Brassmasters PO Box 1137 Sutton Coldfield B76 1FU email: sales@brassmasters.co.uk **R061**
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WAGON SPRINGING AND UNDERFRAME DETAILING KIT FOR RCH 1923 9FT WHEELBASE MORTON BRAKED WOODEN FRAMED WAGONS

Based on an original design by Martin Finney

INTRODUCTION

These subframes have been designed to fit under 3H, Slaters, Cambrian, Parkside and Bachmann 1923 wagons, although they may be used for other manufacturers' wagons. They provide an easy to assemble sprung subframe and include full single-sided brakes activated from both sides by the Morton brake system with a choice of brake levers and brake lever guides. They are intended for wagons with a cross shaft between the 'V' hangers. Also included is a second set of push rods for the rare vehicle with brake blocks on all four wheels and, for the body, coupling hooks, coupling hook plates and washers for the outer ends of the buffer housings (who hasn't managed to lose these from the plastic kits!).

When building wagons, reference to 'LMS Wagons' by OPC and 'LNER Wagons Volume 4A', published by Wild Swan, is always useful.
The most numerous user of this type of brake with a 9ft wheelbase and wooden solebar, was the LNER who put them on their 6 plank open wagons (c20,600), 12T covered vans (c6,000) and early cattle wagons based on GNR bodies. The LMS used them under open merchandise wagons.

For the test build we used a 3H LNER 12T van simply because it was the first suitable kit we could find.

CONSTRUCTION

Open out all holes to the required size as shown in these instructions. For small components this is often easier to do before removing the component from the fret.

Some embossing of rivets is required and again for small components we recommend you do this before they are removed from the fret.

Most folds are through 90^0 and always with the etched fold line **on the inside of the bend**.

If fitting to a kit during construction, it may be easier to not attach the solebars to the kit until after the subframe has been fitted to ensure the solebars clear the etch.

WAGON BODY

The underside of the wagon floor **must be flat**. For 3H, Slaters and Cambrian wagons this means removing all the moulded frames from the floor moulding. If building a new kit, an alternative is to turn the floor moulding upside down or replace the floor with a new one from plastic card. **Don't attach the solebars until the subframes have been bent up** to be used as a spacer. In all cases the solebars will need to be modified.

If building a new kit, it is better, if the wheelbase of the plastic solebars is exactly 9'0" (36mm), to leave the axleboxes and springs as part of the solebar. Carefully cut away the 'W' iron from around the axleboxes and then carve/file away the remains from the rear of the axlebox and solebar to leave a flat surface. If the wheelbase of the solebar is not exactly 9'0" (36mm) then the solebar can be cut through the middle and plastic removed or a packing piece added to get the correct length. Alternatively, the springs and axleboxes can be removed as for an already built wagon as below.

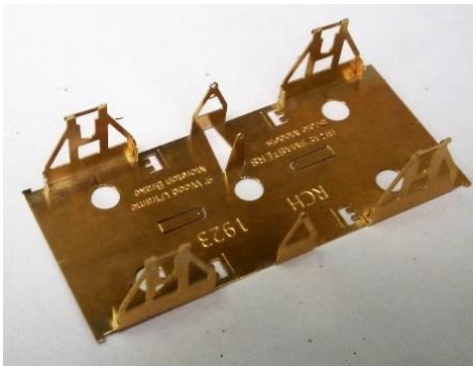
If converting an already built wagon, and for ready-to-run wagons, remove the axlebox and spring from the solebar/plastic subframe by cutting diagonally through each end of the spring next to the spring shoe on the solebar and then cutting through the vertical parts of the W-iron next to the solebar, leaving the spring saddles in place on the solebar. Again, the remains of the W-iron need to be carved away from the back of the solebar and the axleboxes and springs.

Store the removed parts for use later.

UNDERFRAME

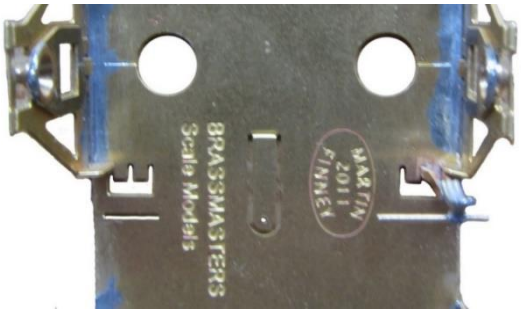
Using a 0.35mm drill open out the holes for the suspension spring wires in the subframe [**U1**]. If you use Alex Jackson couplings similarly open out the holes in the fold up the brackets in the middle of the subframe. Open out the holes in the brake shaft 'V' hangers to clear 0.8mm brass wire.

Fold up the W-irons and both brake shaft 'V' hangers on the subframe [**U1**] and check they are at right angles to the base. Strengthen the folds with a fillet of solder. Fold up the inner brake 'V' but **do not strengthen with solder** as it will be removed later. Fold over the W-iron keeper plates at the bottom of each W-iron.



Fold the eight suspension brackets at right angles to the W-irons. If appropriate, fold the Alex Jackson coupling brackets and strengthen with solder.

Take the bearing carriers [**U2**] and solder in the four waisted bearings. Make a slight bend in the centre 'finger' of the bearing carriers. Cut the spring wire to a length of 15mm and solder in place and remove any 'burr' from the ends as this makes feeding the wire into the holes easier. Clean off excess solder from around the bearings and suspension wire as this will impede easy movement.



Now assemble the bearing carriers and wheel sets as shown and check the suspension works freely. There are three holes in each suspension spring bracket to enable the final ride height to be adjusted. Nominally this is the centre hole, but this can be adjusted when the wagon is completed and weighted.

BRAKES

Take two of the brake block and hanger etches [**U3**], drill out the holes in the centre of the brake blocks 0.35mm and push through the half-etched holes at the joint between the brake hanger and brake block. Then open out the centre hole in four brake block centres [**U4**] to 0.35mm.

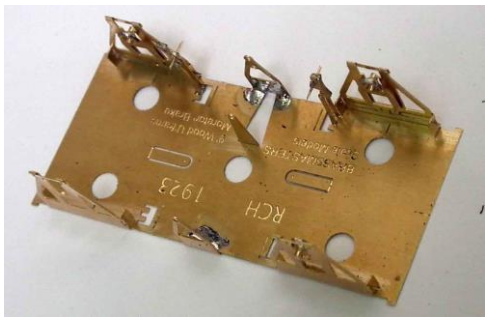
Carefully bend the brake hangers, as shown in the photo, at the half-etched marks on the inside and outside of the etch. **It is essential that when a piece of 0.3mm brass wire is passed through the two holes in the middle of brake block it is parallel to the top**, so don't be afraid to persevere until it is.

Take two of the brake block centres [**U4**] and solder them face to face. Repeat for another two brake block centres.

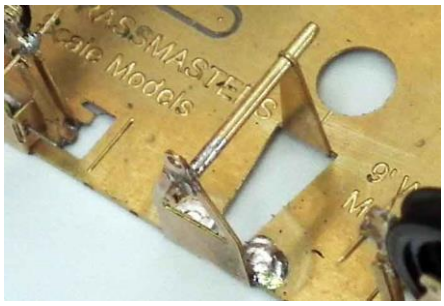
Mount a brake block centre assembly between the brake blocks with a piece of 0.3mm wire protruding from both sides, align the brake block centre with the brake blocks and solder together. Leave the wire protruding from each side. Repeat for the other brake block hanger assemblies. File off the cusp on the wheel side edge of the brake block assembly. A slight angle to match the taper of the wheel tread can then be filed.

For wagons with four brake blocks repeat the above for the second side.

Solder the brake hanger assemblies in place in the 'E'-shaped openings in the subframe floor, the outer slots for P4 and EM, the inner ones for 00. The floor will now need to be recessed to clear the brake hangers where they protrude above the subframe floor. This is done using a large drill rotated in the fingers or a dental burr.



Open out the holes in the end of the push rods [**U5** and **U6**] to 0.35 mm and the hole in the centre to 0.8 mm. Decide whether the push rod packer bolts will be represented by a push through 'rivet' or by a wire and either push through the rivets in push rods from the rear or drill 0.35mm holes. Open out the holes in four of the brake shaft levers [**U7**], and the washers [**U8**] & [**U9**], to clear 0.8mm.



Cut a piece of 0.8mm wire to about 12mm in length and clean up the ends. Place this between the top hole of the Morton 'V' hanger and the sacrificial central support. Place a tiny washer [**U8**] on the wire on the outside of the hanger and position the wire so just less than 1mm protrudes outside the 'V' hanger. Solder the wire and washer in place from behind. Do not solder to the sacrificial 'V' hanger.

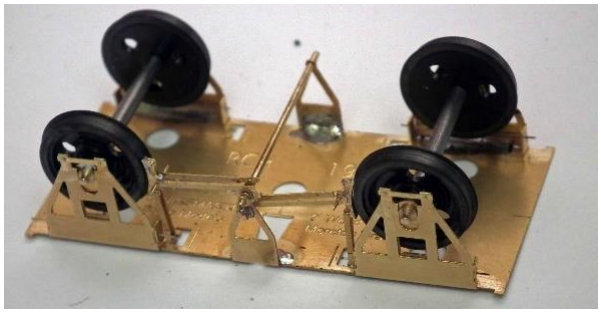
Cut the wire flush with the rear of the 'V' hanger and remove the sacrificial 'V' hanger.

Careful thought now needs to be given to the assembly of the brake gear to ensure that it would actually work if fitted to the prototype. On Morton braked vehicles with a set of brakes on one side only, the Morton 'clutch' was on the side with the brakes. Therefore, the brake push rods were the opposite orientation to 'both side' independent brakes. This means that, when looking from the side with the Morton clutch, the left-hand push rod is above the brake shaft and the right-hand pushrod is below the brake shaft. The wheels on other side of the wagon were usually un-braked but if brakes are fitted, looking from that side, the push rods are the opposite way around to the clutch side i.e. the right-hand push rod is above the brake shaft and the left-hand pushrod is below the brake shaft. If unsure just work out logically if the brake lever is depressed will the brakes move closer to the wheels or further apart (it should be the former!)

A trial assembly of the brake work is now required.

Push a piece of 0.8mm brass wire through the brake 'V' hanger from the unbraked side, then through the inside push rod [**U6**], then through two brake shaft levers [**U7**], then through the outer push rod and finally through the other 'V' hanger. Turn the push rods about the brake shaft wire and engage the holes in the end of the push rods over the wire in the brake hangers (it may be necessary to bend the brake block hangers to allow this to happen. The length of the push rods ensure that the brake blocks clear the wheels sufficiently to prevent shorting.

When satisfied, holding the two push rods tight to the brake blocks at one end, solder the push rods to the brake blocks. Repeat for the other end. Finally, push the 0.8mm wire through the 'V' hanger next to the brake push rods so that at least 2mm protrudes beyond the 'V' hanger on both sides then, making sure the two brake shaft levers line up with the half-etched levers on the pushrods, solder the push rods and levers to the brake shaft. Push a washer [**U9**] over each end of the brake shaft and solder against the 'V' hanger.

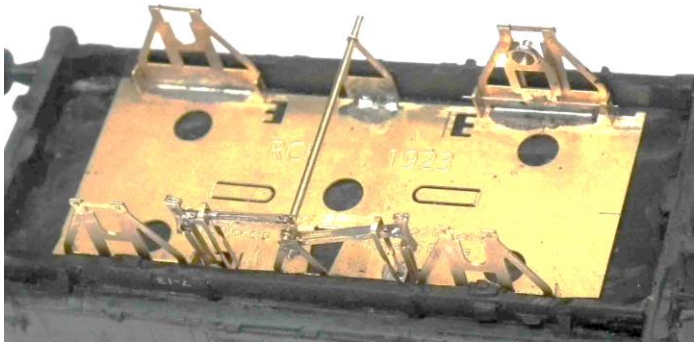


For four block wagons, assembly is similar, but the second set of push rods and another two brake shaft levers will need to put over the 0.8mm wire after it has been pushed through the first 'V' hanger. To check the assembly is correct, when looking form either side of the wagon, both sets of pushrods will align.

Take two push rod packers [**U10**] and if using wire to represent the bolts, drill two holes 0.35mm in each. Solder together making sure the holes align. Place each packer between the push rods, hold in position (using 0.31mm wire if appropriate) and solder together. Repeat for the other set of push rod packers. Finally, cut the 0.31mm wire back to just clear the faces of the push rods. Alternatively, the push rod packers can be glued or soldered in place between the push rods.

SAFETY LOOPS

Wagons can either have vertical safety loops or also safety loops that were inclined towards the brake shaft. The safety loops provided in the kit cover both these possibilities.



Examine the safety loops carefully, there are four half etched marks on the inner face of them indicating where the bends need to be. For wagons with vertical safety loops take four safety loops [**U11**] and bend at right angles at the two half etched marks in the centre of the loop. Hold one leg of the safety loop below the half-etched mark on the leg in a pair of pliers and twist the leg above the pliers through 90 degrees. Repeat for the other leg.

Open up the slots in the floor with a scalpel blade and slide the safety loop over the brake push rods and through these floor slots. There are two methods of attaching the safety loops. (i) Cut the legs of the safety loops to 10.5 mm long. Solder the safety loops into the slots in the subframe base, towards the outer end for P4 and EM, at the inner end for 00. (ii) Alternatively, position the safety loops just clear of the underside of the push rods and solder from above the floor. Cut off any excess and file clean.

For wagons fitted with inclined safety loops, if only slightly angled as in the photo, simply assemble as above and bend after soldering in place. The incline only starts from the twist which is located level with the bottom of the solebar. For wagons that have safety hangers at a greater angle than this, bend up the safety loops as before into a 'U' shape and then determine the length of the inclined section. Twist the legs of the loop at the top of the inclined section and then bend them to the required angle. Cut the upper part of the legs to 4mm from the bend and then solder into the slot in the subframe floor, with the first part vertical.

For a wagon that has solebars fitted, attach the subframe to the bottom of the wagon using epoxy, ensuring that the verticals of the W- irons line up with rivets and/or spring stops on the solebars. RCH 1923 wagon are 1" wider between the solebars than earlier wagons. On the prototype, the W-irons are cranked inwards behind the solebar so that the W-irons are the same distance apart as the earlier wagons. This was too difficult to do in the kit, so if the inside of the solebars are the scale width apart there will be a slight slop, and you will have to centre the subframe between the solebars.

For a wagon where the solebars are not attached, mark a line along the longitudinal and transverse centrelines. Attach the subframe to the bottom of the wagon using epoxy, aligning the marks on the subframes with the centrelines on the wagon.

SOLEBARS

The solebars, if still separate, should now be attached to the body butting up against the outside of the etched underframe. If the axleboxes and springs are still fitted, the backs of the axleboxes should be opened out first (see later section 'Axleboxes and Springs').

BRAKE LEVERS AND GUIDES

On the prototype there is, in fact, a different type of clutch mechanism at each end of the brake shaft, the straight clutch which is in line with the shaft and the curved clutch where the lever is pivoted above the brake shaft (Morton). The two types on the etch are in-line lever [**U12**] and the Morton lever [**U13**]. Take the appropriate lever(s) and bend to shape as shown in the diagram at the end, using the half etch lines and dots as a guide.

Attach a clutch [**U14**] to the back of the in-line lever [**U12**] (when you look from the front of the lever you should only be able to see the top right corner of the clutch). A brake shaft washer [**U9**] will need to be added to the front of the lever. This can either be done now or after the lever is mounted on the brake shaft (see later).

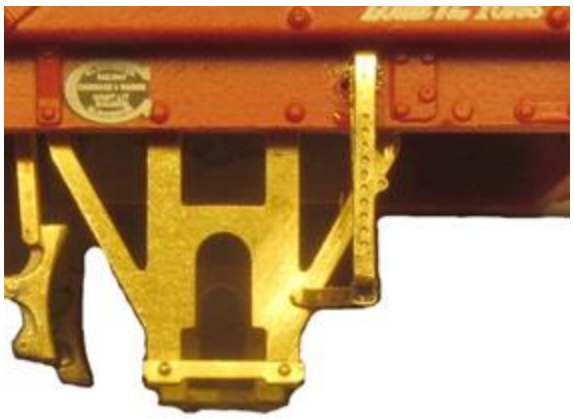
Cut the brake lever guide jig [**U15**] from the side of the etch (see photo below). Open out the large hole to clear the brake shaft and the small hole 0.5mm.

Decide which type of brake lever guide is required, the common pin type [**U16**] or the rarer ratchet type [**U17**]. Bend to shape as shown in the photo using the half-etched marks. The bottom bend of the pin type should be bent first by placing in the slot in the brake lever guide jig and bending over so that both sides lay flat along the jig. This should give a nice round curve.

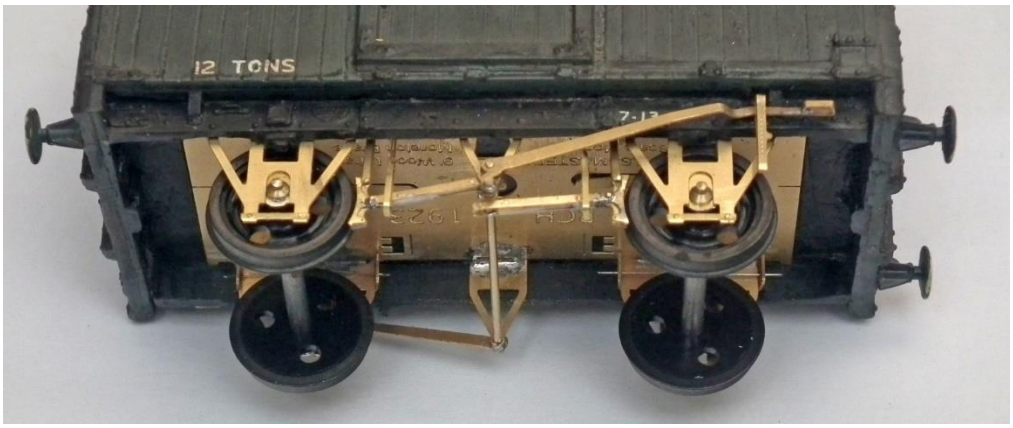
On the edge of the fret there is a jig to ensure the hole for the brake lever in the solebar is in the correct position. Cut the jig from the side of the etch and clean up. Now place the jig over the brake shaft, align the etched line on the jig with the bottom of the solebar and spot through the 0.5mm hole with a 0.5mm drill. Drill through the solebar 0.5mm.

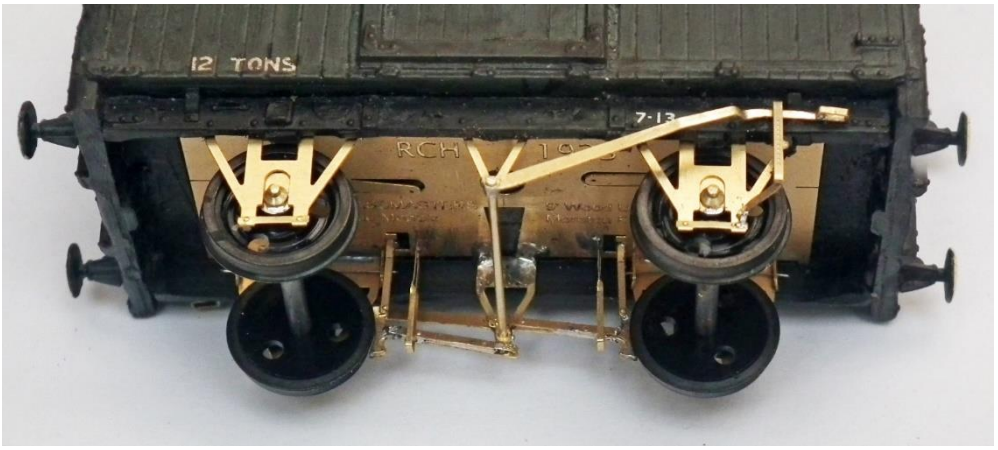
There are two common types of brake lever guide support strap fitted between the bottom of the brake lever guide and the W-iron. These either go to the bottom of the W-iron keeper plate [**U18**] or part way up the W-iron [**U19**]. Take the appropriate etches and fold as shown in the photos (the bends are quite severe!). When satisfied with the shape solder the straps to the bottom of the brake lever guide.

To assemble the brake levers and brake lever guides, push the brake lever through the brake lever guide, mount the brake lever on the brake shaft (both shafts on the Morton side) and then attach the brake lever guide to the solebar and W-iron with epoxy or cyanoacrylate glue. Solder the brake lever to the brake shaft. Finally. on the in-line side, solder a washer [**U9**] over the shaft on top of the lever.



Reduce the length of the brake shafts and pivots. The brake shafts should protrude 0.5mm beyond the lever and the upper pivot wire should be nearly flush.





DOOR BANGS, COUPLINGS AND BUFFER HOUSING NOSE RINGS

The other parts included on the etch are door bangs for mineral wagons, door bangs for goods wagons, coupling hooks, coupling hook face plates for fixed end wagons and buffer housing nose rings.

There are a multitude of types of door bangs fitted to wagons including various types of wooden block, curved metal stop and spring stops. The types included in the kit are the standard RCH 1923 type for mineral wagons [**U20**] and goods wagons [**U21 and 22**]. There are two mineral wagon door bangs per mineral wagon, four goods wagon door bangs per goods wagon (note those for goods wagons are handed).

In the same way as the 'V' hangers, the door bangs can have rivets pushed through using the half-etched indentation or drilled out 0.4 mm. The door bangs need to be bent up as shown in the diagram at the end. The mineral wagon door bangs are fitted on the centre line, the goods wagon door bangs will align with the plates on the door or, if there aren't any, with the hinge plates.

To use the coupling hooks, take one of each hand [**U22**, **U23**], bend slightly along the half-etched line and solder together with the half-etched line on the outside. Round the edges of the hook with a file and taper the point of the hook towards the tip.

Fit coupling hook face plates as required [**U24**].

Bend the bent parts of the hook assembly back straight and pass the tail of the hook through the appropriate coupling hook plate with the slot towards the bottom of the plate, and solder together. Push the tail of the coupling through a 1.35 mm dia. hole/1.2 mm x 0.6 mm slot in the wagon headstock, bend over the tabs and secure with epoxy or cyanoacrylate. Repeat for the opposite end. Fit the coupling chain of your choice through the slot in the coupling hook.

(Brassmasters sell coupling chain separately – with either copper or soft iron links – Ref MC006, MC007, MC008, MC009)

The buffer housing rings are to replace any missing rings from plastic kits. Take two of the rings [**U25**], drill through the centre hole to clear 1.0mm and solder together. Push the assembly onto the end of a rat-tailed file and round the edges of the rings. Mount on the end of the buffer housings with epoxy or cyanoacrylate.

AXLEBOXES AND SPRINGS

It is necessary to open up the back of the moulded axlebox to allow the bearing to move up and down in the W-iron. This can then be done by carving out with a scalpels and file or by using a burr in a slow running mini drill. Push the axle box and spring face down into a piece of Blu-Tac before attempting to carve out the back. Check that enough material has been removed to allow the free movement of the axlebox.

If the axleboxes and springs are still separate, attach to the etch W-irons with epoxy or cyanoacrylate.

WEIGHTING

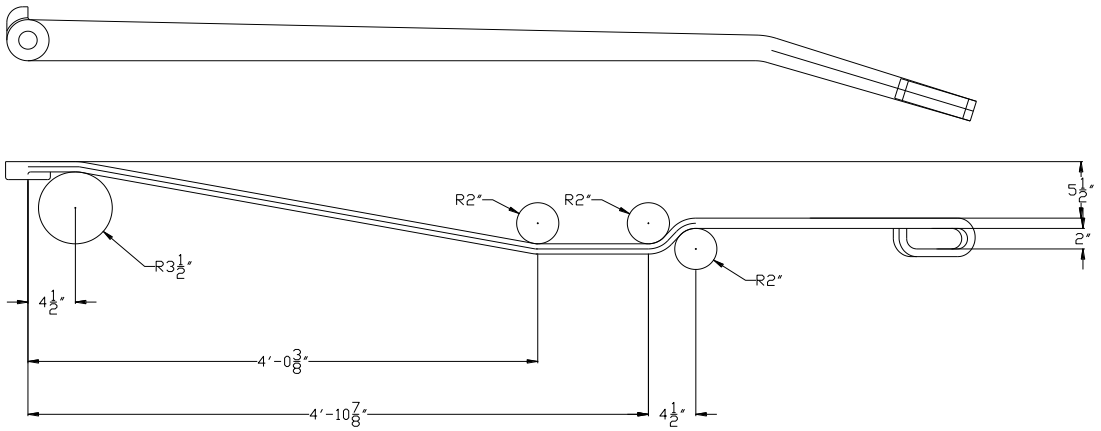
The sub-frame allows plenty of space for weighting the wagon. If Code 4 lead (1.8mm thick) is used, there is space for two thicknesses to be fitted to the underside of the wagon without it being seen. For P4, two pieces 16mm x 54mm give a total wagon weight without load of approximately 50 grams. For EM, two pieces 15mm x 54mm give a total wagon weight without load of approximately 48 grams. For OO, two pieces 14mm x 54mm give a total wagon weight without load of approximately 46 grams. Adjust the size accordingly for loaded wagons.

For wagons with shallower solebars or 'dropped' floors there is only space for one thickness of Code 4 lead which would give a weight of approximately 36 grams but if Code 3 lead (1.32mm thick) is used there is space for two pieces 16mm x 62mm which gives a total wagon weight of approximately 47 grams with space to add more at the ends. For EM, two pieces 15mm x 62mm give a total wagon weight without load of approximately 45 grams. For OO, two pieces 14mm x 62mm give a total wagon weight without load of approximately 43 grams.

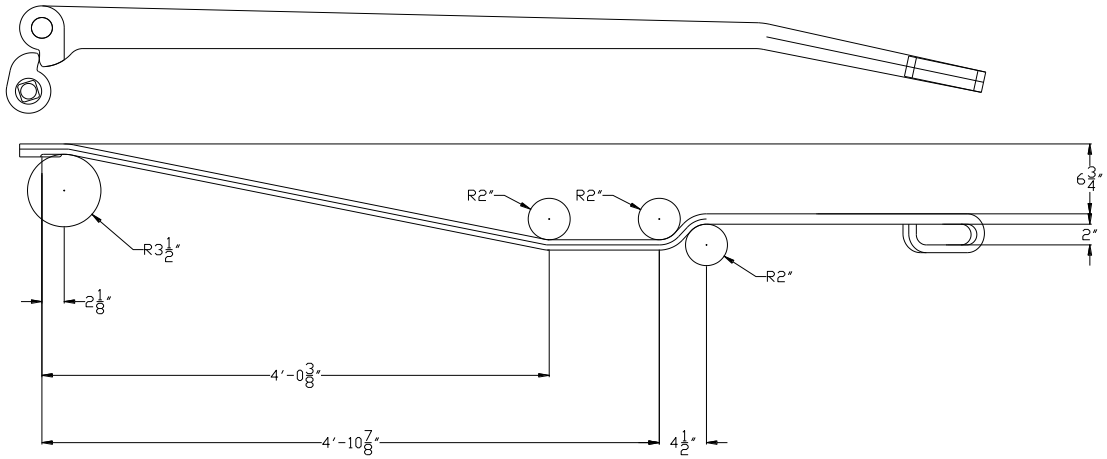
Brake lever diagram

Bends are marked with a small etch dimple on the back of the etch
For 2” bends use a 1.3mm drill
For 3½” bends use a 2.0mm drill

In-line lever



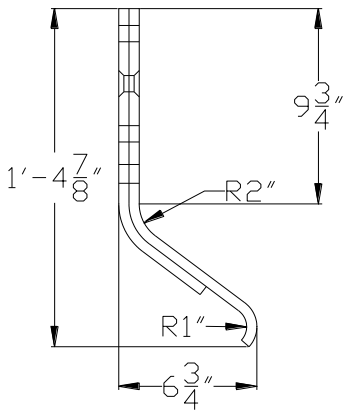
Morton lever



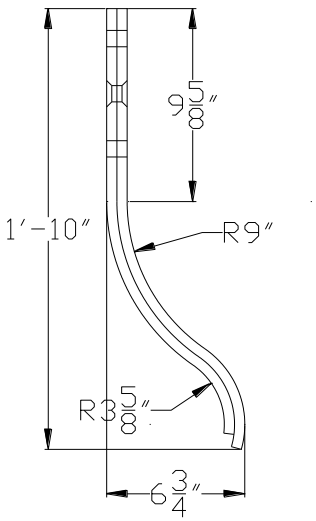
Door bang diagram

For 2” bends use a 1.3mm drill
For 1” bends use a 0.7mm drill (or bend the end with pliers)
For 9” bends use a 6.0mm drill
For 3 5/8” bends use a 2.5mm drill (or use round nose pliers)

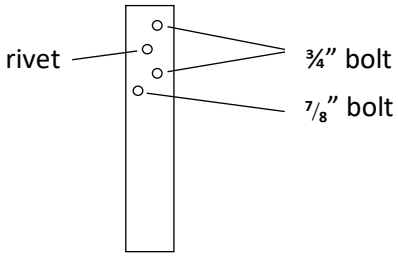
goods



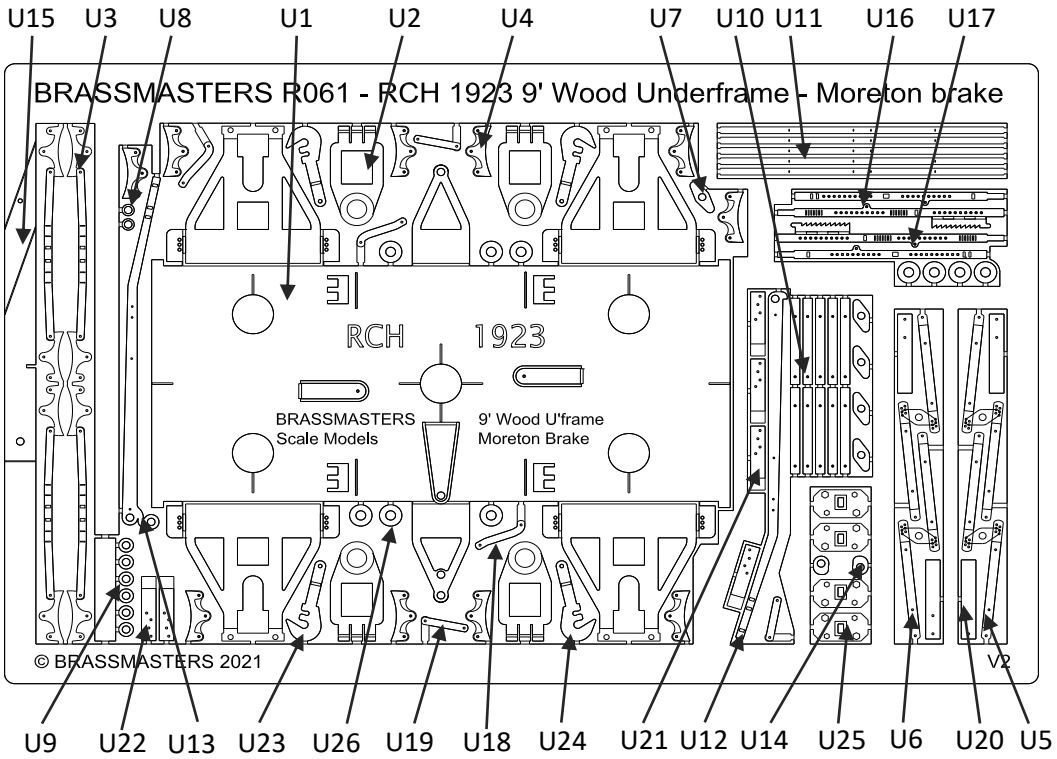
mineral



Goods door bangs
(one this way, one reverse, each side)



Etch diagram



ETCHED COMPONENTS		
U1. Underframe	U14. In-line clutch	**Other components**
U2. Bearing carrier – (4)	U15. Brake lever guide jig	Waisted pin-point bearings – (4)
U3. Brake block and hanger – (4)	U16. Brake lever guide – pin type – (2)	0.2mm steel spring wire
U4. Brake block centre – (8)	U17. Brake lever guide – ratchet type – (2)	0.3mm wire for the brake blocks
U5. Push rods outer – (2)	U18. Brake lever guide support strap – bottom type - (2)	0.8mm wire for brake shaft
U6. Push rod inner – (2)	U19. Brake lever guide support strap – middle type - (2)	
U7. Brake shaft levers – (4)	U20. Door bangs (mineral wagons) – (2)	**Components not supplied**
U8. Morton 'V' hanger washer	U21. Door bangs (goods wagons) left – (2)	Wheels – 3'1½" split spoke with 26mm axles
U9. Brake shaft washer – (3)	U22. Door bangs (goods wagons) right – (2)	Coupling chain
U10. Push rod packers – (4)	U23. Coupling hook left hand– (2)	
U11. Safety loop – (4)	U24. Coupling hook right hand – (2)	
U12. In-line brake lever	U25. Coupling hook faceplate – (2)	
U13. Morton brake lever	U26. Buffer housing nose rings	