

## FREIGHT CARS WITH TRUSSROD ENDS

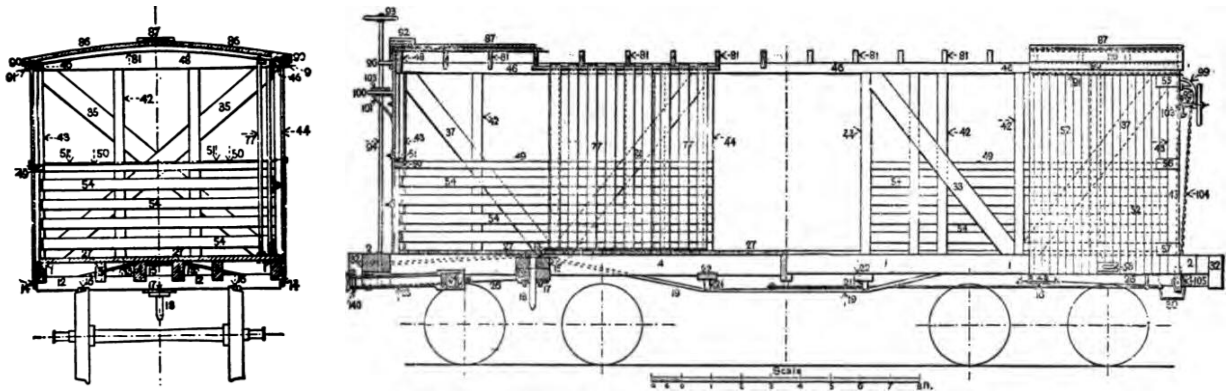
### A Failed Experiment in Frugality

By Ray Breyer



*C&NW 105234, built at ACF's Detroit plant in early 1907. The end trussrods and their corner braces were an early attempt to strengthen house car ends. Barriger Library collection.*

In the early days of freight car design, especially house cars, carbodies were little more than sheds plunked down onto a flat car. Body side bracing was minimal, and was there mainly to support the roof and sides. Since train speed, weight and length were small, this sufficed for most enclosed cars into the 1870s. But as cars began to be interchanged, and as trains began to get faster, heavier and longer, these simply built freight cars received more and more abuse, necessitating that they be built more and more strongly.



*This early CNJ boxcar diagram shows just how simple early boxcar framing was. All support beams were 2.5"x4.0" oak or white pine, definitely insufficient to bear much in the way of crash stresses. 1879 Car Builder's Dictionary.*

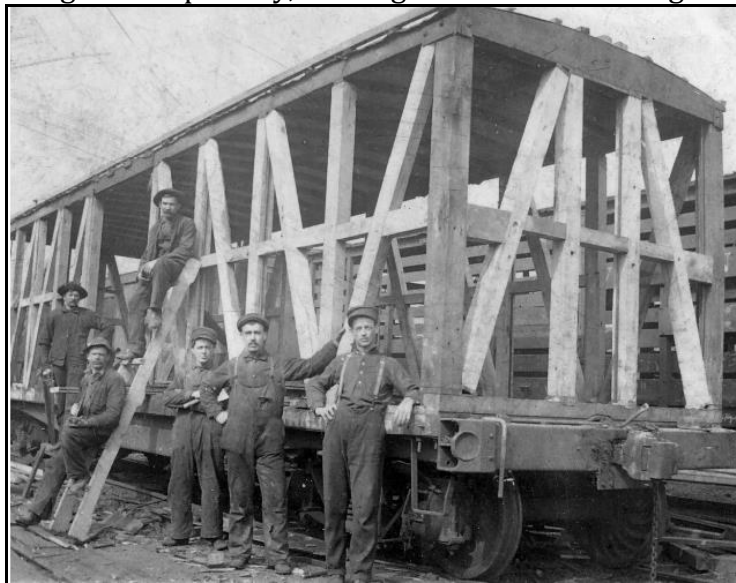
Ultimately, that meant that freight cars with all-steel construction were ideal, but it took decades to get to that point (although the French were building all-steel freight cars as early as 1870). In the meantime, several progressive steps were taken to try and strengthen the walls of house cars, especially their ends;

while enclosed freight cars generally didn't see a whole lot of side stress, loads sliding and crashing through the wood ends was a constant problem.



*This extreme image shows why railroads spent so much time and energy figuring out how to strengthen the ends of their house cars. In this circa 1920 view, a 1916-built car to the left with steel I-beam crash posts, and a 1916-built, all-steel boxcar to the right held up fine. But the two all-wood cars between them are now kindling. Author's collection.*

The first step to strengthen the ends was to beef up the posts supporting the sides. Originally, these were 2x4 oak, but by the 1880s railroads were beefing them up, first to 4x4 oak, then successively up to 6x6 beams. Even that wasn't enough to keep heavy, shifting loads from crashing through an end.



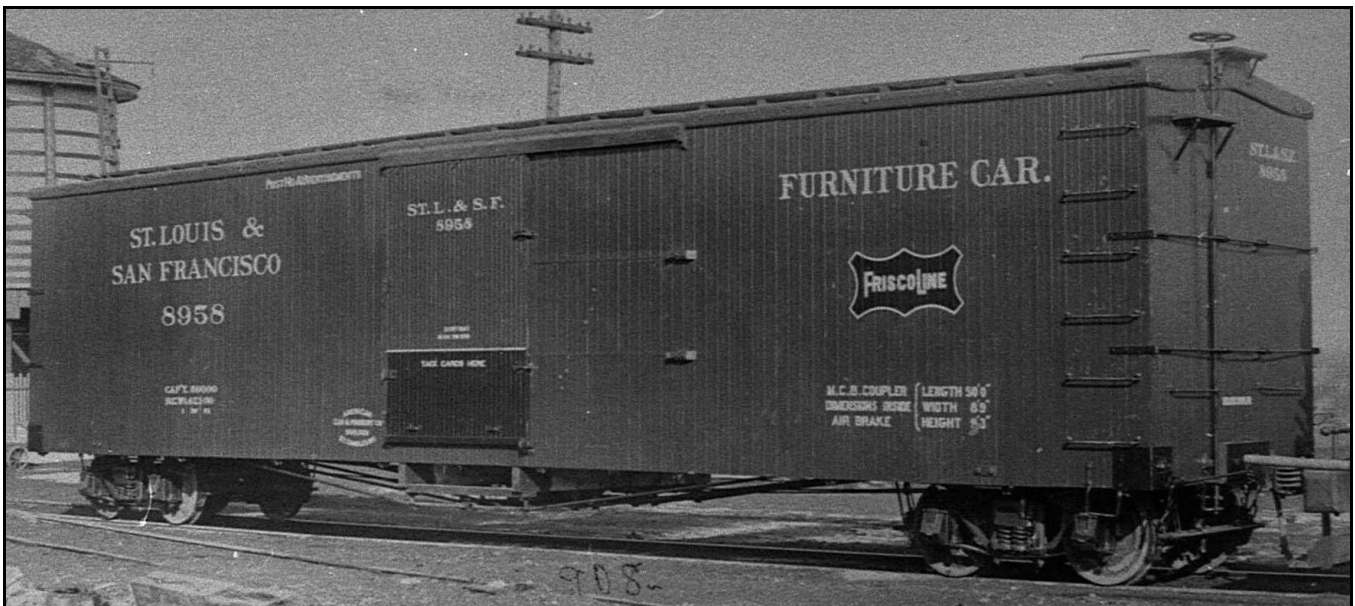
*A PRR class XL boxcar shows off its interior supports. The corners are 6"x6" oak, and the other supports are 4"x6" fir. Even that wasn't enough to keep car ends strong. Author's collection.*

So by the early 1890s, metal began being introduced. At first, vertical 3/4" diameter iron rods were added next to the end posts. As the posts were enlarged, these were eliminated, and horizontal rods were added inside the car ends. From there, some railroads moved the horizontal rods to the outside of the cars, creating "trussed" rods that were visible on the outside of the cars.

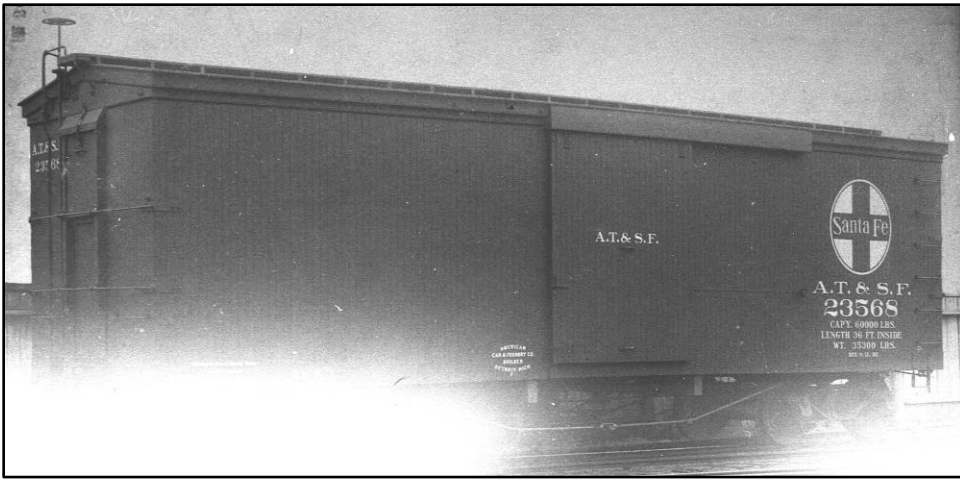


*AA 3004 is seen here with trussrodded ends, while DL&W next to it does not. In theory the Ann Arbor car has “stronger” ends, but in practice that wasn’t the case. DL&W company photo, Steamtown NPS collection.*

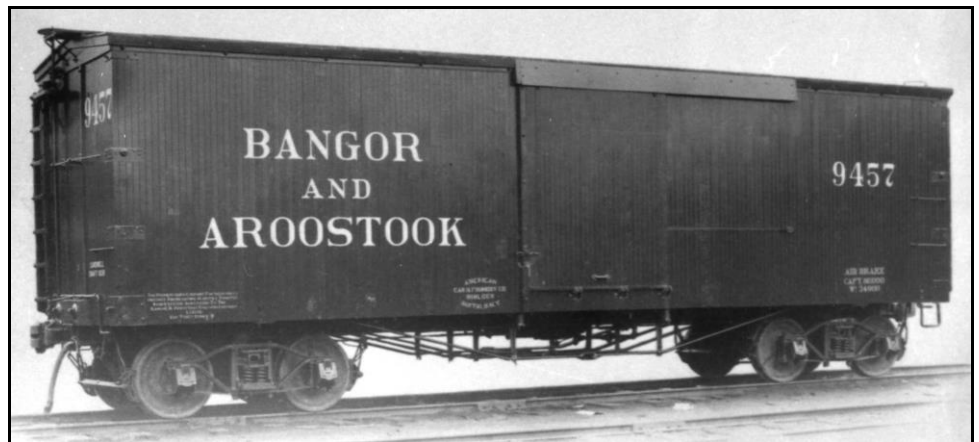
These trussrod ends were very popular for a time in the industry. Car repair crews liked them because they were easy to work on. Master mechanics liked them because they used the same material as underframe trussrods, a manufacturing technique that they were comfortable with. And company bean counters liked them because they were CHEAP. First appearing on cars around 1890, over 125,000 freight cars were built with them up through 1909; a few thousand cars were even built with them as late as 1916.



SLSF 8958, built by ACF St. Charles in October 1900, was a long and tall car designed to carry bulky loadings prone to shifting, so was designed with two end trussrods. ACF photo, Al Westerfield collection.



*This sadly washed out builder's photo does clearly show the two trussrods added to 1,500 Santa Fe boxcars delivered in 1902. As most ATSF boxcars usually hauled grain in the beginning of the 20<sup>th</sup> Century, this was a relatively uncommon addition to their cars. Al Westerfield collection.*



*BAR 9457, built at ACF Detroit in 1906, is seen here with an end trussrod added just off the car's centerline. Al Westerfield collection.*



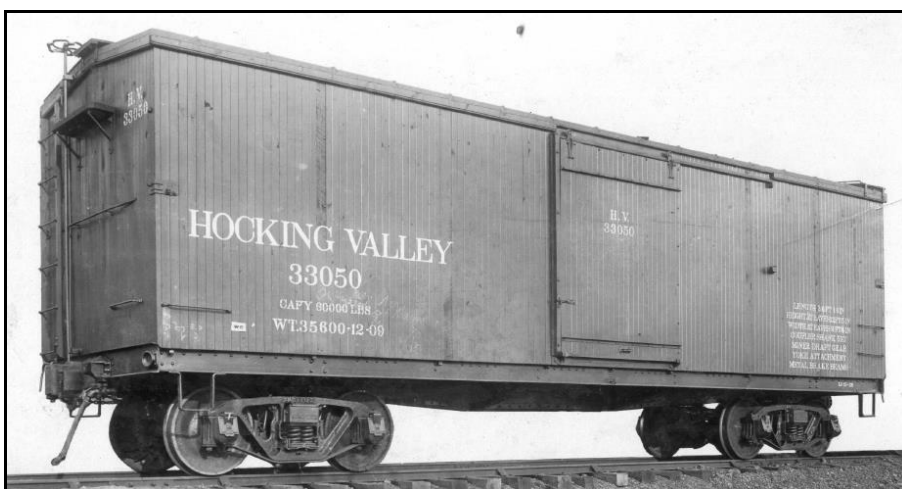
*The C&N was one of the largest users of trussrods on the ends of their house cars, with over 12,000 boxcars built with them between 1905-1909. Author's collection.*



*The Canadian Pacific preferred two trussrods on their cars ends, and built nearly 25,000 cars with them. DL&W company photo, Steamtown NPS collection.*



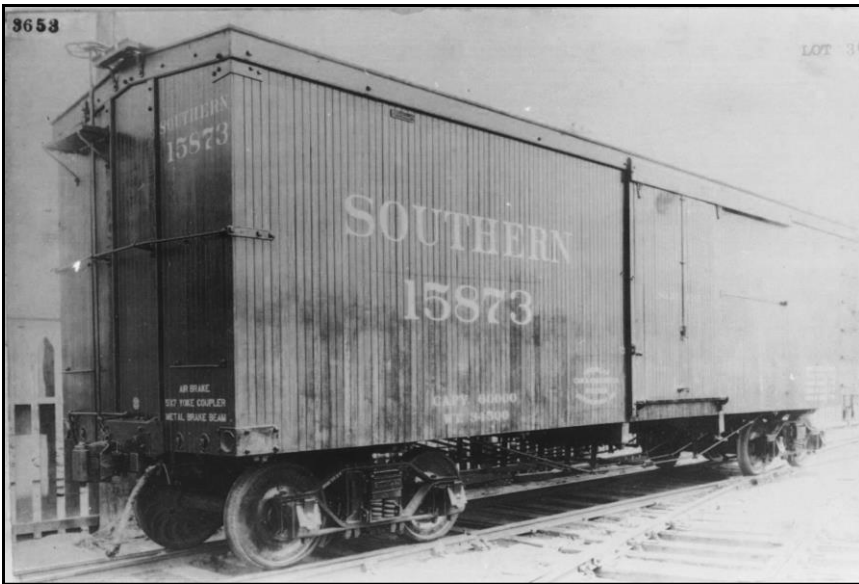
*With its seasonal grain traffic in mind, the Rock Island transitioned to 40-foot long boxcars before most other railroads. Understanding bowing stresses better than some other roads, the Rock added their end trussrods low on the car ends. Al Westerfield collection.*



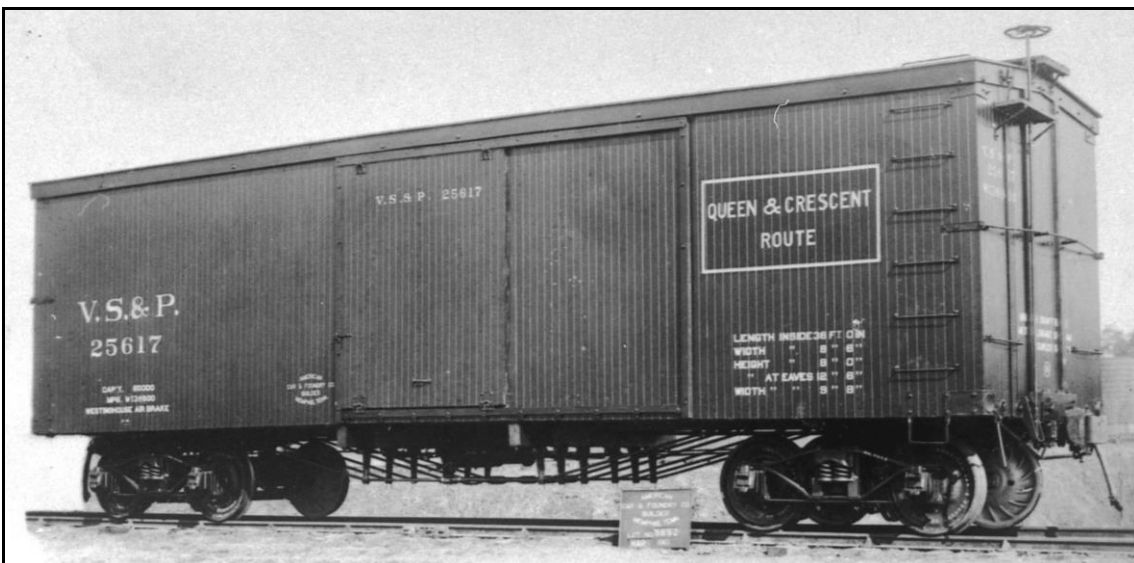
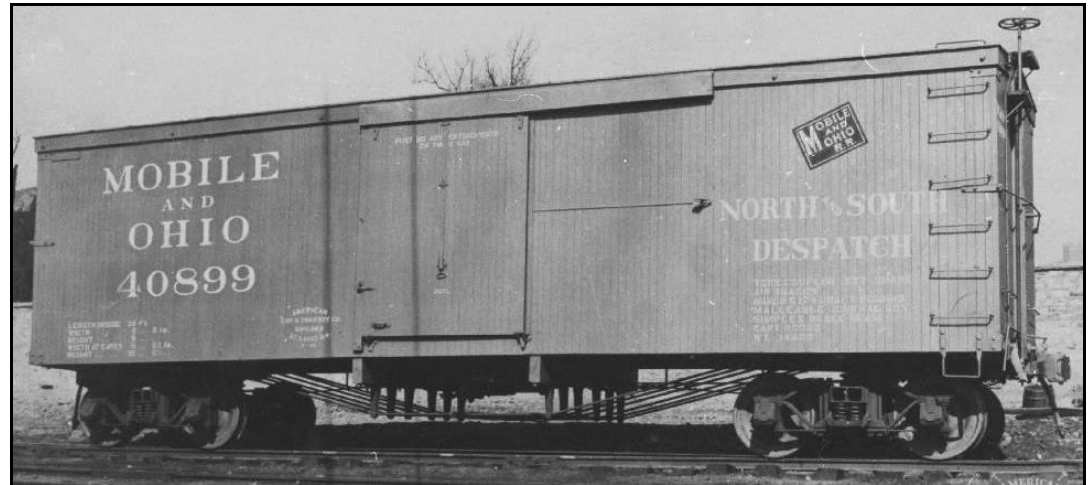
*The Hocking Valley never needed many boxcars in its fleet, and these cars, built by Ralston in 1909, all sported an unusual end trussrod partly buried into the end sheathing. Author's collection.*



*Most of the D&H's house cars, including box, auto, stock, and refrigerator cars, were built with trussrodded ends between 1905-1907. This image of D&H 21995 is a wonderful study of how these rods were added to cars. DL&W company photo, Steamtown NPS collection.*

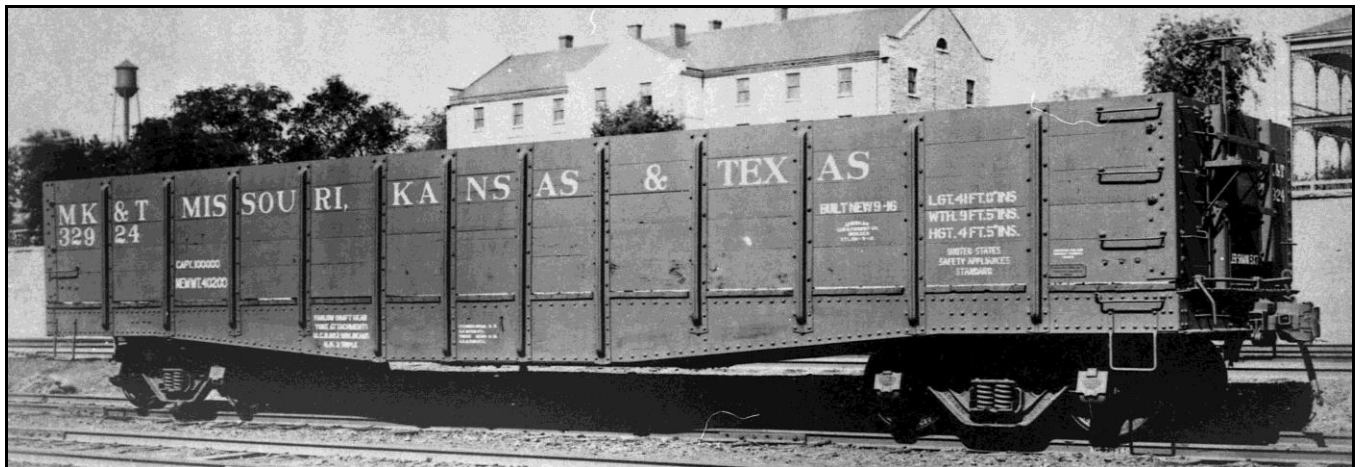
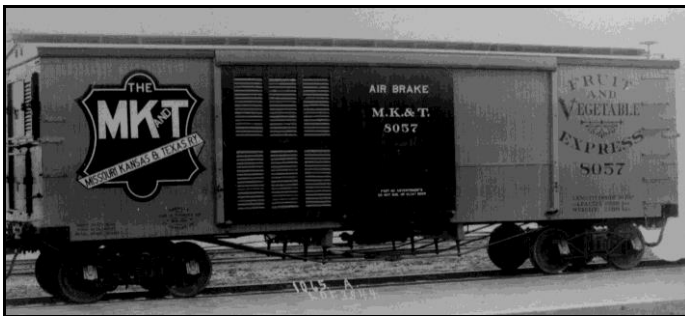


*Many southern-area railroads also preferred adding trussrods to their cars ends, rather than steel center posts, mainly as a cost-saving measure. All three photos Al Westerfield collection.*





*The Katy had a real love affair with trussrod ends. Starting in the early 1890s and extending to 1916, the railroad added them to every car they could, including ventilated boxcars, stock cars, and even gondolas! All photos Al Westerfield collection.*









*By 1910 car designers knew that steel needed to be added to car ends, but some railroads continued to build cars with wood ends and trussrods, hoping that they'd be strong enough. NO&NE 16560, an ACF Memphis product from 1910, shows one such later-built car. ACF photo, Al Westerfield collection.*

In the end, although popular, trussrod ends proved to be a problematic stopgap that didn't work very well. While they helped a car end take a certain amount of crash stress, when the forces were too great they had a tendency to tear the entire end loose from the car.



*AGS 11091 is seen in Memphis, circa 1920. It's readily apparent that one of the big problems with having trussrods tied to corner braces is that when they took a hit, the entire end failed!  
J.W. Barriger photo, St. Louis Mercantile Library collection.*

In 1910 the NYC began a major program of rebuilding all-wood boxcars with metal components, one of which was the corrugated steel end. New cars on the Vanderbilt-controlled lines were also constructed with steel ends, and other railroads soon followed the larger road's lead. In some cases another mid-point

step was taken, in the form of steel I-beams installed in place of wood beams. Tens of thousands of these “indestructible” car ends were installed on older cars, and built into all-new designs.



*Two DL&W boxcars show off two different steel ends, both of which were far more successful than trussrods. To the left is a car with “Indestructible” ends, and to the right is a car with corrugated, all-steel ends. DL&W company photo, Steamtown NPS collection.*



*When trussrods failed to strengthen car ends, some railroads experimented with other methods to shore up boxcar ends, without resorting to the cost of a full steel end. CNO&TP 15104, seen in Newark NJ in 1918, has custom formed, hat section ribs added, in an attempt to do what the trussrods couldn't. The side legs of these ribs extend almost six feet along the car sides, and even they couldn't take crash stresses: the ribs are cracked at the corner. And both end beams are cracked. DL&W company photo, Steamtown NPS collection.*

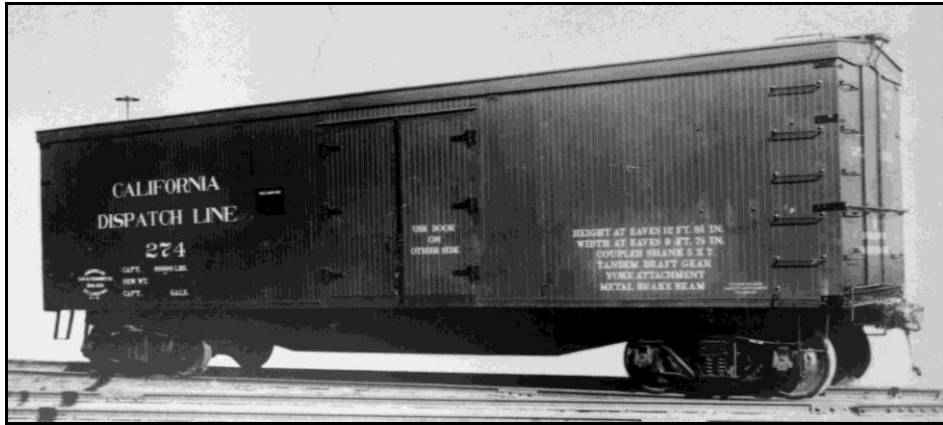


*By WWI railroads were quickly realizing that trussrods on the ends of boxcars weren't worth the effort, and began removing them. C&NW 113320, seen in Hoboken NJ in 1919, is one such car. The corner braces remain, but the rods are gone. DL&W company photo, Steamtown NPS collection.*

By the beginning of World War I railroads were busily upgrading their existing car fleets, and removing the trussrods from cars as they came up for repair. In many cases it was because the cars were being rebuilt with steel ends, but in others it was simply because the end trussrods were too heavy and maintenance prone to be worth keeping on cars. By the early 1920s most end trussrods had disappeared, although a few did hang on in the larger Granger car fleets, up to the Great Depression.



*M-IL 3335 has a 4/1929 reweigh date, and still has its original end trussrods in this Depression era photo. Author's collection.*



*A few reefers, and more beer cars, were built with trussrod ends. CDL 274 was built by ACF in 1913, part of a 10 car order. ACF photo, Al Westerfield collection.*



*Stock cars with trussrod ends were far more common than reefers. WC 6182 was built in 1905 by Haskell & Barker. Author's collection.*



*Oddly, there were even a few gondolas built with trussrod ends. Iowa Central 13805 was one of 250 such cars, built around 1905. These cars eventually went to the M&StL, and were quickly scrapped. Author's collection.*



*An interesting footnote to the idea of strengthening a freight car with trussrods were the few gondolas built with trussrods on their sides, in an attempt to keep them from excessively bowing outward during harsh treatment at mines. Never very popular, by 1900 the idea had been dropped in favor of all-steel gondolas. Both photos J.W. Barriger photo, St. Louis Mercantile Library collection.*



*Probably the most extreme examples of trussed up gondolas were the 100 cars of the Lake Terminal Railroad's 1000-2000 series. These 63-foot long, "all wood" cars were designed to move long dimensional steel loads from the mills of Lorain, Ohio. Author's collection.*

**CARS WITH TRUSSROD ENDS**

(from photos)

<b>CAR TYPE</b>	<b>ROAD NAME</b>	<b>CAR NUMBER (from photo)</b>	<b>BUILDER</b>	<b>BUILD DATE</b>	<b>LOT NUMBER</b>	<b>NOTES</b>	<b>No. CARS</b>
XM	A&V	22762	ACF	1910	5652	ONE ROD, CENTERED	100
XM	A&V	22943	ACF	1910		ONE ROD, CENTERED	100
XM	A&V	22963	ACF	1910	6514	ONE ROD, CENTERED	100
XM	A&W	517	ACF	1907		ONE ROD, CENTERED	10
XM	AA	3004				ONE ROD, CENTERED	100
XM	AGS	11091				ONE ROD, CENTERED	2,000
XM	AGS	11173				ONE ROD, CENTERED	0
XM	AGS	12882	ACF	1906	4407	ONE ROD, CENTERED	500
XM	AOW	502				ONE ROD, CENTERED	5
XM	ASR	19	ACF	1914	7312	ONE ROD, CENTERED	6
XM	ATSF	23568	ACF	1902	2037	TWO RODS	1,500
XM	ATSF	23659				TWO RODS	0
XF	ATSF	80400	ST CHARLES	1890s		ONE ROD, BURIED	500
XM	B&S	6192				TWO RODS	300
XM	BAR	1590	ACF	1909	5744	ONE ROD, CENTERED	1
SM	BAR	2056	ACF	1912	6761	ONE ROD, CENTERED	1
SM	BAR	2077	ACF	1906	4762	ONE ROD, CENTERED	43
XM	BAR	9457	ACF	1906	4760	ONE ROD, CENTERED	732
XM	BE&SW (SLSF)	12966	ACF	1902		ONE ROD, CENTERED	500
XM	C&A	13130				ONE ROD, CENTERED	234
XM	C&A	15281	MT. VERNON			ONE ROD, CENTERED	1,000
XM	C&C	525	ST CHARLES	1890s	367	ONE ROD, CENTERED	500
XM	C&NW	12398				ONE ROD, CENTERED	172
XM	C&NW	29666				ONE ROD, CENTERED	340
XM	C&NW	86332				ONE ROD, CENTERED	6,550
XM	C&NW	105234	ACF	1906	4548	ONE ROD, CENTERED	750
XM	C&NW	108184				ONE ROD, CENTERED	2,000
XM	C&NW	113320		1907		ONE ROD, CENTERED	1,000
XM	CB&Q	93057				ONE ROD, CENTERED	900
RS	CDL	274	ACF	1913	7342	ONE ROD, LOW OFFSET	10
XM	CH&D	48341	ACF			ONE ROD, CENTERED	250
XM	CI&L	17419	PULLMAN			ONE ROD, CENTERED	1,140
XM	CI&L	17956				ONE ROD, CENTERED	0
RS	CIDC	9	ACF	1913	7258	TWO RODS	1
XM	CM	5944	ACF	1907	4533	ONE ROD, CENTERED	100
XM	CM&G	95	Central Loco & Car Works	1900s		ONE ROD, CENTERED	20
XM	CNO&TP	15104				ONE ROD, CENTERED	2,350
XM	CO&G	9538				TWO RODS	150
XM	CofGA	1586				ONE ROD, CENTERED	90
XM	CP	41470	DC&F			ONE ROD, CENTERED	5,402
XM	CP	52914	DC&F			TWO RODS	3,700
XM	CP	59298	ACF	1907	5095	TWO RODS	500
XM	CP	72580	DC&F			TWO RODS	4,500
XM	CP	80428	DC&F			TWO RODS	0
XM	CP	88950	DC&F			TWO RODS	8,500
XM	CP	99914	DC&F			TWO RODS	0
XM	CP	140658	DC&F			TWO RODS	1,300

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XM	CRI&P	32813	ACF	1906	4213	ONE ROD, LOW OFFSET	3,000
XM	CS&CC	1125	ACF	1901	1163	ONE ROD, CENTERED	125
SM	D&H	16349	ACF	1910	5925	TWO RODS	100
RS	D&H	16588	ACF	1907	4604	TWO RODS	20
RS	D&H	16762	ACF	1907	4603	TWO RODS	100
XM	D&H	19999	ACF	1906	4598	TWO RODS	1,500
XA	D&H	20999	ACF	1907	4598	TWO RODS	0
XM	D&H	21487	ACF	1906	4755	TWO RODS	1,500
XM	D&H	21995				TWO RODS	0
GM	F&CC	399	ACF	1900s	1221	SIDE RODS (NARROW GAUGE)	50
GM	GMWV	10	ENSIGN	1892		SIDE RODS	25
XM	HV	30957	ACF	1905	3413	ONE ROD, CENTERED	25
XM	HV	33050	Ralston	1909		ONE ROD, BURIED	74
GM	IAC	13505				ONE ROD, CENTERED	250
XM	I-GN	4537	ACF	1901	1365	ONE ROD, CENTERED	700
XM	I-GN	5488	ACF	1908		ONE ROD, HIGH OFFSET	500
XM	ITS	5165	ACF	1916		ONE ROD, CENTERED	50
RS	JWBC	XXX	ACF	1902	1787	ONE ROD, LOW OFFSET	5
XM	LR&N	5200	ACF	1906	4445	ONE ROD, CENTERED	250
GM	LT	1039	SSCC			SIDE RODS	105
XM	M&O	19213	ACF	1907	4946	ONE ROD, CENTERED	1,000
XM	M&O	40107	ACF	1908	5031	ONE ROD, CENTERED	20
XM	M&O	40899	ACF	1906	4162	ONE ROD, CENTERED	900
XM	M-IL	3335				ONE ROD, CENTERED	125
XM	MJ&KC	1463	ACF	1905	3668	TWO RODS	1
XF	MKT	1639	PULLMAN			TWO RODS	200
XM	MKT	6381	ACF	1909	5500	TWO RODS	459
XM	MKT	7405	ST CHARLES	1890s		ONE ROD, CENTERED	124
VM	MKT	8057	ACF	1906	3844	ONE ROD, CENTERED	250
XM	MKT	16724				TWO RODS	4,750
XM	MKT	16790	ACF	1906	4309	TWO RODS	1,000
XM	MKT	16990	ACF	1906	4309	TWO RODS	700
SM	MKT	18091	ACF	1908	4828	ONE ROD, CENTERED	25
GM	MKT	32924	ACF	1916	7958	ONE ROD, HIGH OFFSET	1,500
XM	MKT	71431	ACF	1907	4957	TWO RODS	2,000
XM	MKT	72999	ACF	1910	5915	TWO RODS	1,000
XM	MP	1058	ST CHARLES	1890s	323	ONE ROD, CENTERED	700
XM	MR&BT	2030	ACF	1900s		ONE ROD, CENTERED	620
GM	NH	2878	ACF	1899	603	ONE ROD, CENTERED	200
GM	NH	28450	ACF	1901	1181	ONE ROD, CENTERED	400
XM	NO&NE	16560	ACF	1910	5652	ONE ROD, CENTERED	0
XM	NOGN	1283	ACF	1907	4772	TWO RODS	200
XM	NOM&C	1186	ACF	1912	6649	ONE ROD, CENTERED	400
RS	OBA	107	ACF	1899	555	ONE ROD, CENTERED	3
XM	P&MP	507	ACF	1913	6807	ONE ROD, CENTERED	12
XM	PGL	1	ST CHARLES	1890s		ONE ROD, CENTERED	50
XM	PGL	572	ST CHARLES	1890s		ONE ROD, CENTERED	100
XM	PS&N	8700	ACF	1904	3144	ONE ROD, CENTERED	300



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RS	PS&N	10086	ACF	1904	3144	ONE ROD, CENTERED	0
RS	RRL	102	Seattle Car Co.	1910		ONE ROD, CENTERED	5
VM	SA&AP	7488	ACF	1910s		ONE ROD, CENTERED	100
VM	SA&AP	8499	ACF	1913	6906	ONE ROD, CENTERED	1,000
VM	SLSF	7853	ST CHARLES	1898	356	ONE ROD, CENTERED	250
XF	SLSF	8958	ACF	1900	1192	TWO RODS	25
XM	SLSF	30705				TWO RODS	7,620
XM	SN&ST	515	ACF	1907	5006	ONE ROD, CENTERED	20
XA	SOO	28354	ACF	1910	5885	ONE ROD, LOW OFFSET	100
XM	SOO	32784	ACF	1910	5884	ONE ROD, LOW OFFSET	900
XM	SOUTHERN	10652				ONE ROD, CENTERED	1,700
XM	SOUTHERN	15873	ACF	1905	3653	ONE ROD, CENTERED	500
XM	SOUTHERN	16016				ONE ROD, CENTERED	5,500
XM	SOUTHERN	16632				ONE ROD, CENTERED	0
XM	SOUTHERN	16709				ONE ROD, CENTERED	0
XM	SPLA&SL	11398	ACF	1904	3535	ONE ROD, CENTERED	1,350
GM	SPSC	109	ACF	1903	2948	ONE ROD, CENTERED	25
GM	SPSC	244	ACF	1909	5543	ONE ROD, CENTERED	15
XM	SSW	16518	ACF	1904		ONE ROD, CENTERED	5,540
XM	SSW	20552	ACF	1903	2928	ONE ROD, CENTERED	2,000
XM	SSW	22060	ACF	1904	3309	ONE ROD, HIGH OFFSET	87
XF	StLIM&S	9920	ST CHARLES	1890s		ONE ROD, CENTERED	100
RS	StLIP	1496	ACF	1910	5693	ONE ROD, CENTERED	50
XM	StLM&SE	1053	ACF	1900s		TWO RODS	100
RS	StLRCC	1236	ACF	1901	1473	ONE ROD, CENTERED	110
XM	T&P	5601				ONE ROD, HIGH OFFSET	500
XM	T&P	7897	Missouri Car & Foundry	1897		ONE ROD, CENTERED	1,400
XM	T&P	11520				ONE ROD, CENTERED	2,500
XM	T&P	11651				ONE ROD, CENTERED	0
XM	T&P	12946	ACF	1902	1894	ONE ROD, CENTERED	2,500
XM	TC	687	ACF	1907	4923	ONE ROD, CENTERED	100
VM	TM	8026	ACF	1900s		ONE ROD, CENTERED	50
GM	VGMC	350	ACF	1900s		SIDE RODS (NARROW GAUGE)	50
XM	VS&P	25617	ACF	1910	5652	ONE ROD, CENTERED	0
XM	VS&P	25853	ACF	1910		ONE ROD, CENTERED	52
SM	WC	6182	H&B	1905		ONE ROD, CENTERED	50
GM	WVAC	1062	ENSIGN	1888		SIDE RODS	25

<b>TOTAL CARS:</b>	<b>107,699</b>
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