

## A Survey of Railway Track on Pre-Grouping Island Railway Companies

by Richard Brimson

In 1923 Southern Railway (S.R.) came into being by absorbing the three large mainland railways in southern England and with them other smaller concerns including the three I.W. railway companies: The I.W. Railway Co. (IWR), I.W. Central (IWCR) and The Freshwater, Yarmouth & Newport Rly. Co. (FY&N). S.R. set about renewing the worn and assorted, mostly, flat-bottomed rail and fixings with standard bullhead rail and LSWR or S.R. cast iron chairs laid on re-ballasted track bed.

Whilst looking for evidence of the track construction materials used by the original pre-grouping railway companies it became apparent that the FY&N differed in many respects to the other six original companies. The two main island companies absorbed by the SR: IWR and IWCR, were amalgamations of five companies that began as independent concerns. IWR bought the Bembridge Harbour Improvement Scheme railway and harbour and the IWCR came out of the IW Newport Junction Rly (IWJR) when it joined the Cowes Newport (CNR) and Ryde Newport (RNR) companies, the IWCR later absorbed the Newport, Godshell & St Lawrence Rly. (NGStL) Each of these companies had appointed different contractors and engineers who bought their materials from a large range of producers available in the second half of the nineteenth century so that the results were lines with a distinctly different 'look' to them. The FY&N seems to have differed to a further extent than the other small lines which were constructed between 1860 (CNR), and the last section of the NG&StL, St Lawrence to Ventnor opened in 1900, by employing construction techniques unique among the other island lines.

To find items from the original pre-grouping track components is rare, but fortunately two of the first lines to close the Brading to Bembridge branch and the Newport to Freshwater line had portions of the original track bed exposed or at least only lightly re-ballasted by SR and not overgrown or paved at the beginning of this century, so 'field-walking' quite often turned up track fixings and over time differences in supplier's patterns by the railway companies who used them became apparent.

'Track' is not the rolling stock, signals or stations (although stations have or had distinct company styles) track includes:

- a) rails, chairs, fishplates with the fixings and sleepers.
- b) fencing and gates.
- c) structures - bridges, culverts, embankments, cuttings and tunnels

## 1. Rail

Practically no identifiable original rail survives today from the seven companies and the few pieces that can be seen had been re-used as fence posts and corrosion has eroded any evidence of brand marks that may have existed to identify the company that purchased it or the mill that rolled it.



*Above: Cross-sections of typical flat bottom and double headed rails as used by island companies.*

One piece of rail does exist though, difficult to access, hence the poor quality photo (below) it is from the Isle of Wight Railway Co. and rolled only five years after the opening of the line; it's dated 1869. At this time IWR used only flat bottom wrought iron rail and during the first few years IWR bought rail from the Governor & Company of Copper Miners in England, this company ceased along with so many other iron works once steel became generally available. By the mid-1870's IWR were seeking quotes for steel rails from Siemens Landore and Ebbw Vale, but still had to purchase iron rails from the Governor company due to lack of funds.

Books published describing track and its history are few but they all seem to chart the development of rail through the use of chairs to hold rail culminating in the 'Big Four' companies standardising rail weight and shape and the chairs that support it, however, flat bottom or 'Tee' rail barely gets a mention except as used in the USA or British overseas territories. In fact all seven island companies used flat bottom rail and only the IWR converted to chaired track on its mainline which they began in 1877. The irony is that all mainline rails are now of the flat bottom type worldwide.



*Just visible on this rail fence post is the date 1869 and IWR; surely a valuable piece Isle of Wight industrial history.*

Another identifiable piece of rail exists, but not from the brand mark as it's only half an inch thick, but from the circumstances of its location. It was found among a dump of smashed fixings on the Freshwater line thrown down an embankment after track adjustment well over a hundred years ago and a slice of rail was cut probably to insert the rail into the line to enable the correct expansion gap, it would not have been cut off during dismantling the line. The entire steel rail for the line was purchased in 1887 from the Blaenavon company in south Wales,



*Possibly the only piece of FY&N Blaenavon rail existing, the foot is 4 1/2" wide, 4" high. The end of a length of rail was trimmed either because of the damage to the foot in this case or to fit the rail into the existing line to allow the correct expansion gap.*



*Similar to the FY&N piece (bottom right) - this rail off-cut was similarly found discarded on the track-bed at Darke Peak on the Eyre Peninsula in South Australia, probably cut off for the same reason*



*The FY&N rail would have looked similar to this piece of Blaenavon rail rolled in 1897 for the Lambourn Valley Light Railway (L.V.R.) now a fence post photographed in Devon. The Lambourn line opened in 1898.*

although the contractor appointed by the FY&N, William Jackson, who had been given full responsibility for the procurement and the construction of the line went bankrupt and the Blaenavon company who had supplied the rails having accepted FY&N shares as payment, later found them to be worthless.

Another piece of flat bottomed rail has been found, this time on the Newport to Sandown line in the River Medina which runs alongside. It was encrusted in rust and gravel and must have laid there for quite a time and once the canker was hammered away a brand mark was revealed: "E.V." (from the Ebbw Vale Iron & Steel works in south Wales) "Steel" (Steel rail was branded to distinguish it from iron), it was



*The Sandown piece of rail with brand mark roughly highlighted with chalk.*

rolled in month “8” (August) year “81” (1881) for the “G.W.R.” (Great Western Railway) What could account for GWR rail being on the island? The island’s railways had no connection with the GWR even when under the control of SR or even British Railways (BR) that could account for this rail being here. The date 1881 puts it with the I.W. Newport Junction Railway which although it had opened from Sandown to Shide in 1875, the Shide to Newport wasn’t opened until 1879, in 1878 the company had applied to the Ebbw Vale company to quote for 25 tons of rail, probably to complete the Shide to Newport section using steel rails, so the IWNJ had traded with E.V. In 1880 the manager of the IWNJ reported that the original iron rails were wearing out quickly and in May 1881 the company needed to replace rails on the Merstone to Blackwater section, 25 tons were required and were looking to replace the worn iron rails with steel, but the company was strapped for funds, however, in June they ordered 20 tons of “*slightly defective rails*” from Green & Burleigh, a railway materials wholesaler and in November the company ordered a further 20 tons. It seems quite likely that the found rail was originally ordered from Ebbw Vale works by the GWR which was a large wealthy company that would not need to use imperfect rail on their network and rejected it, hence the Ebbw Vale company sold the order on to an intermediary such as Green & Burleigh as ‘partly defective rail’ who then sold the rail on to the IWNJ for which it was presumably ‘safe’ enough for their requirements. An off-cut somehow ended up in the river Medina. The rail is worn and corroded and was probably 75 pound/yard; rail size is still graded by weight; pounds per yard, the two batches 20 and 25 tons of 75lb rail would lay about 700 yards of track, not much of a replacement programme! By July 1887 IWCR was formed and the new company continued to buy ‘slightly defective rails’ up till 1889, this time directly from Ebbw Vale, but it is notable that in October 1890 it was recorded that 50 tons of “*perfect*” steel rails were purchased; the financial situation had obviously improved. At the end of 1887 IWCR were offered 300 tons of steel rails ‘*drilled to pattern*’ presumably the company had agreed a standard size of rail across the three former companies, later, in 1892 IWCR obtained quotes from seven different suppliers for 67lb rail and asked to get quotes for 69lb rail which illustrates the variety of rail available. Flat bottom rail often had the base flange punched or drilled for bolting through to the sleepers; some times just one hole either side at each end and others for the whole length of the rail hence the rail ‘pattern’ as the drilling would be done by the supplier to the customer’s requirement.



*A close-up of a section of worn iron flat bottom rail recovered from a siding showing the fibrous nature of the material, once the relatively hard surface is worn away the body of the rail quickly breaks up, half of the rail table has actually broken off on the left. Steel is far tougher and more homogeneous than iron, it being more crystalline in structure so it wears evenly and will give good service for much longer even when worn. The hole in the foot is for a through bolt near the rail end the rest of the rail would be 'dog spiked'.*

## **2. Fishplates**

This is where the FY&N start to differ from the other companies, most plates at



*Above: a typical fishplate shown installed on some flat bottomed IWCR style flat bottomed rail viewed as from inside the '4 foot' as they would have looked on most of the island's railway lines.*

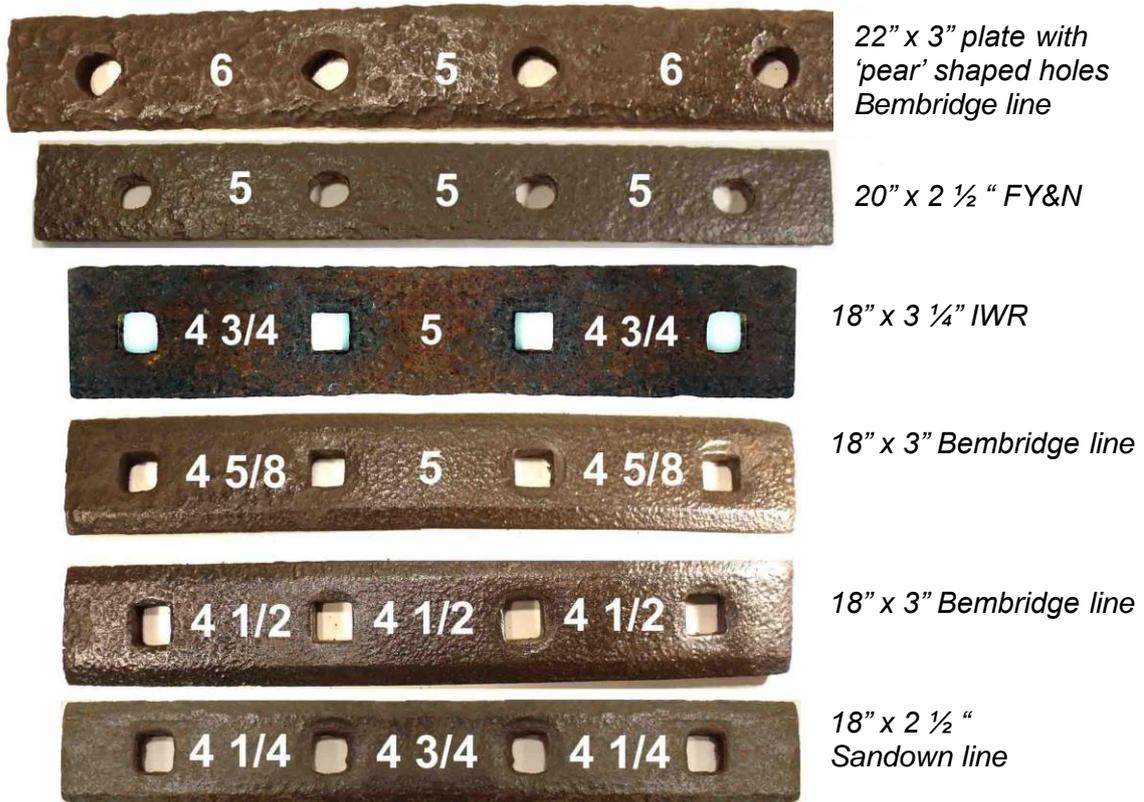
this time were made to accept 'square necked' fish bolts, however the FY&N used 'oval' necked bolts, what the advantage was isn't clear, but the plates themselves are fairly light so cost might have been a factor.



*Above: a matched pair of FY&N fishplates with a set of four oval necked fish bolts and nuts. The upper plate with oval holes would be fitted inside the track, the lower plate with circular clearance holes outside the rails where the nuts are fitted.*

Fishplates were usually purchased to be supplied with the rails because until rail dimensional standardisation was brought about at grouping, the shape of rail and the fishplate fixing holes would vary depending on the supplier's design. The larger railway companies could have track components made to their own specifications, but smaller companies would buy material to the supplier's pattern. To illustrate this a selection of plates have been placed together with their dimensions to show the differences between them; none of the plates would have been interchangeable.

*N.B. The whole of the author's railway track component collection is now in the possession of the Isle of Wight Steam Railway.*

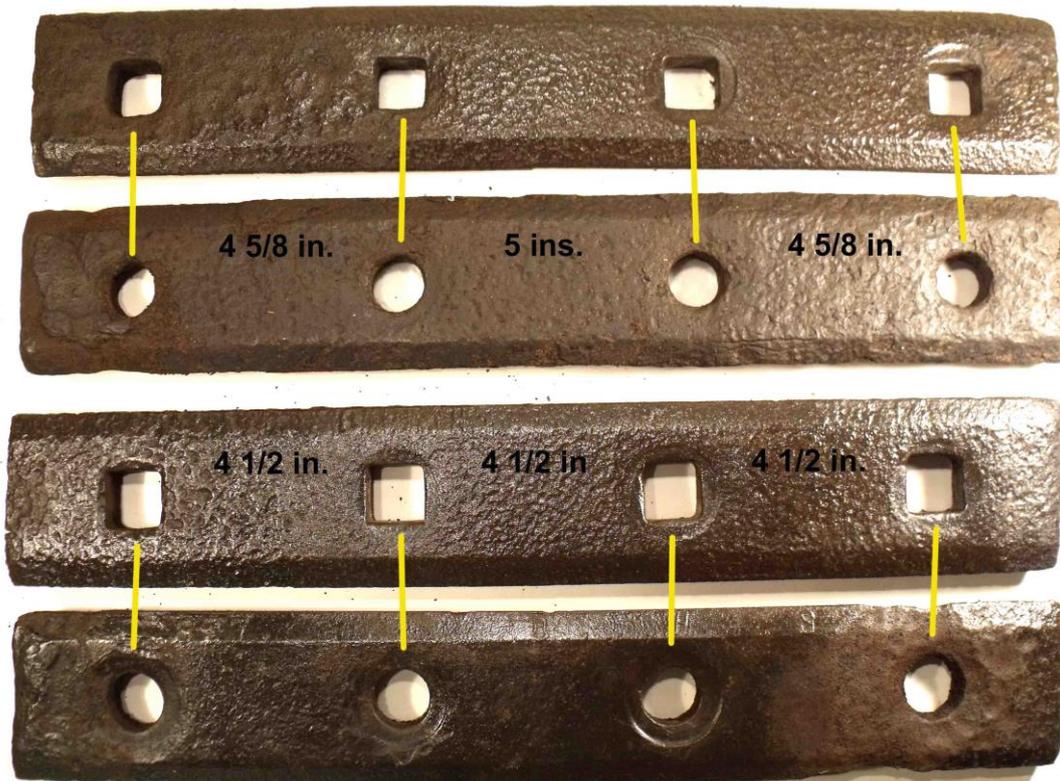


*Dimensions of plates and hole spacing in this small selection collected on the island illustrate the variety of rail joints pre-grouping railway companies worked with.*



*A sample of square necked fish bolts with a lighter FY&N oval bolt on the right*

Fish plates were always paired: one had the shaped holes that prevent the bolt neck from turning as it was tightened and the other plate had circular holes so that the nuts could attain the maximum grip to minimise loosening under vibration.



*Two pairs of matching plates collected on the Brading to Bembridge branch, that wouldn't have been able to fit the same rail or at least setting the expansion gap would have been difficult in pre-drilled rail. The lower plate has indentations made by the washers and even from the nut visible on the second hole from left.*

The need to have matched pairs of plates was eliminated with the introduction of the 'pear' shaped hole which provided the locking aspect for the bolt and still left enough 'ground' underneath the nut (and washer when used) to give adequate grip to maintain tension. Although SR adopted this as a standard it may well have been in use prior to grouping. Despite the standardisation in U.K., the rest of the world's railways continued to develop the flat bottomed rail and methods of fixing to the track.



*Above: Fish plates with oval shaped holes can be found further afield - this one was found on a dismantled railway in South Australia; walking the track-bed looked similar to the FY&N with the same bolts and dog spikes scattered about. In 1919 re-laying the track in S.A. meant they adopted their own construction methods rather than British as previously. This is an 'L' shaped six hole plate made by B.H.P. Co. Ltd. Australia, which was also spiked to the sleepers to prevent rail-creep.*



*Oval necked fish bolts found at Peringa on the Barmera line in South Australia opened in 1913 and closed in 1968 – the smaller track fixings were almost identical to the FY&N*

Back on the island

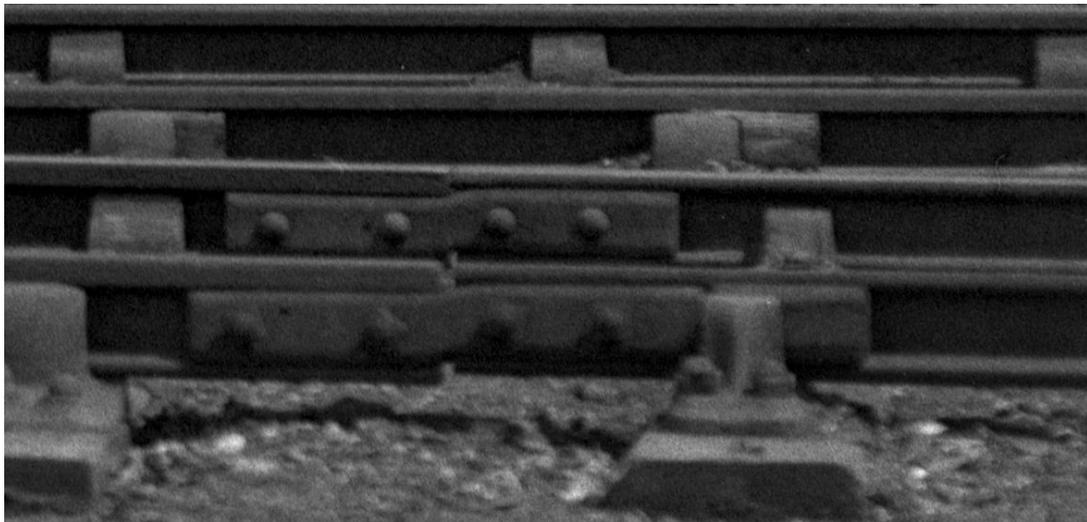


*Above: two plates from the Bembridge line that match physically but with slightly different brand marking, so not rolled at the same time, once they were cleaned up 'B. H. S.' was found on the lower plate – could this be Bembridge Harbour Scheme? The initials turn out to be more prosaic: the upper plate has B.H.S.C. but also SECR (albeit the 'R' is inverted) which is the South East & Chatham Rly formed in 1898 and BHSC almost certainly stands for 'Barrow Haematite Steel Co.' Why the IWR (by this date operating the line) were using SECR materials would be interesting to know.*



*Above: Continuing with the topic of mismatching rails and fish plates: above is a detail from a photo taken in c1930 at Newport Yard which shows how connecting two dissimilar flatbed rails with un-matched fish plates could be problematical – by this time the yard had almost been fully converted to chaired track so this might have been seen as only a temporary measure – (top left) a four-hole plate with only three bolts fitted and (centre right) the other has only two bolts fitted – good enough for the yard!*

*Below: Some creative work done in the blacksmith's shop at Newport yard, also 1930s, to form cranked fish plates to join new 'bull head' rail coming in from the left to some double headed rail on the right; the hole spacing on the two rails differ considerably.*



### 3. Chairs and Base Plates



*Side and plan views of Isle of Wight Railway Co. rail chair cast in 1880 by Head & Wrightson, Teesdale, a major iron works that supplied railway materials worldwide.*

The first of the island's companies to use chairs and double headed rail was the IWNJ when it laid its first length of line with used double headed rail and chairs purchased from the LSWR, the rail was condemned by Col. Yolland in 1872 Board of Trade inspection as being worn and not fit to use for passenger traffic. Chairs were used later as an inspection of the Shide to Newport section referenced chaired and flat bottom track. There is an IWCR chair dated 1917 at the Haven Street Railway Museum.

Chairs (*pictured above*) were first considered by the IWR in 1877 and they gradually converted their track to steel double headed rail.

The FY&N used flat bottom rail laid on base plates, or rather plates every two or three sleepers.

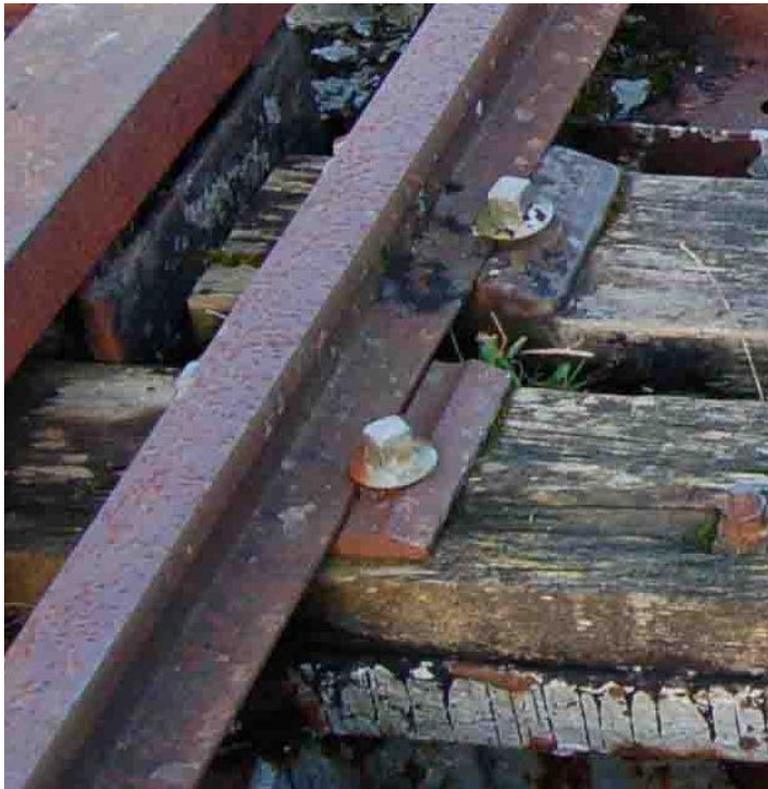


*Fragment of a large base or bed plate 7" wide x 7 ½" used on rectangular sleepers.*



*Small base plate 4 ½" x 8" as used on half round sleepers (see below) special bolts secured the assembly. The rails had a 4 ½" wide base which fit these plates - the rail and plates have to match so as to anchor the rail effectively.*

*Below: An original (broken) bed plate positioned on top of a portion of original FY&N half round sleeper that survived as a fence post. Each half round sleeper had to be cut and shaped to receive the plate and the through bolt holes line up pretty well.*



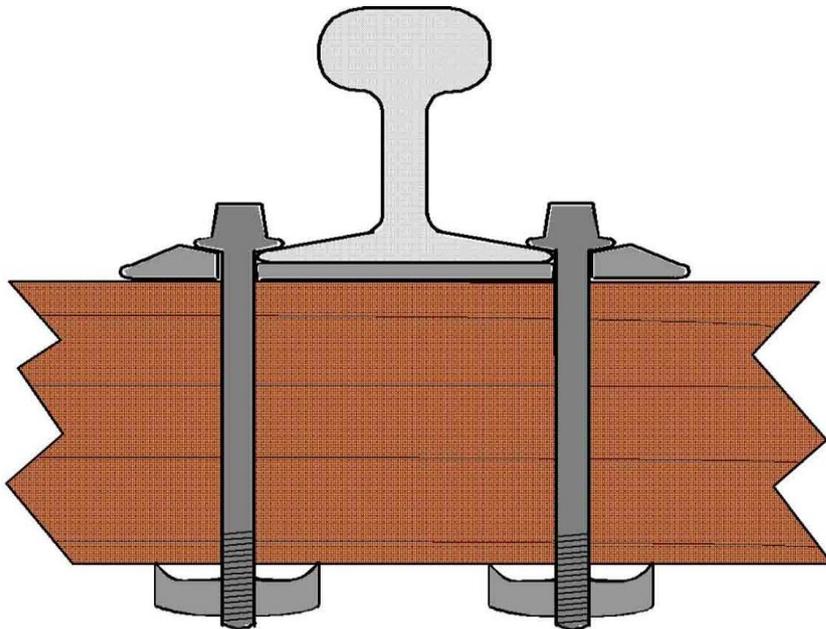
*Left: a detail from a photo of abandoned track in Ireland which has used similar plates to that on the FY&N, the nearest has the same profile as the original (above) while the plate behind has a 'stepped' profile similar to the larger FY&N type.*

#### 4. Fixings – Through Bolts

Methods for securing the rails to the track bed has been evolving since the first railway, by the 1860's when the island's railways began wooden cross sleepers were normal on which chairs or flat bottom rail would be fixed. In the case of fixing rail chairs, this was with 'pot' or 'dome' head spikes driven through wooden 'treenails' into the sleeper, but through bolts would be used sometimes to mitigate the stresses on curves.

Up until the FY&N, island companies had typically begun with flat bottom rails bolted down using 'fang bolts' at each end near the fish joint and 'dog spikes' at the sleepers in between. Later, the IWCR employed a system of through bolts over the whole length of rail, whilst IWR migrated to chaired track (see above).

For whatever reason, Henry Jackson, the FY&N contractor opted for the 'bed-plate' system and this required special bolts with 'mushroom' heads to secure the rails without holes in the flanges.



*Above: A sketch of the base or bed plate method of securing the rail to the sleepers. It uses specially shaped heads on the bolts. The underside of the sleepers have triangular 'fang nuts'.*



*Mushroom headed bolts  $\frac{5}{8}$ " dia. by  $7\frac{1}{2}$ " long including the head. They were found on the line with fang nuts fitted that can still be engaged.*

*Author's Collection*

An alternative through bolt was heavier and used a square grip nut; these were used extensively by Great Western Railway and turn up on abandoned lines in the West Country.



*Above: These bolts are  $\frac{3}{4}$ " x  $7\frac{1}{2}$ " and were found with these square nuts still fitted, a blow lamp soon loosened them. However, it's not clear which way the nuts were to be fitted when in use.*



*Left: Photo taken at Didcot Railway Centre of some old railway chairs taken out of decayed sleepers which still have their fixings attached. The square nuts (arrowed) have been fitted on both ways round, so it's still unknown which is the 'right' way up, but probably as the right hand example and the others visible.*

It's quite likely that the heavier bolts were used on the larger bed plates placed on the rectangular sleepers. These screw fixings (or broken parts) have been found along the whole length of the FY&N.

There has been no evidence found for these mushroom headed bolts being used on any other line (of course, a negative isn't proof of anything), but it infers that bed plates were unique to the FY&N, whereas there is plenty of evidence of the common alternative fang bolts with square heads (below).



*Above: a selection of fang-bolt nuts found on the Brading to Bembridge line and their square heads smashed off during demolition. The smaller fang nuts have only been found on the Bembridge line - they are an oddity as their threads fit the large 3/4 " diameter bolts, the larger nuts suit smaller diameter 5/8" bolts.*



*Left: A selection of through-bolts and 'fang nuts' from the Central Railway, some maybe from the original lines. It was usual for platelayers to smash the bolt heads off for rapid dismantling of track during any replacement programme.*

Another style of 'fang bolt' type fixing seems to have been used by the R.N.R., at least they've been found on the Asheby branch that connected the chalk pit at Asheby Down, almost three quarters of a mile from the siding. Numerous examples have been found and although crude, look quite effective (below). It's tempting to think that



*Through-bolts from Asheby siding and so far, this design of grip nut hasn't appeared anywhere else on the island or in any literature. The track was laid in the 1870's*

this style of fixing was used on the early Ryde line, but very little evidence of any fixings appear on the surface there (and of course, a long section of track is in use by the heritage railway), probably because of extra ballasting during BR days has buried everything. Another reason for lack of track debris was that there was a competition

for platelayers in later IWCR days for maintaining the tidiest section of track – there certainly wasn't any practice like that on the FY&N judging by the stuff littered along their track.



Left: A lone through bolt found on the Shanklin to Ventnor section of the IWR where there is also little to find, the deep square head is different to the other examples.

Bolting the rails to the sleepers is obviously more secure and it was the practice to do this on curves, in stations and tunnels where derailment from out-of-gauge track would be more problematic. It seems that the IWCR up-graded their track this way as time passed and when the NGStL railway was being planned negotiations were held with the IWCR who were intended to operate the line for a percentage of takings. One of the conditions made by IWCR was that the NGStL 'road should be fanged throughout', this probably after the un-happy experience of the FY&N line on which IWCR operated the service (more below).



*Above: a track detail from a photo of the NGStL line outside the tunnel which shows the square headed bolts through both sides of the rail flange at each sleeper.*

## 5. Rail Spikes

The 'dog spike' is the simplest and quickest method of securing flat bottom rail to the sleepers, important where cost of railway construction is critical, they are driven vertically alongside the rail flange into the wooden sleeper with a large hammer. There is evidence that they were used on all the earlier island lines. The drawback is that under frequent traffic movement the rails can easily loosen the spikes and potentially the rail can move out of gauge without good quality sleepers and constant monitoring and re-spiking the line it can rapidly deteriorate.



*Typical dog spikes, the name comes from the shape of the head, the 'nose' overhangs the rail flange and the 'ears' are to provide points to lever out the spikes with an adapted crow bar.*

*Left and centre: 5 ½" long 5/8" thick spikes found on IWCR lines Ryde and Sandown respectively.*

*Right: smaller at 5" long 1/2" thick FY&N spikes of a type found along the whole line without exception – no other size of spike has been found on the FY&N.*



*These two spikes are similar in style, but cruder in design not having the means to lever them from the sleepers.*

*Left: 6" long 7/16" thick and looks older than the 'dog spike' type. It was found on the Cowes line and could possibly be a spike from the original CNR company. It is fairly worn under the head indicating prolonged service compared to the other.*

*Right: 6" long 1/2" thick, one of several similar spikes found on the Ashy chalk pit branch constructed in the late 1870's*

The other commonly used spike is 'dome headed' and used to spike through rail flanges and rail chairs pre-grouping and after, until replaced by the 'chair screw' in the case of chairs during the reign of The Big Four and BR.

*Below left: most likely laid by SR after grouping when relaying the islands lines often included the use of second-hand components, but this 1902 LSWR chair still has its spikes attached illustrating the dome headed spike in use and the remains of wooden 'treenails' which are inserted 'rawl-plug' fashion into pre-drilled holes in the sleeper with the iron spike driven in. It was found on the Sandown line in the river.*



*Above right: Dome or pot head spikes from the Sandown line*

## **6. Spikes – Oddities**

By far the most common design are the dog spikes pictured above, but there are some alternative types of spike that appear to have been used, although there has only one of each type found, described below, so the usual caveat must apply that it doesn't mean that they were used in quantity. They are also included for the historical record as they may be the only examples in existence! There may be a museum of railway track somewhere exhibiting these components, but not as yet identified.



*This is a badly corroded spike (5 ½" long x ¾") made from circular section bar folded over to form the head and a thread of some sort applied half way up the body (just visible), it's not certain whether the threaded chisel point is to screw the thing into a pre-drilled hole in the wood (which would require a special tool) or to be hammered in and the ridges providing grip, probably the latter. It was found at Ashey.*



*This curious object 5" long ¾" thick, again, found at Ashey, was thought to be a damaged spike or an apprentice's joke project. There seems no obvious advantage to having two rather fragile looking spikes to hammer in when one usually serves well enough. However, researching American publications on track construction Marshall M. Kirkman's 'Science of Railways' series from 1904 has a passage in which he describes dog spikes and then mentions fang bolts being favoured in England (presumably not in the US) and then goes on:*

*"Another English device for fastening rails is known as the wedge spike. The spike is split at the bottom for receiving a wedge which expands the two halves of the spike and makes it assume a dovetail shape. A hole is bored through the tie (sleeper) and an iron plate is used to hold up the wedge while the split spike is driven onto the latter. The spike cannot be removed from the tie until the wedge is withdrawn, this being done by a lever made for that purpose".*

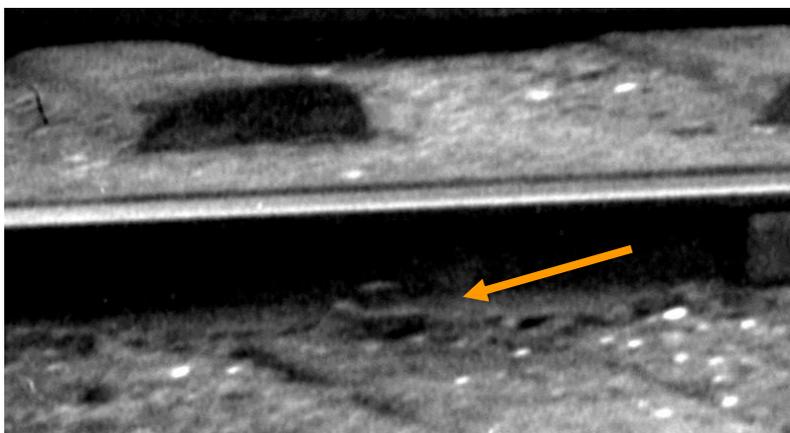
*Rather elaborate, lucky to find a reference for this object at all, perhaps the RNR thought it worth a trial, but there isn't a clue as to who invented it or who made them.*



*This 6 ¼" long spike was found on the track-side of the Brading to Bembridge line and appears to be a rather singular object. It almost certainly has to be used to hold a flat bottom rail much like a dog spike does, (unless it has some other special purpose, perhaps a keep for a gate latch!), but surely the only way it can be correctly fitted is to drill the sleeper at a pre-set position, hammer the spike home and slide the rail flange into the spike's 'jaws'. It might be for precision alignment, but having seen the wedge spike, surely anything is possible!*

## 6. Other Track Fixings

Where it is inconvenient to drill a hole in the rail flange to install a through bolt, a clip can be fitted using a screw alongside the rail flange.



*Above: rail clips 3 x 3"  
Left: from the Sandown line  
Right: Bembridge line.*

*Left: detail from a photo at Newport yard taken mid 1920s revealing a rail clip fitted to some flat bottom rail there.*



*Left: Coach Screws have multiple uses, but when found on the track it would probably have been used for securing rail clips above or the rail itself.*

*Far left: This screw has been worn on the shank just beneath the head which suggests that it was used to secure a rail through the hole in the flange, instead of a fang bolt. Both were found on the Sandown line.*



*Above: These fish plate bolts were used on the Brading to Bembridge line, they have square shanks, but also square heads – the reason for this is unclear – the bolt is already secure with the square neck why the need for a square head which can't be turned?*

## 7. Gauge Ties

Gauge ties are designed to lay across the track bed and fit onto the outside flanges of the two flat bottom rails and literally hold the rails to gauge, but unlike tie-bars which are generally threaded rods that are passed through holes drilled in the vertical rail web which can be adjusted and secured to gauge with nuts, gauge ties have no adjustment. They have to be procured to suit the dimensions of the rail in use on the line.



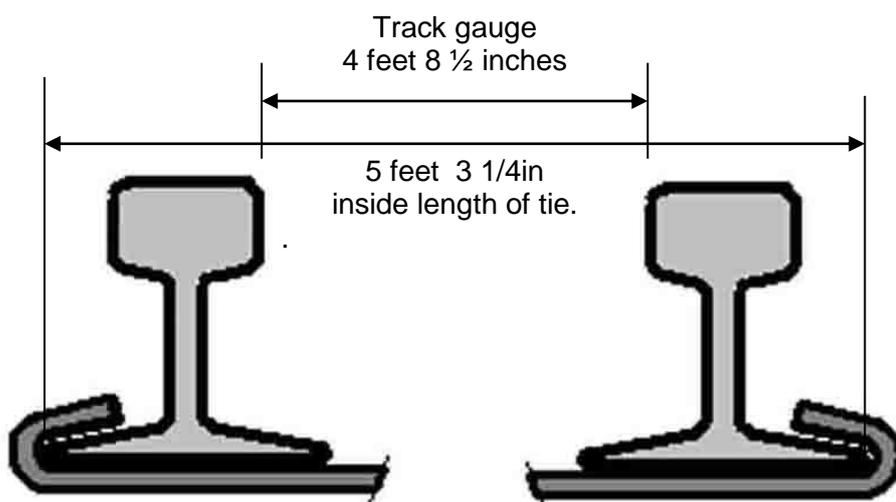
*Above are three gauge ties, the R.H. ends damaged on dismantling –  
The upper example is from the FY&N,  
Centre: was used on the Ryde Newport line  
Lower: was found on the Newport to Sandown line.*



*Left: detail of the folded bar ends that grip the rail flange. Nearest is the FY&N tie, centre RNR, rear the Sandown.*

Measurements of the ties strongly suggest that the two IWCR ties were used with the same sized rail which happens to be the same as the piece of EV 1881 rail found on the Sandown line. The FY&N tie is slightly shorter and suits the piece of Blaenavon rail found on that line (see above).

The base of the FY&N Blaenavon steel rail is four and a half inches wide and the rail head is two and a quarter inches wide, therefore from the inside of the head where the track gauge is measured to the outside of the rail foot is three and three eighths of an inch, two rails make six and three quarter inches, add this to the track gauge and it makes sixty three and a quarter inches – 5 feet 3 ¼ inches – which is the actual inside dimension of the FY&N gauge tie pictured above.



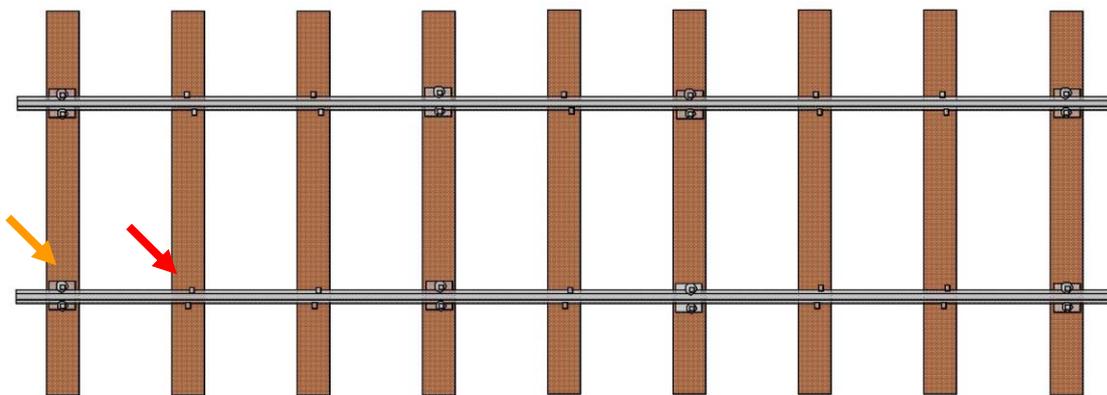
However, the two IWCR ties from the Ryde and Sandown lines have an inside length of exactly sixty four inches which suits a rail like the 1881 piece with a five inch base and a two and a half inch wide head.

This might suggest that there are only two versions generally required for all track work, even on the island. However, although not having made a survey, among the few examples of rail that still exist three rails have been found to have dimensions different to the two described above. One, with three and a half inch wide base with two inch head, a second having a four inch wide base and two and a quarter wide head and the third with four and a quarter base and two and a quarter inch wide head. Therefore track using these rails would require gauge ties of sixty two (62), sixty two and three quarters ( $62\frac{3}{4}$ ) and sixty three (63) inches wide respectively. There is no evidence of these rails being used in track using gauge ties or even where the rails themselves were used, they may be bits used in sidings. But, this situation adds to the evidence of how during the nineteenth century and early twentieth there lacked any sort of 'standard' railway equipment.

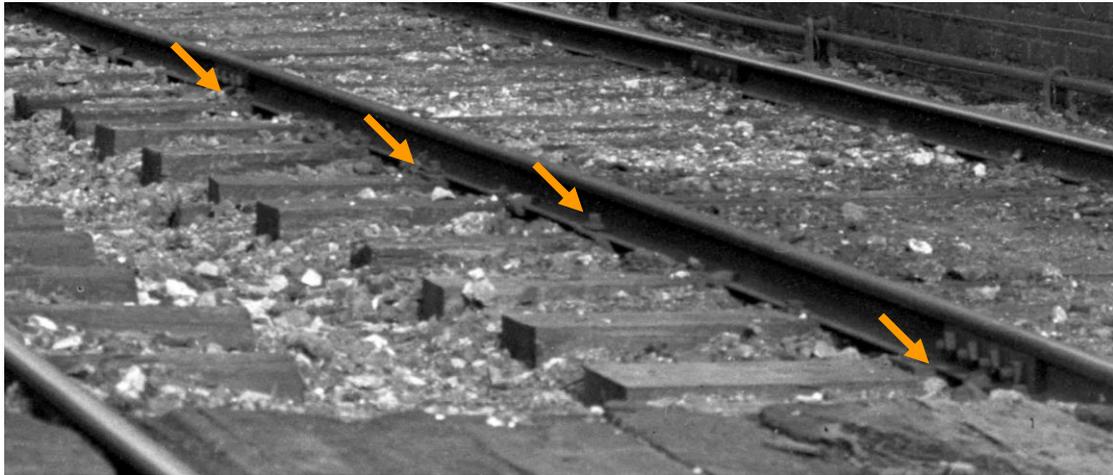
Retrospectively fitting gauge ties in the line would require removal of the rail on one side of the track for the length of line requiring them, usually on curves or station approaches where traffic load tends to push the outer rail out of gauge or the consequence of derailment more serious.

## 8. Track

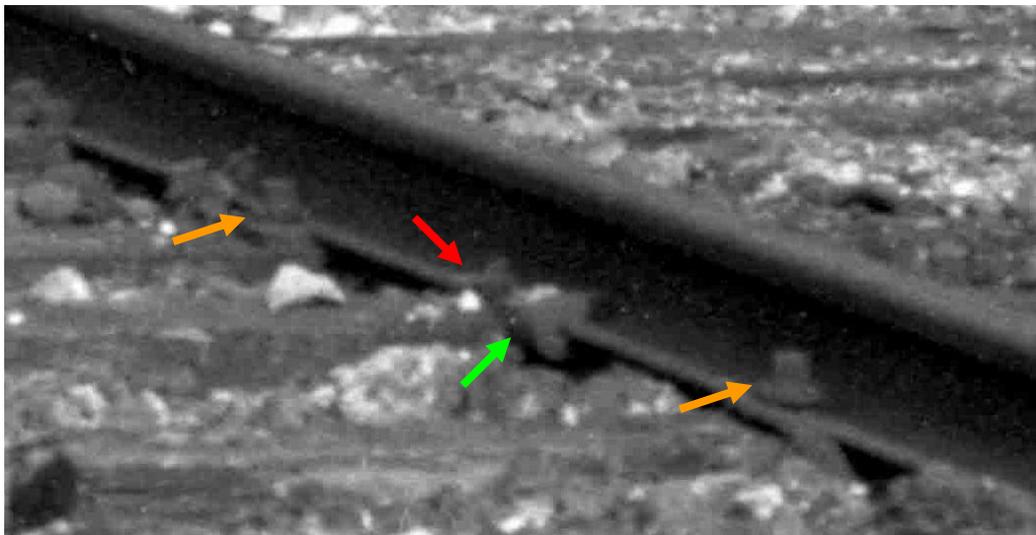
In 1895 the FY&N was subject of an enquiry by Major Addison R.E. of the Board of Trade into the circumstances of a derailment on the Town Gate viaduct at Newport. In his report he describes the track; the rails are flat bottomed steel rails in 24 foot lengths weighing 64lb to the yard; the sleepers nine feet by nine inches by four and a half inches (some new ones are ten x five) 2 feet apart at the joints and 2 feet nine inches apart. The rails are fixed to the sleepers with eight fang bolts and 10 dog spikes on each length. The permanent way inspector added in evidence that "no gauge ties were fitted and that we use 5/8 inch fang bolts and bed plates; the bolts do not go through the rails". This detailed description bears out the singular nature of the FY&N track and materials used compared to the other companies.



Above: This diagram was drawn using the 1895 description of the FY&N track; arrowed orange; one of four bed plates and two of eight fang bolts, red arrow indicates two of the ten dog spikes there being two at each sleeper per rail.



*Above: Photo detail of track at Carisbrooke station shows it laid exactly as the description: there are nine rectangular sleepers between the fish plates and four bed plates (arrowed in orange) spaced in the manner of the diagram above. Incidentally, the track on the left has half round sleepers.*



*Above: A further detail of the centre of the rail showing the bed plates with the mushroom heads of the fang bolts (orange arrows) and the head of a dog spike (red arrow) and the end of a gauge tie (green arrow)*



Above: A set-up of a portion of FY&N track as it would have looked using actual parts from the line except for the rail. On the left is a 10 x 5 in. rectangular sleeper with two dog spikes inserted into the original sockets. Right: a 10 x 5 in. half round sleeper and bed plate fitted with a mushroom fang bolt and centre is a gauge tie.

In less than nine months from the opening of the FY&N line, the IWCR who operated the traffic, complained about the condition of the line and even threatened to undertake the necessary repairs themselves at one point. The condition of the track was a problem for the FY&N and any receipts from traffic was being spent on the upkeep of the line until the receiver was appointed in August 1893. What was the reason for the poor state of track? It could be the method of construction, at the end of 1887 Herbert Simmons, the then manager of the IWCR informed the board 'as to the manner in which the rails are being laid upon the Freshwater line' The board decided that 'this company cannot interfere in the matter'. This was eighteen months before the line opened; it seems that Simmons could see problems ahead for his company given that they had agreed to use the line. The problem could well be the bed plates; both the examples found on the line were broken, easily done as they are made of thin cast iron and if they weren't seated on a flat surface could easily break. An unknown proportion of the line had half round sleepers which had to be sawn and adzed or chiselled to form a seat for the bed plate; the stress of the bolts to secure the rail would be considerable and any unevenness could break the plate. From

reports it was difficult for the track to be kept to gauge and at the 1895 enquiry many of the nine by four and half inch sleepers were rotten and being replaced by ten by five inch sleepers, the report doesn't mention the shape of the sleepers.

A reason for the need for tightness of these bolts is that this would be the only restraint to prevent rail-creep in this system, a problem where several factors contribute; traffic movement and thermal expansion among them, gradually moves the rails and closes up the expansion gaps and if several lengths of rail collect together broken fish bolts result in a large gap created and the wheels can 'batter' the end of the rail which could result in fracture, these rails weren't able to be secured through the flange as was then usual. With spiked track there are usually holes at each end of the rail to bolt through which help prevent rail-creep or as in one example of a rail found 'notches' have been cut in the flange to receive dog spikes to prevent rail creep.



*Preventing rail creep: two pieces of 4 inch wide flat bottom iron rail found in sidings.*

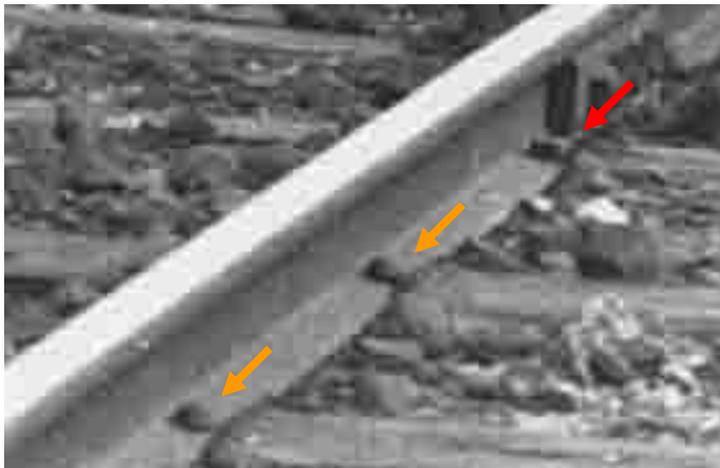
*Above: with notched edges for dog spikes at 9 ½ & 14 ½ inches from rail end.*

*Below: holes drilled or punched for bolts 13 ½ & 15 ½ inches from rail end, dog spikes would secure the rest of their rail lengths.*



Having considered rail-creep it doesn't explain the 'out-of-gauge' problem; this appears to be attributable to really poor quality sleepers laid in the track from the beginning which rotted quickly and must have been so soft as to be unable to hold

any fixings securely and added to that the poor maintenance, but does this explain Herbert Simmons concern in 1887? It could be that he saw poor workmanship on the installation, the FY&N was twelve miles long and from the track description that would have required nearly twenty four thousand sleepers, even a small proportion of half round sleepers would require a lot of cutting and shaping to accommodate the bed plates and the evidence shows that they were used. Why not spend a little more money on quality rectangular sleepers and lay rails straight onto those?



*Above: IWCR track – a detail from a photo of Shide station which shows the nature of their track. Inside the rails (visible on left rail) are square headed fang bolts at each sleeper.*

*Left: further detail R.H. rail shows the outside flange with one bolt (red arrow) at the fish plate the others are dome headed spikes (arrowed orange).*

British track for the most part adopted rail chairs for main lines and only small companies and industrial lines in mines and quarries used flat bottom track. The IWR was able to afford to convert to chaired track on it's Ryde to Ventnor line although photos appear to show flat bottomed rail at Ventnor sometime after conversion, this might be because IWR bought steel rails which lasted longer being more durable. It's ironic that post WW2 British Railways moved away from chairs and adopted flat bottomed rail on base plates not so dissimilar to the FY&N.



*Above: Detail of IWR double headed rail in chairs from a photo taken at Shanklin station early 1920s.*

## **9. Track Side Fencing**

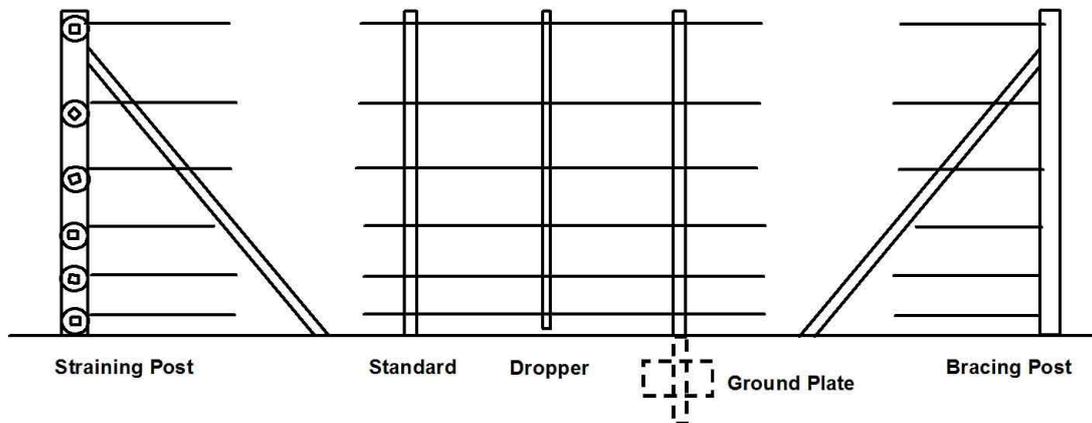
It was incumbent on railway companies to securely fence their track, firstly to mark the boundary of the railway property and to prevent livestock straying on the line and deter trespassers. A fence originally meant a hedge, a post and rail fence would be erected and 'quicks' hawthorn shrubs planted that would grow and form the boundary. In Francis Wishaw's 1842 comprehensive 'Railways of Great Britain and Ireland' he describes some fifty eight railway companies lines and this is the 'fencing' most used, apart from the fencing on the Northern & Eastern Railway –

*“The fencing for a great proportion of the length between Stratford and Broxbourne is of a novel description, consisting of iron standards, at intervals of 6 feet, and six wires running horizontally, and passing through perforations in the standards, the wires being placed closer together as they approach the ground. Although it has a very neat appearance we question whether this kind of fencing will be found economical in the end.”*

Iron fencing did become economical and lots of iron works patented their own designs and iron fencing became almost universally used in Britain and around the world. Twenty years after Wishaw's book the newer island companies CNR, IWR and IWNJ opted for hedges initially and erected fencing where it failed and that was probably wooden post and rail. The first company to erect iron fencing from the beginning was the RNR, who purchased fencing from two companies in 1875, the first was from Francis Morton of Liverpool, the 'high end' of fencing used on government and local authority civil engineering projects and they installed it along the railway line and road approaches to their prestigious Ashley and Whippingham stations. On the remainder of the line they used Baylis, Jones and Baylis (BJB) of Wolverhampton which was still a quality product (this company became a huge manufacturer of railway supplies until its closure in the 1980's). The materials used by

both were wrought and cast iron and some of it can still be seen a hundred and forty years after being erected. The next line constructed by 1878 was the Brading Bembridge line as part of the Bembridge harbour improvement scheme, in fact the railway connected the IWR branch that went to the original Brading Harbour. It was originally fenced along the whole length using an unknown supplier for the standards and gates. Ten years later, the FY&N line was also iron fenced by another unknown supplier. The last line constructed by 1897, the NGStL used the latest BJB heavy fencing. During this time failures in the fencing on the IWCR lines were made good using William Bain & Co of Coatbridge and after the turn of the century concrete posts began to appear which were used by IWR and the IWCR. FY&N standards corroded quickly and the company often used split railway sleepers and droppers to replace their failed fencing.

Strained wire fencing generally comprises: standards (the fence posts); straining posts which have spools and ratchets or turnbuckles for tensioning the wires; bracing posts to which the end of the wire run is fixed; droppers: which allow standards to be placed further apart, but keep the wires from being widened by animals, and ground plates are sometimes included with standards and always on straining posts to give stability.



All standards that were used up until the FY&N had holes through which wires were drawn. With the increased use of barbed wire, standards were produced with an amended fixing at the top and companies devised various, clips, screw and slot versions so that the top wire could be barbed and could be securely attached to the standard as it couldn't be threaded through a small hole.

Ryde to Newport Railway – Francis Morton Fencing



*One of the earlier wire fence manufacturers, Francis Morton fencing on the RNR:*

*Top left: a patent sheet iron standard still with its cast iron cap, once the top wire failed these were easily lost.*

*Above: heavy cast iron straining post fitted with a gate, the ratchet and housed locking latch also cast iron.*

*Left: a cast iron bracing post*

Ryde to Newport Railway – Earlier Baylis, Jones & Baylis

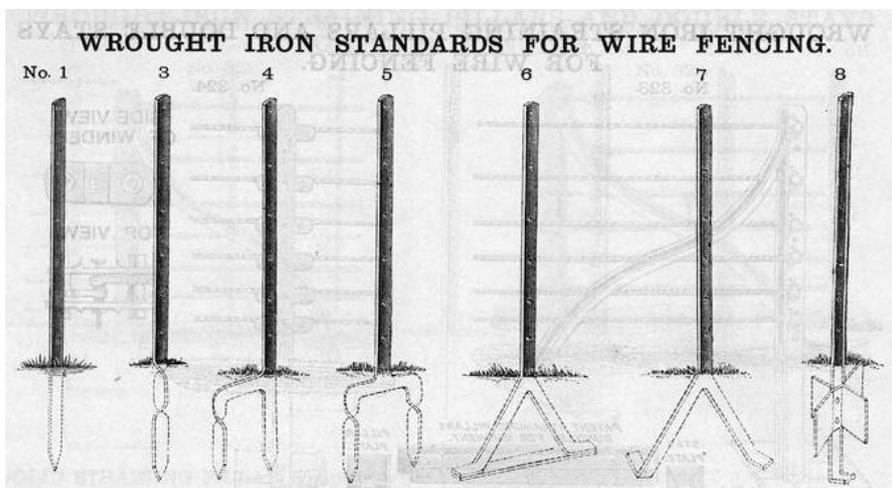


*Examples of Baylis, Jones & Baylis fencing on the RNR not so robust as the Francis Morton and much of it was replaced on long stretches of track.*

*Above left: straining post with ratchet and pawl.*

*Above right: a simple standard fitted with bracing bar probably with the original stranded cable.*

*Below: Detail from BJB 19c catalogue showing ground plate arrangement options.*



## Brading Harbour to Bembridge Line – Unknown Manufacturer



*Supplier unknown fencing and gates on the Bembridge line.*

*Above left: found on a spoil heap with a ground plate still fitted with two iron securing wedges to the remains of a standard.*

*Above centre: straining posts are made of old double headed rail, with straining eye bolts fitted, effective given that they are still there.*

*Above right: the only original standard found on the line, as with all the extruded steel posts it had corroded at the base, the 'tee' section standards were 6 feet long.*

*Above: gate near the station, Bembridge.*

*Left: similar styled wicket gate at Wall lane crossing*

## Freshwater, Yarmouth & Newport Railway – Unknown Manufacturer



*Left: A typical straining post found along the line, made of wrought iron and hasn't decayed like steel fencing will.*

*A simple mechanism, once a crank has put the wire under strain a pin is inserted through the reel to hold it fast.*

*The maker hasn't yet been identified. Odd examples were found on the Ryde and also Bembridge tracks.*

*Below: An occupation crossing gate with bracing post, there were many of these along the line illustrating how many farms and properties were divided by the railway which had to provide crossing points either gates or cattle creeps (small tunnels). The bracing posts proved inadequate though and SR reinforced them with double headed rail, this one near Yarmouth is the only un-modified example found.*



**FY&NR Cont.**



*Left: A standard which has decayed at ground level as they all did. The posts used were steel angle extrusions which were painted with a black varnish, a typical treatment before galvanising was widely used. This wasn't enough though and even replacements rusted quickly as well. The top has a slot if barbed wire is required, either type would be held by a wedge at the back. A whole post was 6' 6" long.*

*Right: Three droppers found on the line.*

*Centre: remains of an original 'L' cross section dropper the only one found, this still has some punched tags hammered over to grip the wires.*

*Right: The company lost so much iron fencing they replaced it with split wooden sleepers and these galvanised droppers and many are still to be found in situ on the line.*

*Left: Some of these droppers were found rusted away, this is a surviving top half, BJB were known suppliers of this corrugated sheet metal design.*

*Lower right: Angle iron standard on the RNR probably a replacement, but here showing the fixing of the top strand wire with a small wedge just as the FY&N ones would have been.*



**Isle of Wight Central Railway Company - William Bain Fencing**



*IWCR used Wm. Bain to replace fencing – galvanising prolongs life.*

*Left: Straining post with external pawl and ratchet.*

*Above: Cap with name detail.*

*Below left: Standard top with slot and clip for barbed wire. Posts are 6 feet long, top to bottom wires are 3 feet 6 inches (as with all fence systems)*

*Below centre: Post ground plate.*

*Below right: dropper wire fixing clip detail.*



## Newport, Godshill & St. Lawrence Railway - Later BJB



*Newport, Godshill & St Lawrence company built a good quality railway with well built stations and structures, at least on the Merstone to St Lawrence section. The fencing used galvanised posts, gates and heavy straining posts which still show little sign of deterioration a hundred and twenty years after installation. However, if they no longer serve a function they get removed like all other remains of the railway lines*

*Above left: a double straining post, the only double found.*

*Above centre: Detail showing the later BJB use of an internal ratchet and pawl system. Note that it is single strand wire not barbed wire used.*

*Above right: A single straining post where the earth bank has been excavated and reveals the heavy ground plates.*

NGStL – Later BJB Cont.



*Top: A BJB occupation crossing gate near Dean crossing.*

*Left: a dropper very similar to the surviving original FY&N type as it rested on the ground rather than being suspended like the Bain version does. It's also an 'L' shape section but unlike the FY&N these are galvanised and still survive although only ten years younger. Centre: A standard.*

*Above right: A wicket gate on the St Lawrence to Ventnor section.*

*Below: 'Tee' section post from the Ventnor section with the only barbed wire yet found on any line fixed with a clip – post unknown supplier.*



## Replacements - Wood & Concrete



*Ferro-concrete posts were being produced by the early 20<sup>th</sup> century and IWR & IWCR probably used them for fence replacement. Various styles can be found, but dating is uncertain.*

*Above L-R: Ryde, Sandown and Bembridge lines.*

*Far left: early style next to tall British Railways post on the IWR (Island Line)*

*Near left: The FY&N used old split sleepers, concrete posts weren't used until SR days.*