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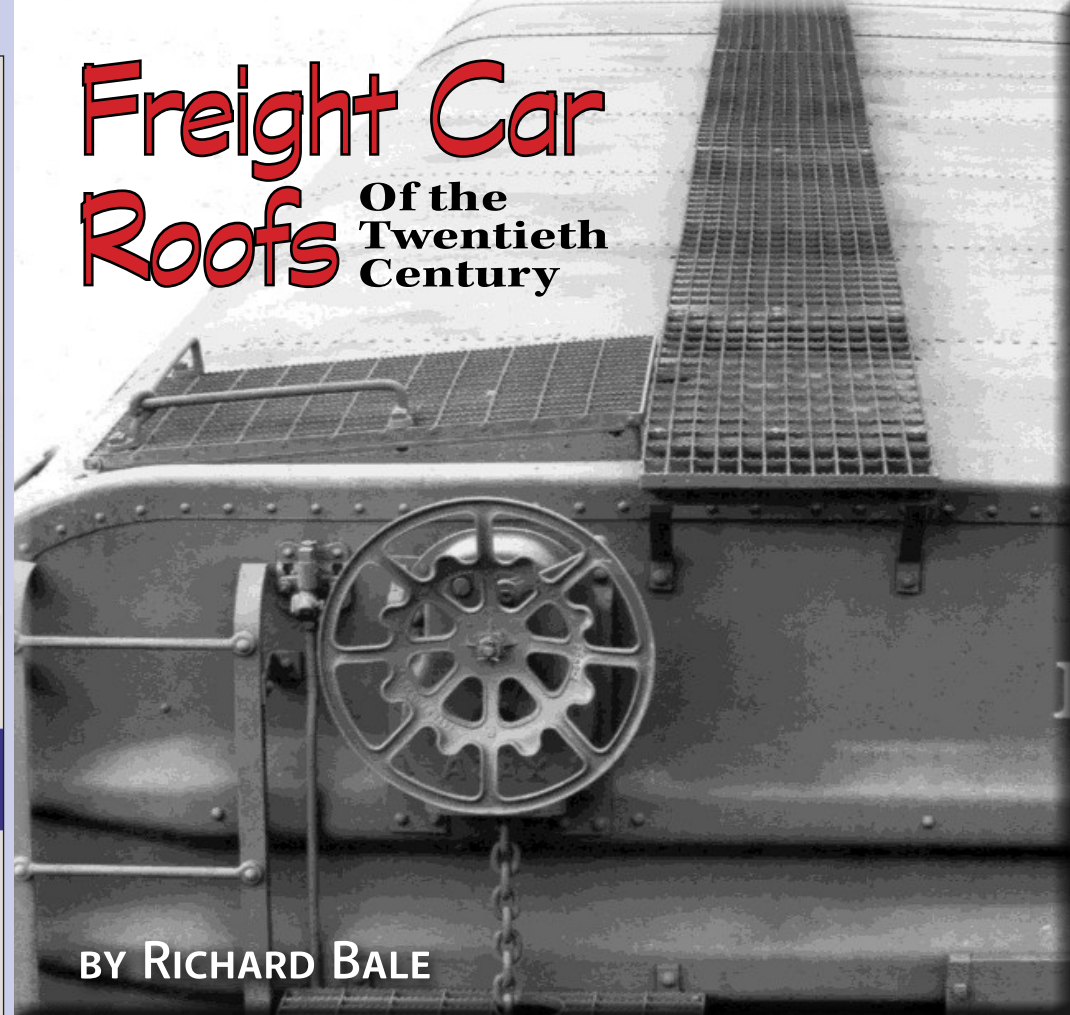
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Freight Car Roofs

Of the
Twentieth
Century



BY RICHARD BALE

Car builders faced a long learning curve in making roofs long-lived and tight against weather ...

ROOFS TURNED OUT TO BE ONE OF THE MOST challenging issues to face car builders. In addition to the obvious

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requirement of protecting lading from theft and from the weather, including sun, rain, sleet, and snow; a car roof needed to be sturdy enough to support one or more trainmen as they moved from car to car setting or releasing mechanical brakes. The roof needed to provide these functions on an all-wood car that vibrated, twisted, and flexed as it traversed less-than-perfect track work. It was indeed a challenge.

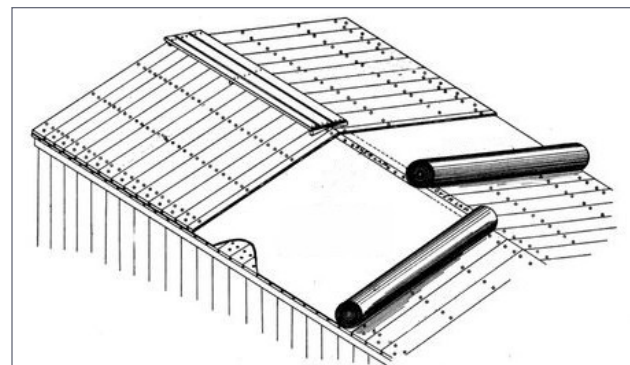
The earliest car roofs were constructed of a layer of tongue-and-groove wood. This proved inadequate as the twisting car body caused the wood roof to buckle and part. Some success was achieved with the application of various water-resistant materials such as treated canvas. The material worked well on passenger cars but was less successful on freight cars on which trainmen were required to walk.

Sheets of water-resistant material spread between two layers of wood [1-2] met with some success but the shifting of the two wood layers soon rubbed holes in the inner membrane.

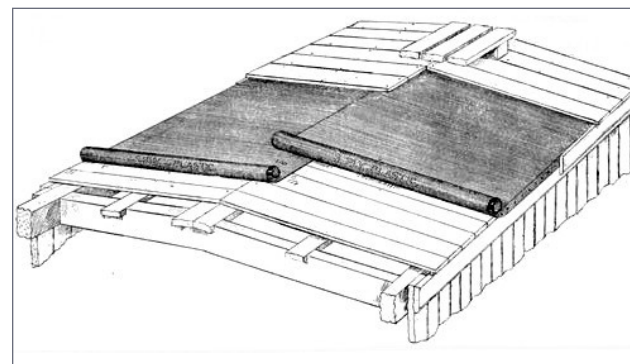
Flexible metal roofs

New cars built beginning in the 1880s and 1890s began to receive metal roofs over wood frames. To accommodate twisting of the car body, the metal roof panels were not rigidly connected to one another, but rather overlapped or nested together to allow some adjustment as the car body shifted and twisted. A variety of metal-wrapped battens were developed to join the metal panels and still allow some movement.

FREIGHT CAR ROOFS | 3



1. Hutchins plastic roof circa 1880.



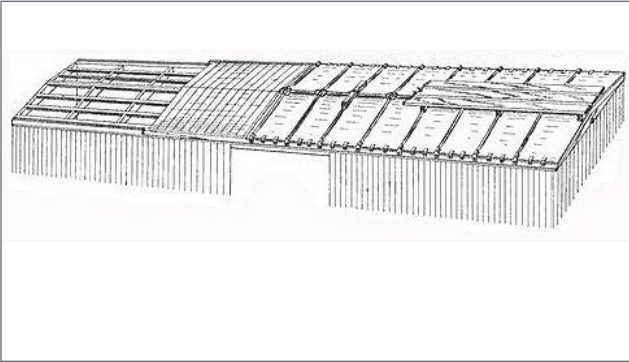
2. Drake Weirs roof circa 1880.

In the 1890s, the P.H. Murphy Manufacturing Co. of East St. Louis, IL developed an inexpensive galvanized metal roof that could be applied over a deteriorated wood roof [3]. Much of the success of the Murphy roof related to the special fixtures that held the metal roof panels in position while still allowing them to move as the car body shifted and twisted. Murphy made a similar metal roof under the Excelsior [5] brand name.

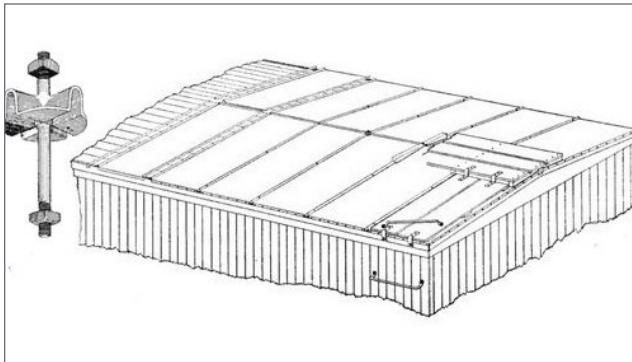
By the beginning of the 20th century, there were four general types of freight car roofs in use. They included:

- Double layer of wood boards
- Inside layer of boards covered with sheet metal panels

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3. Murphy galvanized iron car roof manufactured by P. H. Murphy Co. East St. Louis, Illinois, circa 1890.



4. Excelsior car roof manufactured by Excelsior Car Roof Company, St. Louis, Missouri (an affiliate of P. H. Murphy Co.). Circa 1890s.

- Sheet metal panels protected with an outside layer of boards
- Inside wood roof covered with felt, tarpaper or asphalted canvas, topped by an outside roof of wood

In each type mentioned, the wood is fitted tongue-and-groove, and the metal panels are free to move as the car body twists and flexes.

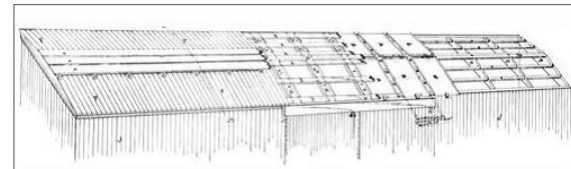
Wood generally withstood wear from trainmen's boots better than thin sheet metal, so what may appear to be a plain wood roof is often an outer layer of wood over an inner metal roof.

At the turn of the century, dozens of companies were promoting roofs of similar design. Some were sold as kits with all the

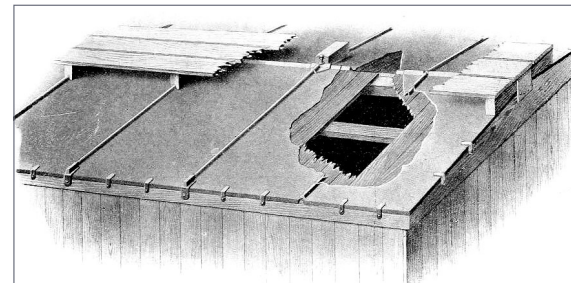
FREIGHT CAR ROOFS | 5

wood and metal fixtures needed to install a new roof on a boxcar. H.P. Murphy acquired several small companies. One example is a double-sheathed wood roof sold by the Winslow Car Roof Co. It was inexpensive but lacked any sort of effective moisture barrier. P. H. Murphy acquired the company in the late 1880s and reintroduced the roof as the Improved Winslow Car Roof [5] with flexible metal panels beneath the wood exterior.

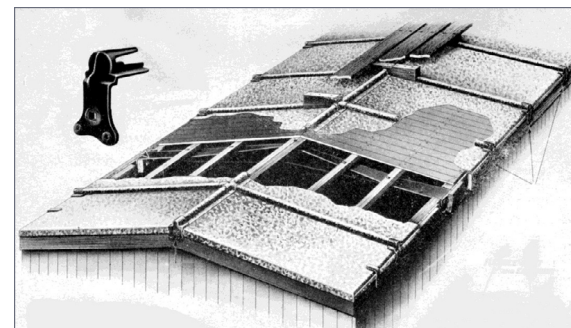
In the early 1900s P. H. Murphy was itself acquired by Standard Railway Equipment Co. (Stanray) which continued to promote and sell a variety of metal roofs using the Murphy brand name. One of the most successful was the American Outside Roof [6].



5. Murphy's Improved Winslow car roof, circa 1890s.

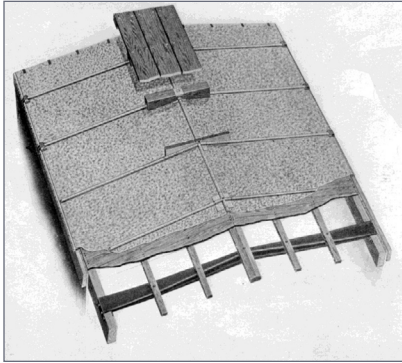


6. Murphy American Outside Roof, circa 1890.

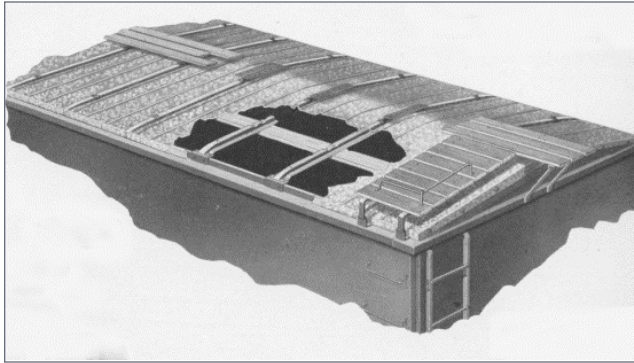


7. Superior flexible outside roof. Circa 1910.

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8. Chicago flexible outside roof Model 20. Circa 1915.



9. Viking all-steel rigid roof. 1910 through the 1930s.

The design claimed to lower the height of the roof and reduce overall car weight some 1200 pounds.

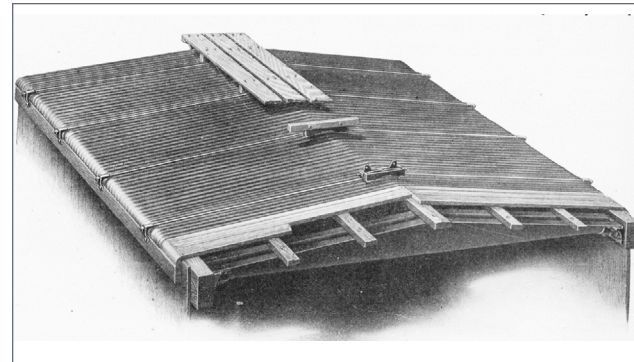
Another major manufacturer of freight car roofs was the Chicago-Cleveland Roofing Company which sold products under a variety of brand names including Superior and National. In the teens, the Chicago-Cleveland Co. promoted the Superior Flexible Outside Metal Roof [7] that used special cast clips to limit the movement of the metal roof panels. During the same period the firm introduced the Chicago Flexible Outside Roof Model 20. It was supported by stamped metal carlines and had thinner battens than the Superior version [8].

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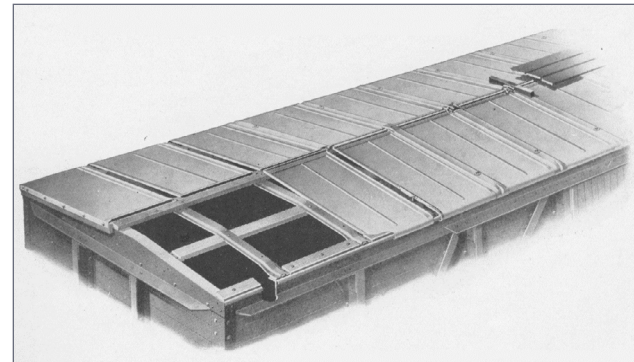
By 1910 more freight cars were being built with steel underframes which greatly reduced twisting and flexing of the car body. Chicago-Cleveland promoted the Viking rigid metal roof [9] for steel-framed cars and cataloged it through the 1930s.

Just prior to WWI, the Union Railway Equipment Company got into the roof business with a flexible metal roof it sold as the Ureco Type A freight car roof. It can be identified by the series of small ribs in each metal panel [10].

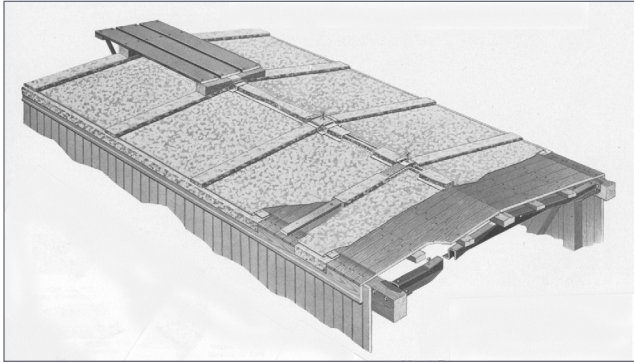
Certain dry products could sweat and begin to ferment if not provided with some ventilation. To solve the problem, the Hutchins Car Roof Company developed a roof that kept rain out but allowed some ventilation under the eaves where the roofing



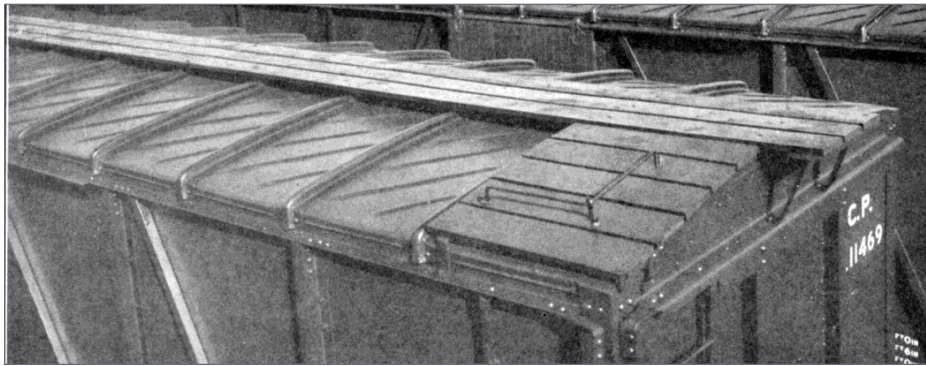
10. The Ureco Type A flexible metal roof from 1914.



11. Hutchins dry-lading roof circa 1920.



12. Murphy Improved model XLA, circa 1918.



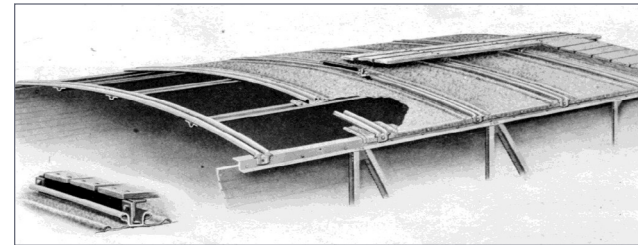
13. Hutchins radial roof from the WW-I era.

sheets were offset from the fascia. The spotting feature of the early Hutchins dry lading roof is a single small crease in the center of each roof panel [11]. Hutchins roofs gained considerable popularity in the early 1920s. The Murphy model XLA galvanized roof Stanray introduced in the teens had flat panels and plain flat seam caps [12]. The straight wood battens were encased with metal that nested into a fold at the edge of each roof panel. The XLA was inexpensive, and damaged panels and battens were relatively easy to replace. On a 40-foot car the XLA had 12 battens. A similar appearing Hutchins roof had sixteen seam caps narrower than the XLA battens.

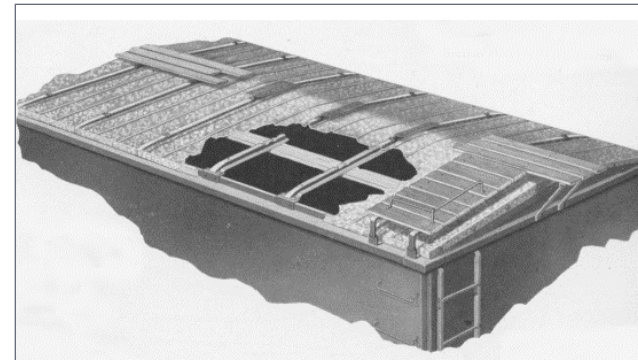
Radial roofs

Some railroads favored radial roofs which they considered stronger than traditional peaked roofs. Most peaked roofs consisted of metal panels or sections that joined under the running board. Radial roofs were less prone to leak because the curved roof panels extended the full width of the car without a seam in the middle.

Among the popular radial roofs that can be readily identified is the Hutchins roof that had three ribs pressed diagonally into each panel [13]. Chicago-Cleveland's two most commonly seen radial roofs were its Chicago "Common Sense" model 100-A [14], and the Climax roof that had two small ribs in the center of each panel [15]. In the late 1920s Stanray introduced an all-steel radial roof under the Murphy brand name [16]. It remained in common use through WWII.



14. Common-Sense roof model 100-A from Chicago-Cleveland Co.

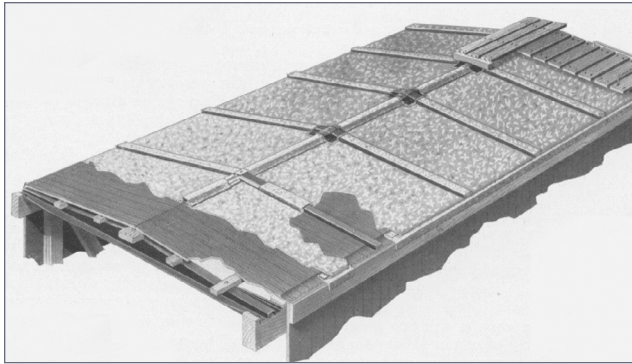


15. Climax radial roof introduced by Chicago-Cleveland Co. in the early 1920s.

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16. Murphy all-steel radial roof manufactured by Stanray circa early 1930s.



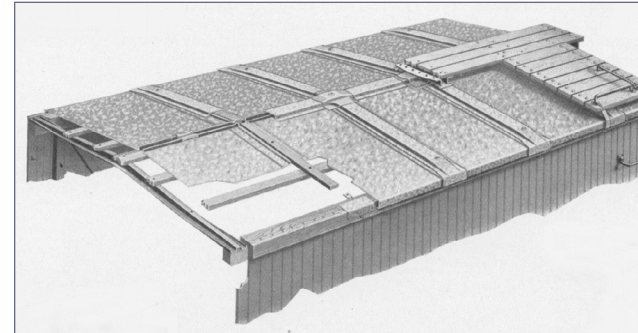
17. National flexible roof by CCRC late 1920s through the steam era.

Money for capital expenditures was scarce during the Depression years of the 1930s and many railroads elected to repair rather than replace aging equipment. Master mechanics had a wide assortment of replacement roofs from which to choose. The Chicago-Cleveland Co. offered several all-steel roofs including a flexible National [17] roof aimed primarily at older equipment, and the Zenith all-steel roof that used no rivets [18]. Both roofs utilized stamped metal carlines.

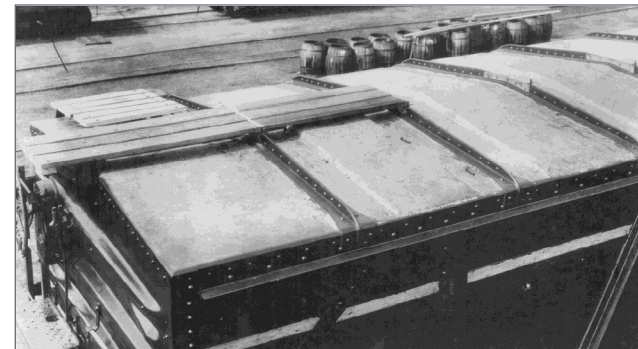
Stanray applied the Murphy brand name to several types of roofs. One of the most readily identified had panels with turned up edges that were held together with horizontal rivets [19]. A galvanized steel roof with welded double panels [20] was introduced in the late 1920s as a “new and improved” Murphy roof.

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One notable new design that appeared during the Depression was the wagon-top concept Baltimore & Ohio utilized for cabooses, covered hoppers and boxcars built in its own shops [21]. The inverted U shape resulted in a strong car body with a roof that couldn't leak.



18. Zenith all metal.



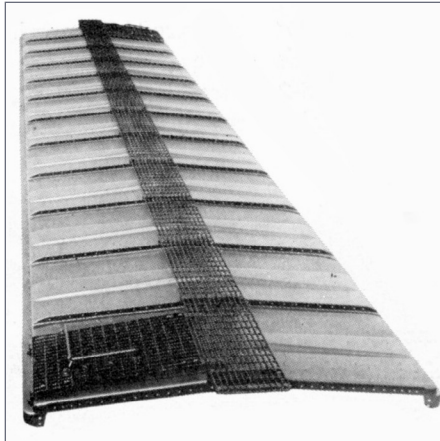
19. Murphy “solid steel” roof.



20. Milwaukee Road ribbed-side boxcar built in 1940 with unpainted galvanized steel Murphy double panel welded roof.



21. Wagon top roof with a Blaw-Knox Steel running board.

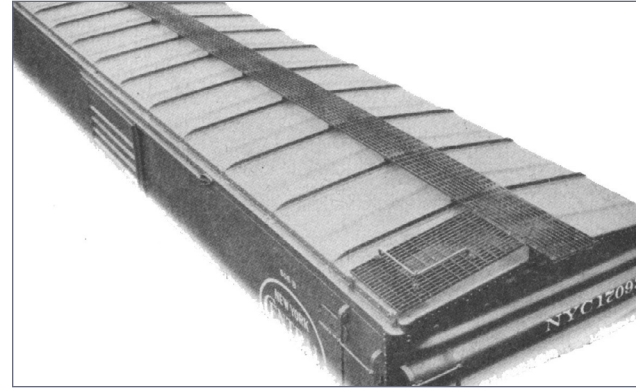


22. Pullman Standard riveted roof on a PS-1 boxcar.

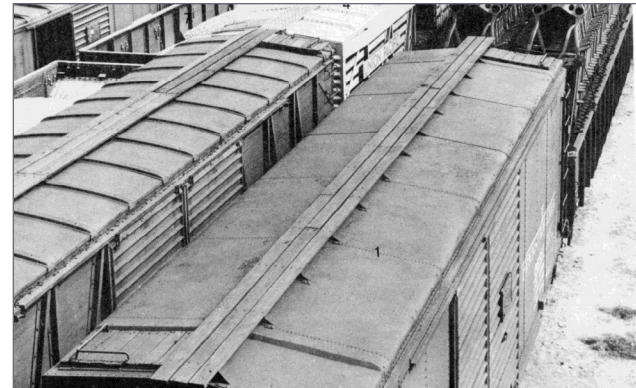
Post-WWII construction

The building boom after WWII saw the development of several new roof designs. The Pullman-Standard Car Manufacturing Co. used both riveted [22] and welded [23] roofs in building their ubiquitous PS-1 boxcar. The PS-1 roof is easily mistaken for a Murphy roof, which has slightly wider panels and therefore fewer panels and seams on a car of the same length.

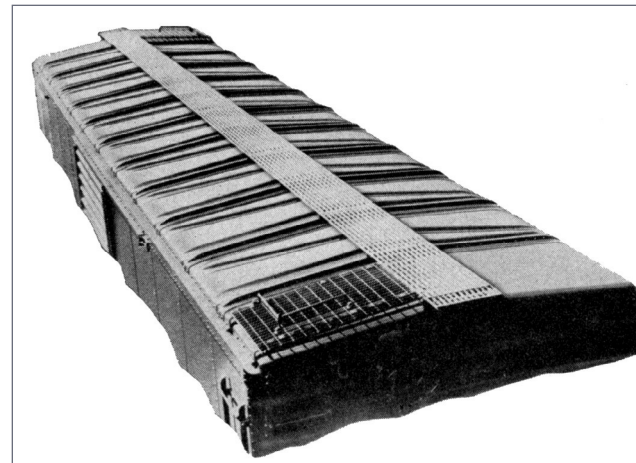
Stanray's diagonal panel roof of the 1950s was available in both welded [25] and riveted [26] versions. They are virtually identical



23. Pullman standard welded roof on a PS-1 boxcar.

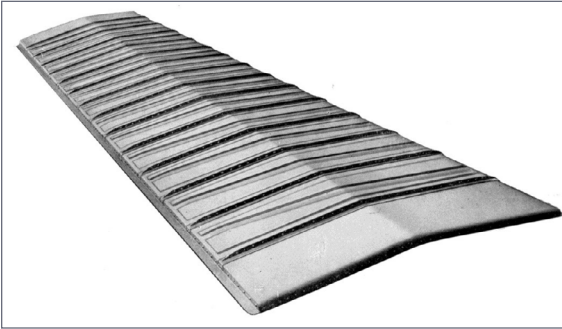


24. Pennsy boxcar built in 1941 with riveted roof with notched end panels to accommodate longitudinals and grab irons. Without notch car would exceed AAR clearance limits.

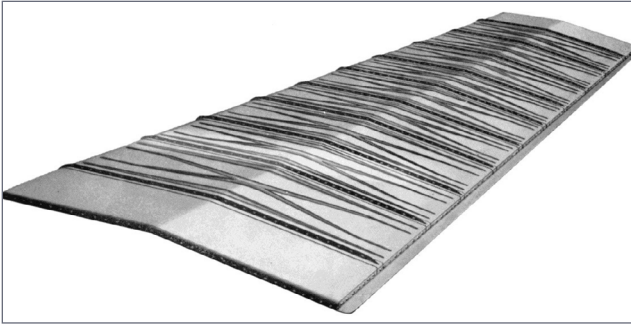


25. Standard diagonal welded panel roof from Stanray circa 1950.

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26. Stanray riveted diagonal panel roof circa 1970.



27. Stanray X-panel roof circa 1970.

and difficult to tell apart. All the Stanray panels extended the full width of the car body. All of them were impressed with a diagonal pattern except the end panels, which were left flat to facilitate installation of the latitudinals.

Stanray's X-panel roof [27] was introduced in the late 1970s. The X design was well accepted and became a signature product for Stanray. It is still used in contemporary flat roofs. Pullman-Standard's answer to Stanray's X-panel was the roof shown in figure 28.

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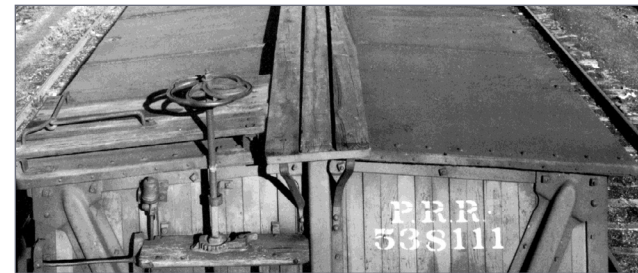
RUNNING BOARDS, LATITUDINALS, AND BRAKE STEPS

Wood running boards

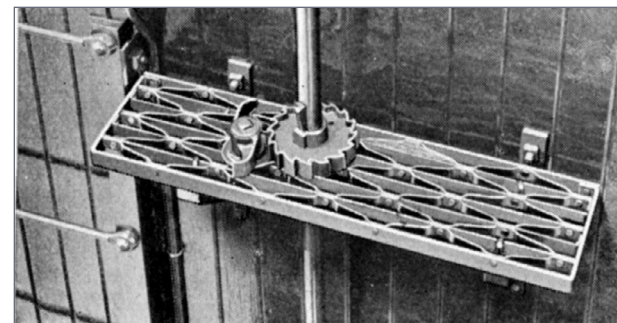
Until the late 1960s, freight cars were required to have a longitudinal running board on the car roof. The Master Car Builders Association and later the AAR specified that the width of the



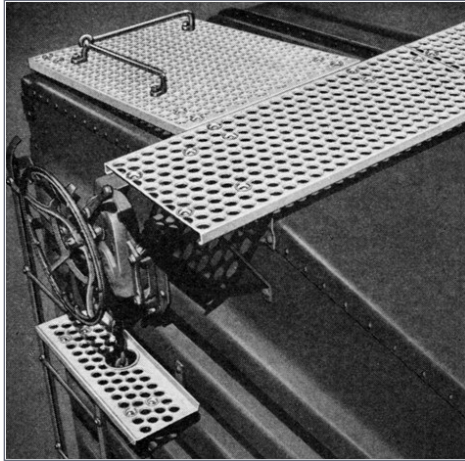
28. Modern Pullman-Standard roof from the 1970s.



29. Wood running board, latitudinal, and brake step.



30. Safkar brake step.



31. Morton metal running board.

running board be a minimum of 18 inches and a maximum of 20 inches. The running board was required to extend beyond the end of the car a minimum of 6 inches and not more than 10 inches, from a vertical plane measured from the inside face of the car's coupler.

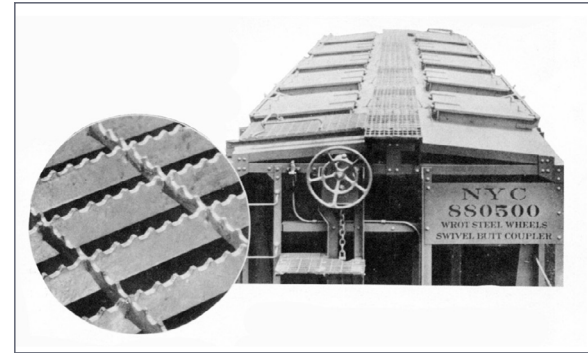
Latitudinal extensions of the running board at the right-hand corner of the roof must be a minimum of 24 inches wide. A brake step, if used, must be a minimum of 28 inches long. Although there were sporadic efforts to produce metal versions of these components, through the first three decades of the 20th century the vast majority were made of wood [29].

Metal running boards

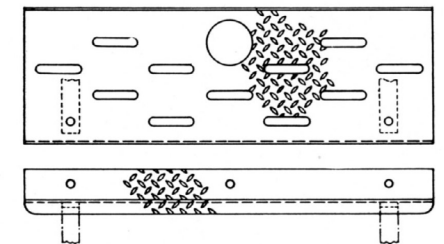
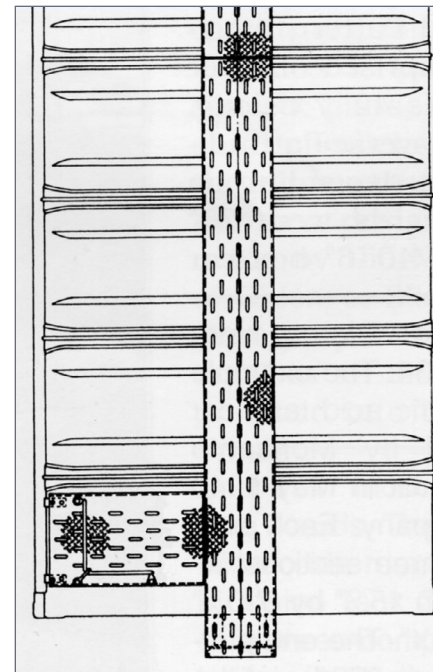
Records reveal that one of the earliest uses of metal running boards was on an all-steel boxcar that Canadian Car & Foundry built during WWI. It was similar in appearance to Morton's punched hole design [31].

Safkar: The Safkar brand of steel running boards [30] were among the first to be available as a standard off-the-shelf

product. Manufactured by the Irving Iron Works of New York, Safkar products were first shown in the 1931 edition of the Car Builders Cyclopedia. The design consisted of formed iron straps riveted together in a diamond pattern. The riveted assembly was held in place by an outer frame of heavier steel stock. The



32. Apex Tri-Lok metal running board.



33. Alan Wood metal running board and brake step.

introduction came during the depth of the Depression and met with limited success.

Morton: In the late 1930s Morton Manufacturing Co. introduced a line of metal running boards, latitudinals, and brake steps using steel safety tread developed earlier by Kass Co. Morton products are readily identified by the distinctive 1.5-inch holes stamped in the steel plate [31].

Alan Wood: A Pennsylvania-based company named Alan Wood Steel introduced metal running boards and brake steps about 1937. The design used a series of slots punched into diamond safety tread steel plate [33].

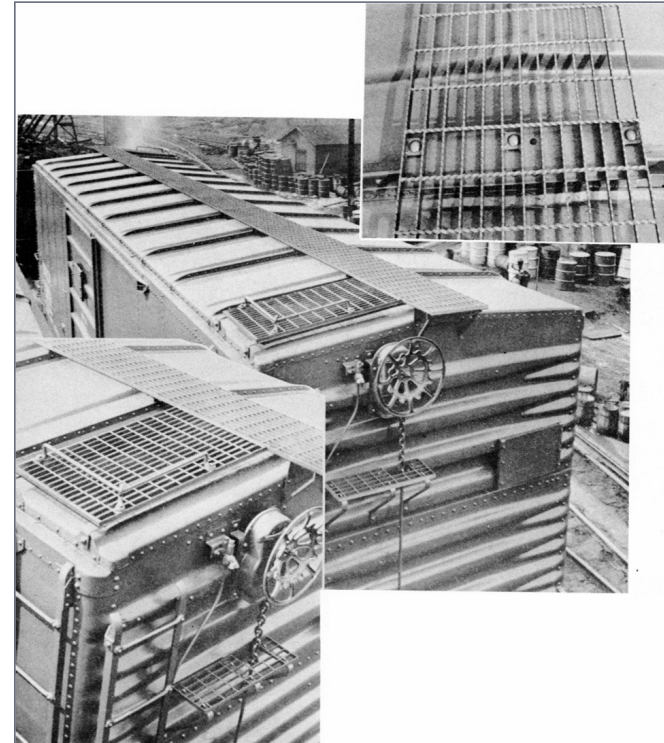
Tri-Lok: Apex Railway Products Co. introduced its Tri-Lok brand products in 1937 [32]. The design consisted of serrated metal bars held in position by smaller serrated cross bars pressed into notches during the manufacturing process. Advertising material for Tri-Lok said that the open design was self-cleaning and quickly shed water, ice, and snow.

Blaw-Knox: Open grid running boards sold by Blaw-Knox [34] were similar in appearance to Apex Tri-Lok except that the cross pieces were made of quarter-inch spiraled rod rather than flat stock. Blaw-Knox steel latitudinals advertised in 1953 measured 40 by 24 inches.

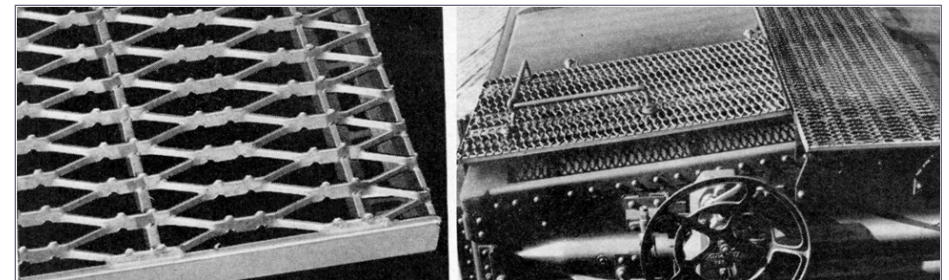
U.S. Gypsum: About 1940 the United States Gypsum Co. introduced running boards, latitudinals and brake steps made of lightweight expanded metal [35]. An open diamond pattern was formed by stamping and stretching 12-gauge steel. USG running boards and associated components cost about 20 percent less than comparable items from Tri-Lok, the leading supplier at the time. Per USG advertising, by 1953 more than 75 railroads were using USG expanded metal running boards.

Kerrigan: In 1950 the Kerrigan Iron Works of Nashville, TN, introduced a line of metal running boards and brake steps. The Kerrigan design was visually like Blaw-Knox products except that

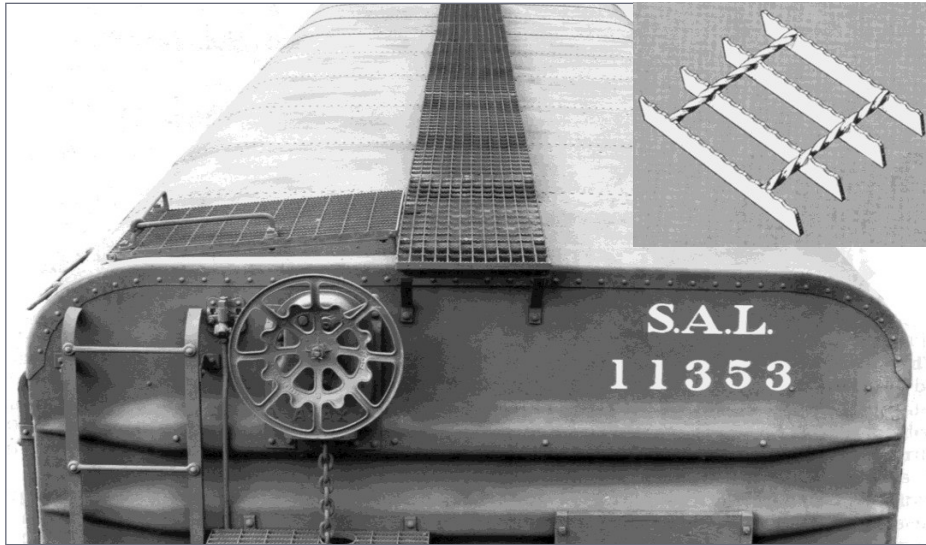
they used a spiral rod to hold the serrated metal strips in position [36]. The Kerrigan, Blaw-Knox and Tri-Lok running boards were all composed of 12 rows of edge-mounted serrated steel. It is difficult to distinguish among the three.



34. Blaw-Knox metal running board.



35. U. S. Gypsum Co. stretched metal running board and latitudinal.



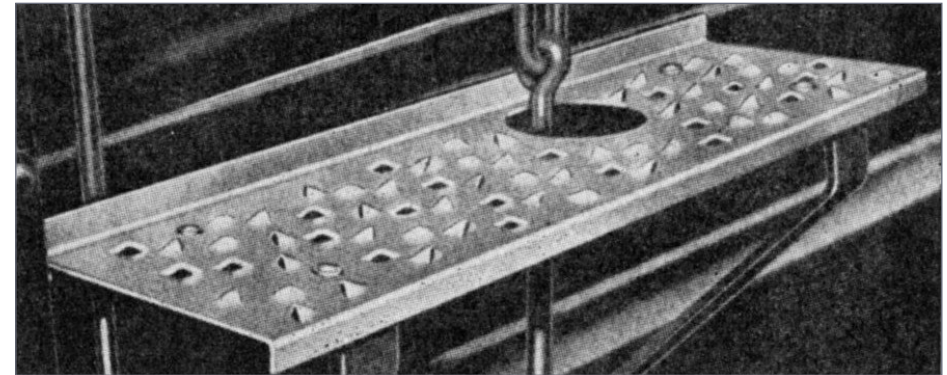
36. Kerrigan metal running board.

Stanray: The Standard Railway Equipment Co. offered a steel brake step with half-round punctures pressed upward to engage the soles of a trainman's boot [37].

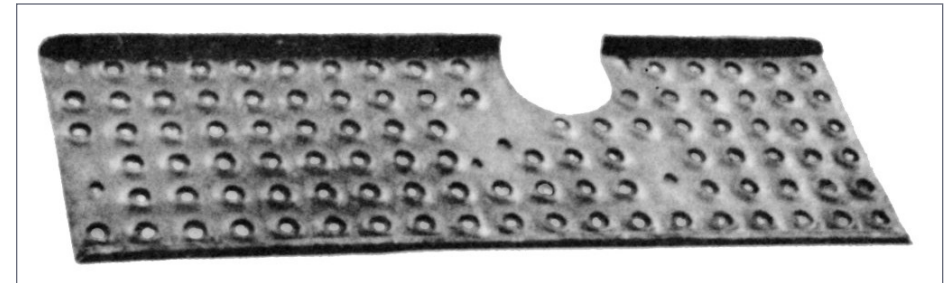
Parish: Parish Pressed Steel Co. cataloged a steel brake step with a series of round holes in the 1940 edition of the Car Builders Cyclopedia. The edge of the holes was slightly ragged, creating a non-slip surface on the brake step [38].

Vilco: The Vilco Railway Equipment Co. steel brake step [39] is similar in appearance to the type sold by Stanray [37].

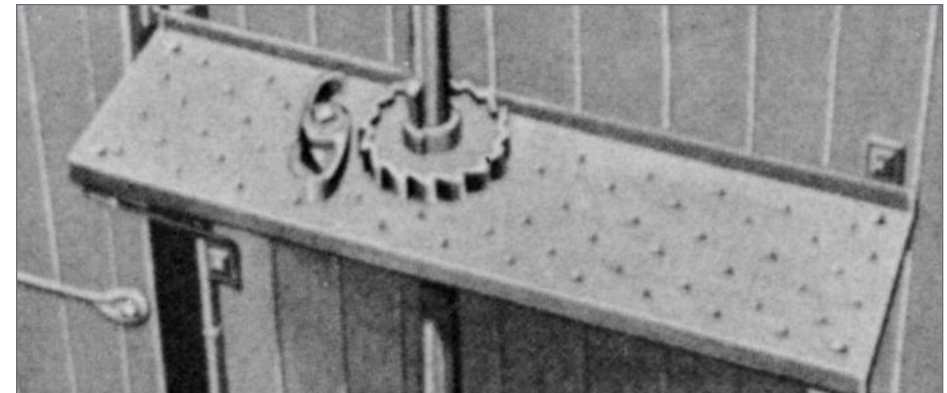
Metal running boards and latitudinals were required on all new cars built after 1945. As of 1966, running boards were no longer required on new cars. In 1974 the ARA issued a directive to remove all running boards on house cars. As the deadline approached, the effective date of the order was extended to 1979.



37. Stanray pressed steel brake step.



38. Parish non-skid steel brake step,

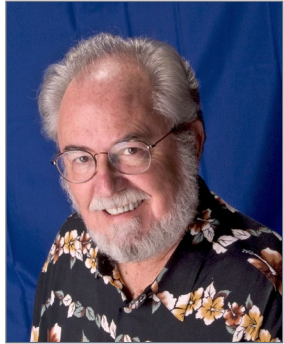


39. Vilco steel brake step circa 1939.

To facilitate loading and unloading, covered hoppers and tank cars continue to be equipped with walkways. ☒



RICHARD BALE



Richard Bale writes the monthly news column in MRH. He has been writing about model railroading since the 1960s. His articles have appeared in several publications including *Rail Line News* which he published in the 1990s. Bale enjoys all aspects of the hobby including researching the prototype. He currently serves on the board of the North County Model Railroad

Society in Oceanside, CA.

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