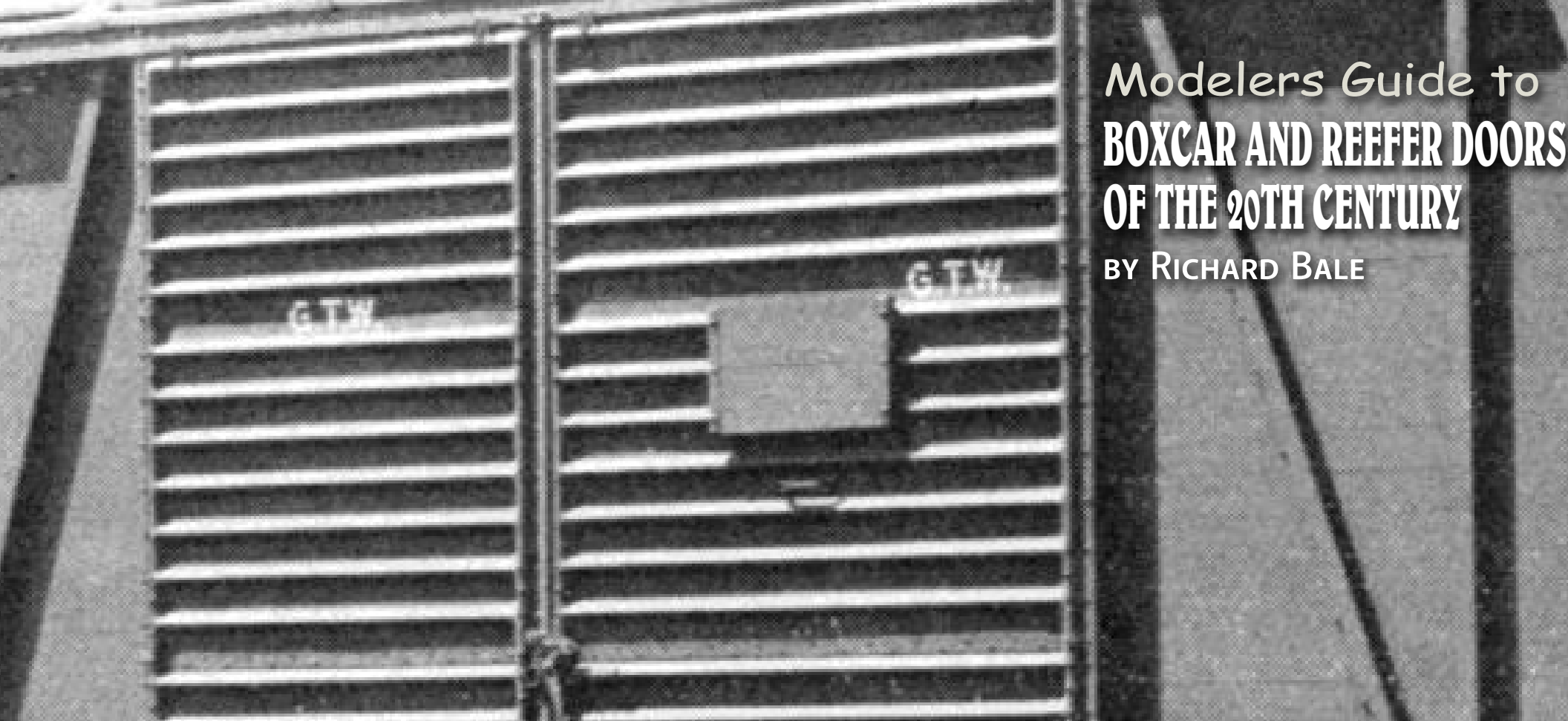




Modelers Guide to BOXCAR AND REEFER DOORS OF THE 20TH CENTURY

BY RICHARD BALE

The Modeler's Guide Series continues with rolling stock doors ...

FROM THE EARLIEST DAYS OF RAILROADING, car builders assembling house cars searched for a reliable side door that would first protect the contents of the car against theft, fire, and weather; second, be easy and safe to operate, and third, economical to produce and maintain.

Some doors of the 1860s, 70s, and 80s had difficulty meeting any one of the requirements, let alone all of them. Early doors were often easy to jimmy open and goods could be pilfered

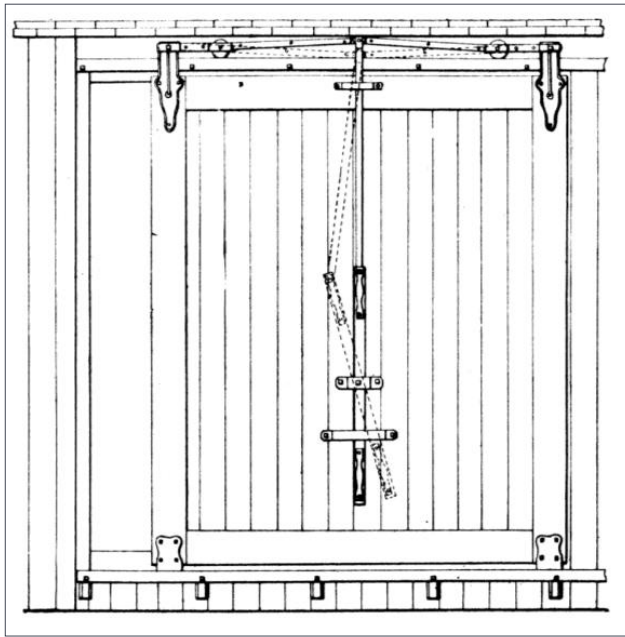
without leaving evidence that the car had been disturbed. As a car traveled over multiple railroads to its final destination it was virtually impossible to determine where the theft occurred and which carrier was to be held responsible.

Wood cars tended to shift and sway, forcing framework against the side doors, jamming them and making them difficult to open. Top-hung doors on wood cars put added weight on roofs of already questionable strength and stability. Doors were heavy and were particularly difficult to move when jammed or out of square. Stuck doors sometimes required the use of a crowbar and a sledge hammer to get them open.



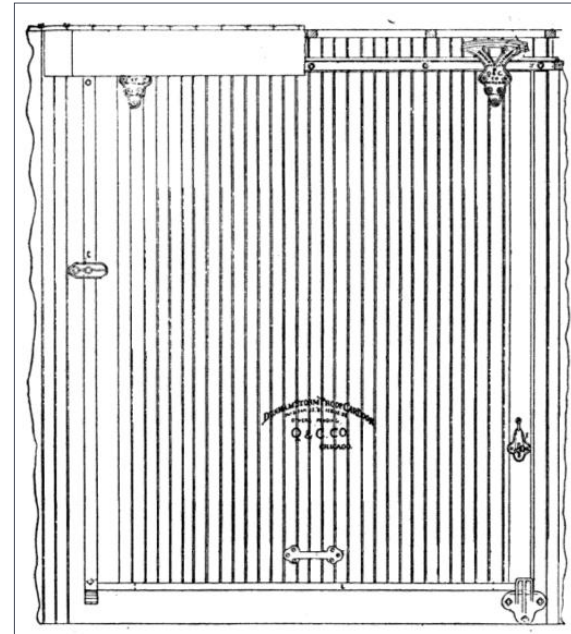
[Click here for
reader comments](#)

The earliest wood doors were generally made of oak stiles and rails, framed together using tenon and mortise. A metal bar was often placed across the outer face of the door tying everything together and limiting any tendency for the door to warp or bulge from shifting lading.

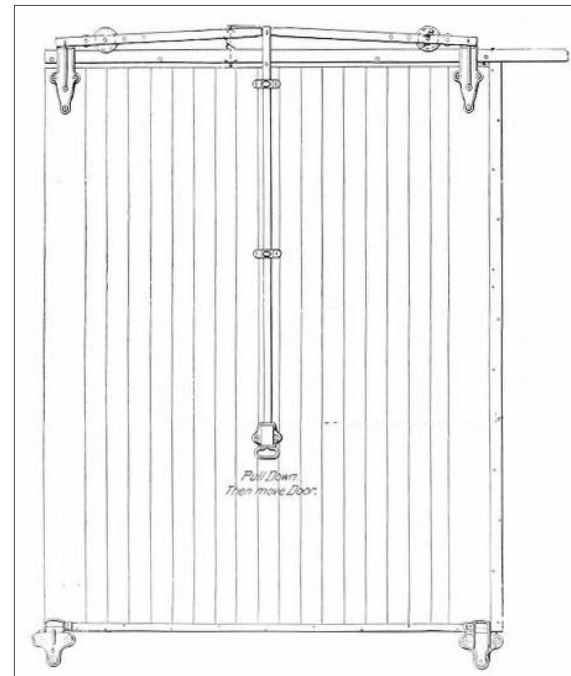


1. Moore top-hung car door.

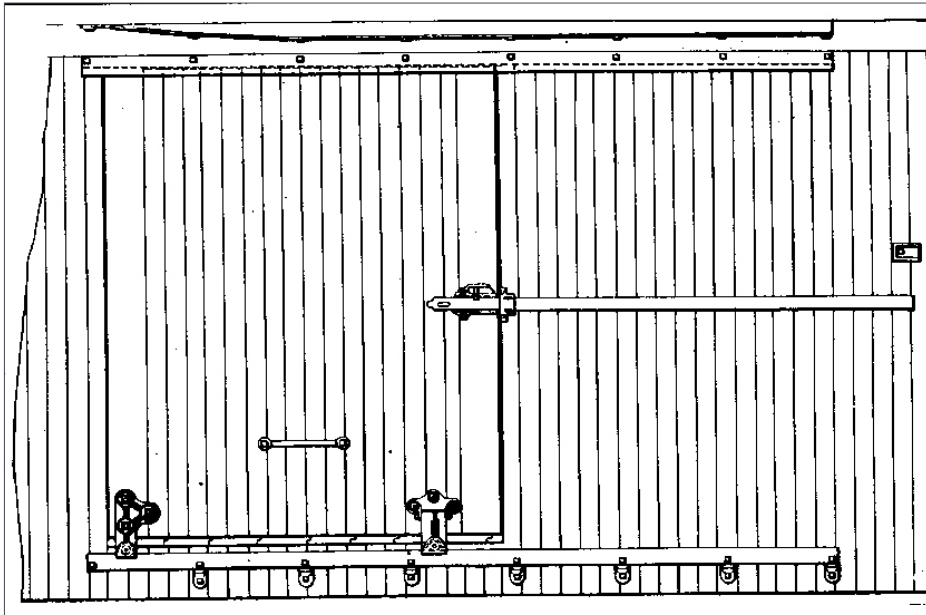
BOXCAR AND REEFER DOORS | 4



2. Durham car door.



3. Jones car door.



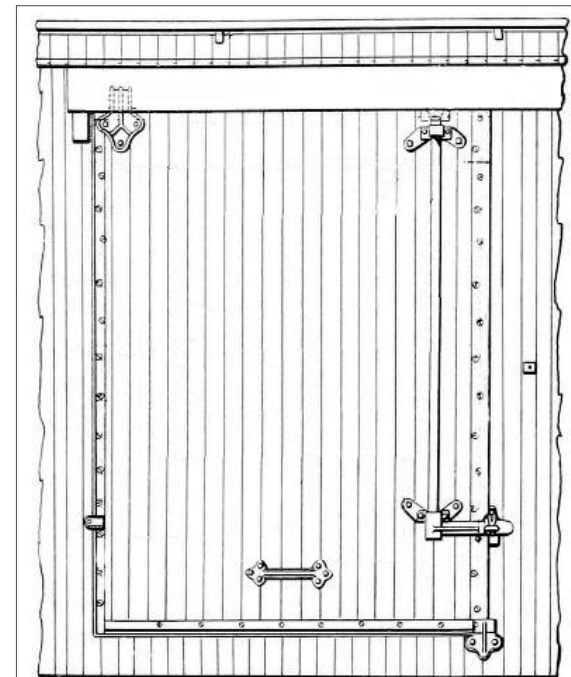
4. American Flush car door.

The Moore Company offered a top-hung door [1] in the late 1880s with a lever in the center of the door that when released, allowed the door to be opened or closed. When actuated the lever took the weight off the bottom supports so the door could be moved. With the lever in the locked vertical position, the door rested on the bottom with its weight wedging it against the side of the car.

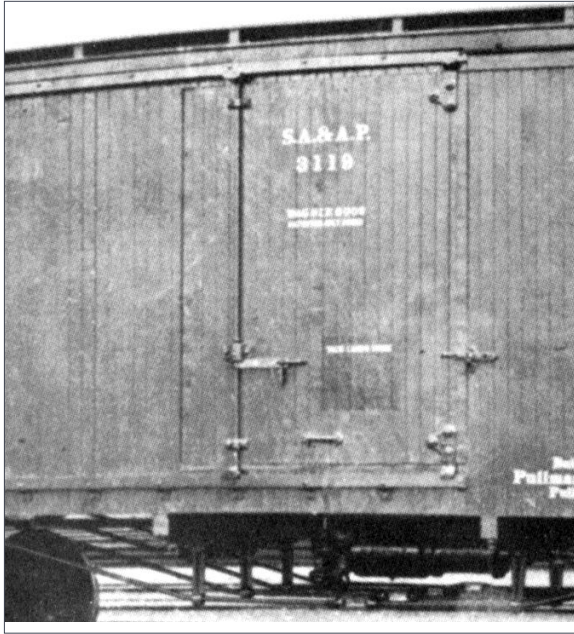
In the early 1890s a firm named Q&C Manufacturing Company developed a top-hung sliding door called the Dunham Storm-Proof Car Door [2]. The company also sold the malleable iron fixtures separately to independent car builders that preferred to fabricate their own wood door. Around the turn of the century the Jones Car Door Company offered a top-hung door with a locking bar located in the center of the door [3]. It was similar in appearance to the Moore door. Jones also

sold several versions of a top-hung wood door including one branded the Smith car door.

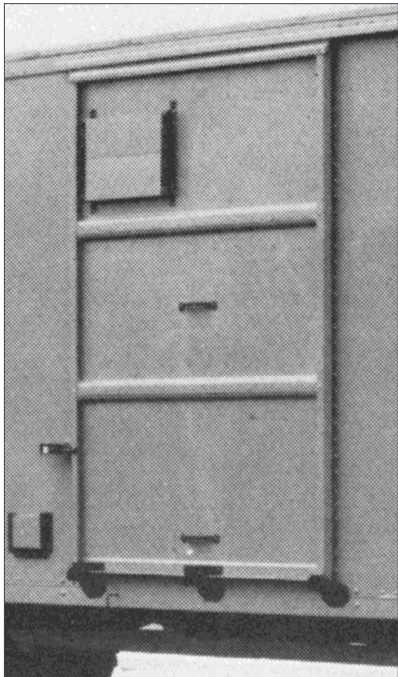
Lading could fall out of a car if the door did not remain firmly in place. The American Flush Car Door Company attempted to solve that problem in the late 1890s with a bottom-supported door that, when locked, wedged into the opening – much like an early plug door [4]. The bottom rollers were spaced to insure that the door, regardless of its position, was always supported by at least three rollers. A metal strap to the right of the door opening protected the car side from being scarred by the sliding door.



5. St Louis Flush car door.



6. Wagner left-hand car door.



7. Creco steel car door.

Another approach to eliminate spilled lading was met in the first decade of the 20th century by Western Railway Equipment Company that promoted a top-hung door called the St. Louis Flush Car Door [5]. The front of the door slid into a vertical Z-shaped bracket while the back side of the door was locked in place with a rod mechanism. It met with some acceptance with both the Pennsylvania Railroad and the Santa Fe, two roads not easy to please. Both wood and metal-clad versions of the St. Louis door were offered.

The left-hand sliding Wagner door [6] is shown here on a 34-foot San Antonio & Arkansas Pass boxcar built by the Pullman Company in the early 1900s. Most doors of the period moved to the right but in-service photos portray the Wagner door as a left-hand slider. Note that the Miner- type rotating rod with cam locks is mounted on the back side of the sliding door.

The first all-metal door to gain general acceptance was launched in 1910 by the Chicago Railway Equipment Corporation (Creco), a major supplier of other accoutrements to car builders. Creco three-panel steel doors [7] were used on Pennsylvania Railroad's X23 boxcars built in 1912 but acceptance of Creco doors remained limited. Things changed in 1923 when the three-panel bottom-supported Creco doors was applied to many PRR X29 boxcars. Variations of the Creco door continued in use into the 1940s.

The top-hung Allen Flush Car Door was introduced during a meeting of the Master Car Builders Association in 1914. It gained limited attention and was used by only a few railroads, most notably the Southern Pacific. Because of the inadequacies of the locking fixtures on some top-hung doors it was possible to jimmy the door open with a crowbar without breaking

BOXCAR AND REEFER DOORS | 9

the seal on the locking fixture. Promotional literature for the Allen door claimed it could not be pilfered without breaking the seal. Additional features mentioned in Allen ads noted the door was flush on inside allowing for maximum loading, and flush on the outside to minimize wind resistance.

Between 1923 and 1924, the Southern Pacific acquired 6,675 single-sheathed boxcars. Most of the cars were delivered with Type 32 Camel doors, but 1,000 were fitted with the rare Allen door. In most respects the Camel-Allen door was like other wood doors of the period, except the door hardware was located on the right hand side of the door, even though the opening was on the left.

Wood continued to be a major ingredient in car building and one of the most popular boxcar doors from the late teens through the 1930s was the composite wood and metal National car door manufactured by Union Metal Products Company. The National door [8] was composed of vertical tongue and groove wood secured within a steel frame. Riveted steel gussets at the four corners of the door and a horizontal L-shaped bracket about one third of the way from the bottom are spotting features of National doors. An additional feature is a handle centered at the bottom of the door. Locking hardware varied but many had a fastener with a long hasp made by National Malleable Casting Company [9].

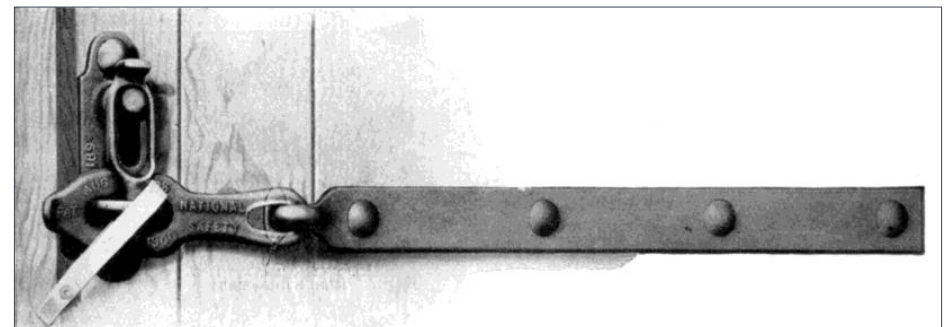
National made both top-hung and bottom-supported doors. In photographs, the two types cannot be identified with any certainty. The rollers at the open doorway were beveled to force the door tightly against the car when closed [10]. Other brackets with flat rollers kept the door away from the side of the car when open. Lower supporting brackets were open at the

BOXCAR AND REEFER DOORS | 10

bottom to prevent accumulation of dirt, cinders, ice, and snow. Thousands of USRA boxcars were built with National doors.

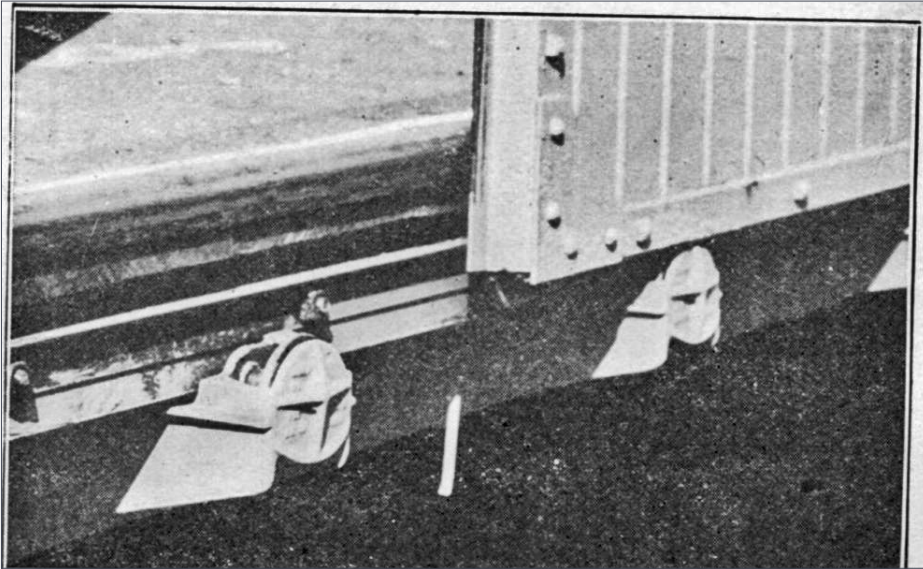


8. National wood door with Camel hardware.

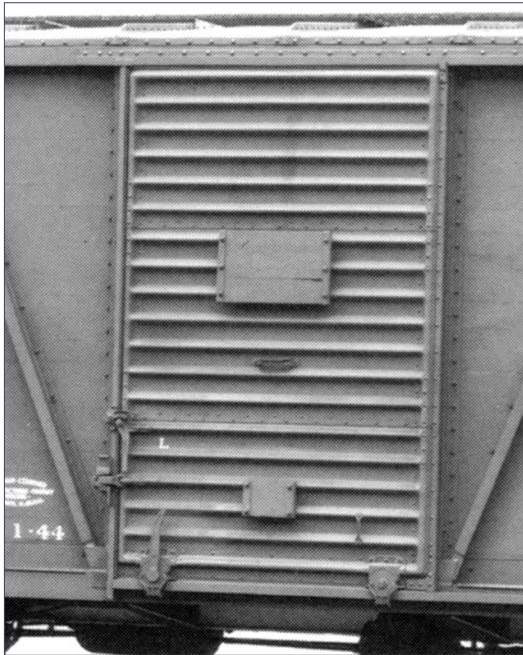


9. Long hasp door fastener made by National Malleable Casting Co.

BOXCAR AND REEFER DOORS | 11



10. Bottom rollers on a National door.



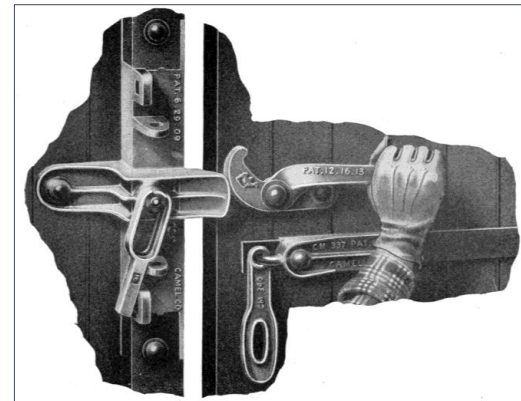
11. Youngstown corrugated steel car door.

BOXCAR AND REEFER DOORS | 12

The Camel Sales Company, which handled the marketing of Youngstown steel doors, introduced a new sliding door about 1925 that would, in time, become the most popular door of the steam era [11]. The three equal-sized steel panels with multiple horizontal corrugations made the Youngstown door easy to identify.

Freight car doors are heavy. Hundreds of miles of travel in a wide range of weather conditions, coupled with shifting lading wedged against the inside of a door, could make a 150 pound door difficult to open. Hardware manufacturers attempted to solve the problem with a variety of locking and unlocking mechanisms that incorporated levers to help force a stuck door off dead center. Among the more successful designs was a “door starter” sold by the Camel Company [12]. Many early Youngstown doors had Camel door starters mounted on the opening side of the door about one-third up from the bottom [11].

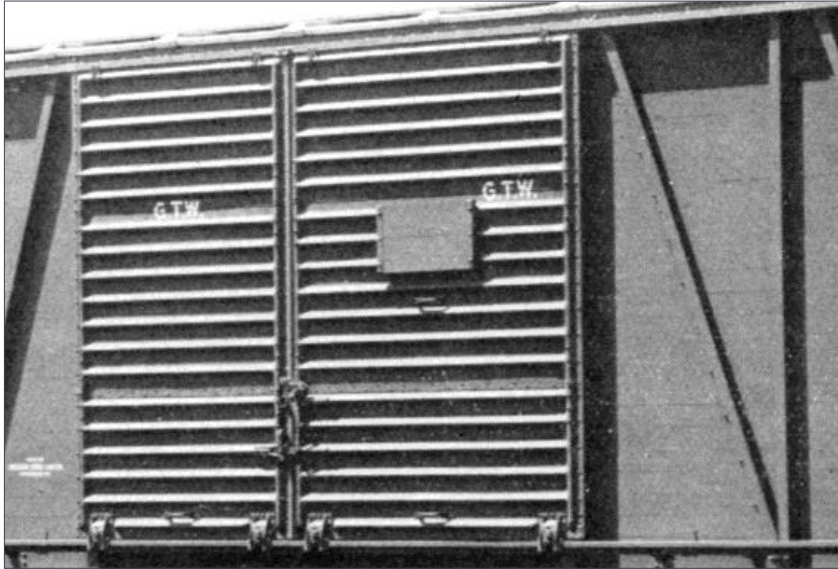
According to Youngstown sales literature, the use of Camel fixtures made opening and closing heavy steel doors much easier. When the lifting lever at the opening edge of the door was held down, the door was raised off the bottom support and was free to move. When the lever was released, the door dropped down on



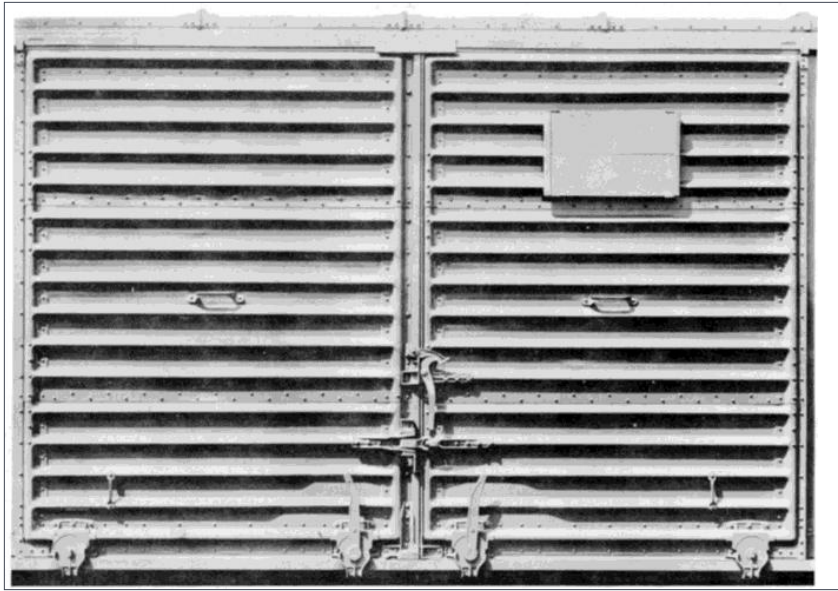
the bottom track and was prevented from further movement.

12. Camel “door-starter.”

BOXCAR AND REEFER DOORS | 13



13. Youngstown double doors on an automobile car built in 1929.



14. Youngstown double doors from late 1930s.

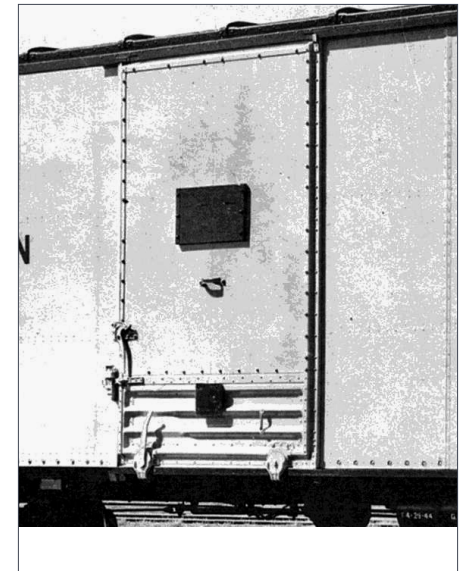
BOXCAR AND REEFER DOORS | 14

Figures 13 and 14 show the evolution of the bottom support rail and operating hardware on Youngstown corrugated steel doors from the late 1920s to the late 1930s. During WWII Youngstown produced composite doors using tongue and groove hardwood [15] as well as plywood [16]. The lower portion of the wartime doors that housed the rollers and locking mechanism showed the familiar Youngstown corrugations.

Near the end of 1945, Youngstown introduced a revised door design with visible changes. The new door had the rollers covered and a single operating lever located at the center of the door. For a brief interim period, the section where the three panels were



15. (Left) Youngstown WWII-era composite door with tongue and groove panel.



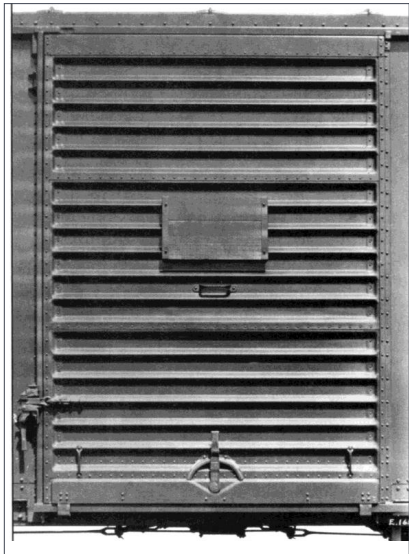
16. (Right) Youngstown WWII-era composite door with plywood panel.

BOXCAR AND REEFER DOORS | 15

riveted together was raised and widened [17]. They remained raised for only a short time and the following year they reverted to their original width [18]. Following its introduction in the mid-1920s, the Youngstown door became the most common boxcar door well into the diesel era.



17. A Santa Fe car built in December 1945 by Mount Vernon Car Manufacturing Company has the interim version of the Youngstown door with wide horizontal join panels and centered door opener at the bottom.



18. By 1946 Youngstown had revised their postwar door with narrow rivet sections similar to prewar designs.

BOXCAR AND REEFER DOORS | 16

Identifying doors from different manufacturers sometimes requires a close look. Beginning in the late 1950s the panels on Pullman-Standard boxcar doors featured a slightly peaked pattern with beveled ends [19]. The raised diamond pattern in the panels of the Evans door [20] are similar to those on the Pullman-Standard door. The Evans and Pullman-Standard doors are often confused with the other.

Less familiar than their six-panel door [19] is Pullman-Standard's sliding steel door with four bold rectangular corrugations in each of three panels [21] that began to appear in the late 1960s. A similar door with corrugations of varying lengths was first used by P-S on a series of 50-foot 70-ton waffle side boxcars built in their Bessemer plant for the Southern Railway in 1970 [22].

ADVERTISEMENT

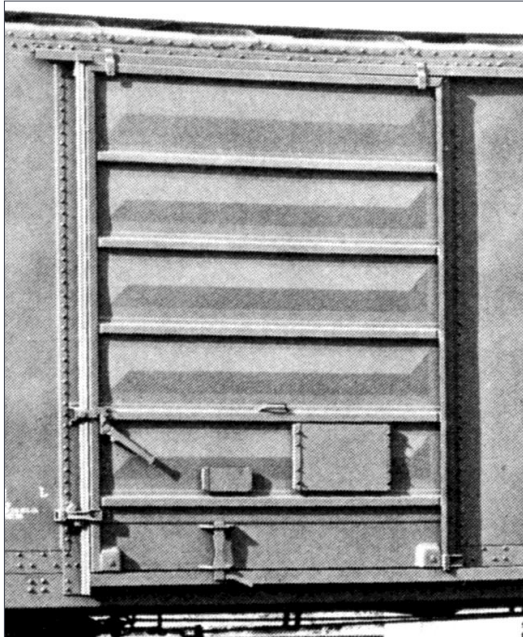


Announcing
Motrak Models New Coal Load
For Fox Valley 50' Coal Gondola:

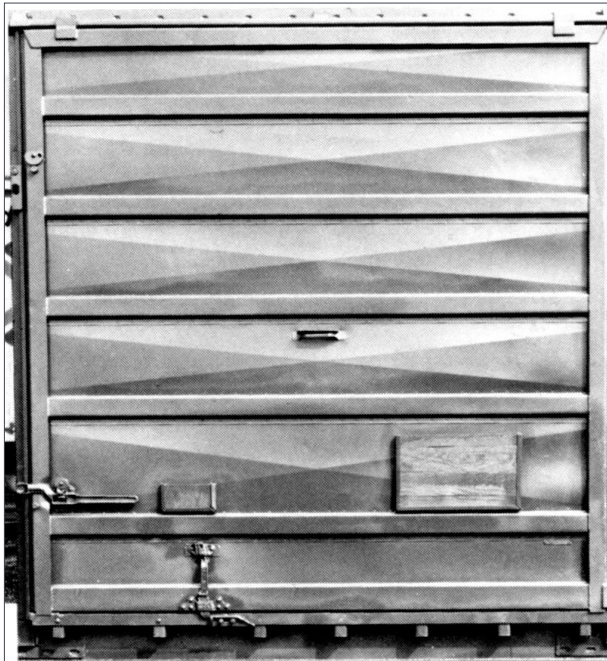


Phone number: 813-476-4784
Email: motrakmodels@centurylink.net

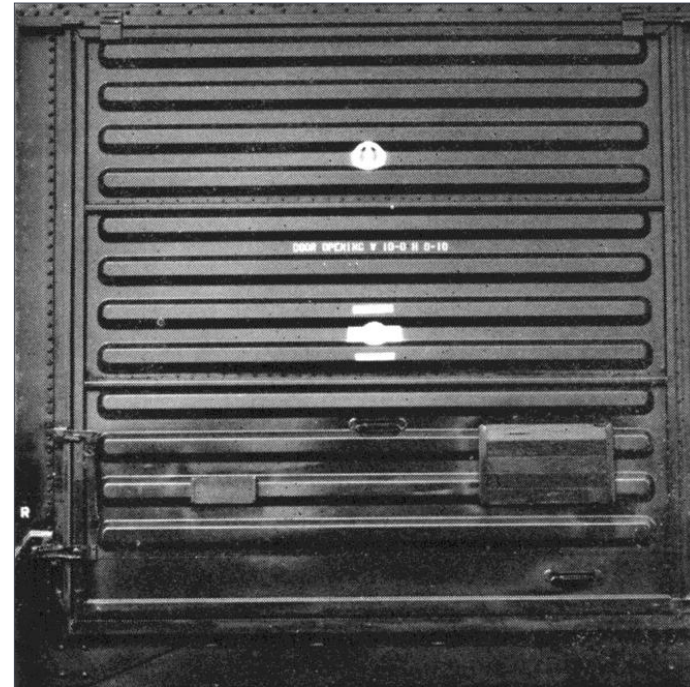
**CHECK
IT OUT!**



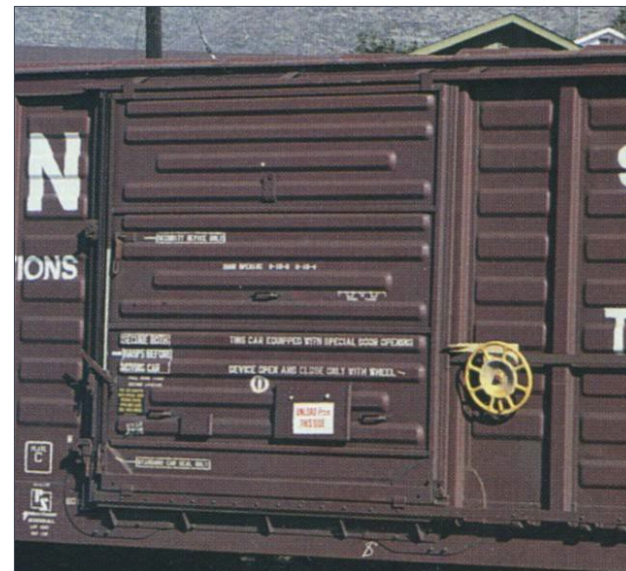
19. Pullman-Standard six-panel steel door.



20. Evans six-panel steel door.



21. Pullman-Standard corrugated steel sliding door dating from the late 1960s.



22. Pullman-Standard waffle-design sliding door with corrugations of different lengths.

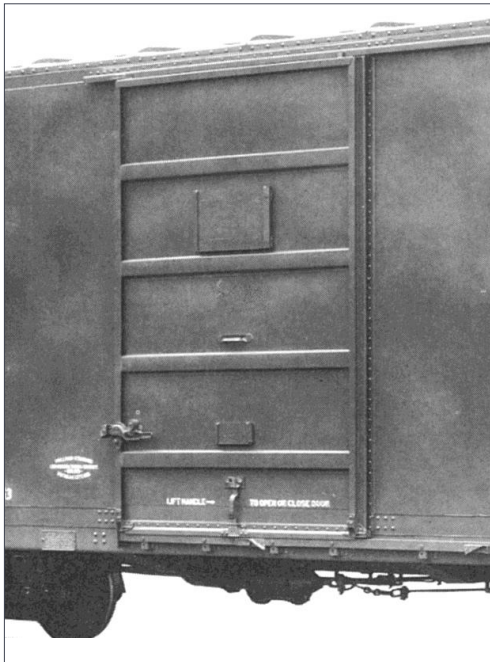
BOXCAR AND REEFER DOORS | 19

Occasionally car doors became stuck or jammed and were difficult to open. The sledge hammers, crowbars and forklift trucks used to open sticky doors often resulted in damage to the door jamb and the door itself. Various mechanical devices were developed with the most successful being the Slidewell rack and pinion system manufactured by the Hennesy Company.

It was attached to the right hand side of a sliding door [22] and was operated by simply turning the wheel.

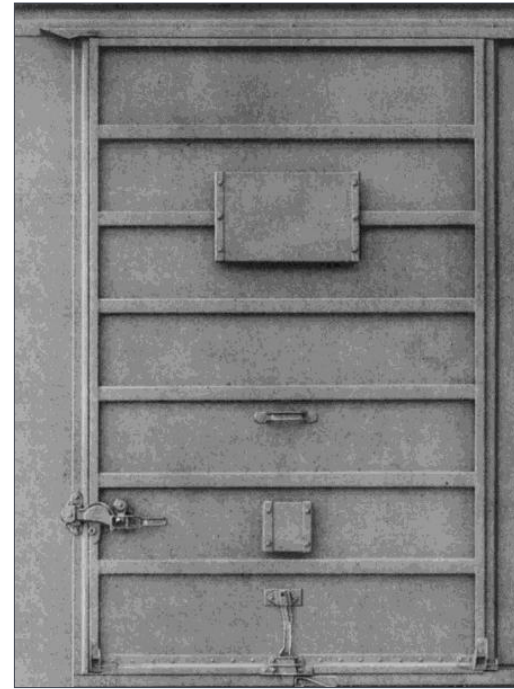
In 1945 the Superior Car Door Company introduced the Superior Welded Car Door for box and automobile cars. Advertising literature explained how the door was fabricated with overlapping panels that were welded in place. Five [23] to seven [24] flat panels were used with wider doors generally having more panels. Superior doors were bottom-supported with the door riding on

four ball bearings contained in a carriage along the bottom of the door. Promotional material claimed Superior doors rolled freely and were lighter than the more popular Youngstown doors. Some PS-1 boxcars built by Pullman-Standard in 1954 had six-panel Superior doors.



23. Superior five-panel door.

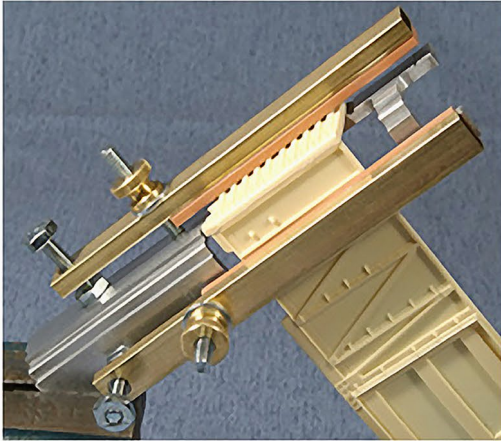
BOXCAR AND REEFER DOORS | 20



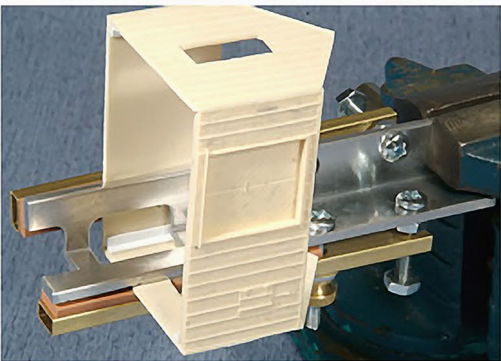
24. Superior seven-panel door.



25. Superior seven-panel double doors.

Combo Right Clamp™

Combo Right Clamp™
with cast resin boxcar



Combo Right Clamp™
with Wolf Design Pump House

**Click here for
all our products ...**

Tools for Modelers

Coffman Graphic Solutions Co.
1500 River Circle, Richmond,
KY 40475-7907

BOXCAR AND REEFER DOORS | 21

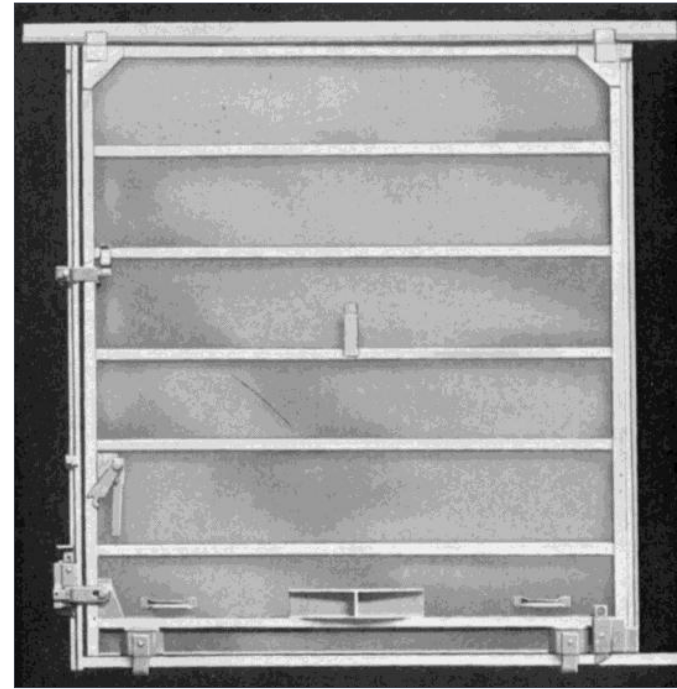
Unarco Industries developed a line of bottom-supported steel replacement doors that were sold under the brand name of Equipco [26, 27].

The spotting feature on Equipco doors that distinguishes them from Superior and International doors is the small gusset at the upper corners.

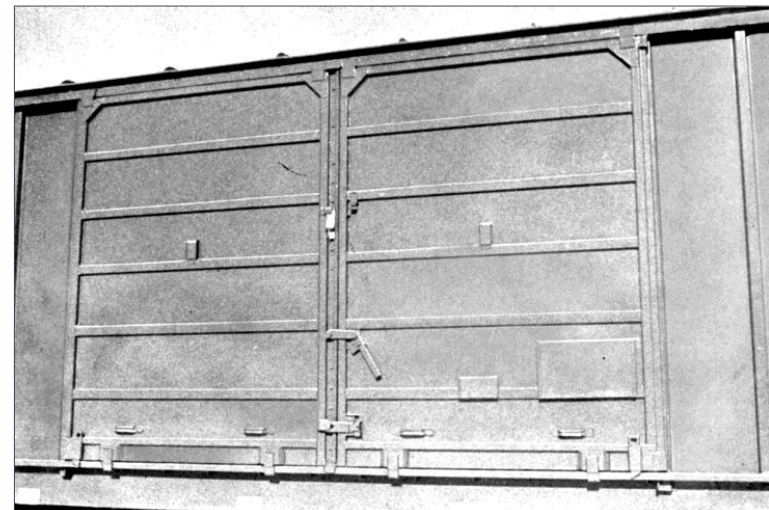
In the 1970s the International Steel Company of Evansville, IN, introduced a sliding car door the company claimed could be easily repaired [28]. The door used no castings and was fabricated from standard off-the-shelf steel parts.

Application literature suggested that any shop with welding capability could easily repair their sliding side doors. The horizontal ribs of the International five-panel door are thinner than those on a similar

BOXCAR AND REEFER DOORS | 22



26. Equipco six-panel car



27. Equipco six-panel double sliding door circa 1980. Note small gussets at the upper corners.

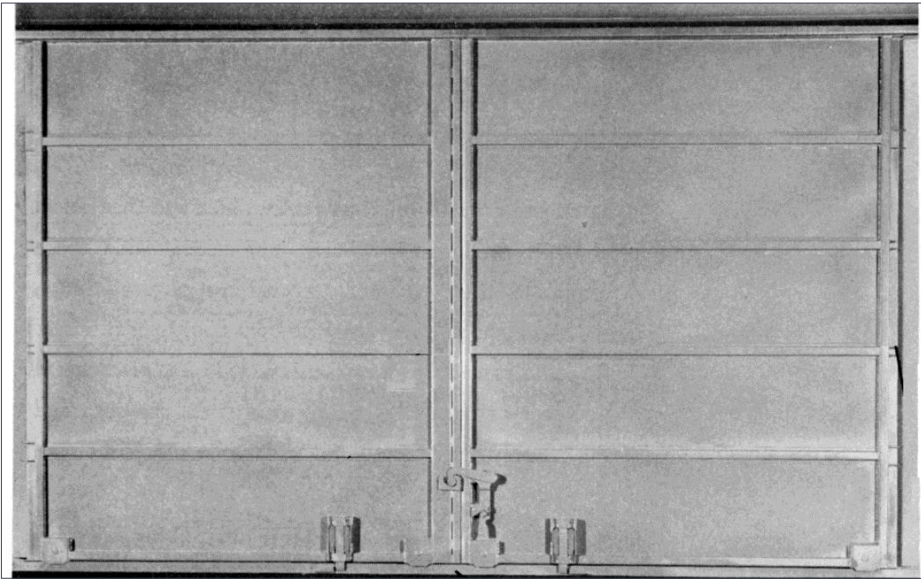
BOXCAR AND REEFER DOORS | 23

Superior door [23, 24]. International Steel was perhaps better known for their car underframes and full-width end doors for automobile cars [57].

In an effort to speed up the loading and unloading process Pullman-Standard built several 52-foot cars for Southern in 1963 with three Youngstown roll-up doors on each side [29]. Some of the cars were modified with four Youngstown sliding doors [30]. Neither idea proved particularly successful.

Hinged refrigerator doors

Prior to the introduction of ice bunkers, railroad cars transporting perishable goods had screened or barred doors that provided ventilation to the interior of the car. Some cars had both ventilated and standard doors to give trainmen an option depending on the type of lading and changing climate conditions as a train moved from one region of the nation to another.

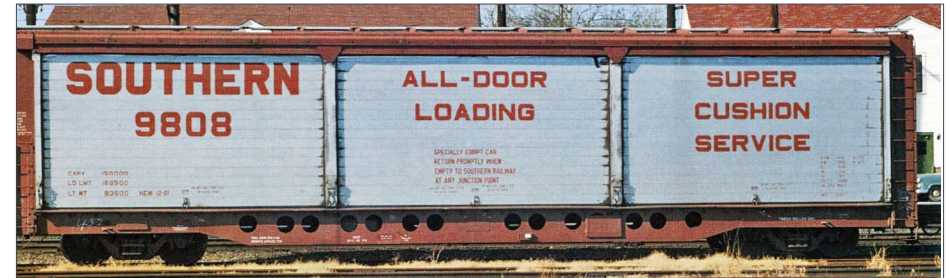


28. A pair of International five-panel doors, circa 1970.

BOXCAR AND REEFER DOORS | 24

Construction of ventilating doors varied from large openings with bars [31] to fabricated metal doors with adjustable louvers [33]. Built in the mid-1920s by Standard Steel Car Co., the durable ventilated car with the fishbelly underframe [31] remained in regular service until 1957.

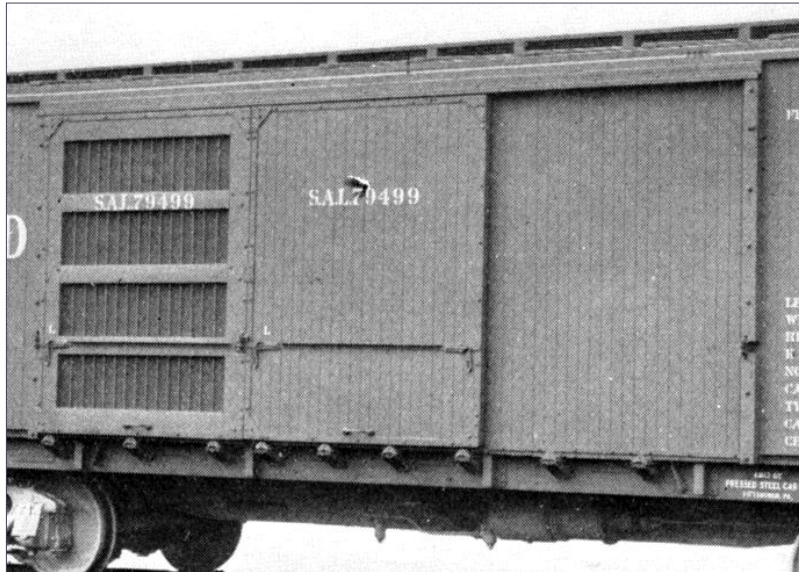
By the 1890s fresh fruit, vegetables and dressed beef were being shipped in insulated cars fitted with ice bunkers at each end. Ice was loaded through hatches at the corners of the roof. Two of the early successes were the Tiffany Car and the patented Wickes Refrigerated Car built by Pullman-Standard with the distinctive diagonal patterned wood swing doors [34].



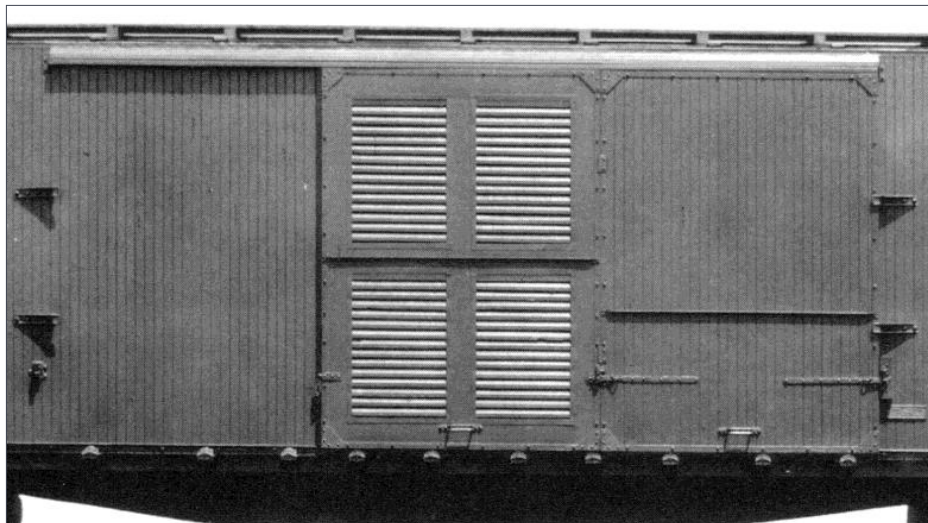
29. All-door car with roll-up doors.



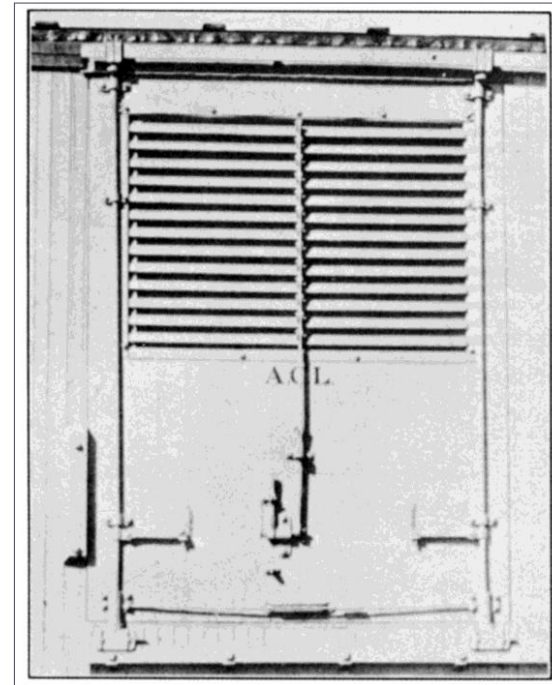
30. All-door car with four Youngstown sliding doors.



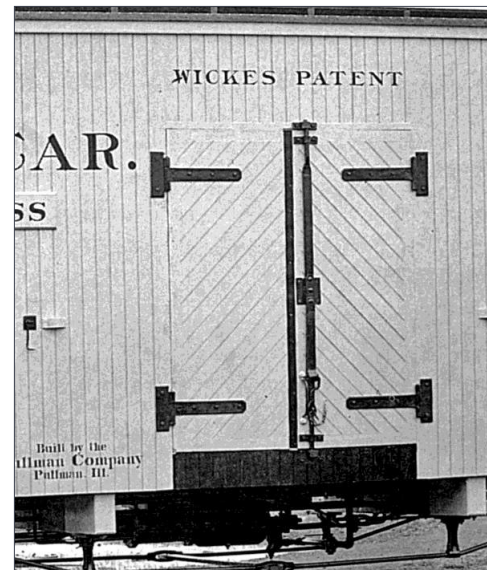
31. Combination vented door and solid wood door.



32. Combination vented door with stamped metal louvers and solid wood door.



33. Kennedy vented sliding door with vertical locking rods, circa 1930s.



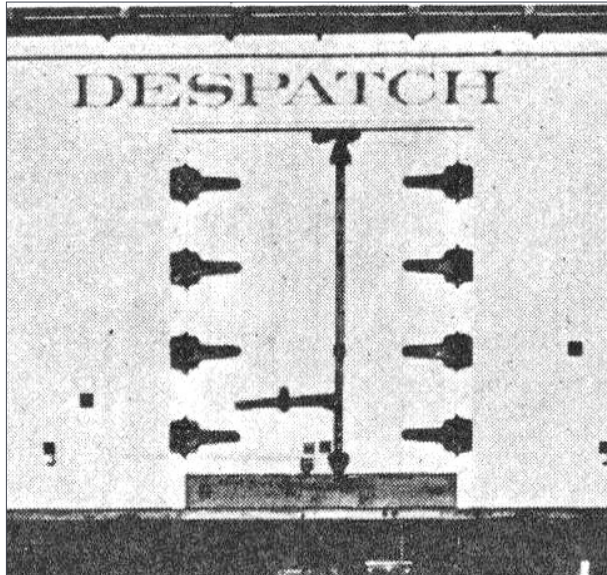
34. Four-hinged doors on an early Wickes ice refrigerator car.

BOXCAR AND REEFER DOORS | 27

Reefer doors were heavily insulated and required strong hinges to ensure reliability and a good seal to keep the cold in and the heat out. The number of hinges ranged from four [34] to eight [35] with six [36] being the more common. In the early 1930s Pressed Steel Car Co. built 40-ton refrigerator cars for NADX with just four hinges.

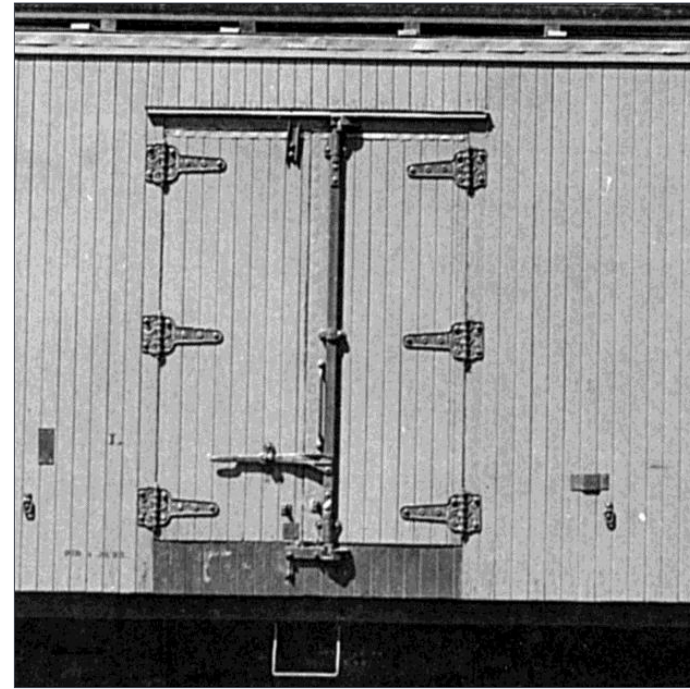
In an effort to limit the amount of cool air escaping an iced car, four feet remained the standard width for refrigerator door openings. A nominal 28-inch clearance between the loading platform and the car side was sufficient for each half of the thickly insulated doors to safely swing open.

To maximize the retention of chilled air, knee action hinges were used on some swing doors with a separate vertical cam-action locking rod on each door [38].

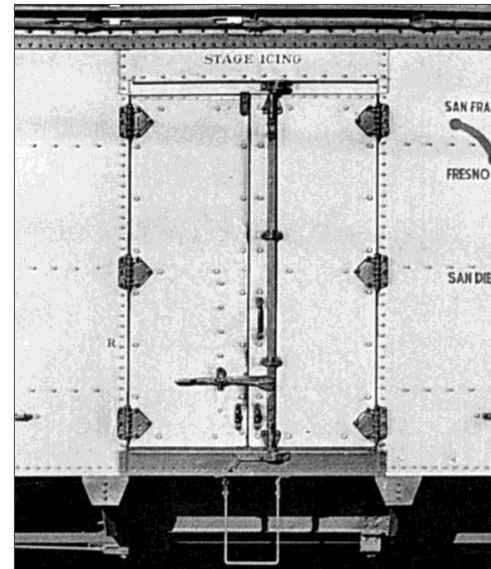


35. Swing doors on Merchants Despatch reefer built in 1917 had eight hinges.

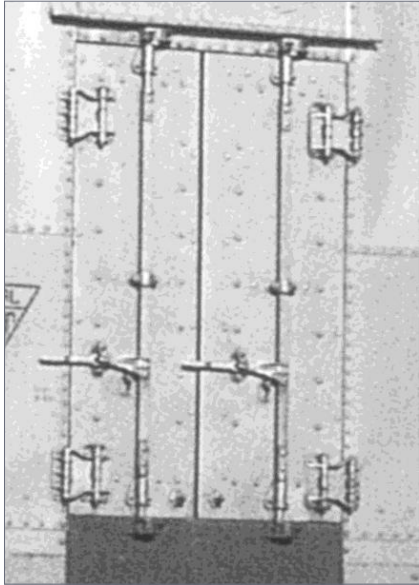
BOXCAR AND REEFER DOORS | 28



36. USRA reefer built in 1926 has six hinges on doors.



37. Doors on some reefers such as this SFRD car had short hinges.



38. Dual cam-action locking bars on steel reefer built in 1937 with double-acting knee hinges.

ADVERTISEMENT

END OF TRAIN DEVICE

NEW ORANGE CASE!



Patented Technology - US Patent 7,549,609

Bright Red Flashing Light!

**Installs in minutes!
No freight car modification required!**

RE RING ENGINEERING

Click Here to Learn More

Does not affect Load!

↓ Car without Load ↓



↓ Car with Load ↓



A few mechanized refrigerator cars built in the early 1950s continued to be fitted with four-foot swing doors, but to facilitate pallet loading, the majority of new cars of the period had plug doors at least six feet wide. Eight-foot plug doors appeared on PFE reefers built in 1954, and by the early 1960s some 52-foot reefers were being built with nine-foot plug doors. By the 1970s plug doors up to 10 feet wide were in use.

Plug doors

Refrigerator cars, especially those fitted with brine tanks or ice bunkers, required extensive cleanup at the end of each run. During the war years end-of-run maintenance was often incomplete which resulted in thousands of worn out cars after WWII. During the 1946-1950 recovery era many older reefers had their four-foot hinged plug-doors replaced with six- or eight-foot sliding plug doors.

Although introduced in the 1920s, widespread use of power lifts manufactured by Towmotor and innovative material handling equipment developed by Yale & Towne slowed during the Great Depression when the cost of labor was at an all-time low. However, by the late 1930s battery powered lifts in combination with hydraulic equipment and the increased use of standardized pallets began to significantly change the way both reefers and boxcars were loaded and unloaded.

The direct influence was the demand for cars with wider doors to facilitate mechanized loading equipment. Larger door openings in reefers meant an increased loss of chilled air during the loading process, but the loss was offset by reduced loading time using powered forklifts.

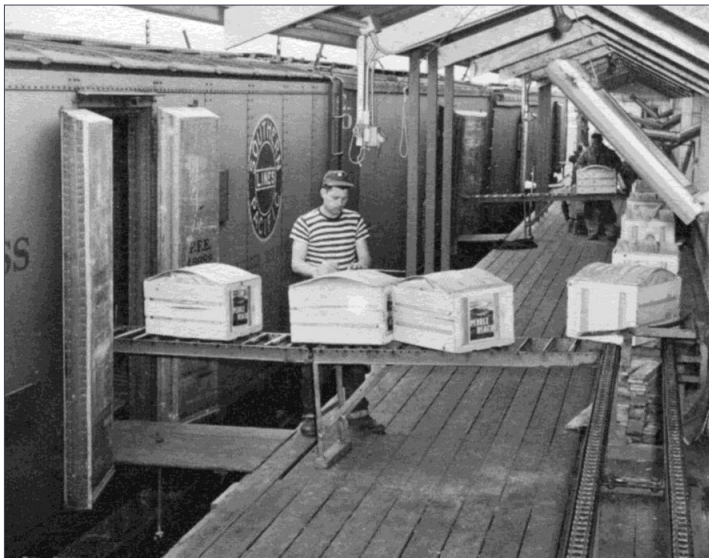
Sliding doors, which move longitudinally only, were always problematic because shifting lading could wedge against the

BOXCAR AND REEFER DOORS | 31

back of the door making it difficult to open without damaging the lading or the door itself – sometimes both. Since the initial movement of a sliding plug door is to pull away from the opening, there is less chance of damage to the lading. Sliding plug doors also are more adaptable to insulation. Despite their shortcomings, non-insulated sliding doors continued to be used on new boxcar construction. By the mid-1950s the eight-foot sliding door had become a virtual standard in new boxcars with the move to 10-foot doors following within a few years.

Most sliding plug-doors were top-hung and used elbow brackets [45] that, when rotated, forced the door into the opening flush with the inside of the car. Variations on the old Miner-type vertical rod with locking cams at top and bottom provided both security and a tight seal.

Some AAR rule modifications in the mid-1950s changed the appearance of car doors.

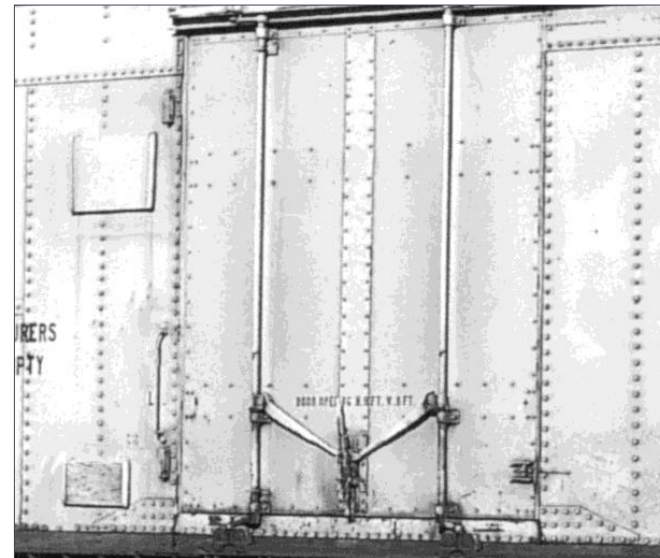


39. Note the clearance needed between the loading dock and car to safely open swing doors.

BOXCAR AND REEFER DOORS | 32



40. To limit the escape of chilled air some reefer doors were just five feet in height.



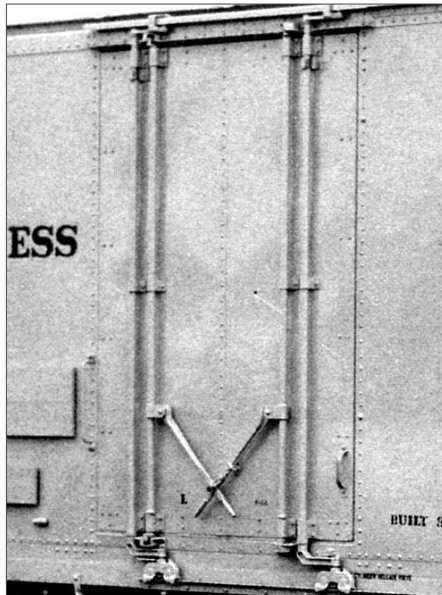
41. Youngstown sliding plug-door from 1953.

BOXCAR AND REEFER DOORS | 33

Tack boards on car ends and doors were moved from up high [13] where they could be read from a loading dock or brakeman on the ladder, to down low [19] where they were more convenient for a trainman on the ground. The move was seen as a safety measure for trainmen.

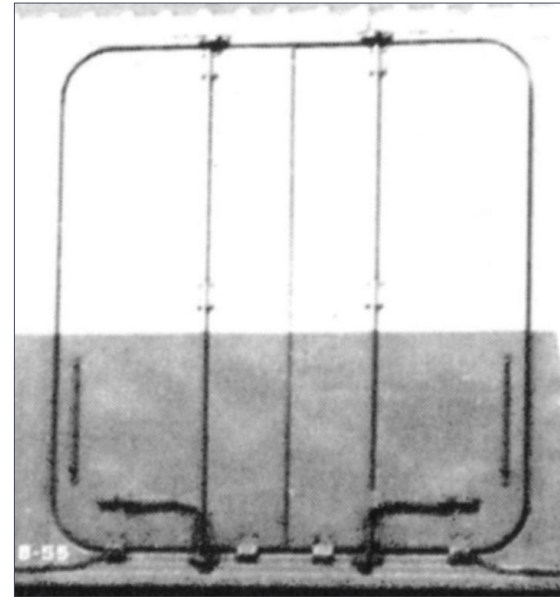
Although sliding plug doors were not new, Youngstown, the biggest name in the freight car door business, made a big splash in 1952 with an advertising campaign that touted the “The first complete, ready-to-hang sliding flush door for refrigerator and insulated box cars” [41]. The outside of Youngstown doors had a flat surface with two vertical locking rods. When in the locked position the two actuating bars near the bottom were secured in a chevron position.

Superior’s 6-foot sliding plug-door introduced in 1958 [42] is similar to a Youngstown door. It is distinguished by the paired vertical locking rods at each side of the door.



42. Superior sliding plug door has a pair of locking rods at each side of the door.

BOXCAR AND REEFER DOORS | 34



43. EMD rounded corners on 1956 Frigifrater car.

In 1955 Electro-Motive Division of General Motors (EMD) built a green and white mechanical refrigerator car called the Frigifrater [43] with two-piece sliding plug doors that had distinctive round corners. Although tested by various operators including FGE, SFRD, and PFE, the Frigifrater did not receive any production orders.

Pacific Car & Foundry of Seattle, WA, parent company of Kenworth and Peterbilt motor trucks, introduced the Landis “leverless” sliding plug-door in the mid-1960s [44]. The door used an internal chain drive to operate the locking bars. The door was applied to a large group of 50-foot insulated boxcars PC&F built for Southern Pacific, Cotton Belt, New York Central, Santa Fe, and Pacific Fruit Express (R-70-17 and -18). The Landis door did not achieve wide acceptance and was generally regarded as somewhat unreliable.

BOXCAR AND REEFER DOORS | 35

RBL boxcars (heavily insulated cars without ice bunkers) required insulated plug doors capable of sealing a car from exterior temperature changes for up to 10 days or more. Insulated plug doors made by Evans Products of Des Plaines, IL, [45] used four cam-actuated locking bars on each door to ensure a tight seal.

Equipco Division of Unarco Industries offered sliding plug doors with levers [46] as well as a leverless type [47]. A spotting feature is a third locking crank centered at the top of the door. In 1974 AAR addressed the problem of doors falling off with a ruling requiring a third upper crank arm assembly to act as a safety hanger.

In 1953 the Santa Fe Railroad launched a program to promote their reefers equipped with a new mechanical temperature control system (MTC). The campaign linked to the reefers themselves which had eye-catching blue Youngstown doors

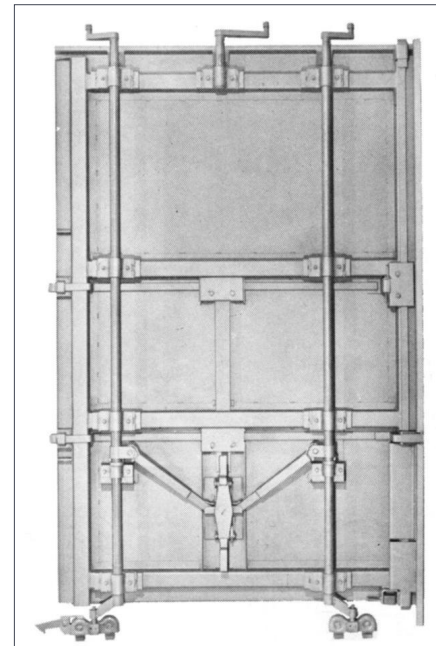


44. Landis leverless doors circa 1969.

BOXCAR AND REEFER DOORS | 36



45. Evans double sliding plug doors circa 1980s. Note the paired locking rods at the side of each door.



46. Equipco auxiliary lever sliding plug door with safety hanger at the top of the door.

BOXCAR AND REEFER DOORS | 37

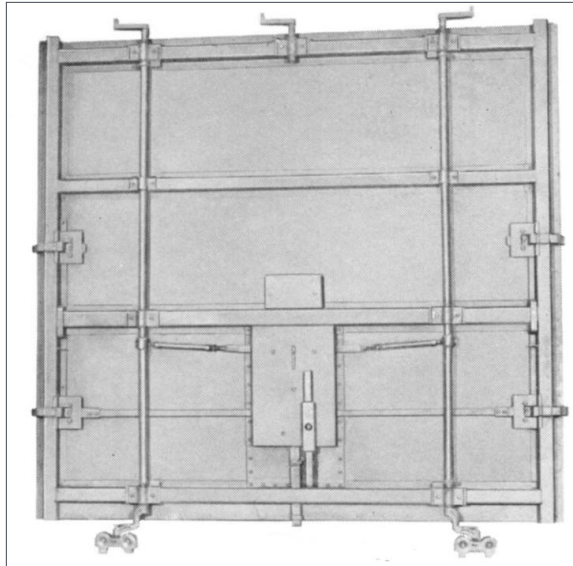
decorated with a white icicle logo [48].

Pullman-Standard offered car builders a 10-foot insulated sliding plug-door [49] as a standard off-the-shelf component in the mid-1960s. It was big and heavy and could be a challenge to open.

In the 1970s Youngstown introduced a new outside framed insulated sliding plug-door that was 10 feet and six inches wide. Promotional literature for the door said the new and improved operating mechanism was so well balanced one man could handle the huge door. It is shown in figure 50 on a PFE class R-70-23 reefer.

PFE fitted some reefers with a combination of a four-foot sliding plug-door and a two-foot hinged door [51].

Visual inspection of the lading was accomplished with a minimal loss of chilled air by using the diminutive swing door.



47. Equipco leverless sliding plug door, circa 1980.

BOXCAR AND REEFER DOORS | 38



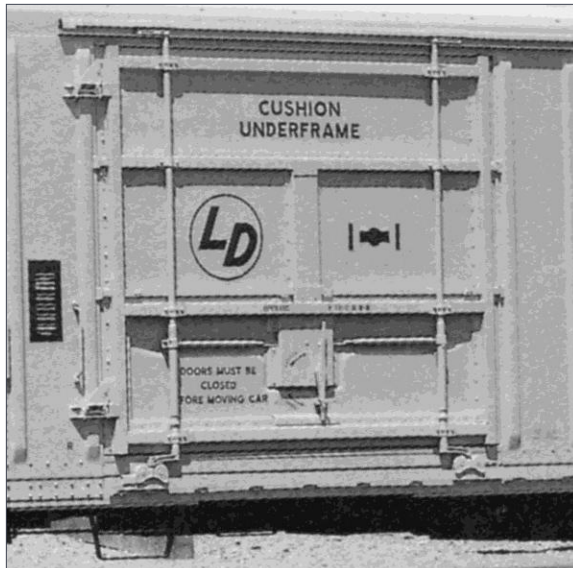
48. Youngstown 10-foot leverless sliding plug door with Santa Fe MTC logo.



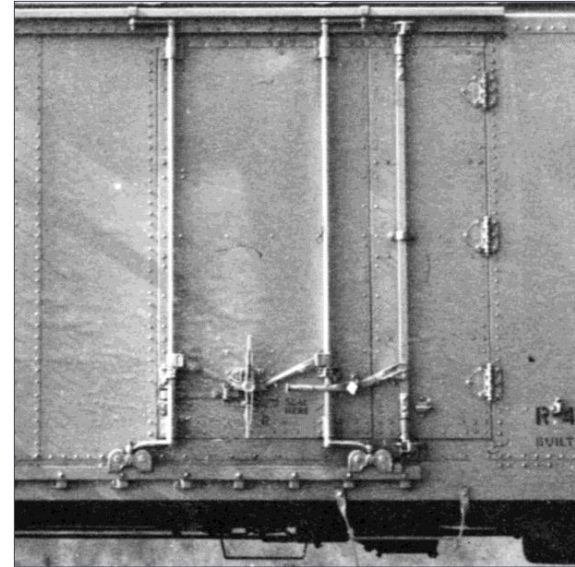
49. Pullman-Standard 10-foot insulated sliding door from the mid-1960s.

Loading lumber with a forklift required cars with a wide opening with double doors and no center post between the doors. Lumber tended to shift in transit often jamming conventional sliding doors. To overcome this problem, some lumber-carrying railroads, including the Great Northern, ordered cars with a Youngstown sliding door as well as a sliding plug door [52].

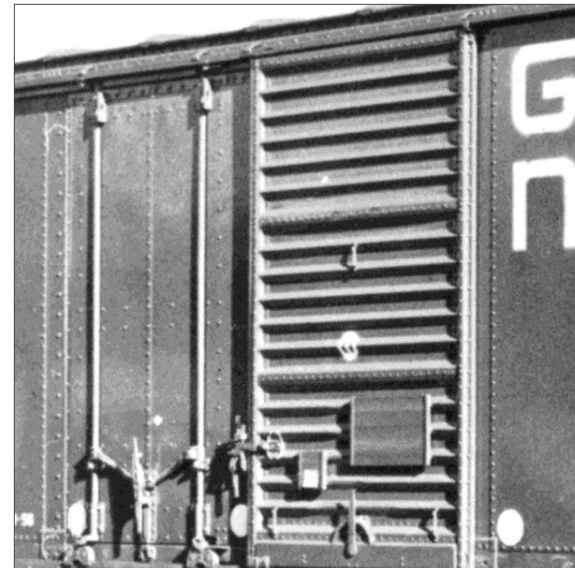
Shifting lumber could not jam a sliding plug door since the initial opening movement of such a door is to pull away from the car side. A second benefit of cars equipped with both types of doors came during the grain season. With the plug door locked in place and the sliding door open, standard grain boards could be fitted inside the opening.



50. Youngstown 10-foot 6-inch "one man" car door on PFE reefer from early 1970s.



51. Combination of a four-foot Youngstown sliding plug door and a two-foot hinged swing door on PFE R-40-27 reefer built in 1963.

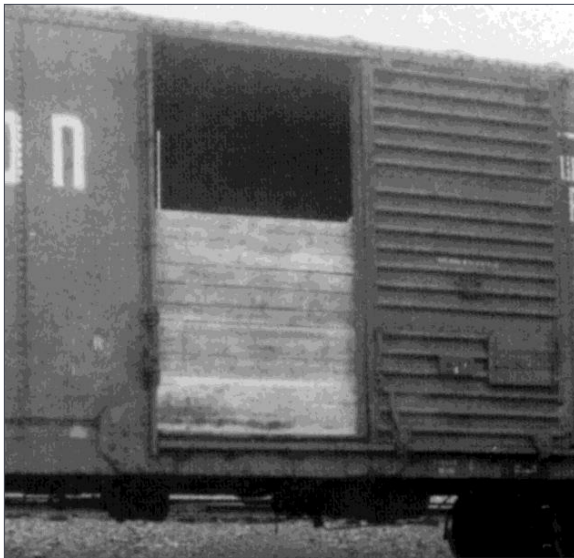


52. Combination plug door and Youngstown door.

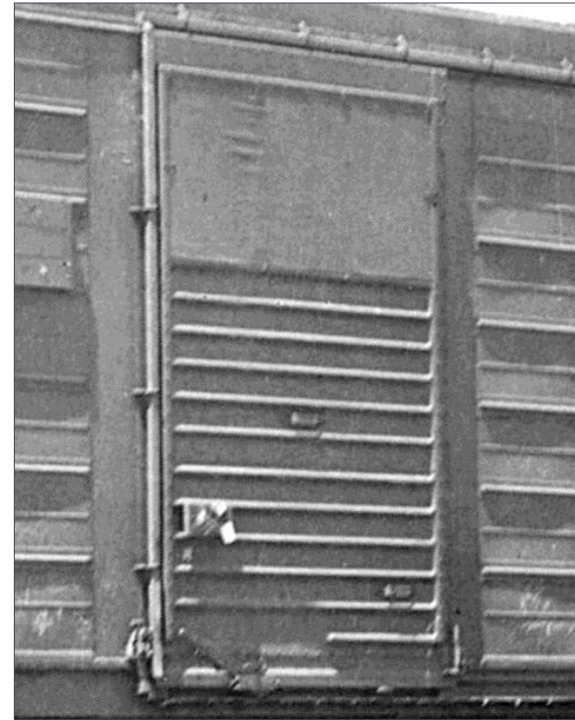
Grain doors

Prior to the popularization of covered hoppers, general purpose boxcars were used to transport grain. At peak season regular boxcars deemed clean enough to haul grain were fitted with temporary wood boards across the door opening [53]. The boards facilitated loading, unloading and inspection, as well as minimized loss of grain in transit. In the early 1960s a few Midwestern railroads modified some of their boxcars with new combination doors that could handle regular ladings as well as grain without the need for troublesome boards.

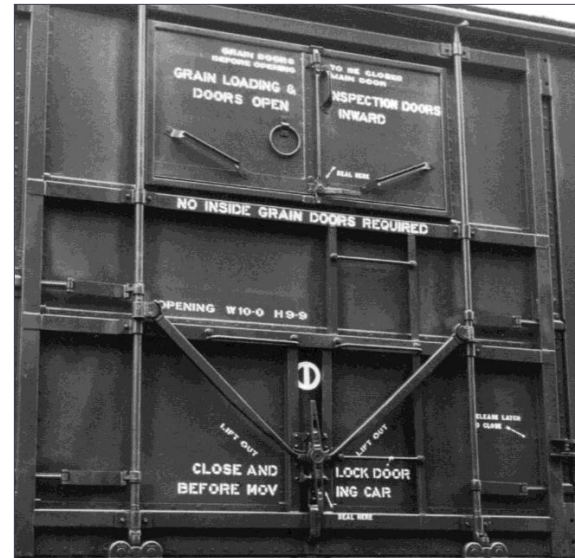
In 1964 the Minneapolis, St. Paul & Sault St. Marie Railroad (Soo Line) rebuilt some of their 50-foot exterior-post boxcars with a 10-foot sliding plug-door that had a pair of grain doors in the top panel [55]. The message stenciled on the door reads, "Grain loading and inspection doors. Doors open inward." The car could be used for regular service after the grain season.



53. Boxcar fitted with boards for hauling grain.



54. Milwaukee rib-side car has a Youngstown door with plywood grain door at the top.



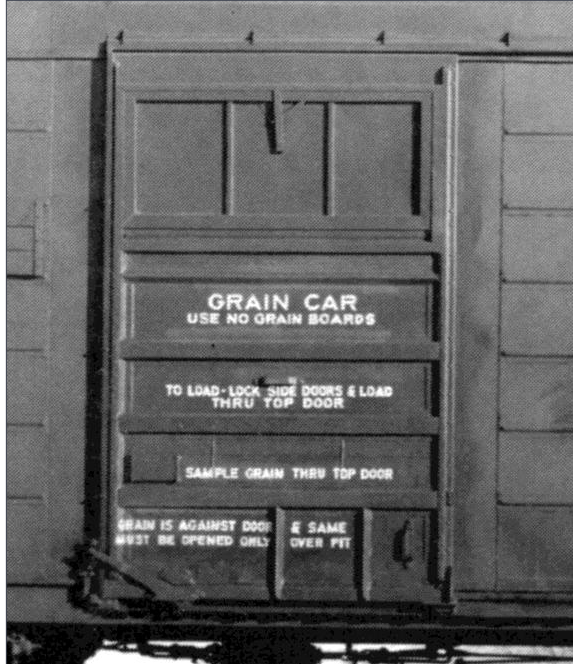
55. Soo Line 10-foot plug door with two small grain doors at the top.

Specialty doors

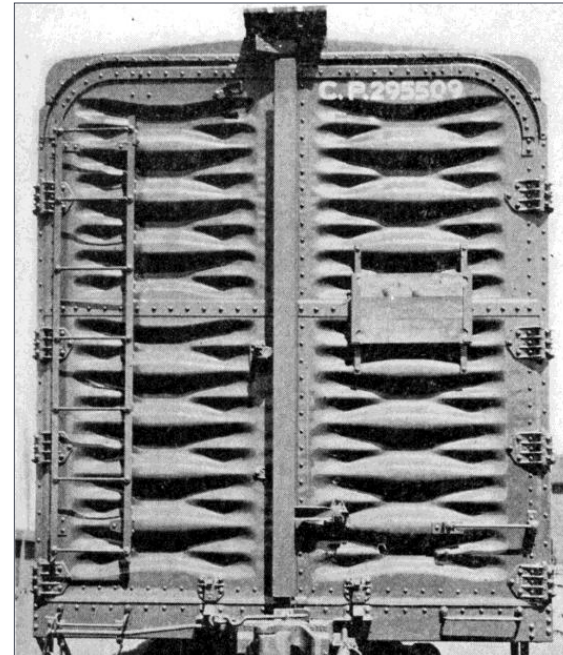
Prior to the development of auto carriers, new automobiles were transported in boxcars with double sliding doors [14, 25]. Cars designed to carry automobiles were often built with full-width hinged end doors [57] usually stamped with a Dreadnaught pattern. Both interior and exterior locking hardware was used.

The small lumber doors on the ends of boxcars [58, 59] were not for inserting or withdrawing lumber. Long pieces of lumber were loaded through the regular side door, then poked out the lumber door as far as required for the lumber to clear the jamb of the side door. The piece of lumber was then backed into the car. The procedure was reversed to unload. Most lumber doors provided an opening 18 inches square. Generally lumber longer

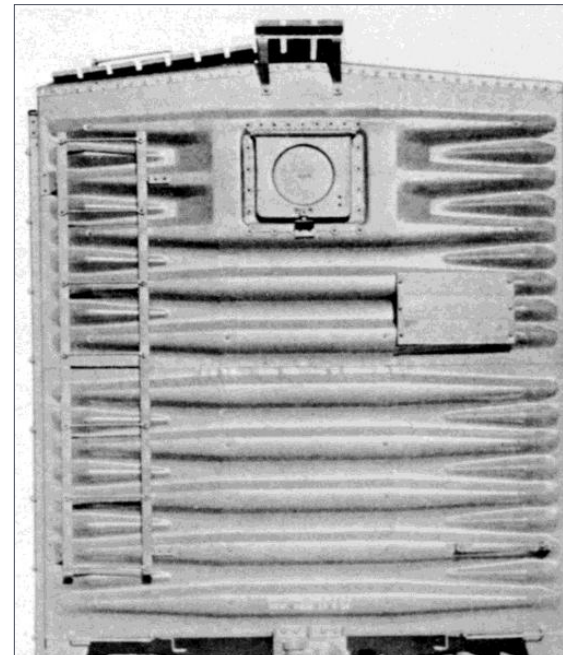
than 24 feet was not loaded into 40-foot boxcars.



56. Milwaukee Road postwar rib-side car with grain door in upper panel of door.



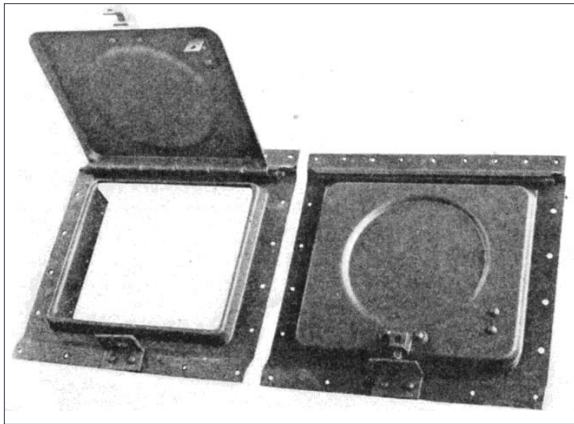
57. Full-width hinged end door.



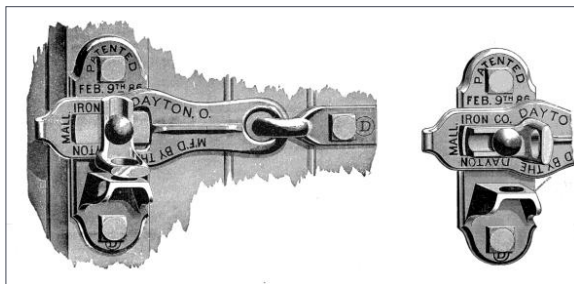
58. Boxcar end with small lumber door.

Door hardware

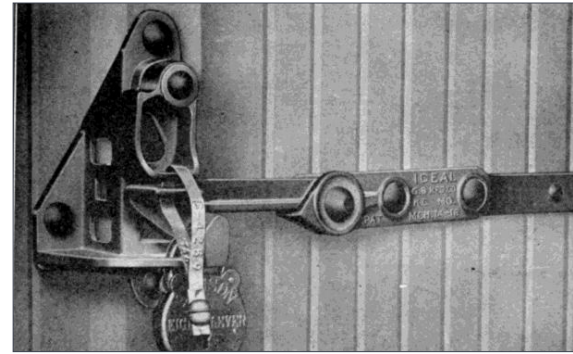
In the early development of refrigerator cars, locking doors for security as well as to prevent loss of chilled air over a prolonged period was a challenge. In 1910 Miner began selling door hardware with the familiar locking rod invented by a fellow named Calvin Patch. The inventor's basic idea of a sturdy vertically rotating rod with dogs or cams that engaged top and bottom clamps is used to this day on railroad cars as well as on containers and highway trucks. ✓



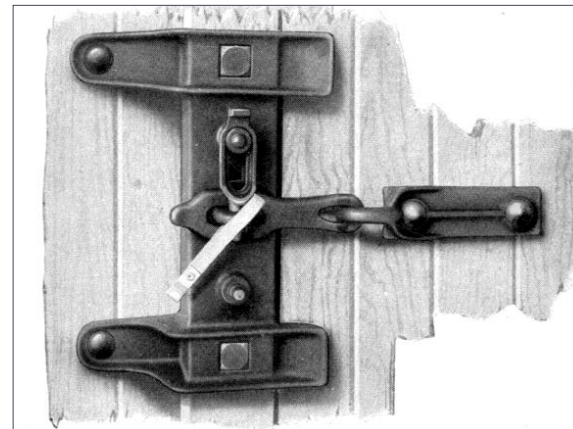
59. Bettendorf lumber door.



60. Freight car door lock made by Dayton Malleable Iron Co. circa 1900.



61. Automatic freight car door lock by Gustin-Bacon Co. circa 1910.



62. Combined door stop and lock from National Malleable Castings Co., circa 1920-1935.



[Click here for reader comments](#)