the earlier pattern but one standard dimension was purposely retained.

The height setting gauge

The height of the wire from the track has always been 10 mm. In keeping this dimension it is possible to run vehicles of both the old and new types together, and also by careful observation to carry out uncoupling by operating the particular vehicles which are in accordance with the system used on the layout. The height of 10 mm. is set and maintained by means of a simple gauge as shown in Fig. 6, which also sets the coupling wire central in relationship to the track.

The hook

The original design of hook as designed by Alex Jackson is shown at Fig. 8. It is important to observe the "handing" of the hook when looking end on at the wagon, otherwise it will not couple with those already in existence. This hook is made by bending the wire hard back on itself with no daylight showing between, and a tail formed as Fig. 8. The double bend is carefully soldered so as not to fill the whole hook with surplus metal. Correctly done this should be smooth

FIG.11. THE DROPPER:- ON WAGONS.

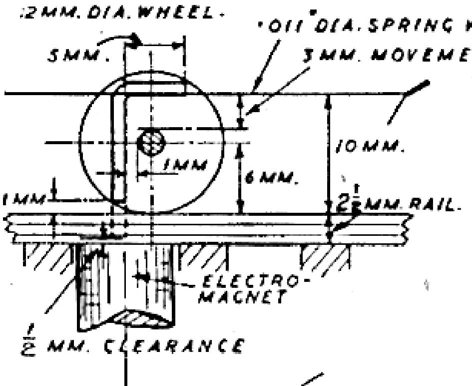
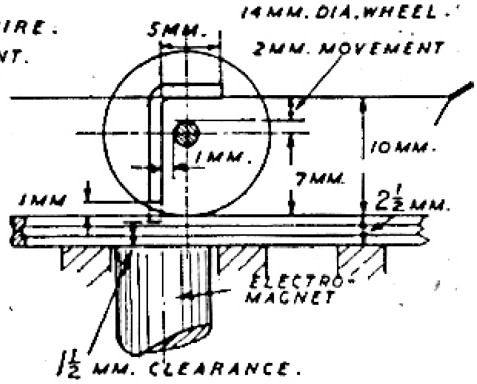


FIG.12. COACHES.



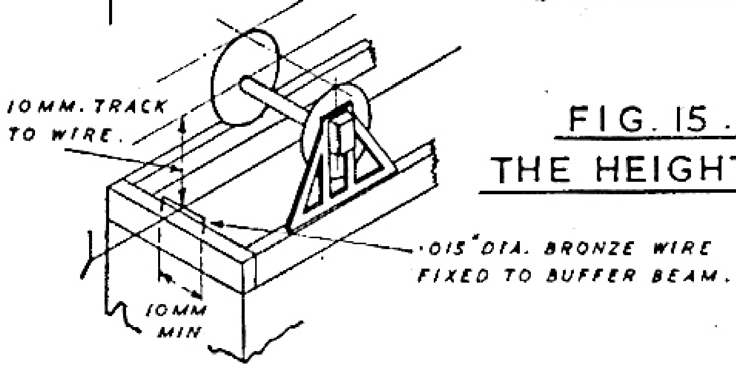


FIG. 15. THE HEIGHT BAR.

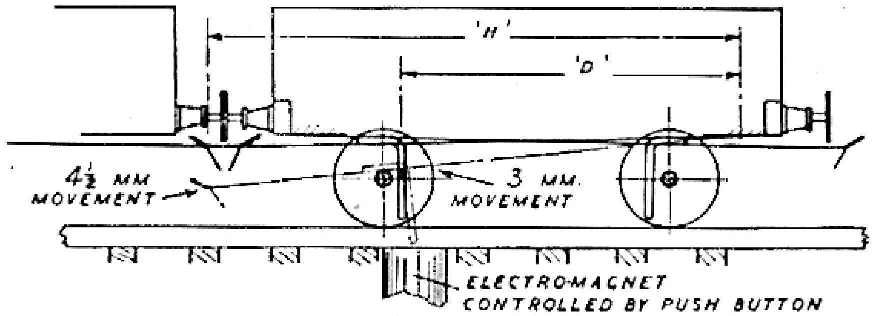


FIG. 13. WAGONS, RATIO OF MOVEMENT.

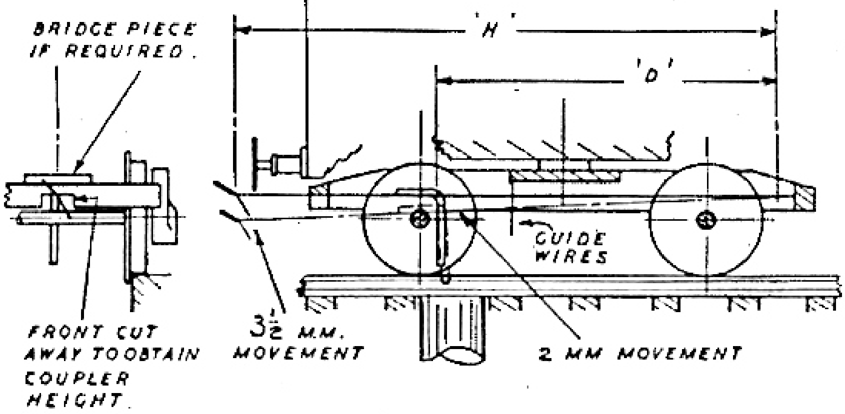


FIG. 14. 4W. BOGIE, RATIO OF MOVEMENT.

and appear solid and twice as thick as the other part. This gives strength and also prevents the next wagon hook from getting jammed in the bend.

The nose rise angle, originally at 45 deg., is now made at 30 deg. This lower position of the slope of the nose gives easier drawing off when parting one vehicle from a string of others. Otherwise with free-running bearings (such as pin-point) the vehicles may not part even though the couplers are disengaged.

Where long trains are frequently used some instances have been noted where the bend forming the coupling nose has opened. Alex fully approved of the suggestion made by Norman B. Whitnall of forming the hook as shown in Fig. 7. This is made by bending the wire back along the top of the nose with the tail coming down on the right of the shank when the coupler is viewed end on. This type, which does not require to be soldered, is now in general use.

Bending the hook

At first sight it might appear a difficult task to bend the special shape of hook consistently the same. By the aid of a simple jig as shown in Fig. 9, however, this is easily performed. First insert the end of a length of 0.011 in. wire into the 5 mm. deep hole and bend at right angles, remove from jig and fold the bend right down on the wire (Fig. 10). Now insert the doubled end into the 2½ mm. deep hole in the jig and bend the projecting long wire to the combined angles of 30 deg. and 45 deg. as shown in Figs 7 and 10.

A suitable template may be made to check this but with practice it can be judged quite well by eye. With the double portion still in the jig, bend the tail to the combined angle of 60 deg. and 60 deg. as shown. There must not be any burr on the end of the tail, and if there is, it should be stoned off. Cut the wire off longer than required and adjust when fitting to a vehicle.

The dropper

The finished form of armature or dropper by which the coupling is drawn down by the magnet is shown in Figs 11 and 12. It is made from soft iron wire—readily obtained from the ordinary office paper clip, one of which when straightened out will make a number of droppers. Having a plated surface the wire may easily be soldered to the coupler wire and will not easily rust. Solder each dropper in the position shown on the drawings leaving the vertical leg portion longer than required, so that it may be snipped off at 1 mm. above rail level afterwards.

Ratio of movement

Wagons

Fig. 11 shows that in relation to a 12 mm. diameter wheel there will be a permissible downwards movement of 3 mm. The axle acting as a lower stop when the coupler is in the down position. The tip of the dropper leg is then 2 mm. below rail level and with the magnet face level with the sleeper surface there should be ½ mm. clearance. This, of course, allows for " scale rail " 2½ mm. deep.

It is important that there should be no physical contact between the dropper and the magnet which would have disastrous results. The dropper must be on the inner side of the axle with its horizontal arm pointing towards the hook as shown in Fig. 11. In this way the dropper rides smoothly on the axle when in the lower position, whereas if assembled in the opposite manner the friction between the dropper and the axle doubles up the coupler !—we tried it. From Fig. 13 it will be seen that the position of the dropper "D" in relation to the hook "H" from the point of anchorage is in the approximate ratio of 2 : 3. That is, a movement of 2 mm. at the dropper gives about 3 mm. movement at the hook. Therefore by proportion, with actually 3 mm. movement at the dropper, we obtain about 4½ mm. at the hook which is ample to disengage the coupling.

Four-wheeled bogies

In this application, using 14 mm. diameter wheels as shown in Fig. 12, the downwards movement of the dropper is 2 mm. The relationship of the dropper movement to the movement of the hook is in the approximate ratio of 4 : 7 as shown in Fig. 14. Therefore, with 2 mm. dropper movement, the hook will move $\frac{7}{4} \times 2 = 3\frac{1}{2}$ mm., which is satisfactory.

These dimensions may vary to suit a given application but it should at all

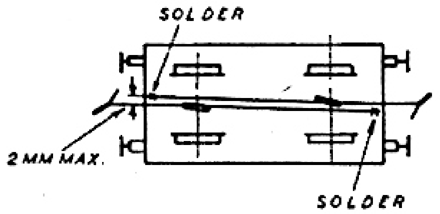


FIG. 16.

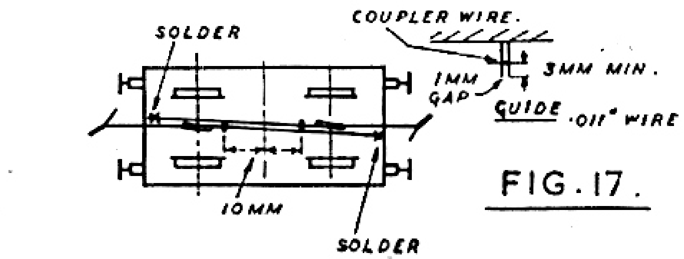


FIG. 17.

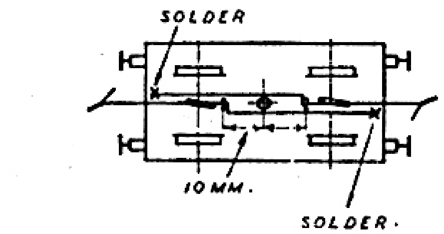
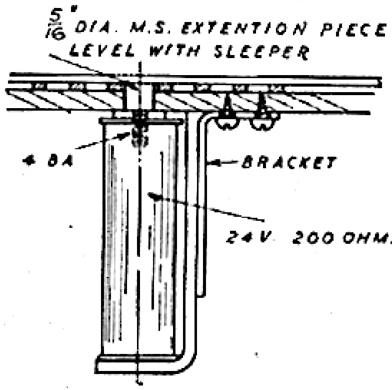


FIG. 18.



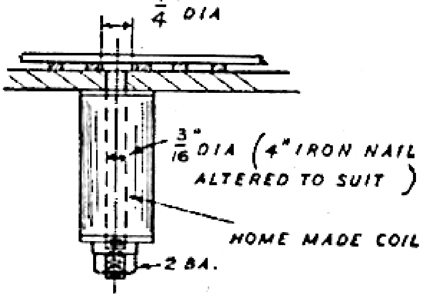


FIG. 20.

FIG. 19. ELECTRO-MAGNET. P.O. RELAY COIL.

times be possible to have 3½ mm. down movement at the hook without the dropper leg contacting the magnet.

The height bar

Fig. 15 shows a development associated with magnetic operation of the coupling, which is a height bar to act as an upper stop to retain the coupler at the standard height of 10 mm. above the rail level. This is formed from 0.015 in. diameter bronze or brass wire and fastened under the buffer beam of the vehicle. It may be soldered to a metal beam or in the case of a wooden buffer beam just pushed in to the correct height. Allowing for the diameter of the coupler wire the height of this stop bar may be easily checked by means of the height block already mentioned, and for this purpose the pin should project from the block a minimum of ⅜ in. as shown in Fig. 6.

When this bar is fitted, the coupler is arranged to spring very lightly against it and so maintain the normal height more easily than when the coupler hook is just in mid-air. One experienced "EM" modeller, Mr S. Stubbs, A.M.I.Mech.E., reports satisfactory operation without the use of a height bar, his couplings being entirely unrestricted and arranged as Fig. 16. This, of course, is quite possible but the above arrangement is put forward as a worthwhile feature.

The central guide

The fact that the vehicles are really pulled from the end remote from the coupling makes it desirable to anchor the end of the coupler wire as near the longitudinal centre line of the vehicle as possible in order to avoid a turning movement. It is preferable that the wires of each coupler shall not interfere with each other and if desired a central guide may be introduced as at Fig. 17. One other feature of this guide is to lead the vehicle from nearer the front end when traversing a curve.

Where an existing vehicle has a centre screw protruding in the middle of the base, which on some stock is due to the equalised wheelbase system, or on a bogie the pivot screw, the coupler wires must be arranged to operate without fouling. The scheme set out in Fig. 18 has been found to be satisfactory and it will be noted that here the centre guide wire also functions to prevent the coupling wire extending due to the offset bend. On new wagons it should, if possible, be arranged to avoid this bend in the coupler wire.

The electromagnet

The type of magnet used to date has been taken from standard Post Office type relays (ex junk shop) with a 200 ohm resistance coil operating on 24 volts. 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 at Fig. 19. It is possible that this type of coil may not suit everyone due to varying voltages

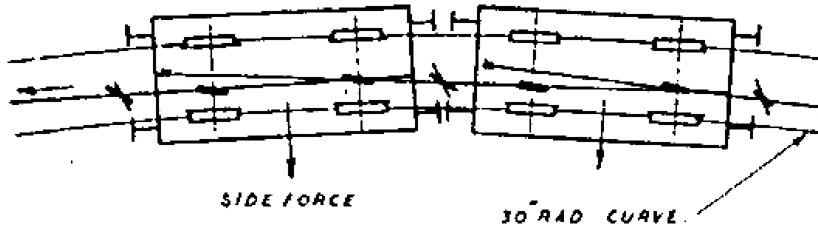


FIG. 21.

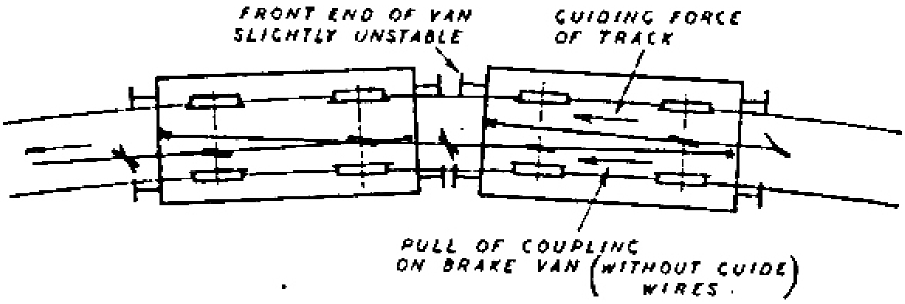
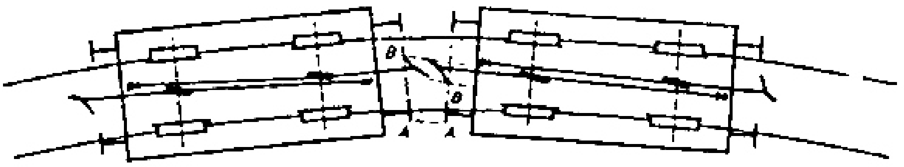


FIG. 22.



FAILING TO COUPLE ON SMALL RADII.
FIG. 23.

and the space available under the baseboard, but there is no reason why other coils should not be used provided they give sufficient magnetic pull to attract the dropper positively at all times.

On Mr Stubbs's layout the coils are home made, and are generally as shown in Fig. 20. For 24 volts operation he uses 5,000 turns of 36 s. gauge enamelled wire giving a coil about ⅞ in. diameter and 1½ in. long, with a resistance of approximately 100 ohms. It will be seen that the coil is held to the baseboard by a 4 in. standard iron nail turned and screwed to suit. To complete the mystery of the operation of the coupler, the position of the magnet should only be indicated by some unobtrusive marker. Such a marker is also necessary when the magnet is some distance from the controller and the operator wishes to know the relationship between the moving wagons and the magnet.

The minimum running radius

Fig. 21 shows two wagons being pulled round a curve of 30 in. radius. It will be seen that the deflection of the hook from the centre line of the wagons is quite large especially when the coupling wire is of the unrestricted type as shown. The resultant side force due to the position of the coupling anchorage is also indicated. This is an undesirable force and increases as the track radius goes smaller. For simple pulling, a track radius of 30 in. would be as small as one could advise. In connection with the use of small track curves an interesting case occurs with regard to the end wagon of a train being pulled along. This, of course, is generally a brake van. The coupling pulling the brake van along is shown at Fig. 22, the second coupling on the van being free. The forces acting on the van are also shown and indicate that the van will tend to twist on track. This may be a source of derailment on the smaller radii, in which case the central guide wires should be fitted.

Track radius for coupling and uncoupling

The uncoupling of vehicles should be arranged on straight track if at all possible, and it is not desirable to arrange the magnet for this operation on less than 4 ft radius due to the relative angles of the vehicles. Simple pushing of coupled vehicles is only limited by any tendency to buffer lock, but if your vehicles are properly made with minimum side play at the axle bearings you should not be troubled in this respect down to about 30 in. radius. As already described the coupling of wagons is performed by simply bringing them together. However, coupling will not occur reliably if the track radius is

Continued on page 17

THE "ALEX JACKSON" COUPLING

Continued from page 15

less than 4 ft. In Fig. 23 two wagons are shown on a 20 in. radius curve to illustrate that before the coupling tails "B-B" have passed each other to engage, the inside buffers will have made contact. This condition occurs up to slightly over 3 ft radius and this is why we stipulate 4 ft as a minimum for reliable coupling. Lengthening the coupling wire to allow for this condition would result in wide gaps between wagons when pulling, but every endeavour should be made to keep to the standard dimensions as given.

Note that the coupler cannot in any way act as a centre buffer, and your vehicle buffers must fulfil their proper function on curves.

Buffer stops

Rail built or other types of stop blocks can be made so that the cross beam is high enough to allow the nose of the coupler to pass under. The coupler must clear any obstruction of this kind and generally this can be arranged without any loss of realism.

Stud contact

It is probable that with this type of current collection the dropper of the coupler will foul the studs. The answer to this may be to offset the studs but we regret that we have done no practical experiments in this matter, since we are 2-rail operators.

Locomotives

It is general practice for locomotives to have the coupling non-operative (i.e. without the dropper) at each end. Uncoupling is then performed from the adjacent vehicle.

Coaches permanently coupled in sets could be arranged to have the operating coupling at each end of the set.

Conclusion

This, then, is the Alex Jackson coupling, which we hope will have been found interesting, and as a result of the information which has been given will become even more widely adopted. It must be emphasised that careful workmanship is involved in its construction and fitting, but the financial outlay is small, two principles of which we know the originator of the coupler would have thoroughly approved.