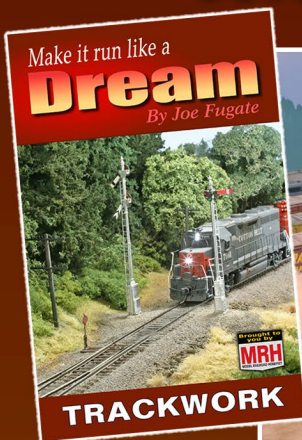


PREORDER
SPECIAL

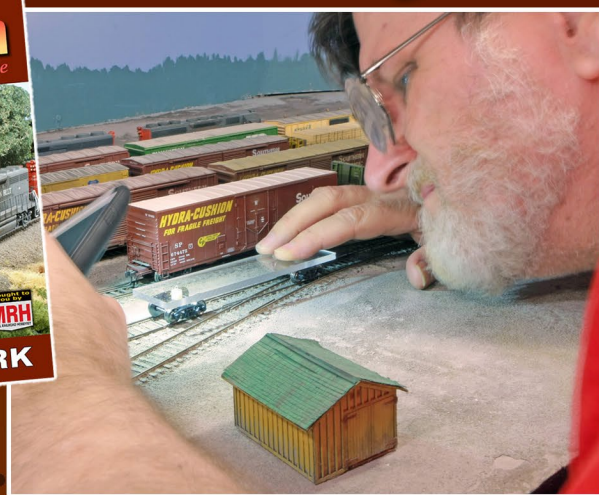
Debug trackwork *Like an expert.*



\$12.99

\$11.49

eBook

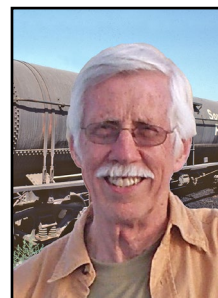
Also coming in
paperback

Click me to
LEARN MORE ...

Make it run like a **Dream** TRACKWORK: *By Joe Fugate*

Book release late September - From the MRH Store: store.mrhmag.comOther books in this series: *ROLLING STOCK* (Mar 2017) and *LOCOS* (Sep 2017)

Model Railroad Hobbyist | September 2016 | #79



TONY THOMPSON
.....

GETTING REAL column



Click here for
reader comments

ACCURATE MODELING OF INDIVIDUAL TRUCKS REQUIRES KNOWING THE PROTOTYPE

FOR LOTS OF MODELERS, TRUCKS ARE LIKE couplers. They are essential for operation, and as long as they look more or less okay and operate correctly, no further attention is necessary. But in fact trucks are a complicated and interesting topic, one that deserves a little examination. I will explore briefly both the prototype and model aspects of the subject in this column.

Understanding the design and history of prototype freight car trucks is an entire topic by itself, as Richard Hendrickson masterfully showed in his article in the May 2013 issue of *Model Railroad Hobbyist*, and complementing that article is a parallel work of Richard's, showing the HO scale equivalents of many of the prototype trucks. The latter is available on Google Drive at this link:

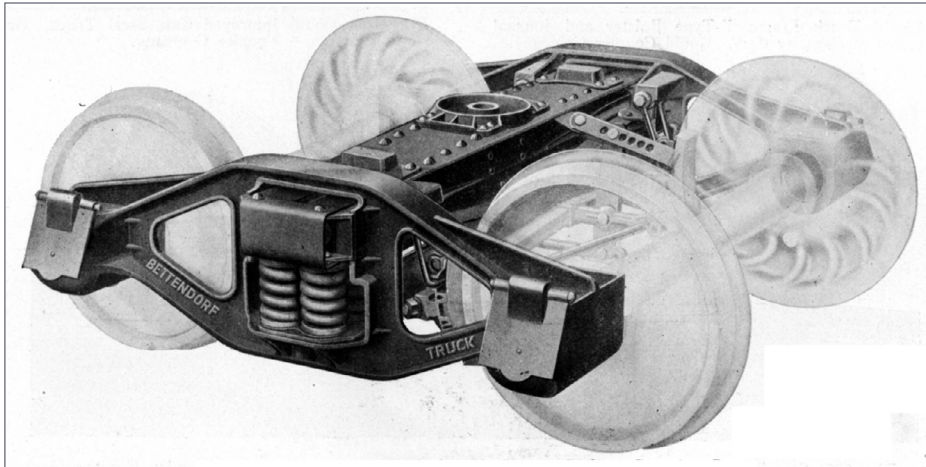
► **MODELING REAL RAILROADS AND WHAT THEY DO**

GETTING REAL | 2

docs.google.com/file/d/0Bz_ctrHrDz4wcjJWcENpaDJYbUU/edit?usp=sharing

There are other fine descriptive works out there about freight car trucks, such as Bob Karig's book chapter on the subject (Chapter 6 in *Coal Cars*; see Bibliography), and another article by Richard ("Freight Car Trucks," *Railway Prototype Cyclopedia*, Vol. 4, 2000, pp. 35–51), which are well worth consulting. All these works can help you identify the types of prototype trucks, and begin to assign correct model trucks to your model cars.

Those descriptive works are an essential beginning, but only a beginning. Even if you have absorbed the information and



1. This truck view, with the wheelsets (wheel-axle assemblies) faded out, emphasizes the truck side frames and the riveted bolster which connects them. The brake beams are also faded in this view. The bolster rests on the spring package in the side frame, with the underlying spring plank not very visible. This truck is a modernized T-section truck by Bettendorf. Bettendorf Company photo, *Car Builders' Dictionary and Cyclopedia*, 1919

GETTING REAL | 3

visual spotting features for all the trucks, you then need to find out which trucks were on the freight car you are modeling (or upgrading). And it may not be easy to reliably identify the trucks seen in a prototype photograph, especially if the photo was taken (or has been printed) so that the entire underbody area is a black hole as far as information is concerned.

Of course, it may be that stand-in trucks will be used in the absence of completely accurate model trucks, but in general terms it's a positive goal to have trucks which look as much like your particular prototype as possible.

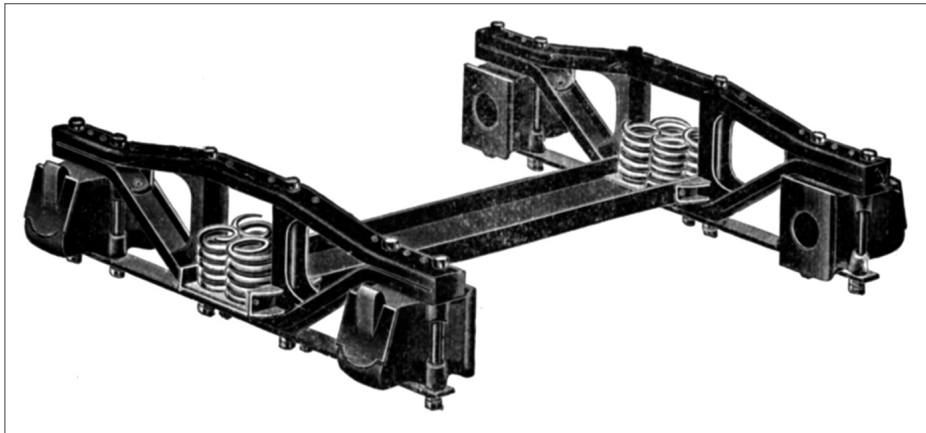
Having made those general points, I want to turn to some truck details, which may be useful as a guide to modeling an individual

ADVERTISEMENT

truck when that is desired, as well as to illuminate some aspects of how trucks are built. Since about 1920, practically all trucks have had one-piece cast-steel side frames connected by a truck bolster and, in older trucks, a spring plank. As modelers, we tend to see only the side frame, and think of the truck in terms of how its side frame looks.

Prototype trucks

Given the several fine articles about trucks cited above, I will just offer a quick description. As shown in [1], the familiar parts of a truck to modelers are the side frames and bolster. Also present for many years was a spring plank, often not evident in prototype photos and rarely modeled, but a clear view of one is shown in [2].



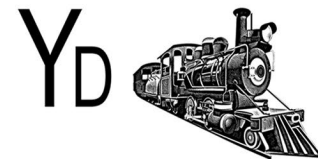
2. The important part not visible in [1] is the spring plank, shown here in a Cloud truck (a kind of arch-bar truck with pressed-steel members). The spring plank not only supported the springs but tied the side frames together and kept the truck square and the axles parallel. Originally spring planks were wooden planks, but by the end of the 19th century had become steel parts. Spring planks began to be superseded after 1937. *Car Builders' Dictionary, 1903*

What do modelers need to learn from this? First, prototype truck bolsters are a rather different shape than most model bolsters (usually that's okay because we don't see them). But if we model a truck in isolation, it may be useful to see how to reproduce the shape(s) of real bolsters. Two examples are shown here [3].

One common feature is a deep center section, as visible in the USRA (United States Railway Administration) bolster in [3]. Another commonly seen prototype bolster was the Simplex bolster, also in [3], a very strong cast-steel part, readily distinguished in photos by the bulky bolster end with its name cast on the surface [4].

Further, prototype trucks are not attached to the car, and only a two-inch kingpin runs between them. If a car body is lifted into

ADVERTISEMENT



Yankee Dabbler – Track 33

**FREE SHIPPING
ON ORDERS OVER
\$100.00**

**YD Specializes in DCC
Sales-Service-Installation
YD provides the BEST for LESS**



ESU LokSound



CLICK AND SAVE TODAY!

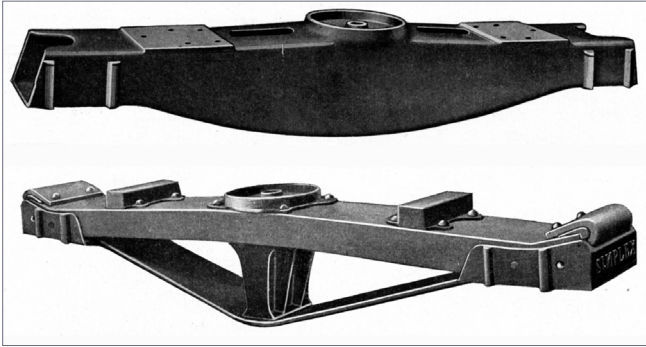


YD installs DCC or RailPro in your engines

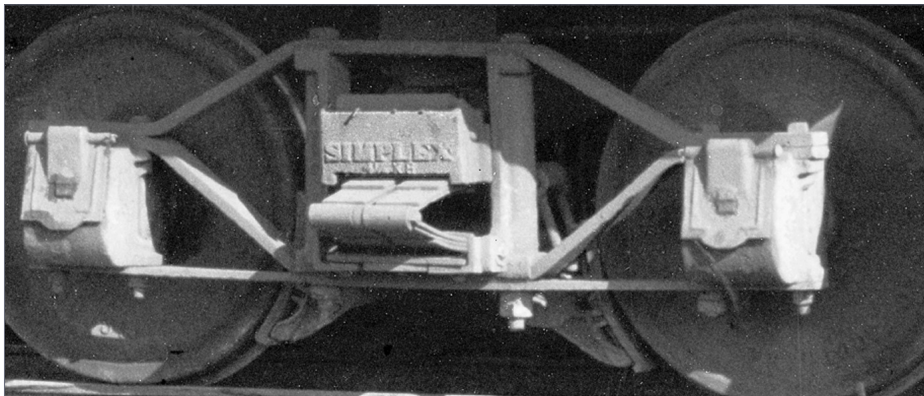
Technical Coordination (727) 457-9227 9AM to 9PM EST

Locations in NJ and FL / Visit our Web Site for Train Show Schedules

GETTING REAL | 6



3. Two typical designs of truck bolsters. The upper one is the standard cast-steel bolster used on the USRA 50-ton trucks, and the lower one is the patented Simplex bolster, widely used as a sturdy replacement part. Truck center plates of both are evident, as are supports for side bearings on either side of center. *Upper, American Railway Association; lower, American Steel Foundries*



4. The Simplex bolster had its name cast into the bolster end, making it easy to spot in trucks where it was used, often as a replacement. This one was under an SP caboose. *Detail of photo by Wilbur C. Whittaker*

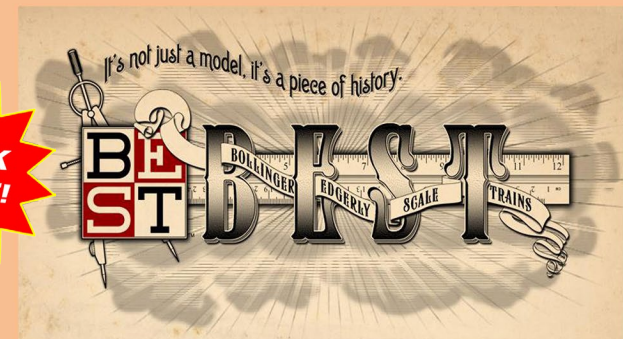
GETTING REAL | 7

the air, the trucks remain behind. A truck kingpin is clearly visible in some photos [5], though usually the kingpin remains in the body bolster. Modelers don't attach trucks this way, so there is no modeling need to think about kingpins, except when showing trucks on their own. I will return to that point. In some of these photos [3,5] the truck center plate is visible. This circular area, with a rim, mated with a corresponding circular part of the car's body bolster, keeping the truck centered. A section drawing is shown [6]. The center hole is only as large as the diameter of a kingpin. Though models do not have anything much like a center plate on either trucks or body bolsters, we might wish to represent them if those parts are separately modeled.

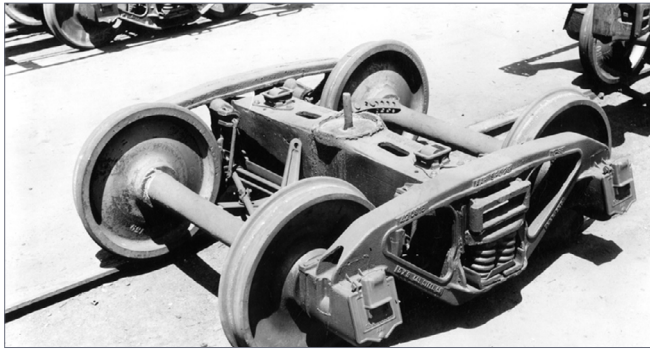
ADVERTISEMENT



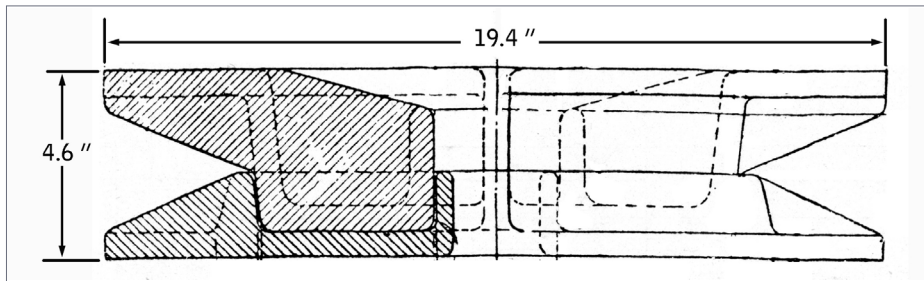
Announces their purchase of
BEST's
Laser-cut Structure Kits



To order or get more information, please email Jeff at:
motrakmodels@centurylink.net



5. This view of an assembled truck shows several features, including the barely visible spring plank, and the kingpin (a 2-inch rod) is in place in the center of the truck bolster center plate. This is a standard ARA side frame, produced by Columbia Steel and used for many of PFE's rebuilding programs. Side bearings, which restrain rocking of the car body, are in place on this truck bolster. *Pacific Fruit Express*



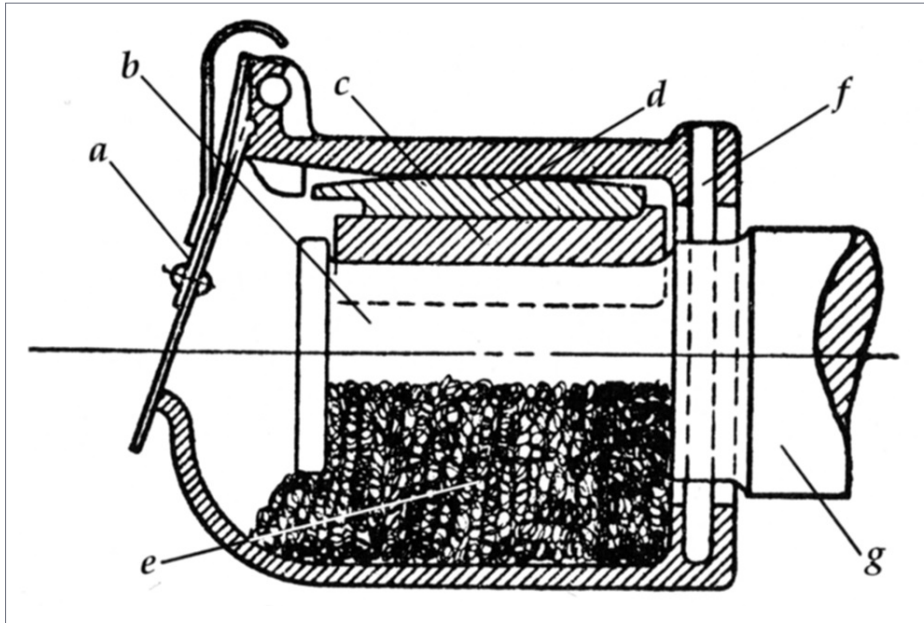
6. The standard Master Car Builders' center plate design for 50-ton cars. Overall dimensions are shown. The mating parts at the center are 1.5 inches deep. The upper part is the body bolster center plate, the lower part is the truck bolster center plate. They mate snugly for truck centering. *Car Builders' Dictionary and Cyclopedia, 1919*

A few words may be appropriate also on the journal box in these trucks. (The journal is the axle end, on which the bearings rest, and this arrangement is called a "journal bearing." That's why both solid and roller bearings are correctly termed journal bearings, because they both ride on the axle journal.) The solid bearings were contained and lubricated in these boxes. At their back, they had a (usually wood) "dust guard" to close the box; these are visible in [2]. Inside the journal box, there was some kind of material for transferring the journal oil onto the journal itself, often cotton waste. The waste, and other journal box parts, are shown in [7].

The bearing itself, shown as part (c) in [7], was usually a cast bronze part, with bearing metal such as Babbitt molded into it to form a working surface of the bearing.

ADVERTISEMENT

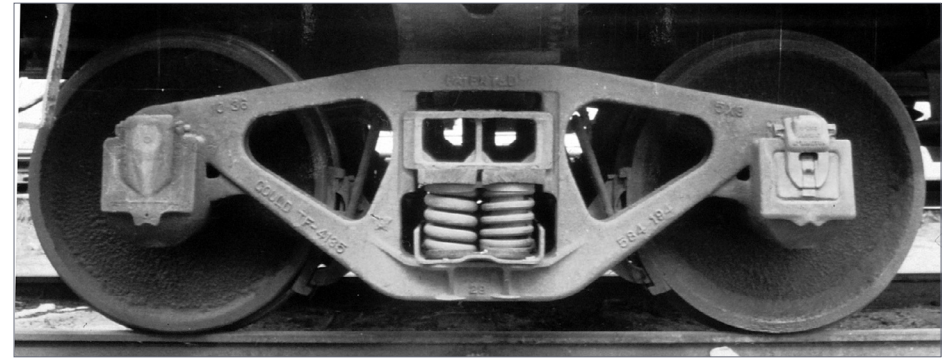
ADVERTISEMENT



7. This cross-section drawing shows the interior of a journal box with solid bearings. The parts shown are: (a) journal box lid; (b) journal, part of axle; (c) journal bearing; (d) wedge or key to retain bearing; (e) waste or packing; (f) dust guard; (g) axle. *AAR Manual*

Once the bolster and side frames were assembled, springs were placed in the center opening of the side frame, resting on the spring plank if there was one [2]. Trucks were produced with spring planks for many years, and as modelers all we usually see is the end of the plank, underneath the springs. That is the case in the photo here [8], which is an ARA truck of standard dimensions.

Spring planks had the disadvantage that on a curve, they resulted in twisting stress on the truck, as the wheels on the inner and outer rails of the curve traveled different distances. A solution was devised by the nine principal truck manufacturers, who

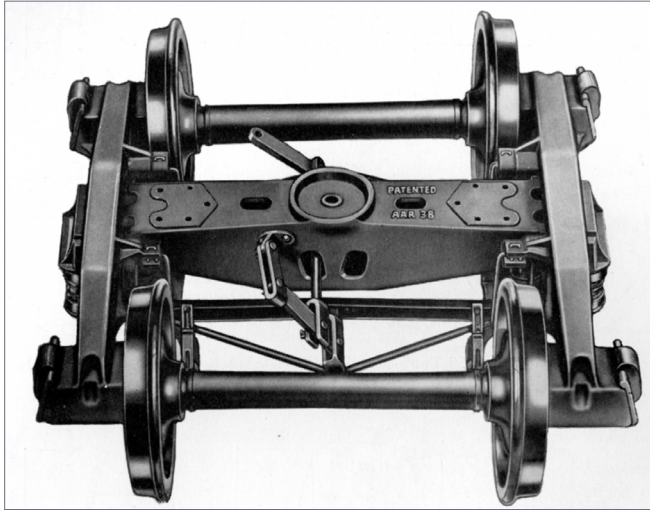


8. This ARA standard truck, manufactured by Gould, is for a 50-ton car. The spring plank, in the form of a steel channel below the springs, and the spring caps on the spring package, can be seen here. Note that the bolster is hollow, with light visible through it. *Richard Hendrickson*

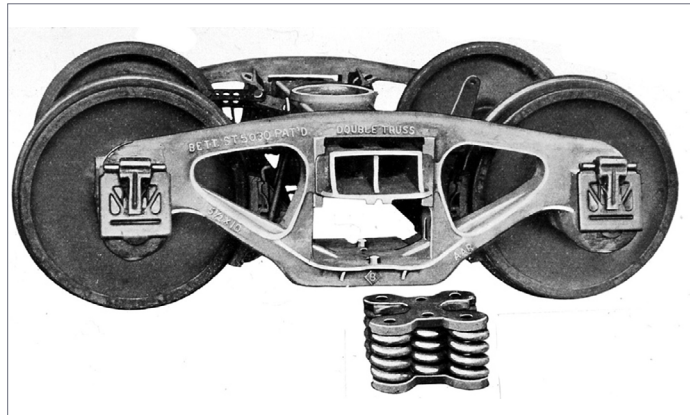
had agreed to work together under a Four Wheel Railway Truck Agreement. In 1937 they announced a new truck design, which was termed a Self-Aligning, Spring-Plankless, Double-Truss Truck.

The double-truss part of the name referred to side frame design (see Hendrickson MRH article). The elimination of the spring plank was made possible by modification of the bolster to rotate slightly around the kingpin, relative to the side frames. That was called self-alignment. It substantially reduced the twisting stresses of a truck with spring planks, along with saving about 400 pounds of weight. A truck of this type is shown in an overhead view [9].

When trucks of this type were disassembled, they were much like earlier trucks, just without the spring plank. A truck with its springs removed is shown in [10]. It's worth a brief description of these springs and their arrangement. Depending on the truck capacity and spring travel, there might be four, five, six, or more



9. This top view of a spring-plankless, self-aligning, double-truss truck shows its features clearly. Note also the width of wheel treads. *Richard Hendrickson collection*



10. This interesting photo shows a truck with its spring group or spring package removed from the side frame. The springs are enclosed by "spring cap" plates, top and bottom, which were bolted together to make a one-piece package. *Bettendorf Company*

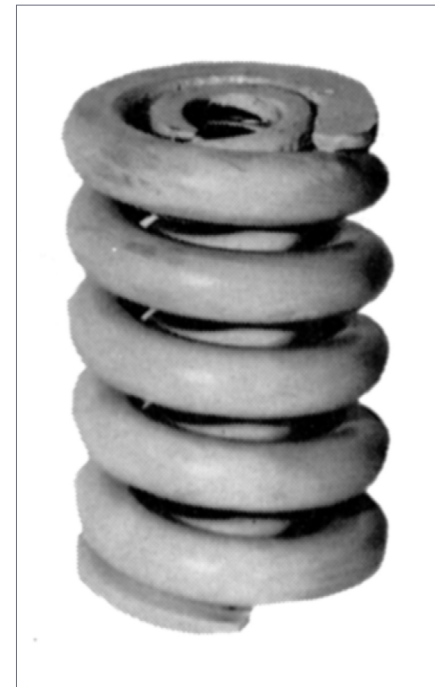
visible springs (there are five in [10]), and these were assembled with spring caps into a spring group or spring package. Though the truck in [10] is spring-plankless, the same spring group arrangement would be used in a truck with a spring plank.

Moreover, each spring might contain a second spring inside the outer spring [11], though it was not always necessary for all springs to be paired. The two springs in a pair would have different spring rates, and had higher capacity. Resources like the *Car Builders' Cyclopedia* volumes contain many examples of varying spring packages for trucks of different capacity and different spring travel.

In the foregoing, I have only written about coil or helical springs. But efforts to dampen spring motion and provide a better ride for freight cars, using several approaches to design of snubbing devices, is a

complex and interesting subject in itself. I have discussed that history in a fairly compact way in my modeling blog, and for those interested, here are links to three discussions of the topic.

modelingthesp.blogspot.com/2016/04/trucks-truck-springs-and-snubbers.html



11. Typical pair of truck springs. Note that one of the two springs is right-handed, the other left-handed. *Union Spring and Manufacturing Company*

modelingthesp.blogspot.com/2016/04/truck-springs-and-snubbers-part-2.html

modelingthesp.blogspot.com/2016/05/trucks-and-snubbers-part-3.html

The topic of spring snubbers is also ably summarized in the Hendrickson MRH article of 2013.

Wheels

The major moving parts in a truck are the wheels. Though as modelers, we tend to see them as a simple appliance, in fact they too represent a complex story in some ways. One point to recognize is simply the vast numbers of wheels and axles needed in operating the prototype. The Southern Pacific wheel shop at Sacramento cast individual wheels in the thousands, year after year [12], to feed an immense production and replacement process. For a single illustration, again from the SP, here is a storage area for wheels [13].

Wheels were cast for many years as “double-plate” wheels, in which the plate center was hollow, until the ARA Recommended Practice wheel was redesigned as a “single-plate” wheel, meaning that the material connecting the rim to the hub was a single piece. Double-plate wheels were produced by casting with an internal sand or ceramic plug, which after solidification of the wheel could be broken up and removed. The sure sign of such wheels is the removal holes (often two or three holes) on the internal surface [14].

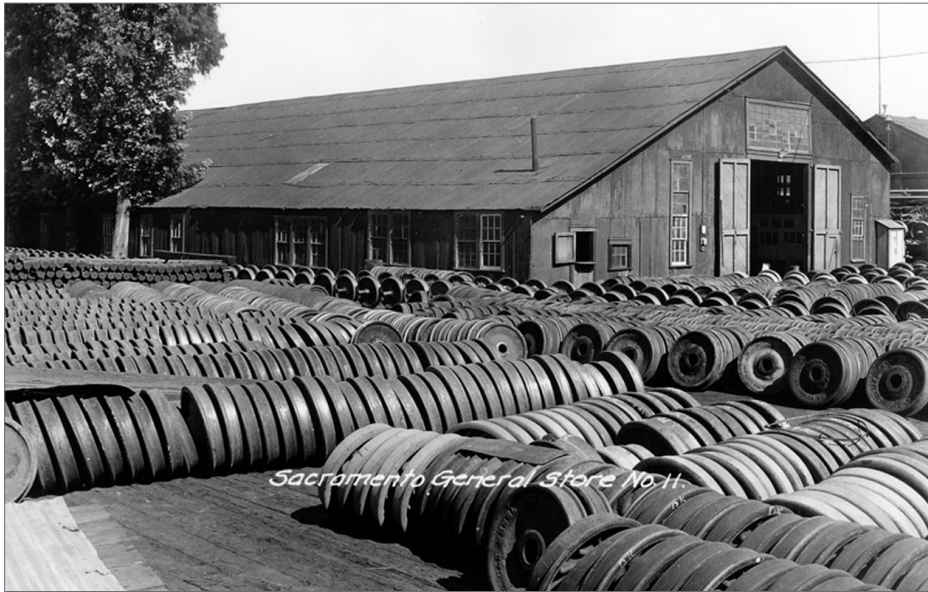
Cast wheels also might have or not have ribs or brackets cast on the inner surface. There have been a number of erroneous statements made over the years about the purpose of these ribs, but they were certainly not to provide faster casting solidification in the plate (if anything, slower solidification in this area would be beneficial), nor in dissipating heat during heavy braking in service (the plate is not the critical heating area). The reason was



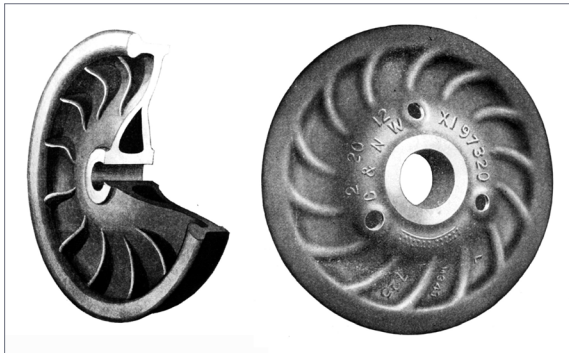
12. Workers in the wheel foundry at Southern Pacific's Sacramento General Shops pour molten iron from a ladle into wheel molds. The photo is from the 1920s. Considering the dangers of liquid metal splashes, the men have minimal protection. *Southern Pacific photo, John R. Signor collection*

mechanical strengthening of the wheel, and even that was not truly essential. Between 1928 and 1938, the recommended cast wheel had no ribs, though they were restored after 1938.

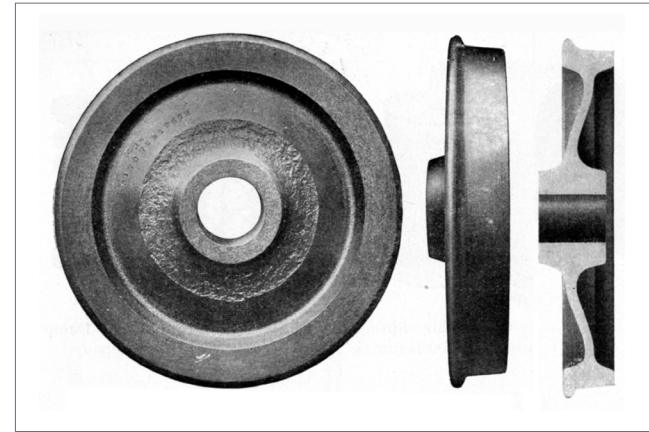
Wrought wheels can be forged or rolled (the latter are usually rolled after forging the wheel blank). An example of their appearance is shown [15]. Note that wrought wheels, whether forged or rolled, were much stronger and thus always produced without ribs.



13. The wheel storage area outside Building 11 of the General Stores at Sacramento General Shops of the Southern Pacific. Wheels here are mostly new, but some rows of worn-out wheels can also be seen. A line of wheelsets is near the building. *Southern Pacific photo X8351-04, John R. Signor collection*



14. A double-plate wheel has a hollow area near the hub, and to remove the casting insert, holes are also part of the casting, and remain present in the final wheel. The ribs were called "arms" or "brackets" in the wheel business. *Association of Chilled Car Wheel Manufacturers*



15. A wrought wheel is a single-plate design; the cross-section shows the S-shaped curvature of the plate. The S-shape optimized stress distribution.

Car Builders' Dictionary and Cyclopedia, 1919

The optimum cross-section of the plate was S-shaped, but in more recent years a simple conical plate has been used, at some sacrifice in weight.

Although it was possible to cast wheels with thicker treads, to make it possible to re-profile them to an as-new condition after they were worn (called "double wear" or even "multiple-wear" wheels), most railroads chose not to carry the substantial added weight of those thick treads on their freight cars, and by World War II, had standardized on single-wear wheels. (These were sometimes designated in car lettering as "1-W" wheels, as contrasted to 2-W or M-W wheels.)

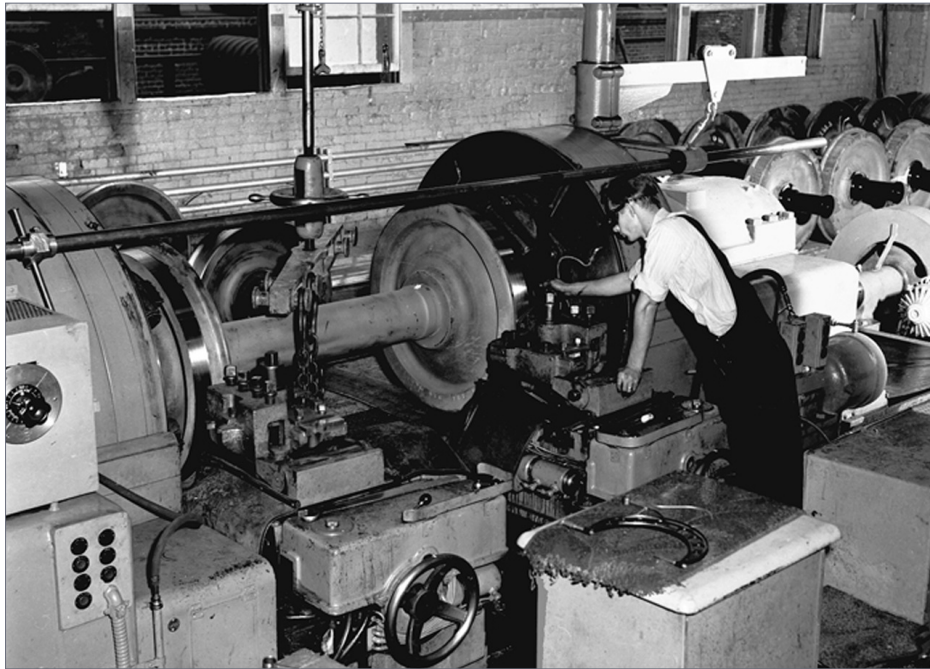
These wheels were usually assembled into wheelsets by pressing onto the axle with a large hydraulic press, and then machined, to make sure the journal dimensions were correct, and the wheel treads would also be machined to standard profile if necessary. A wheel lathe in use is shown in [16].

Wheelsets when ready for use were often shipped from central shops to outlying facilities which might need to replace worn

GETTING REAL | 18

wheelsets in trucks. Many railroads developed some kind of wheel car for this purpose. Here is an example, drawn from SP practice, and note how prominent are the projecting journals in this photo [17]. I will say more below about modeling something like this.

There are other kinds of modeling challenges for an accurate looking truck. For example, another place trucks might be seen by themselves is on the truck car in a relief or wreck outfit. These could be used



16. A wheel lathe in use at SP's Sacramento General Shops, with a line of wheelsets in the background (with coated journal surfaces). The primary task here would be turning the axle journals to correct diameter, but in this photo, the wheel tread is being machined to correct contour, probably after wear. The thick wheel rim is that of a multiple-wear wheel. *Southern Pacific photo N1924-1, John R. Signor collection*

GETTING REAL | 19

as temporary replacements under wrecked cars, or to move wreck debris. The photo on the SP at San Luis Obispo [18] is an example.

As mentioned above, wheelsets were changed out of trucks when wheel treads or flanges became worn, or if wheels were damaged by chipping or cracking. So how were wheelsets changed? The bolster would be supported with a jack or stand, the spring package removed, and the side frame lifted and swung to one



17. This Southern Pacific wheel car, modified from a Class F-50-3 flat car, has wheelsets staggered in two rows. There are about 20 wheelsets, making a total weight of about 47,000 pounds. The projecting journals are evident. The car, SPMW 2549, was converted to this service in 1943 from revenue car SP 40263. The photo was taken on September 19, 1954 at San Diego. *Chet McCoid photo, Bob's Photo collection*

GETTING REAL | 20

side. Alternatively, a small jack was used under the journal box. That raised the bearing brass up off the journal. Then the wheelset could be rolled out.

Photos of wheelset changing are not often seen, but there are a few good ones available. One example is the photo here [19], which was taken at Pacific Fruit Express's Los Angeles Shop, on the light repair track, and the foreground wheelset has been removed from the truck just behind it. The replacement wheelset is already installed, and the two men on the far side of the truck are oiling the new journal.



18. Most railroad relief outfits (what modelers often call “wreck trains”) carried a supply of old freight car trucks that could be used under any wrecked car with damaged trucks. This photo shows SPMW 7024, a 120-ton derrick, long assigned to San Luis Obispo, California, with Relief Tender SPMW 7024B, a custom-modified flat car with storage compartments for tools, cables, blocking, and the like, and trucks on top. As in this case, normal SP practice was to letter all parts of the relief outfit with suffix letters on the crane’s number. Photo taken in September 1953. *Malcolm R. Gaddis*

GETTING REAL | 21

A closer view of a truck being disassembled is in [20], with the side frames pulled away enough to permit the wheelset to be rolled away. Note the dust guards in place on the back of the side frame at the rear of the view, and of course the prominence of the axle journal.

It’s important to realize that all these are heavy parts. A typical freight car wheel in the transition era weighed about 750 pounds, making wheelsets in the vicinity of 2250 pounds. Bolsters might weigh 1000 pounds or more, as might each side frame, to which would be added the weight of spring packages and spring planks, plus brake beams. A complete truck often weighed 12,000 to 14,000



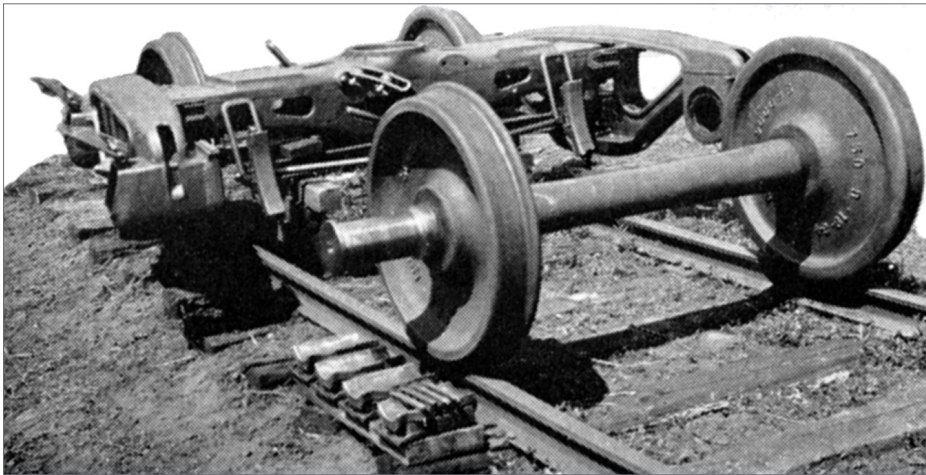
19. The light repair track at the Los Angeles Shop of Pacific Fruit Express in 1950, with a wheelset being changed out in the foreground. Nearest the camera is the replaced wheelset, rolled onto the paved working surface. The tread width, prominent journals, and nearly straight axle are evident on that wheelset. Many of the chalked notations on the cars under repair indicate needed work. Note that tools, carts, parts, etc. are relatively neatly organized. *Richard Steinheimer*

pounds or more. Wheelsets or complete trucks could readily be rolled around by hand, as photos document, but obviously not picked up without a crane.

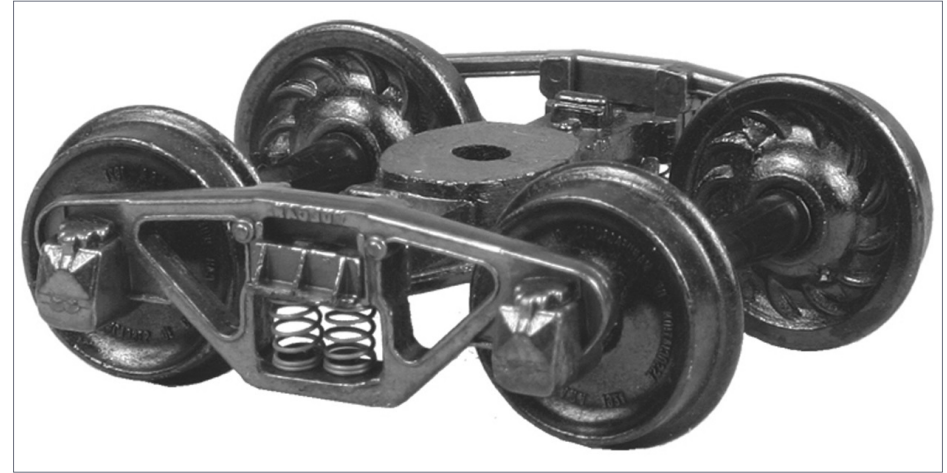
Modeling

All these specifics on truck details can come into play if we wish to model a truck being worked on, or standing by itself. Many aspects of model trucks do not look much like the prototype, which is not a problem when the truck is under a freight car, but obviously the situation is different if for some reason, we get a good look at the model truck. I describe below some approaches to modeling in that situation.

Most trucks under freight or passenger car models need not be as detailed or accurate as the prototype, as long as they are hidden



20. This photo of a truck being disassembled clearly shows the two side frames tilted away from the truck, and the foreground wheelset rolled away from the truck. Reassembly of the truck would proceed in the opposite order. This particular truck still has its brake beams in place. *National Malleable and Steel Castings Company*



21. An example of a “sprung” model truck. The springs are obviously entirely unlike prototype truck springs (compare the spring group in [10] or the double spring in [11] to see the difference). These unrealistic springs may not be noticeable under a freight car, but stand out when a model truck is seen in isolation. This happens to be one of the old Kadee Vulcan trucks. This is not a criticism of Kadee, which is gradually introducing solid-side frame versions of all their trucks.

under the car body. But a truck being serviced, for example, is another matter, and it is worth seeking out prototype details for accurate appearance.

I can begin with the truck as a whole. Many model trucks look fine from the side, which is how we see them under a car. But when a “sprung” truck is examined [21], it is evident that the springs are quite unrealistic. One certainly could not see through a prototype spring pair, such as that shown in [10,11]. Moreover, testing has shown that such model springs do not actually provide spring action, at least in HO scale, for car weights below about half a pound.

GETTING REAL | 24

Trucks like those shown in [21] can be made to look better by a simple “view block” behind the springs, as shown here [22].

Second, model truck bolsters, though hidden under our cars, are not much like prototype bolsters, either in shape or in their immense (relative to the prototype) center holes for screw attachment. Again, as long as this is invisible to a viewer, it doesn't matter, but for a truck in isolation, it is glaringly evident.

One simple change to a model truck bolster is to file the sides flat, so that the center hole is no longer wider than the bolster. Even this change makes the bolster look less toy-like [23]. But even with this change, few prototype truck bolsters are straight beam shapes like model bolsters. I have added styrene shapes, approximating the USRA bolster shown in [3], to provide a generally realistic



22. An example of placing a thin styrene “view block” behind the spring area of a truck with “real springs.” This Dalman one-level brass truck was exactly correct for this Erie gondola, so Richard Hendrickson modified the truck as you see, to minimize the undesirable “see-through” of the springs.

GETTING REAL | 25



23. Model truck bolsters usually have immense center holes for our model truck screws. The one shown at left has been filed flat so that a dummy side panel can be added. At right are a pair, showing both sides of the bolster.

look. Exact shape probably is not vital here, given that prototype bolsters from different manufacturers varied widely. One example is shown in [24]. Of course to complete such a model bolster, one would need to add a center plate with a small center hole (see for example [8]), which has not yet been done in [24].

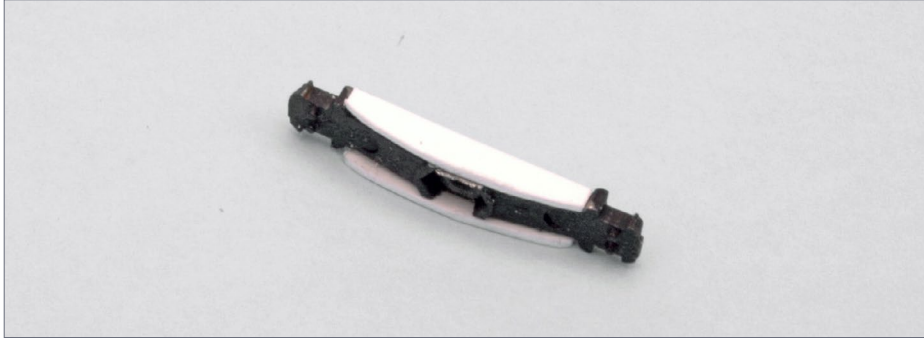
The best part of most model trucks is the side frame, and rightly so, since it's the part we mostly see with a freight or passenger car. For modeling of individual trucks and truck parts, the side frames are most easily provided from disassembled “sprung” trucks, as the side frame openings are generally well rendered [25]. These can definitely be used as scenery items around a truck maintenance facility.

Moving beyond bolsters and side frames, the next topic is wheels. There are certainly times when we need to aim at a prototypically correct, narrow wheel tread. That is when we model wheelsets in isolation, as were often found around shops and roundhouses. If separate wheelsets are to be visible, certainly the first requirement would be to avoid the usual model wheelsets with pointed axles

GETTING REAL | 26

[26]. These of course have absolutely no prototype correspondence, as can be seen in many of the photos above [19,20].

The long-standing width of HO scale wheels has been 0.110 inches, which has been termed Code 110. More recently, a “semi-scale” wheel which is only 0.088 inches wide has been introduced, under



24. Styrene strip on each side of the bolster shown filed-down in [23] looks like this. The exact shape is not vital here. I have also made these panels from paper, which works fine and is thinner than what you see here.



25. An example of a side frame from an old metal “sprung” truck, with a realistic side frame opening, once bolster and springs are removed. These are good items for scenery, though stored side frames often had journal box covers removed.

GETTING REAL | 27

the name Code 88. There has been some anxiety among modelers about whether the Code 88 wheel can operate properly in track-work built to NMRA standards. Involved mathematical arguments have been put forward to “prove” that these wheels will drop into switch frogs.



26. Model wheelsets typically have pointed ends, for perfectly good operational reasons. But they do not make realistic wheelsets in isolation. The fat axle, large flanges, and Code 110 wheels here make the appearance even less realistic.



[Click here for
reader comments](#)

Many layout owners with extensive experience with Code 88 wheels know well that such problems do not occur, for reasons we don't need to go into here, but likely arise from rigid truck frames. Nevertheless, it is possible that Code 88 is the limit of operable wheel width in HO scale, without going to more nearly prototypical dimensions for trackwork.

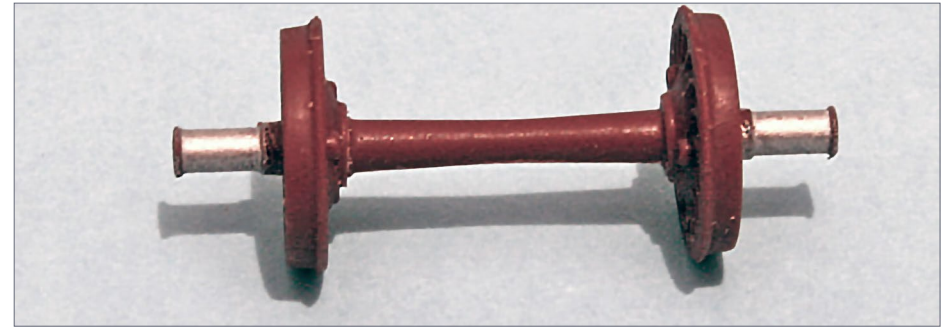
But even "semi-scale" Code 88 wheels really do not look much like the prototype wheels shown here; compare [5,9,19,20]. Yes, Code 88 is a big advance in appearance over the enormous (relative to the prototype) Code 110 wheel treads, and greatly improves the look of freight cars, but even Code 88 will not do for wheelsets in isolation.

The answer is realistically sized wheels in the wheelsets. These can be made in several ways, but the simplest is to use an excellent set of wheels and axles from Tichy, their set 3004. The same wheels and axles are supplied in the Tichy kit for a wheel car. The Tichy parts assemble into very good-looking wheelsets [27].

Modelers often respond to what is shown in [27] with a feeling that the wheels are way too thin. In fact, they are almost exactly correct prototype width, which in HO scale would be 0.065 inches. You can consult some of the prototype photos in this article [9,19,20] to get a clear idea of the comparison being made.

A quick word about color. Unused wheels and axles that have been sitting around awhile are a uniform dark rust color, reddish if not outdoors too long, more of a brown color with more age. New wheels have treads and flanges which were cast or wrought to correct contour, so a new wheel often would not have its tread contour turned, and thus would be the same color as the rest of the wheel. That is what is shown in [27]. I usually darken the assembled Tichy color with Burnt Umber acrylic tube paint.

By contrast, a wheelset that has been in service would be different. The wheel face was usually amazingly thickly coated in oily dirt.



27. This is a Tichy wheelset, assembled from the wheels and axles in Tichy set 3004. The contrast to [26] is considerable. Journal surfaces have been painted silver. The rest of the wheelset is all one color, indicating a new wheel and axle.

Journal oil would leak and spatter, then collect dust and dirt, then accumulate more oil, and so on. This was a dark gray to almost black color. (I use Grimy Black or the Tamiya XF-63 "German Grey.") There was much less of this oily crud on the back of the wheel, so the wheel and axle would take on more of a "road dirt" color from dust and mud along many miles of right-of-way [22]. But wheel treads would be clean and shiny, just like the top of often-used rail.

Finally, removed wheels were often stacked outdoors for some time until scrapped, and in that situation the shiny wear surface of the tread would gradually rust. Final tread color would depend on length of storage. I show some of these colors below.

While on the subject of wheels, I like to make the point that wheels make good gondola loads. Ideally, one would use scale-width wheels like the Tichy wheels, but when stacked, the tread width is not as obvious as it is in a wheelset. I have made a couple of loads consisting of rows of wheels, painted rusty-colored and arranged as though they had been simply laid into the car. Here is a photo

of one such load [28]. It doesn't weigh much, as all the wheels are plastic, and that works for me, because nearly all my open-top cars are weighted so they can run either empty or loaded. I am one of those who makes lightweight loads, not heavy ones.

Just for comparison, here is a 40-foot gondola with one of the wheel loads in it, being switched at the town of Shumala on my layout [29]. There are more than 50 wheels here, most reclaimed from old model trucks with steel axles. The prototype weight of this many wheels would be over 40,000 pounds. Wheels like this could be scrap wheels, being returned to Sacramento to be remelted, or they may be new wheels, being delivered to the local shop to be mounted on axles. This particular load looks like new wheels, rusty but not covered with oily dirt as used wheels would be [29].

As a further comment, I didn't want to have to "polish" the wheel treads, as wheels recently removed from service would exhibit, because the treads are too wide — why call attention to them? (That is one drawback to the polished treads as shown in [22].) So in this case [29], the entirely rusty wheels look right.

But my real goal as part of this modeling was to be able to show clearly, on the layout, a truck being worked on. To model effectively an entire truck being serviced, there is a need to correct the model bolsters, which as I've said can be altered to look more prototypical, primarily in removing the model's huge center hole and adding a center plate.

Separate side frames can be included as part of a model truck scene if sprung trucks are disassembled and the side frames separated (without springs). Brake beams were often removed at the beginning of truck disassembly, so they can be shown as a stack at one side. A number of truck makers, particularly Tahoe Model Works, offer brake beams. (Note their presence in the PFE Los Angeles photo [19]).



28. A load of wheels, made from plastic wheels of old trucks, from which steel axles were discarded. The ones with ribbed backs are Train Miniature wheels. All are glued together into a single piece with contact cement, then painted rusty and various brown tones. The load is sized to fit a 40-foot gondola. Though these are Code 110 wheels, it's less obvious in a mass like this.



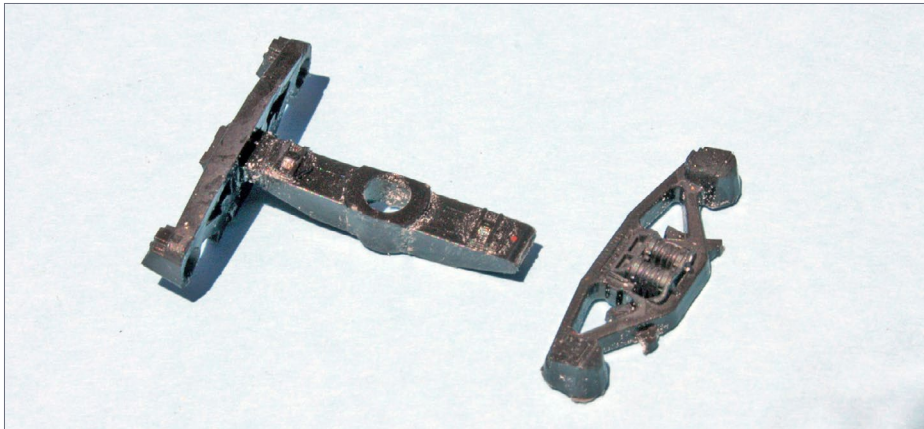
29. The wheel load shown in [28] is here put into a 40-foot gondola, and is being switched at the town of Shumala on my layout. The car models one of the 1944-built T&NO "Emergency" gondolas from World War II, Class G-50-17, and was built from a Funaro & Camerlengo kit.

GETTING REAL | 32

My own work to make a truck having wheelsets changed began with a “sacrifice” truck. I had a one-piece plastic truck with a frame that was somewhat twisted, so that on a flat surface, all four wheels did not touch. It had already been replaced under a freight car, because trucks like that derail easily. I simply cut off the side frame from one side [30].

The reason for cutting off one side frame is because when wheelsets were changed, the side frames were spread apart so the wheelset, with its long journal, could be moved out of the truck. The cut model side frame is now readily placed at the appropriate angle. The spread side frames are evident in [20], showing a freshly disassembled truck, and are also nicely shown in a pair of photos from the early 1930s [31, 32].

These photos also show clearly a jack under the car body bolster, which had been used to raise the weight of the car off the truck



30. A “sacrifice” plastic truck being prepared for detailing. One side frame cut off, bolster filed down to eliminate the wide center hole like those in [23]. New bolster sides and a center plate will be added.

GETTING REAL | 33

(paired, of course, with another jack on the opposite side). Then a car stand was inserted under the side sill to help support the car.

The next step for my model truck was to correct the bolster appearance, essentially in the way shown in [23, 24]. I added a center plate, simply with a disk of styrene sheet, which also serves to cover the large model center hole. I used a paper punch to make thin styrene discs of about 1/8-inch diameter, to serve as bolster



31. This photo at the Nampa Shop of Pacific Fruit Express shows a workman preparing to dismantle a truck (a T-section Bettendorf) that has been rolled out from under PFE 14966. You can see the kingpin hanging from the body bolster, vertically below the 4 and 9 in the car number. The car was jacked up at the body bolster to take weight off the truck, then a stand placed under the side sill. The reweigh date on the car is April 1929; the chalked shop date is May 12, 1930. *Pacific Fruit Express photo, Milton G. Sorenson collection*



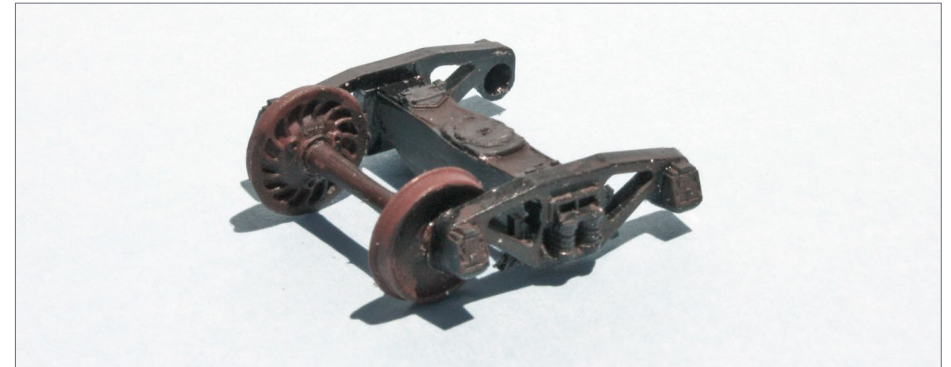
32. Same scene as previous page, at Nampa Shop, with the truck now disassembled and the wheelset ready to remove. *Pacific Fruit Express photo, Milton G. Sorenson collection*

center plates. (Many hole punches make 1/4-inch holes, but some make other sizes.) I also added a small center hole (2 scale inches).

With that done, a couple of Tichy wheelsets were prepared to be shown as the new wheelsets being placed in this truck. One wheelset, depicted as the one already installed in the truck, had to have the journals shortened to fit the limitations of the side frames of the model truck.

The truck being worked on is then shown much like the prototype photo [20], with side frames spread and down. The photo of the model is deliberately posed with no scenery around it, so the arrangement can be seen clearly [33].

The destination for this truck model on my layout is the wheel track near my roundhouse. A concrete pad is located alongside



33. The truck being worked on, showing bolster correction with deeper sides, center plate, and kingpin hole. The wheelset is a Tichy.

this track, providing a place for needed tools and to give workmen room to maneuver. I have added a pair of wheelsets on the pad, colored to look like the used wheelsets which were removed from the truck. Accordingly, those wheel treads are painted silver [34].

Any working area where this kind of work was done offers many detailing opportunities. Additional wheelsets, and additional bolsters and axles, are definitely possibilities, as are the brake beams already mentioned. Tools such as car jacks should be present (I used Evergreen Hill set 608), probably also brooms, shovels, and other implements [34].

One illustration of stored wheelsets I've always liked is another of Dick Steinheimer's photos at PFE's Los Angeles Shop. The stored wheelsets here all have a protective coating on the journals, and it would be fun to model all the tools which are leaned up against the wheels [35].

One could go farther with this, for example including a cart with a couple of spring packages, tools, or other cargo on it. Other kinds of work carts could be part of the scene. More men working in



34. The scene with a wheelset replacement in progress. The two replaced wheelsets have silver wheel treads and oily black wheel faces. At left are some stored bolsters and side frames. Ties have been used to make “crossings,” where workmen can roll wheelsets on and off the rails. Note the shovel and broom resting against the new wheelsets at left, and brake beams at right.

appropriate poses can be added. As shown in [19], areas around truck work areas were usually paved to facilitate rolling wheelsets away from the track. But the 2000-pound weight of a wheelset means that these were preferentially rolled on rails unless absolutely necessary to do otherwise. The modeled area must take this into account. A small crane could also be included. All these ideas could help create a realistic and interesting model scene, all based on showing maintenance work on trucks.

Concluding remarks

I recognize that at least some, and maybe most, of the descriptions of model truck details in this article are beyond what anyone



35. Many prototype photos show axle journals prominently, such as the photo, taken at PFE’s Los Angeles Shop in December 1950, showing two rows of wheelsets with the axle journals quite visible. These have been machined and coated to protect them. Note also that the wheelsets are on paired rails (see another pair at right), so that all will roll even in this double-stacked arrangement. The wooden wedges would be useful to restrain rolling. In the background, posed in front of the Shop office, is PFE 93612, a member of PFE’s largest car class, R-30-9. *Richard Steinheimer*

would want to model on a freight or passenger car. Trucks are underneath cars and ordinarily, little other than side frames can usually be seen.

But any time the modeler has reason to portray a truck by itself, whether in a wreck train, around shops or roundhouses, or on a repair track, the various model compromises and shortcuts become blindingly obvious. The most glaring problem is representation of axle journals and width of wheel treads, but realistic truck bolsters and side frames can also be a challenge. I have tried to show ways to improve these aspects for those wanting to model more realistic trucks and truck parts in such situations. ☑

**Do ALL your model
railroading friends know
about MRH?**

**WE CONTINUE TO BE SURPRISED BY HOW MANY
MODELERS STILL HAVE NEVER HEARD OF US -
SO SPREAD THE GOOD WORD ABOUT MRH!**

BIBLIOGRAPHY

Car Builders' Cyclopedia, various issues, 1903 to 1961.

Hendrickson, Richard H., "Freight Car Trucks," *Railway Prototype Cyclopedia*, Vol. 4, 2000, pp. 35–51.

Hendrickson, Richard H., "Freight Car Trucks, 1900–1960," *Model Railroad Hobbyist*, May 2013.

Hendrickson, Richard H., "HO Scale Freight Car Trucks," April 2014, digital file available at:

docs.google.com/file/d/0Bz_ctrHrDz4wcjJWcENpaDJYbUU/edit?usp=sharing

Karig, Martin Robert, *Coal Cars*, (Chapter 6: Trucks), University of Scranton Press, Scranton, PA, 2007.

Thompson, Anthony W., "Reweight Dates on Freight Cars," *Railroad Model Craftsman*, April 2011, pp. 72–73.

Thompson, Anthony, blog on Google, particularly these posts:

modelingthesp.blogspot.com/2016/04/trucks-truck-springs-and-snubbers.html

modelingthesp.blogspot.com/2016/04/truck-springs-and-snubbers-part-2.html

modelingthesp.blogspot.com/2016/05/trucks-and-snubbers-part-3.html



**Click here for
reader comments**

MODELS OR PARTS MENTIONED

Funaro & Camerlengo

HO scale T&NO "Emergency" gondola, kit 6263
Post-war version, T&NO gondola, kit 6264

Evergreen Hill

set 308, car jacks

Tichy

Wheels and Axles, set 3004
Wheel Car, kit no. 4023

iwata

by ANEST IWATA

Be Realistic

From weathering broad areas
to painting concentrated details,
an Iwata airbrush gives you
precision and reliable performance
for a natural, smooth finish.



Iwata Eclipse CS



NEO for Iwata TRN1



iwata
MEDEA
ANEST IWATA-MEDEA Inc



Locomotive from Alan Houtz, North American Prototype Modelers

Click to see the entire line of Iwata Airbrush and Artool Products

The **SCOTTY MASON** SHOW
S H O W
The Original Model Railroad Podcast

Get the Latest Model Railroading News, Tips, Reviews & Opinions

-Monthly Interviews

- Modeler's Spotlight: Top Modeler's Talk
- Narrow Gauge Modeling w/Chris Lane
- Contemporary Modeling w/ Mike Rose

-More Product Announcements & Reviews

Our feed has changed! To get the latest shows, Please search Scotty Mason and subscribe to the new feed!

www.TheModelRailroadPodcast.com

Scott Mason Jimmy Simmons Mike Rose Joe Duckworth

Freight Car Trucks 1900-1960

– Richard H. Hendrickson
Model Photos by the author

From Arch Bars to Roller Bearings ...



Many years ago, those who modeled in HO scale had few choices when it came to freight car trucks, and it was all most modelers (or model manufacturers) could do to recognize the differences between arch bar, Andrews, "Bettendorf," and roller bearing trucks. The situation today is much different. Prototype research has revealed a wide variety of different truck designs, and model manufacturers have produced HO scale representations of many of them. We're now able to put the correct trucks under almost any HO scale freight car – if we know what the correct trucks are and who makes them in HO scale. Many modelers, however, still know little

about either prototype or model trucks, so they just find the subject confusing. What follows is an attempt to impart more information and reduce the confusion.

To keep things from getting totally out of hand, I've given only a sketchy account of truck development before 1900, since very few modelers focus on railroading in the 19th century. I've also stopped short of discussing roller bearing trucks, apart from some very early experiments, because they are of no interest to steam and transition era modelers like me and also because I know relatively little about them; that's a subject for someone else (any volunteers?).

Some truck basics

Almost all of the trucks described below had solid brass or bronze journal bearings, also known as plain bearings. Note that plain bearings should not be called "friction" bearings, a term coined by roller bearing manufacturers to imply (falsely) that roller bearings had no friction. Though not used in the prototype railway engineering literature, the term has, unfortunately, been picked up and employed by some modelers and model manufacturers. More on this later.

Unlike roller bearings, which are lubricated and sealed, plain bearings were open at the bottom and were crudely lubricated by oil wicked up onto the bottom of the axle journal by cotton waste packing. This packing required periodic replacement, and oil had to be added to the cellars at the bottom of the journal boxes frequently – typically every time a car stopped at a major freight yard or junction point.

Without getting overly technical, a word about truck capacities. The vast majority of freight cars built in the first half of the

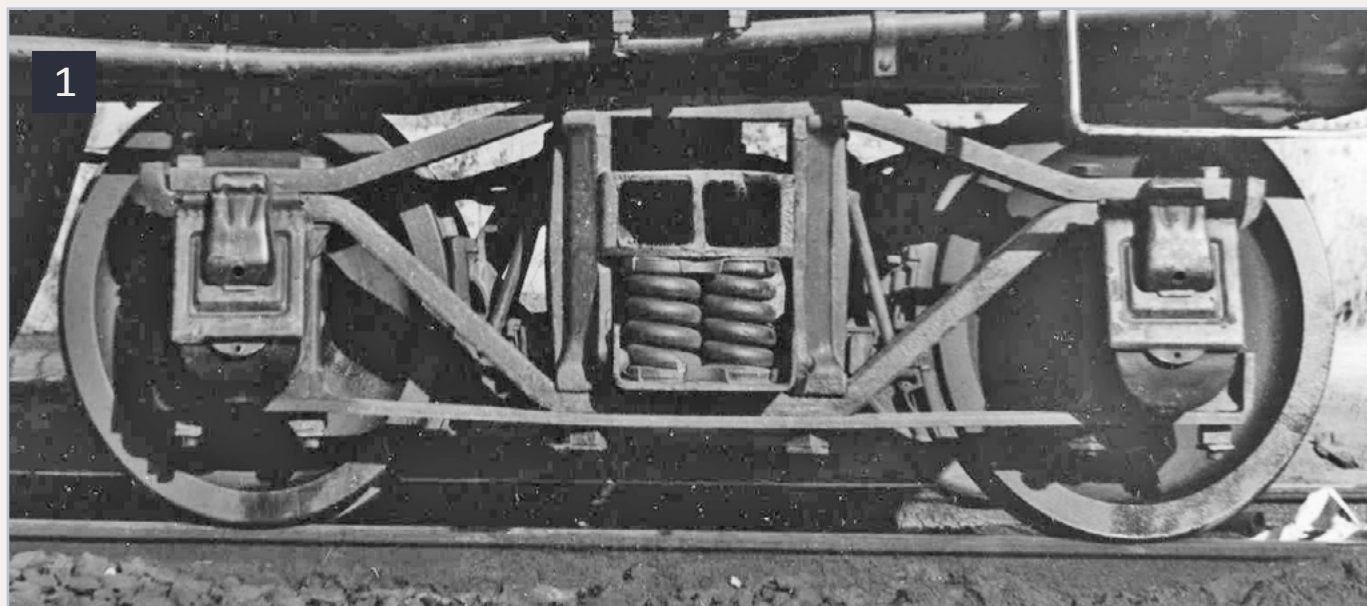
20th century were of 40, 50, or 70 tons nominal capacity, and most of what follows will be devoted to trucks of those capacities. Truck capacity was stated in terms of how much weight a pair of trucks would support. Thus a single "50-ton" truck was designed to carry only 25 tons, with the other half of the 50 tons resting on the truck at the opposite end of the car. Capacity was determined by the size of the journals, as follows:

40 tons nominal capacity, 5" X 9" journals, load limit 136000 lbs.

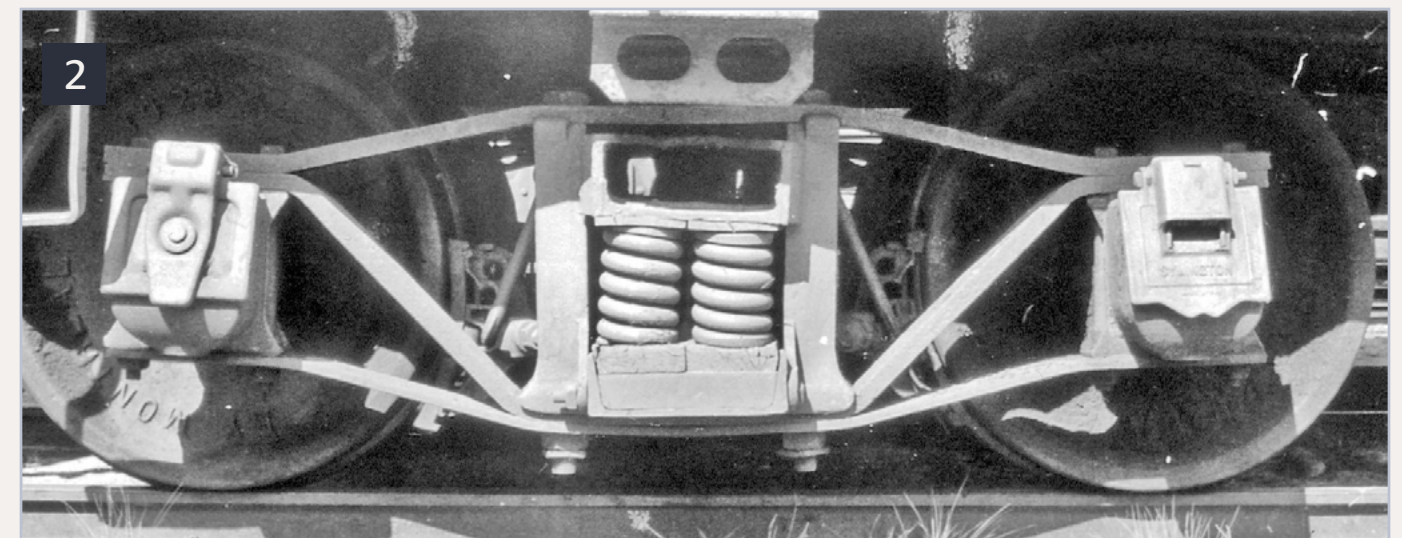
50 tons nominal capacity, 5-1/2" X 10" journals, load limit 169000 lbs.

70 tons nominal capacity, 6" X 11" journals, load limit 210000 lbs.

Nominal capacities were intended to indicate approximately how much weight could be loaded into or on the car, so load limits were more than half again higher than nominal capacities to account for the empty weight of the car itself.



1: A turn-of-the-century arch bar truck with straight lower chords, cast steel bolster, and steel channel spring plank. The vertical columns on either side of the bolster were also steel castings.



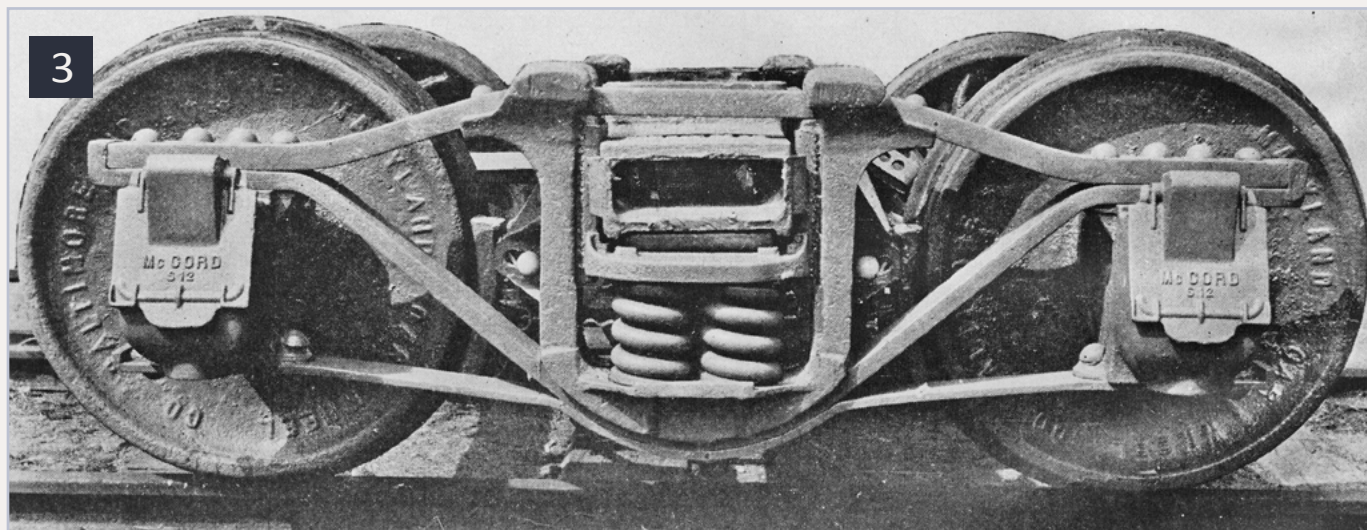
2: This typical early 20th century arch bar truck had symmetrical top and bottom chords, cast steel bolster and columns, and a steel channel spring plank with oak spring seats.

Arch bar trucks

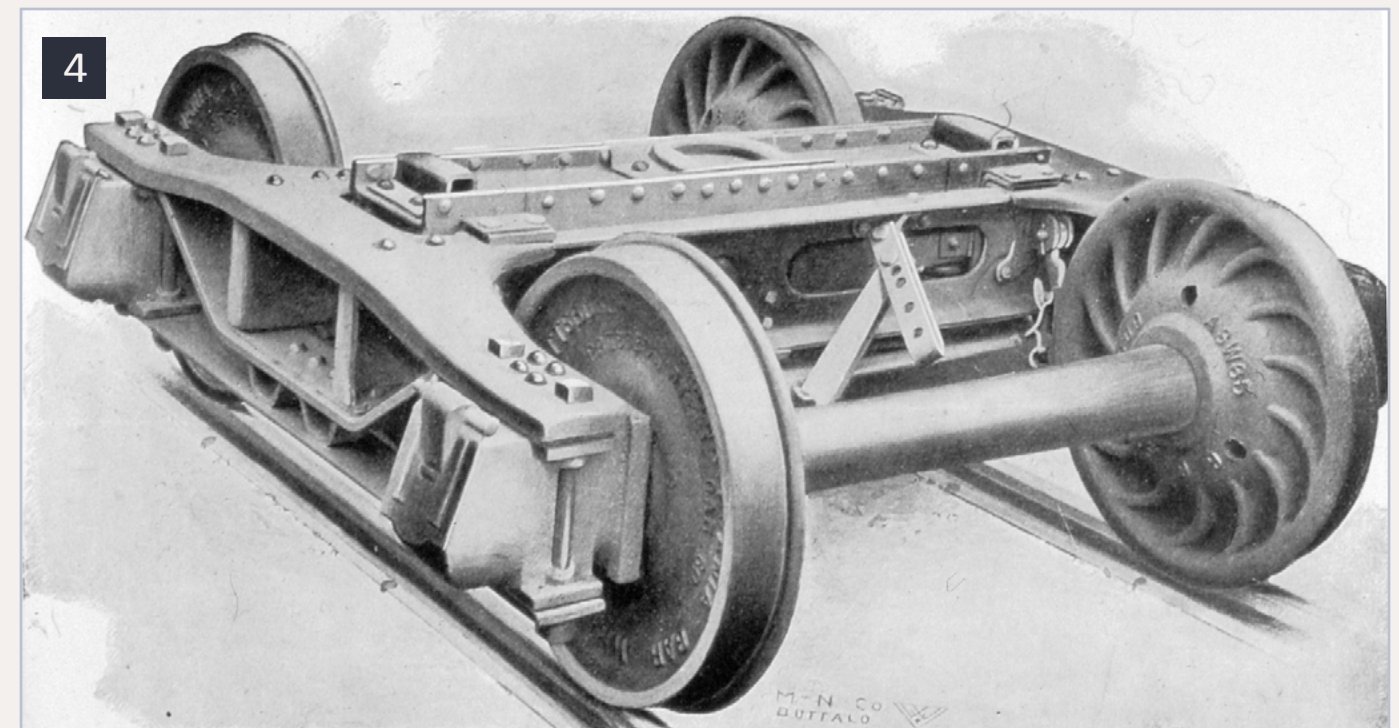
The first arch bar trucks began to appear in the 1860s. Originally the side frames were made of iron bars bolted together, and bolsters and spring planks were wood. The arch bar design was adopted almost universally in the years that followed, with improvements that included iron and (later) steel bolsters and spring planks, steel side frame bars, and longer wheelbases. The arch bar truck had a number of advantages over other freight car truck designs. It was simple and inexpensive to make, and it rode and tracked well. Moreover, as freight cars became larger and heavier, the arch bar truck's load-carrying capacity could be increased simply by making the component parts larger. [For more information on the evolution of trucks in the nineteenth century, see John H. White, Jr.'s *The American Railroad Freight Car*, Johns Hopkins University Press, Baltimore, 1993.]

There was one drawback to the arch bar design, however. Because it was assembled entirely with bolts and nuts, vibration could loosen the nuts, and constant working of the truck could enlarge the bolt holes until the truck would become out of alignment or, in the worst case, come completely apart. This shortcoming was becoming increasingly problematic by the turn of the century, owing in part to the dramatic increase in car size and capacity that followed the universal adoption of air brakes and knuckle couplers. The tendency of arch bar trucks to shake themselves apart could be overcome with periodic maintenance, but cars that ran in interchange might not be returned to their owners for months or even years at a time, and when off-line, their trucks seldom received any attention apart from journal oiling.

As a result, though the venerable arch bar design remained the de facto standard (1 and 2), late nineteenth and early twentieth



3: John J. Tatum, head of the Baltimore & Ohio car department and a prolific innovator, designed this improved arch bar truck in the early 1920s when arch bars had fallen out of favor with most other railroads. The spring seat and columns were a one-piece steel casting and Barber lateral motion rollers were located between the springs and the bolster.



4: The Pressed Steel Car Co. designed this pressed steel version of the arch bar truck design. It was assembled with rivets instead of bolts except for the bolts that held the journal boxes in place.

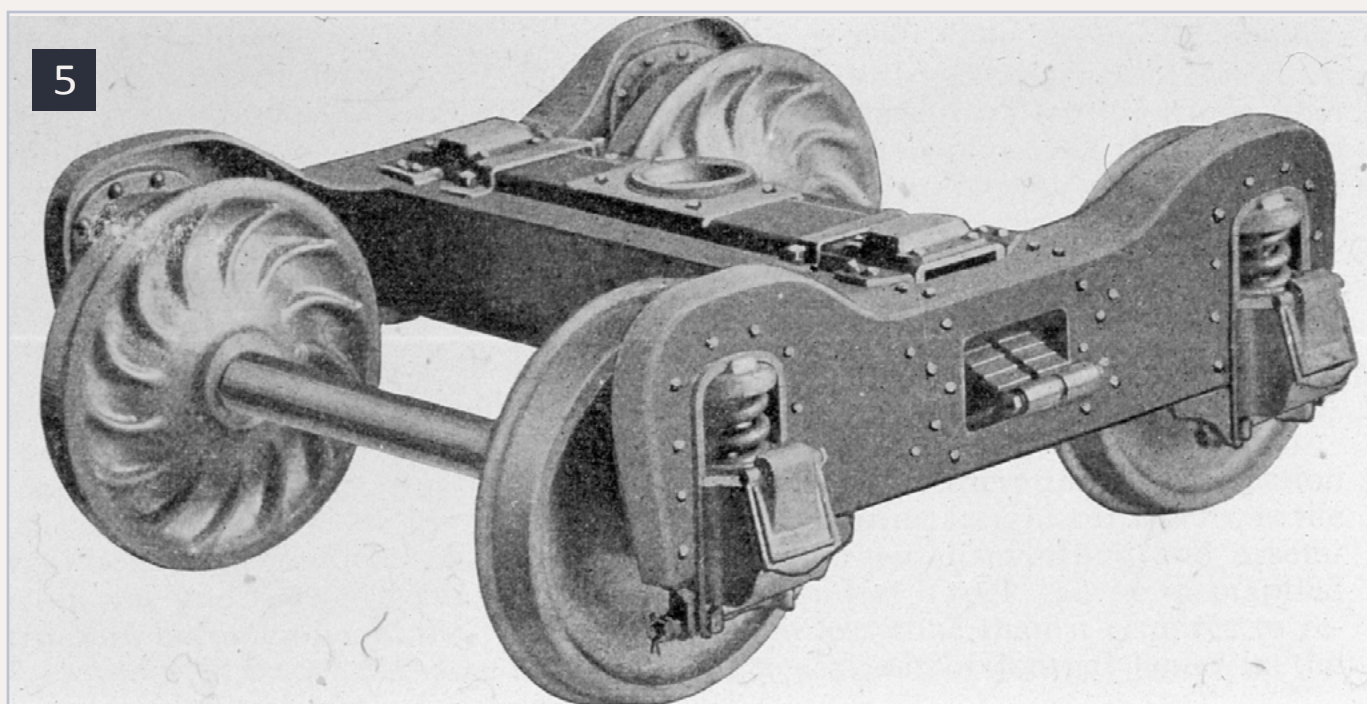
century freight car truck development was devoted largely to finding better alternatives, and a variety of designs employing pressed steel or cast steel side frames and bolsters began to replace arch bars. Some railway mechanical engineers remained reluctant to abandon the arch bar truck, and efforts to improve it continued until the mid-1920s (3). In fact, the Baltimore & Ohio was still taking delivery of new steel sheathed boxcars with arch bar trucks as late as 1928. By that time, however, arch bar trucks were a lost cause. The Association of American Railroads banned them from interchange in 1940, though they continued to be used under company service cars that did not go off-line at least as late as the 1970s.

Pressed steel trucks

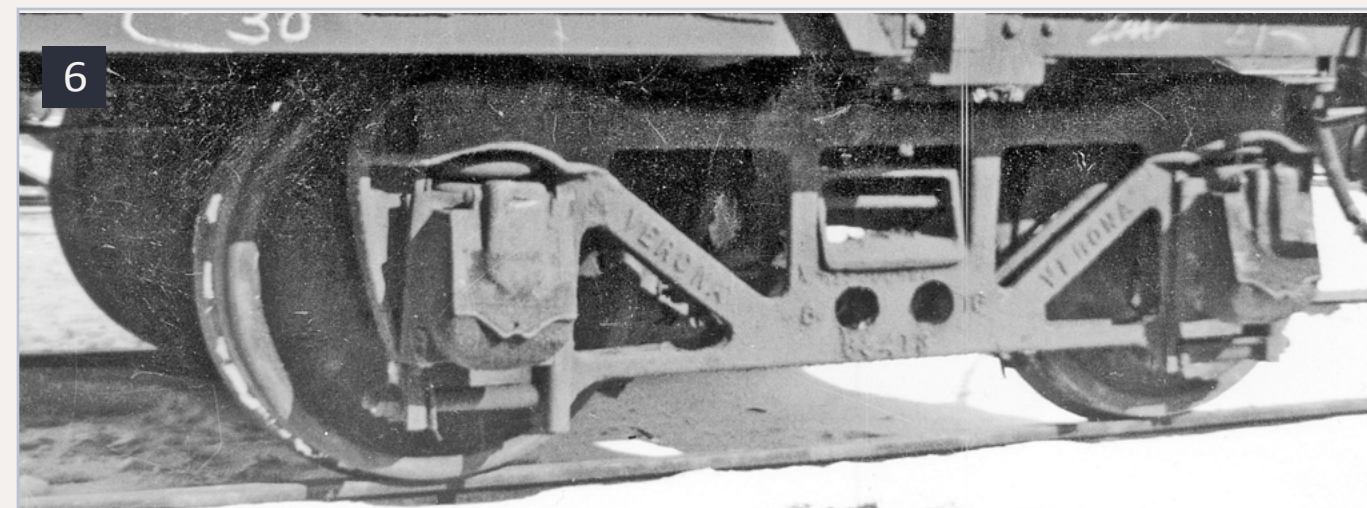
Toward the end of the 19th century, making freight car parts from pressed steel became both practical and economical,

and several truck manufacturers introduced trucks whose side frames and bolsters were made of pressed steel parts riveted together. Some of these were merely variations on the arch bar design in which pressed steel replaced steel bars (4). Others had one-piece pressed steel side frames with the journal boxes sliding in vertical pedestal jaws and coil springs above the boxes. The most widely used of these was the Fox truck, made by the Pressed Steel Car Co. (5).

Trucks with one-piece pressed steel side frames eliminated the bolts-and-nuts assembly of arch bar side frames but, after some years in service, they began to develop other problems that proved to be inherent in the pedestal-jaw design. Unless the wearing surfaces of the pedestal jaws and journal boxes received regular lubrication, which seldom happened, rapid wear resulted. The journal boxes could then become



5: A Fox truck made by the Pressed Steel Car Co. Many Fox trucks had springs only above the journal boxes, but this one also had leaf springs between the bolster and side frames. The downfall of these trucks was the tendency of the journal boxes to stick and jam in the vertical pedestal jaws.



6. Similar in concept to the Fox pressed steel truck but made of steel castings was the Verona truck made by the Standard Steel Car Co. It suffered from the same problems that afflicted pressed steel pedestal jaw trucks.

misaligned and stick or jam in the pedestal jaws, thus seriously affecting the truck's riding and tracking qualities. For this reason, the popularity of pressed steel trucks was short-lived.

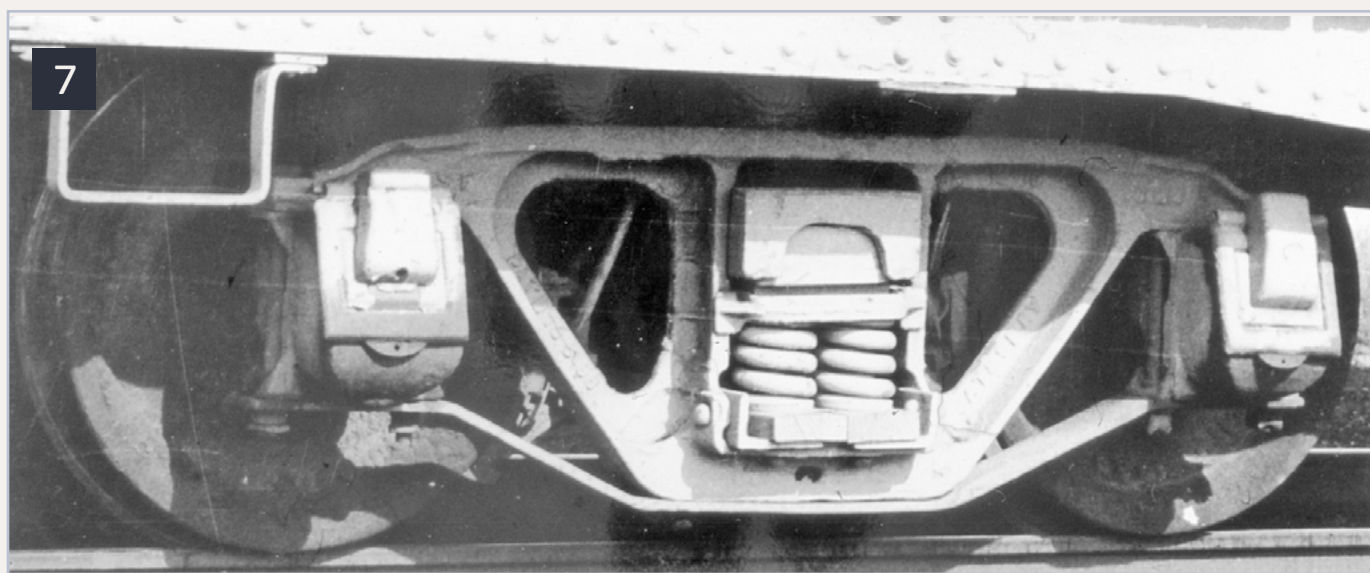
Cast steel trucks with separate journal boxes

As with pressed steel construction, complex steel castings became more readily available and less costly in the closing years of the 19th century, leading to the development of truck designs employing cast steel side frames and bolsters. One of these was the Verona truck, produced by the Standard Steel Car Co. (6). Like the Fox truck, the Verona truck had vertical pedestal jaws with the springs located above sliding journal boxes, and thus it suffered from the same problems as the Fox and other pressed steel trucks of similar design. Though Verona trucks were used briefly and in limited quantities by some northeastern railroads, they were not widely adopted.

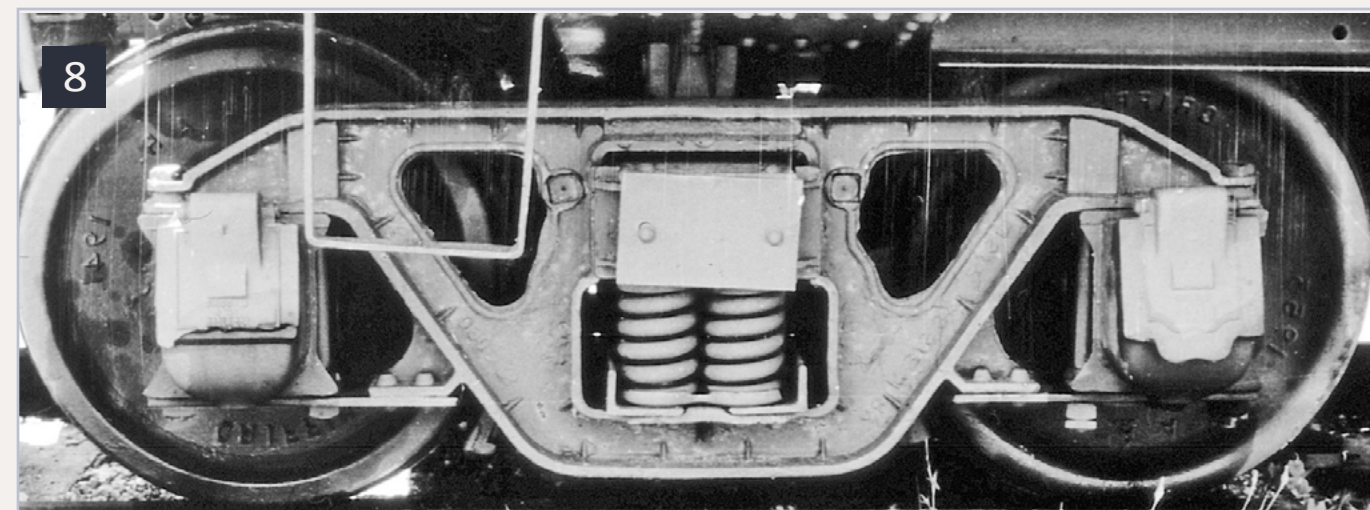
Much more successful was the Andrews truck, which was widely accepted and progressively improved. Andrews trucks had separate journal boxes bolted into cast steel side frames

with retainer bars at the bottom to hold them in alignment. One advantage of this arrangement was that Andrews side frames could be applied to existing arch bar trucks using the original bolsters, journal boxes, and wheelsets – a significant economy for car owners.

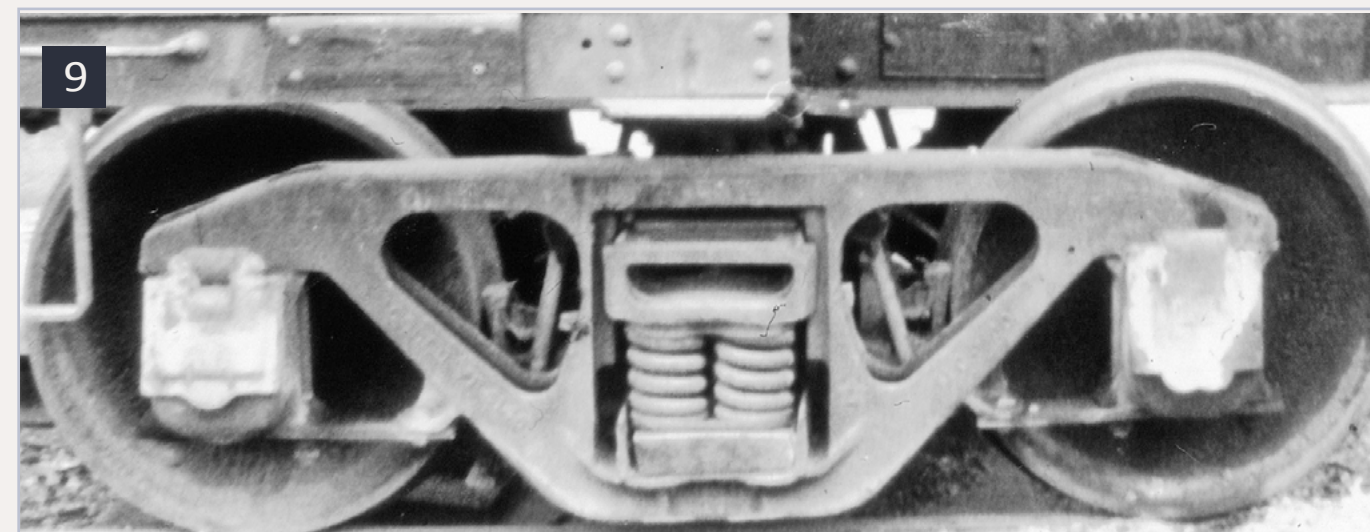
The earliest Andrews trucks had L-section side frames and sloping one-piece journal box retainer bars (7). These were soon followed by T-section castings and short journal box retainers bolted to lugs cast onto the side frames (8). Next came U-section side frames (9 and 10). Later U-section versions of the Andrews truck, made in 40-, 50- and 70-ton versions, were applied to all of the 100,000 freight cars built for the United States Railway Administration during World War I (11). The Andrews design continued to be widely used through the mid-1920s, and lasted on some cars in revenue service through the 1960s.



7: The earliest Andrews trucks had L-section side frames and sloping one-piece journal box retainer bars. Many car owners favored the Andrews design because the cast steel side frames could be applied to existing arch bar trucks, re-using the existing journal boxes, wheelsets, and bolsters. Note the oak lower spring seats, often used on early 20th century trucks.



8: A T-section Andrews truck. By this time, the journal box retainer bars were shorter and bolted to bosses cast onto the side frame, rather than to the bottom of the side frame. The plate on the end of the bolster was a later addition.



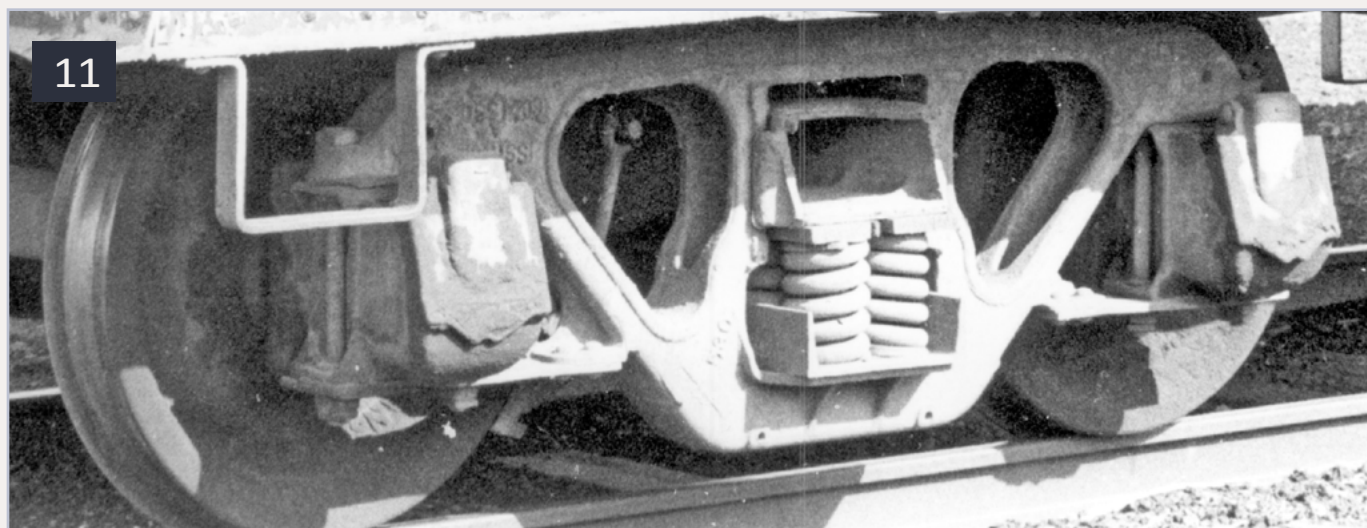
9: The Andrews design progressed to U-section side frames, as shown in this example. Again, note the oak shim between the springs and spring plank.



Another major design using cast steel side frames with separate journal boxes was the Vulcan truck, developed by American Steel Foundries. Vulcan side frames had pedestal jaws into which the journal boxes were bolted.

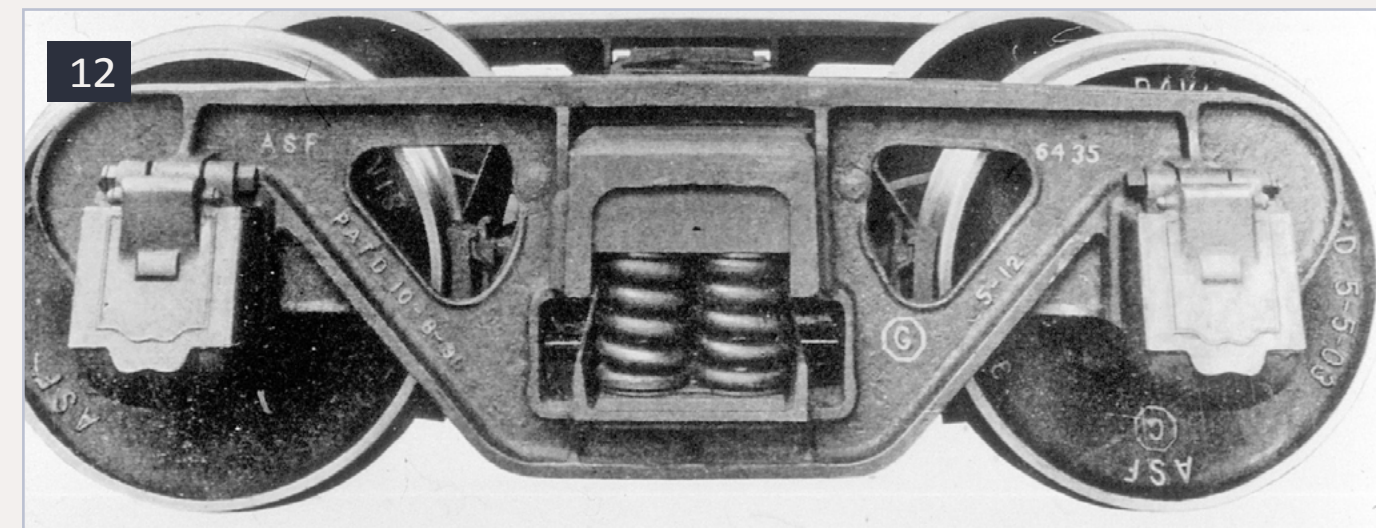


10: The Crown truck was a heavy duty 70-ton version of the Andrews design used in the teens by the Pennsylvania Railroad on gondolas, hoppers, and flat cars.

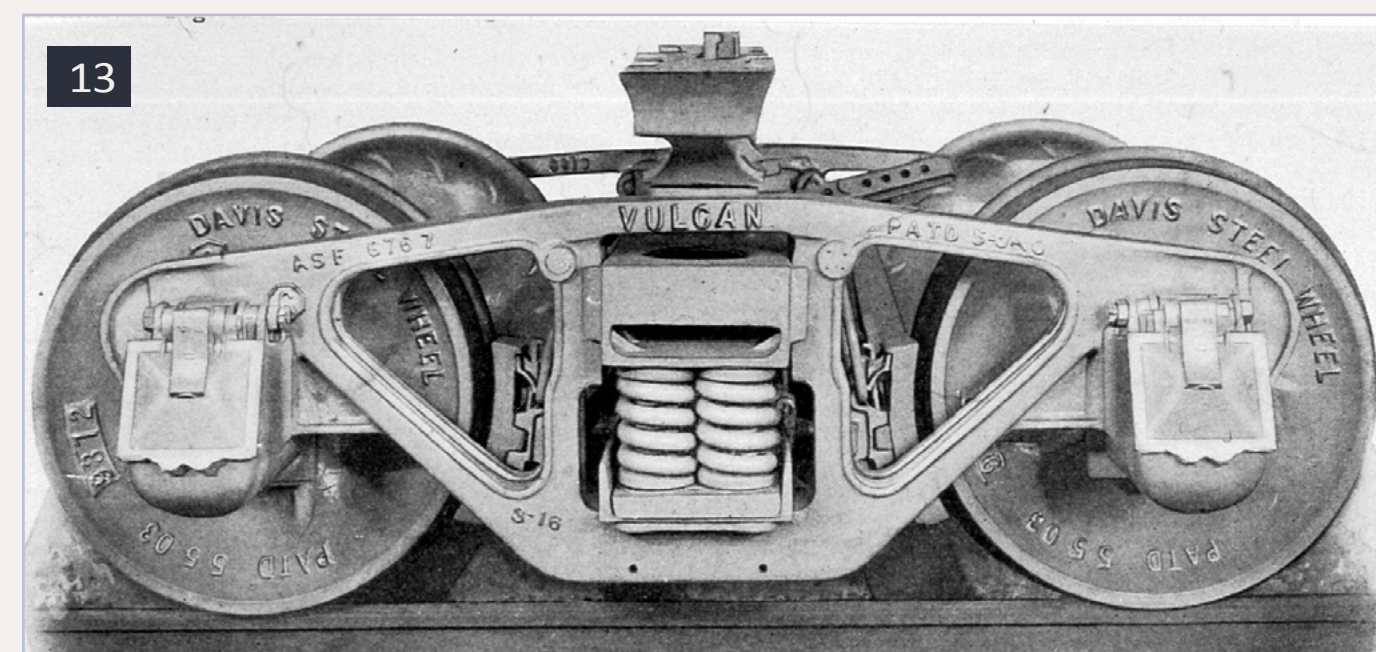


11: During and after World War I, the United States Railway Administration built 100,000 cars to overcome the nation's shortage of modern freight cars, and all of them were equipped with U-section Andrews trucks of 40-, 50-, or 70-ton capacity. This is a 50-ton USRA Andrews truck.

As with Andrews trucks, early Vulcans had L-section side frames (12) but later ones employed stronger U-section side frames (13).



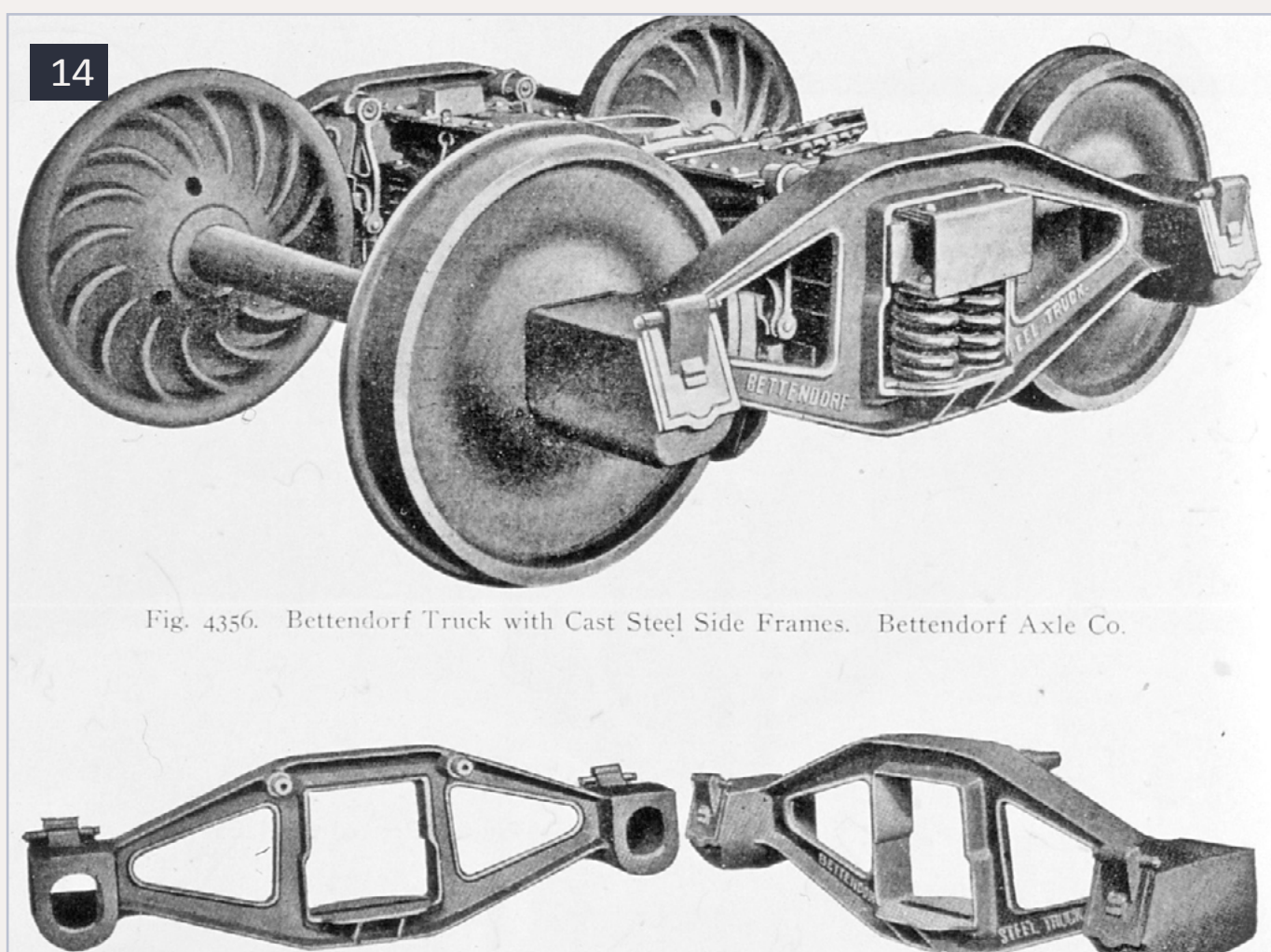
12: Vulcan trucks had separate journal boxes, like Andrews trucks, but in the Vulcan design the boxes fit into pedestal jaws and were secured in place by transverse bolts at the top. This is a T-section Vulcan truck.



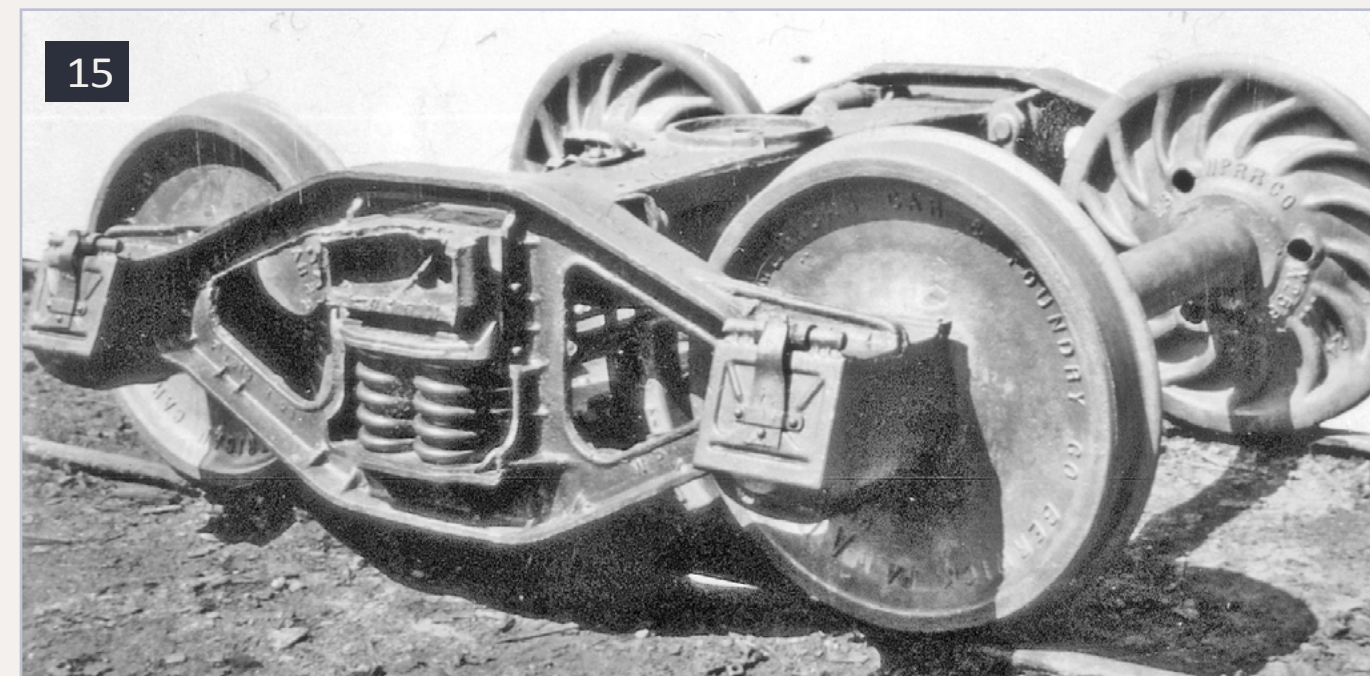
13: A later U-section version of the Vulcan design. The bolts that held the journal boxes in place are visible behind the journal box lid springs.

Cast steel trucks with integral journal boxes

The ultimate development of cast steel truck side frames was to incorporate the journal boxes as an integral part of the side frame casting. This was first accomplished in the Bettendorf T-section truck, developed and patented by Bettendorf Steel Axle Co. The T-section chords of these side frames were arranged as equilateral triangles (14 and 15). The Bettendorf truck was strong, relatively light, and immune to the journal boxes becoming loose and misaligned, and it quickly became



14: The casting of the journal boxes as integral parts of the Bettendorf T-section side frames is seen clearly here. This arrangement eliminated problems with journal boxes working loose and becoming misaligned but required the truck to be dismantled whenever a wheelset was changed.



15: A later, improved version of the Bettendorf T-section truck. Note the stiffening ribs above the journal boxes and between the flange and web of the T-section side frame.

popular with some railroads and private car owners. What discouraged more widespread adoption was the fact that replacing a wheelset required the entire truck to be dismantled, rather than just jacking up the frame and removing the journal box bolts, as on Andrews and Vulcan trucks.

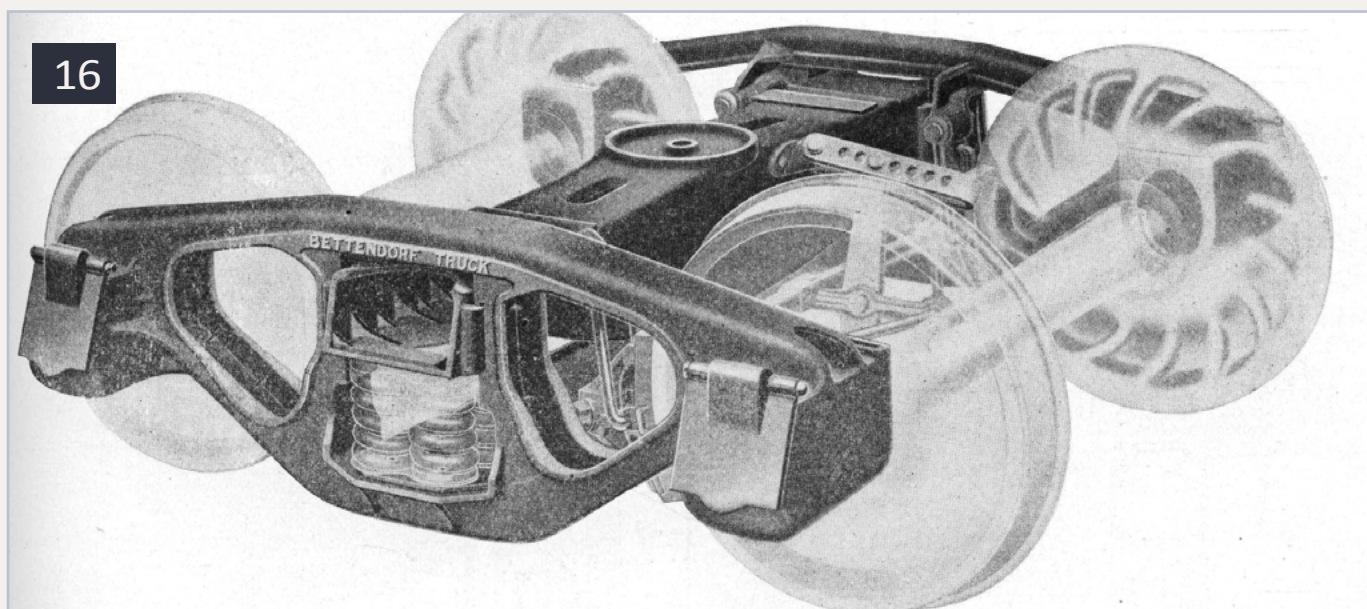
On lighter cars, Bettendorf T-section trucks gave good service, but when loaded more heavily, as on 50 ton boxcars, the side frames were prone to cracking where stresses were highest at the lower corners of the spring box. This weakness was cured by casting the side frames with U-section chords, a change that Bettendorf adopted around 1920, foreshadowing the universal adoption of U-section cast steel side frames in the years that followed. (16). Eventually, in 1956, the AAR banned all trucks with L- or T-section side frames from interchange.

ARA "Standard" trucks

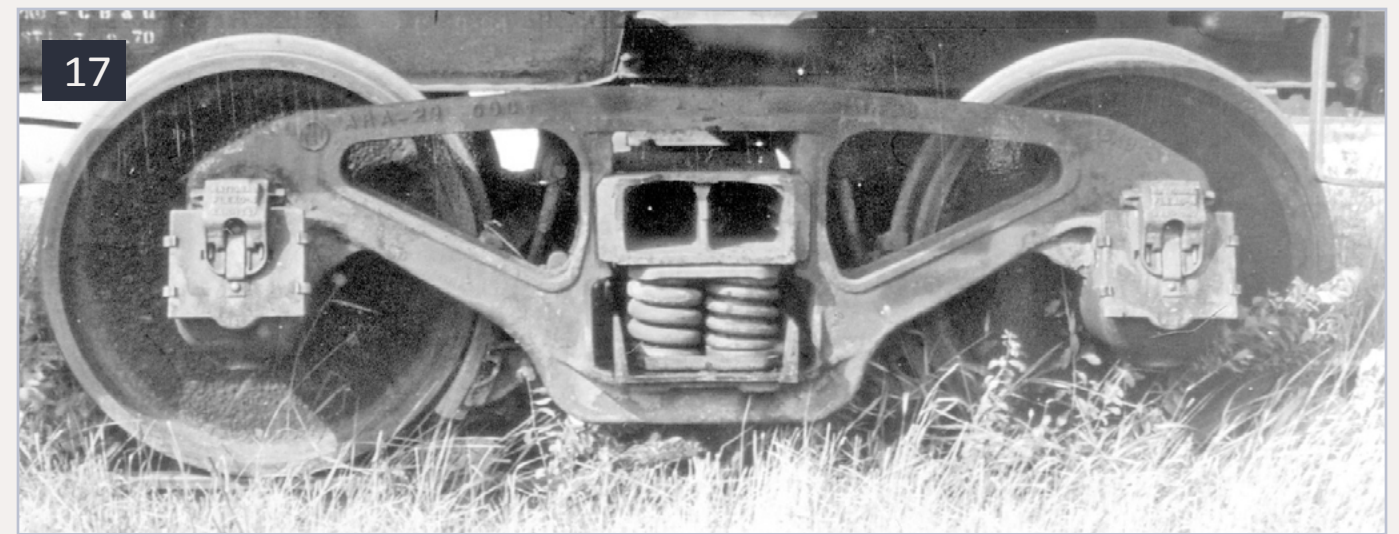
One of the trucks that adopted the Bettendorf concept of integrally-cast journal boxes with U-section side frames was

the Pennsylvania Railroad's 2DF8 truck. The American Railway Association adopted what was essentially the Pennsylvania design as its Type Y truck (17). (There was also a similar Type W truck which, like the Vulcan truck, had separate bolted-in journal boxes, but it was little used.) Equally important, the ARA established revised standard specifications for freight car trucks, including such key dimensions as wheelbase, center plate height, and side bearing height.

It was soon found that the Type Y trucks were prone to cracking at the lower corners of the spring box, so the Type Y side frame design was short-lived except on the Pennsylvania Railroad, which continued to employ 2DF8-style trucks until the late 1930s. However, other truck manufacturers quickly developed alternative side frame designs of varying configurations which reduced the cracking problem. All had integral



16: Following the end of World War I, Bettendorf redesigned its integral journal box truck to incorporate U section rather than T-section side frames, and this was the forerunner of many similar trucks in the 1920s conforming to ARA specifications.



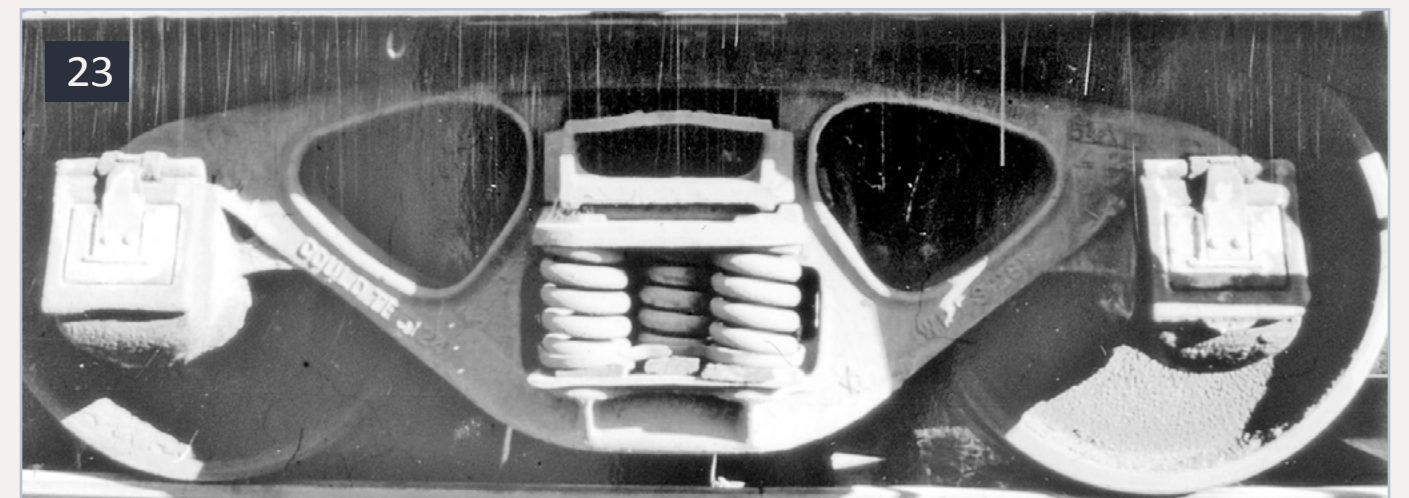
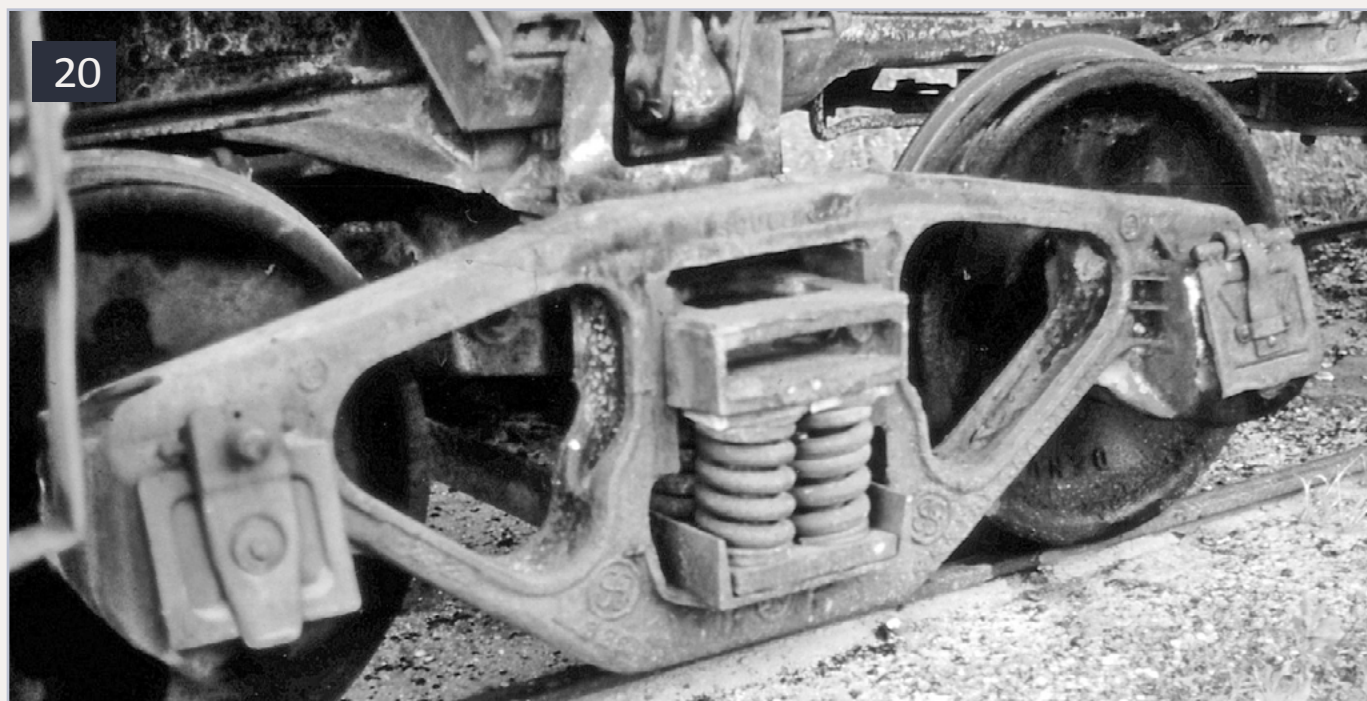
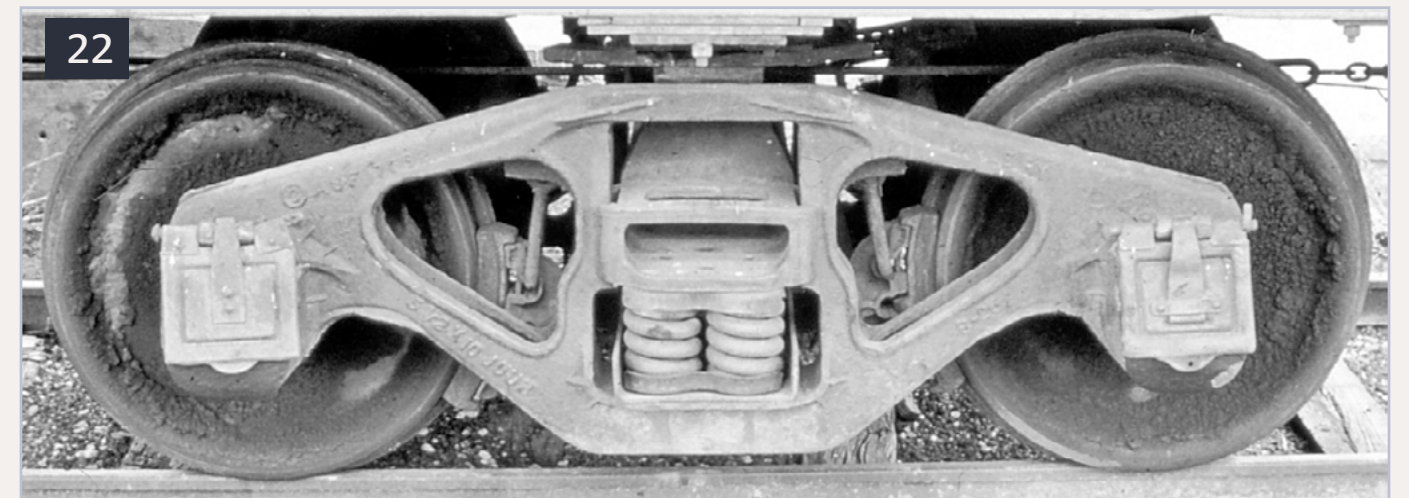
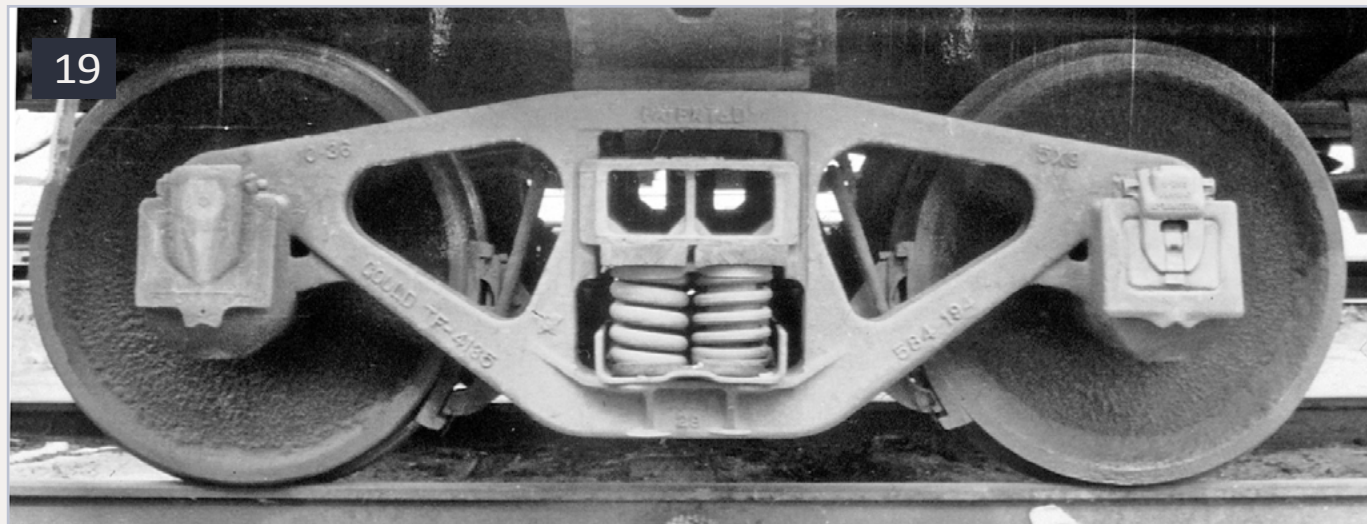
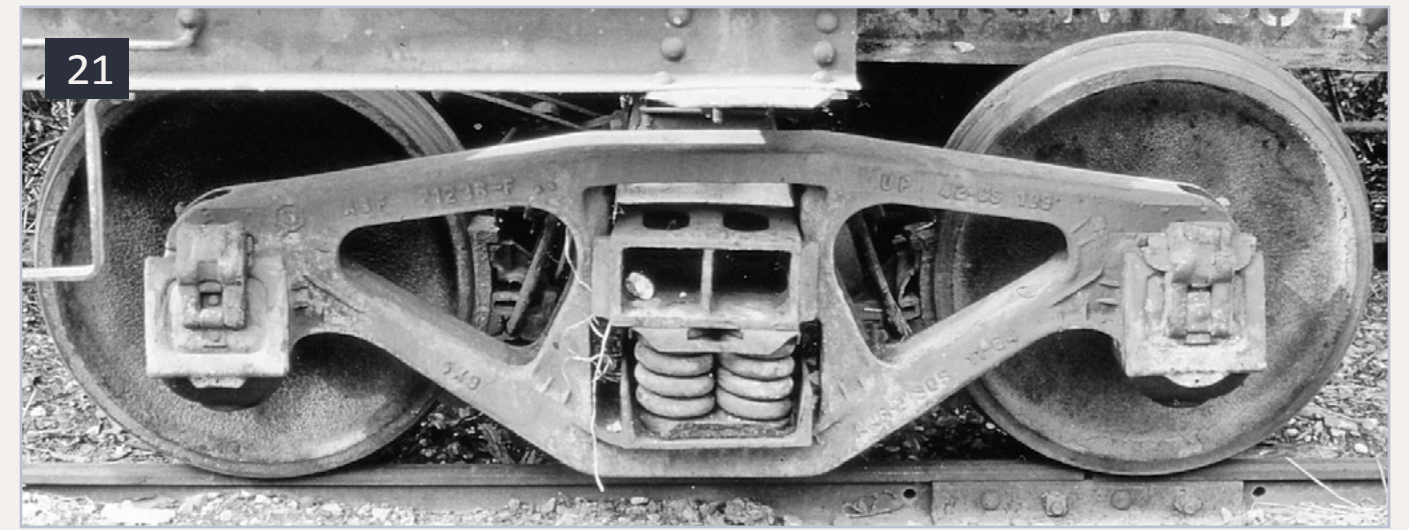
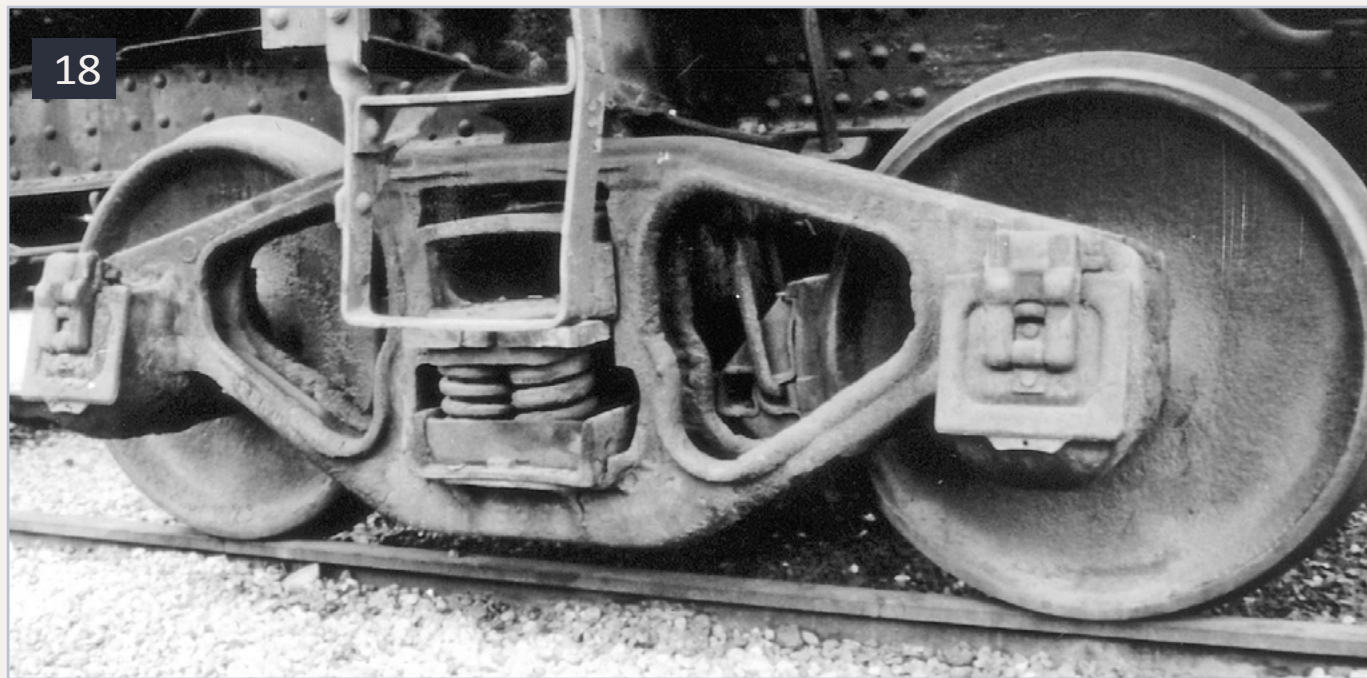
17: The ARA Type Y truck was an integral journal box truck developed from the Pennsylvania Railroad's 2DF8 truck, which it closely resembled. Its popularity was short-lived, owing to side frame cracks at the lower corners of the spring box, though the Pennsy continued to produce the 2DF8 and variants for many years.

journal boxes, U section side frames, and shallow U-section steel spring planks, and all conformed with ARA standard specifications (18 through 25). It is therefore useful to consider these trucks as ARA "Standard" trucks, as long as it is understood that – apart from the Type Y – none were ever designated as standard designs by the ARA.

In 1934, when the American Railway Association was reorganized into the Association of American Railroads, the ARA standard truck specifications became AAR standards. With some modifications, the AAR standards have continued in effect to the present day.

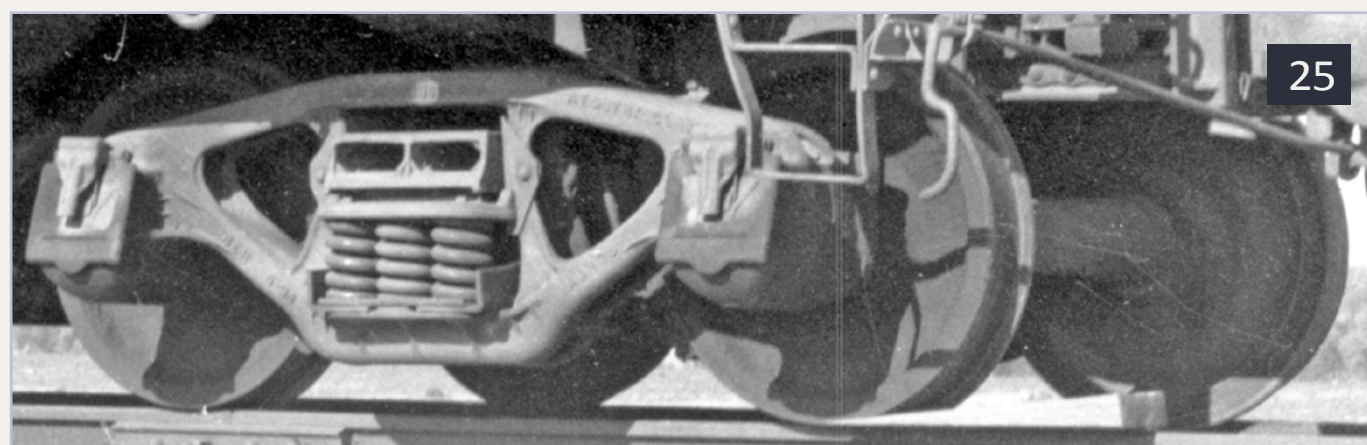
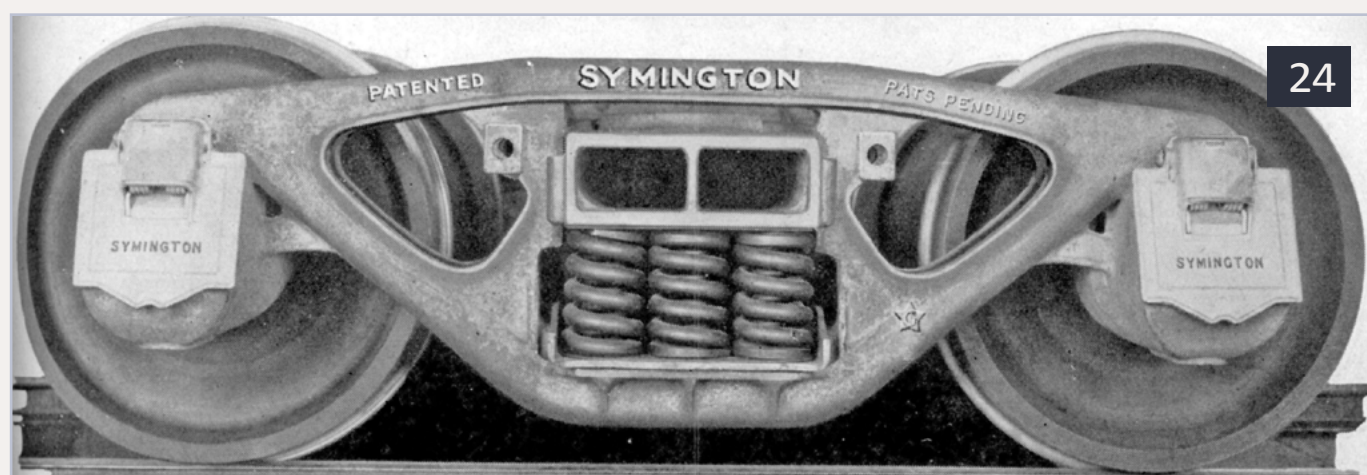
Efforts to improve riding qualities

In the first two decades of the 20th century, the size, weight, and tractive effort of locomotives increased dramatically. Initially most railroads emphasized using this increased power

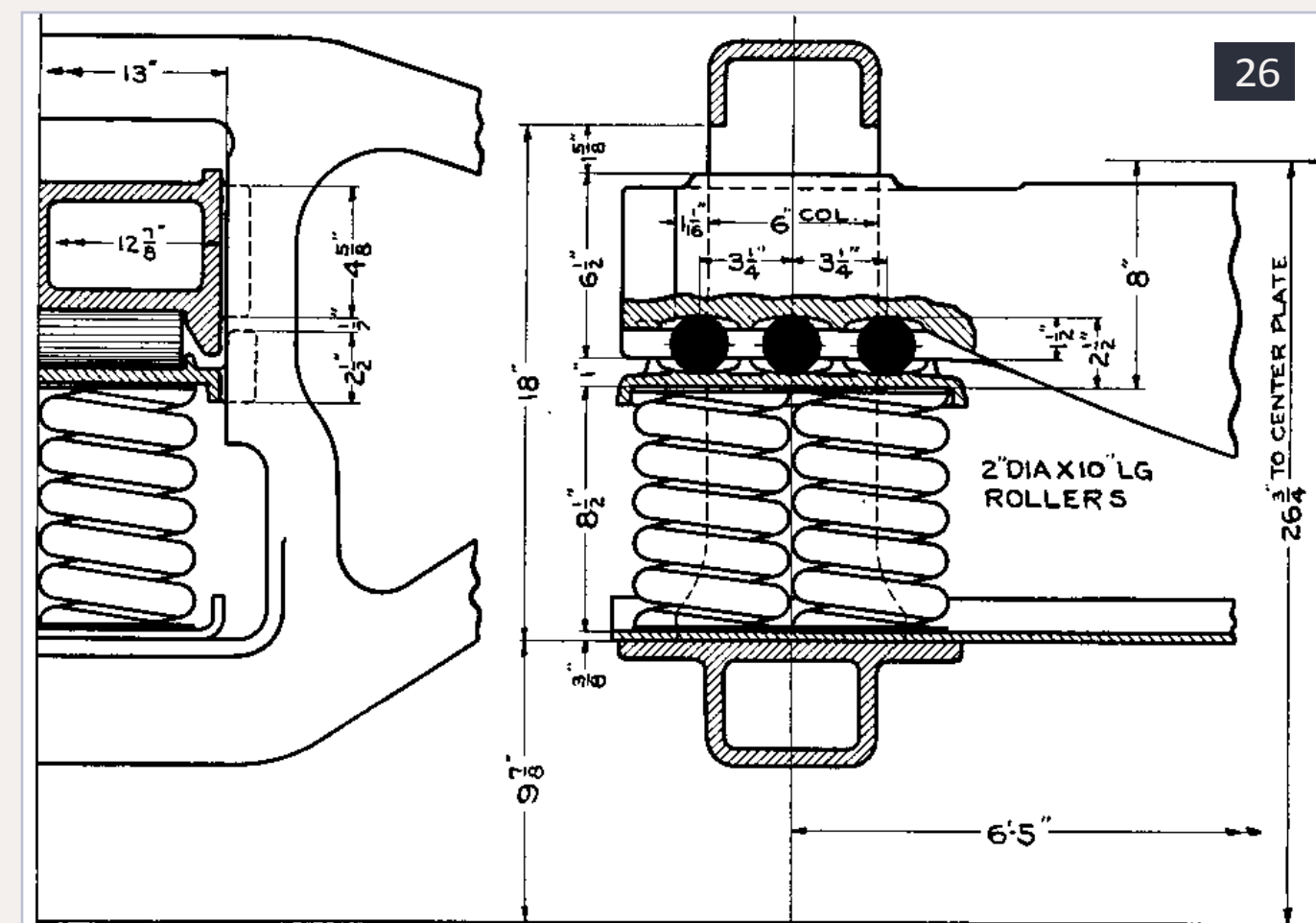


18-23: Take a look at the variety of side frame configurations on these ARA "standard" trucks. All are 40- or 50-ton cast steel U-section trucks with spring planks, but apart from that they vary all over the map. The truck in Figure 23 had Barber Lateral Motion devices between bolster and springs.

to haul longer and heavier trains at relatively low speeds. After World War I, however, this "drag freight" philosophy began to change as shippers demanded faster service. As the speed of freight trains increased, it was found that most freight car trucks were unequal to the task. Truck springs that cushioned loaded cars provided a harsh ride when the car was empty, and vice-versa. In addition, experiments showed that the 39' spacing of rail joints set up harmonic oscillations in trucks at certain speeds which were so severe that, in extreme cases, the wheels were actually being lifted up off the track.



24-25: Two slightly different versions of the ARA 70-ton truck with 5'8" wheelbase, one by Symington and the other by American Steel Foundries. The ASF truck had Barber Lateral Motion devices.



26: This cross section drawing reveals how the self-centering rollers in the Barber Lateral Motion device made limited sideways motion between the side frame and bolster possible.

A variety of measures were taken to address these problems. Truck spring stiffness and spring rates were modified. A number of different trucks designed to improve riding qualities began to appear, and these efforts continued through the 1930s and into the post-World-War-II period. Friction snubbers were also developed which could replace one spring on each side of existing trucks and provide some improvement in riding qualities at modest cost.

Barber lateral motion devices

As the cushioning effect of lateral motion in trucks had long been recognized as desirable, the Standard Car Truck Co.

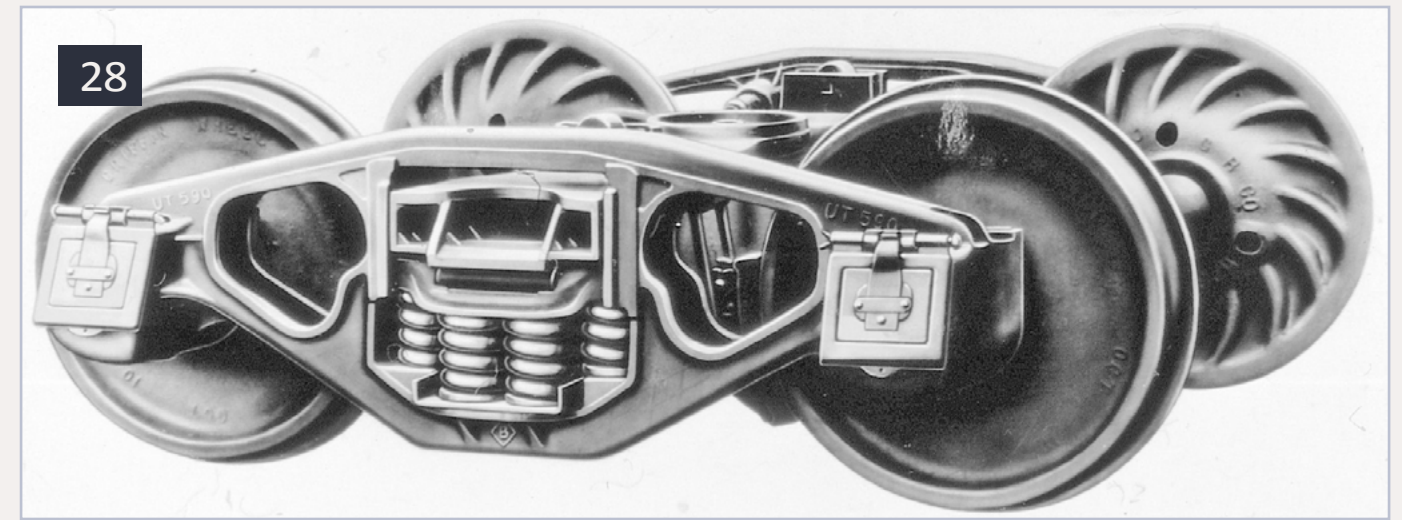
offered the Barber Lateral Motion Device, which could be fitted to almost any type of freight car truck. This consisted of self-centering rollers between the bolster and the top of the spring package (26). Many trucks made in the 1920s through 1940s incorporated this device (3, 23, 25, 28, and 40).

Dalman trucks

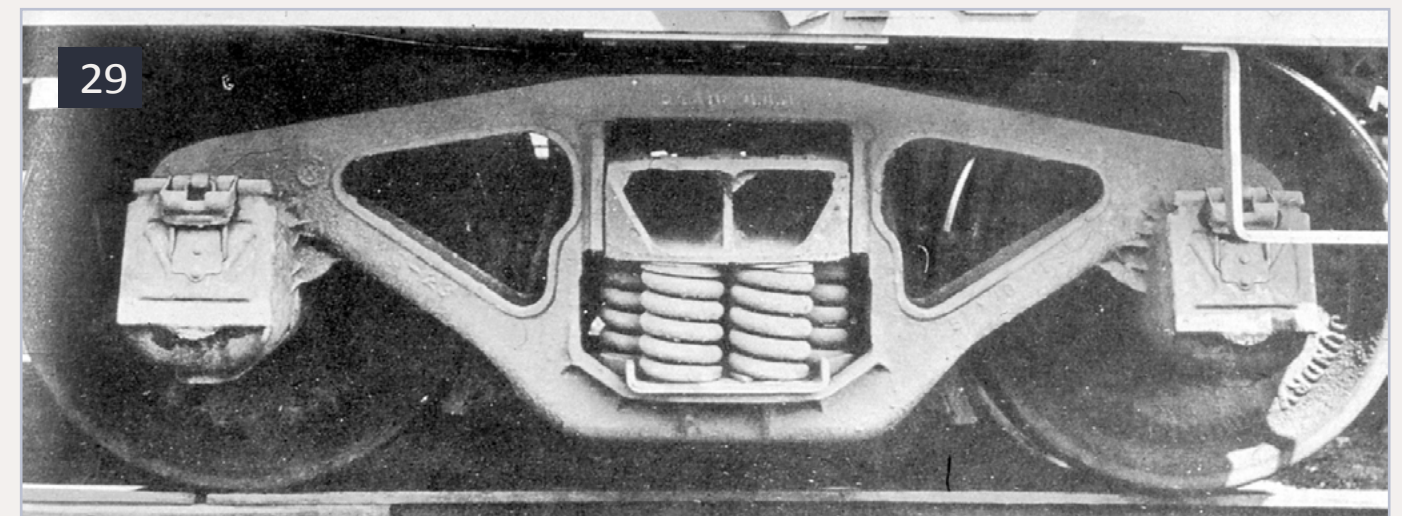
The Dalman Two-Level truck, introduced ca.1922, was an ARA standard design with the bolster and side frames modified to accommodate more, and softer, springs. Owing to its improved riding qualities, it was widely adopted during the 1920s on all types of freight cars (27 and 28). Later, a One-Level version of the Dalman design was introduced in which the outer springs of the spring package were at the same level as the other springs, rather than being offset vertically (29). The Dalman One Level truck was equally-popular for a brief period in the



27: This 50-ton Dalman Two Level truck offered improved riding qualities by providing more and softer springs. There were six pairs of springs on each side with the spring seats for the outer pairs slightly offset vertically, hence the Two Level designation.



28: Clearly visible on this version of the Dalman Two Level truck are the seats and rollers of the Barber Lateral Motion device between the bolster and springs.

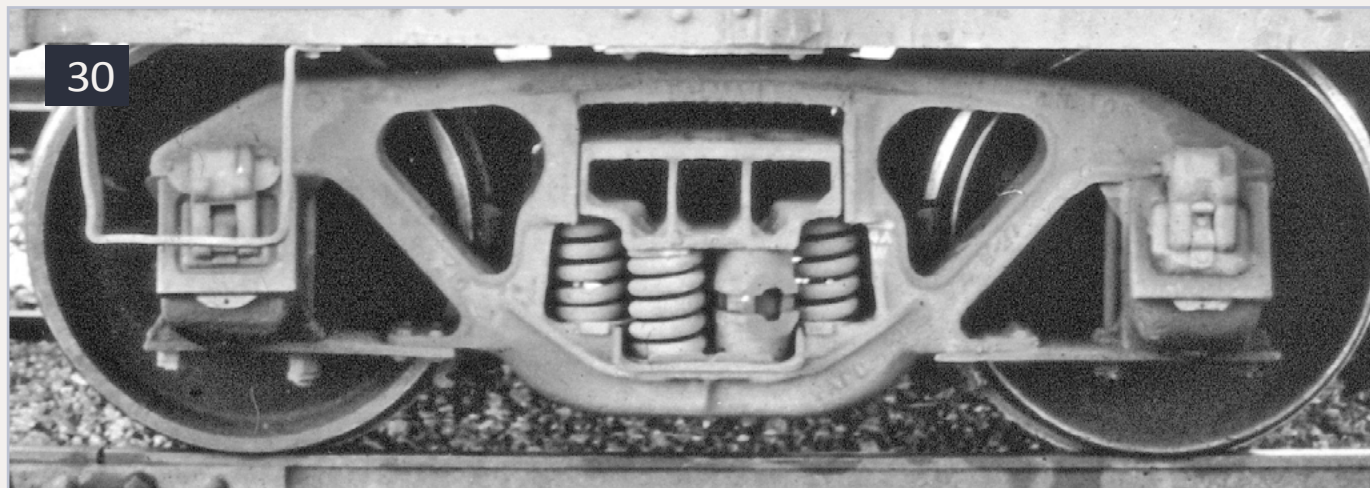


29: The Dalman One Level truck worked exactly like the Two Level Dalman, but the spring seats were all at the same level instead of being "stepped."

late 1920s and early 1930s. The Dalman arrangement was even applied to Andrews trucks; cars of a few railroads, notably the Great Northern and Seaboard Air Line, were equipped with Dalman-Andrews trucks in the 1920s (30).

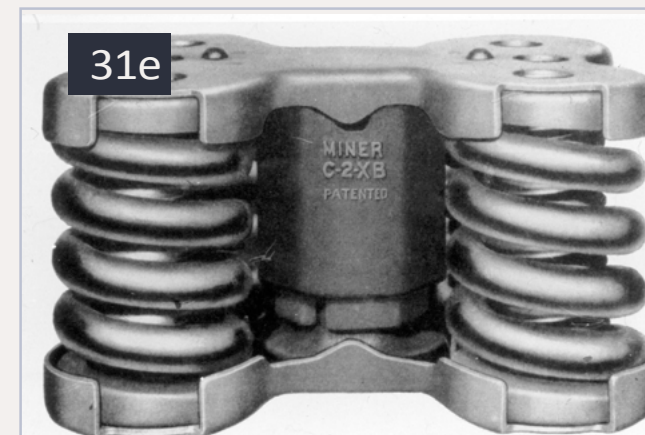
After-market friction snubbers

In the late 1920s after-market snubbers began to appear which employed various friction devices to reduce uncontrolled shocks and harmonic oscillation. All of these were designed to replace one spring on each side of an existing truck. All of the major railway equipment manufacturers eventually had their own patented snubbers (30 and 31), and these became increasingly popular in the 1930s through 1950s as an economical way to improve the riding qualities of trucks that were already in service, rather than replacing them with entirely new trucks.



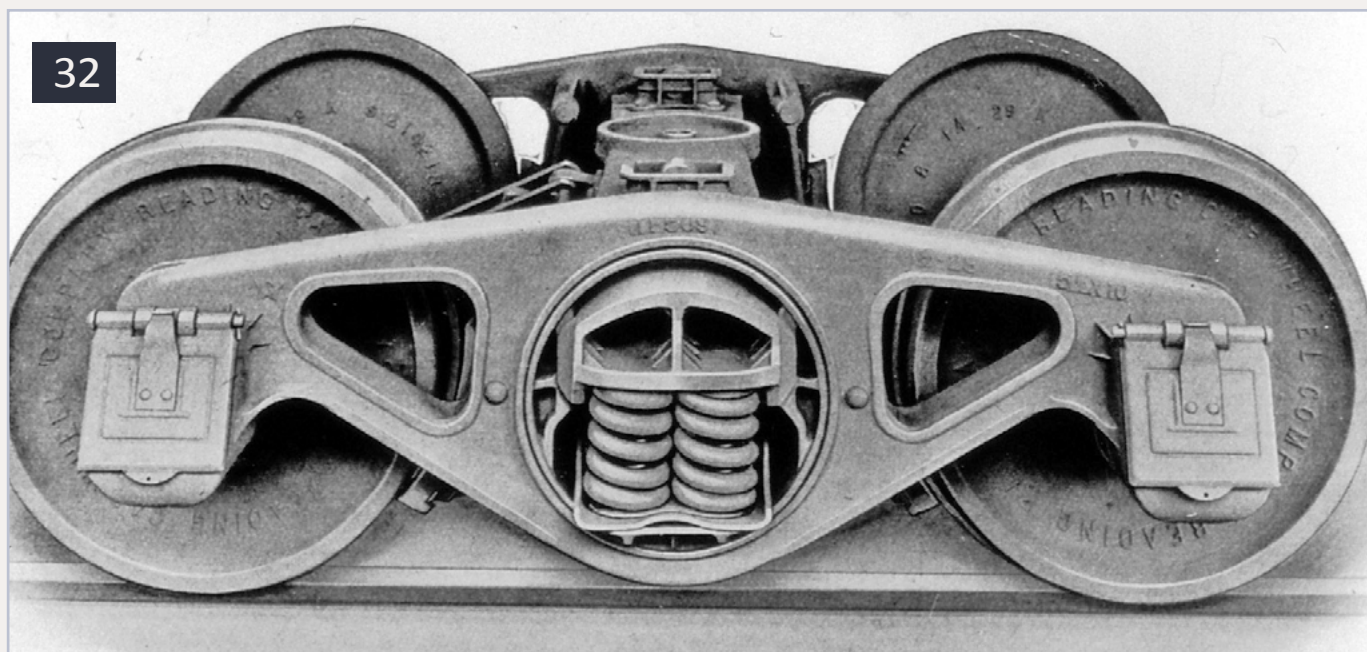
30: The Dalman Two Level design was adapted to the Andrews truck, as shown here. Note that when this truck was photographed after World War II, one spring on each side had been replaced by an ASF Simplex friction snubber.

31a-31f: It seemed as if every railway equipment manufacturer developed its own design of friction snubber spring replacement to dampen unwanted movement and harmonic oscillation. Here are, in alphabetical order, the ASF Simplex, Cardwell Type A, Frost #360, Holland A-6-A, Miner C2XB, and Symington SBS.

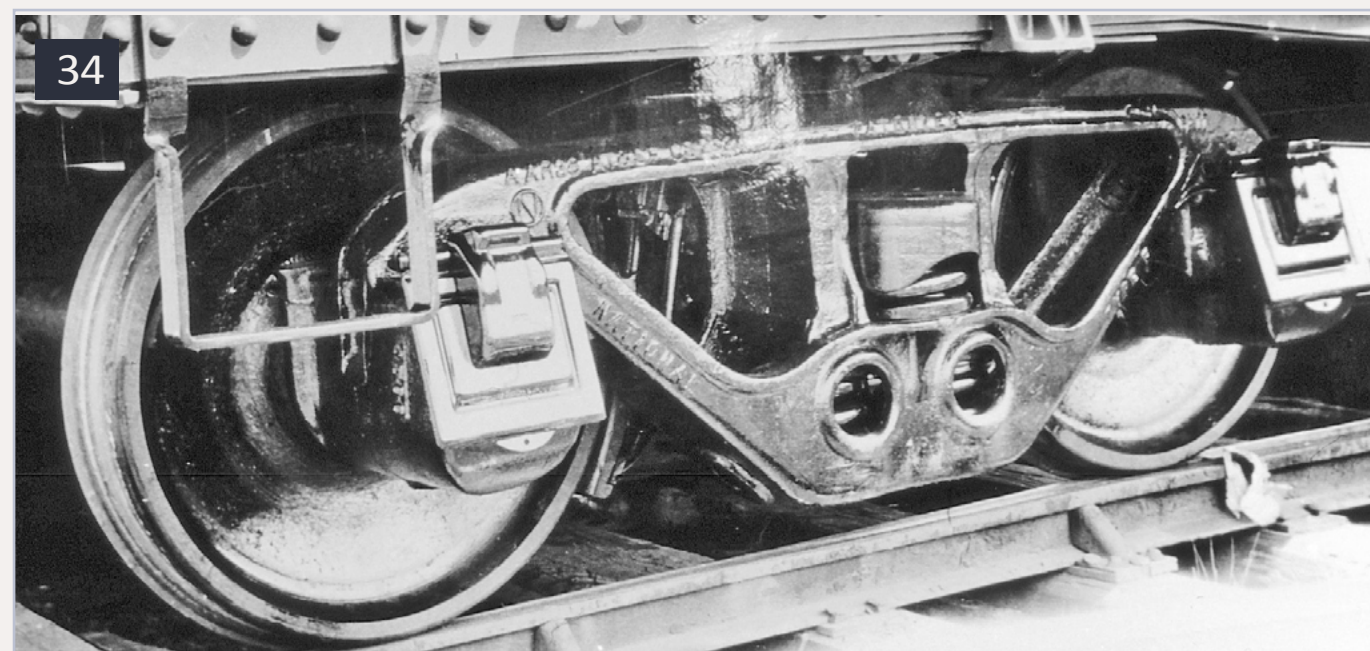
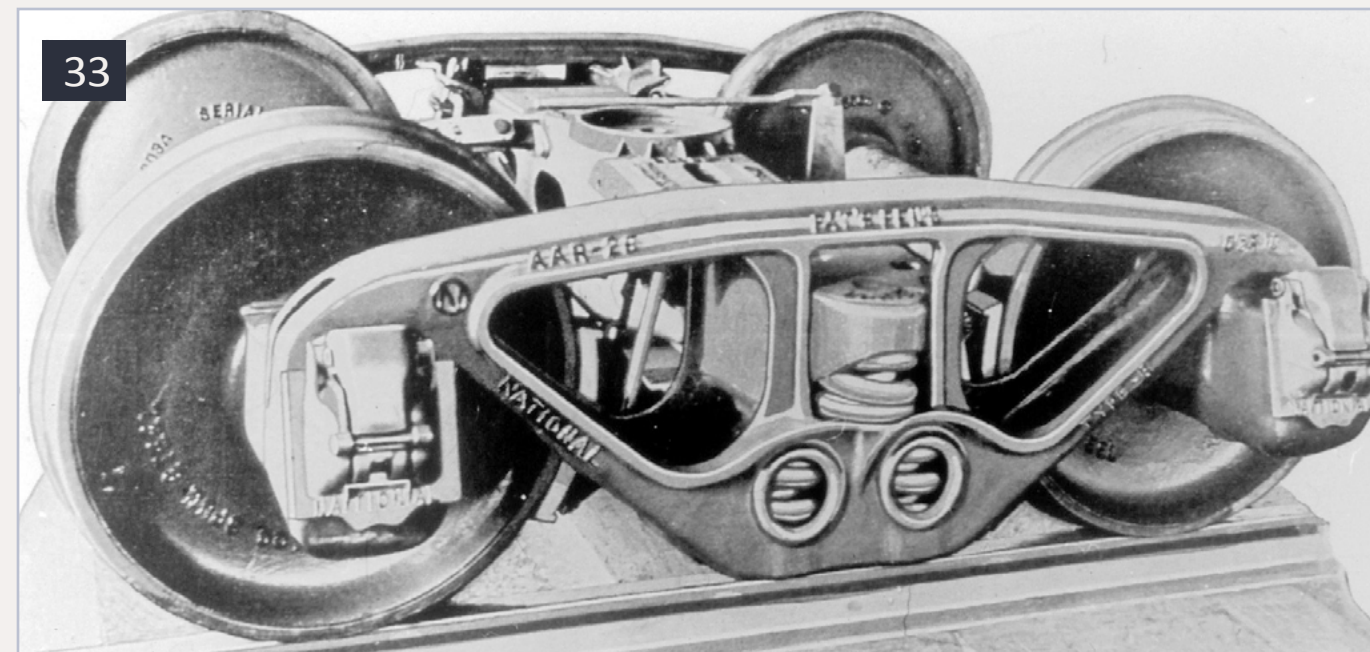


Taylor Flexible trucks

Developed ca.1930 by the Flexible Truck Co. of Reading, PA, the Taylor truck allowed each side frame to rotate freely around the bolster and spring package (32). This arrangement turned out to be more impressive in theory than in practice, as conventional trucks already provided enough flexibility to negotiate even very uneven track. The only major railroad to adopt Taylor Flexible trucks was the Reading; apparently the Taylor brothers were well enough connected with Reading mechanical officials that several batches of new cars for the Reading were ordered in the late 1920s and early 1930s with Taylor trucks. The Flexible Truck Co. soon disappeared, however, one of many victims of the Great Depression.



32: In the Taylor Flexible truck, the side frames were free to rotate around the bolster, springs, and spring plank. This novel idea offered little advantage in practice, however, so Taylor trucks were employed only briefly and only by the Reading railroad.



33-34: 50-ton and 70-ton versions of the National B-1 truck, a unique self-aligning truck which first eliminated the heavy steel spring plank. National B-1s were widely used by many railroads from the early 1930s through the early 1950s.

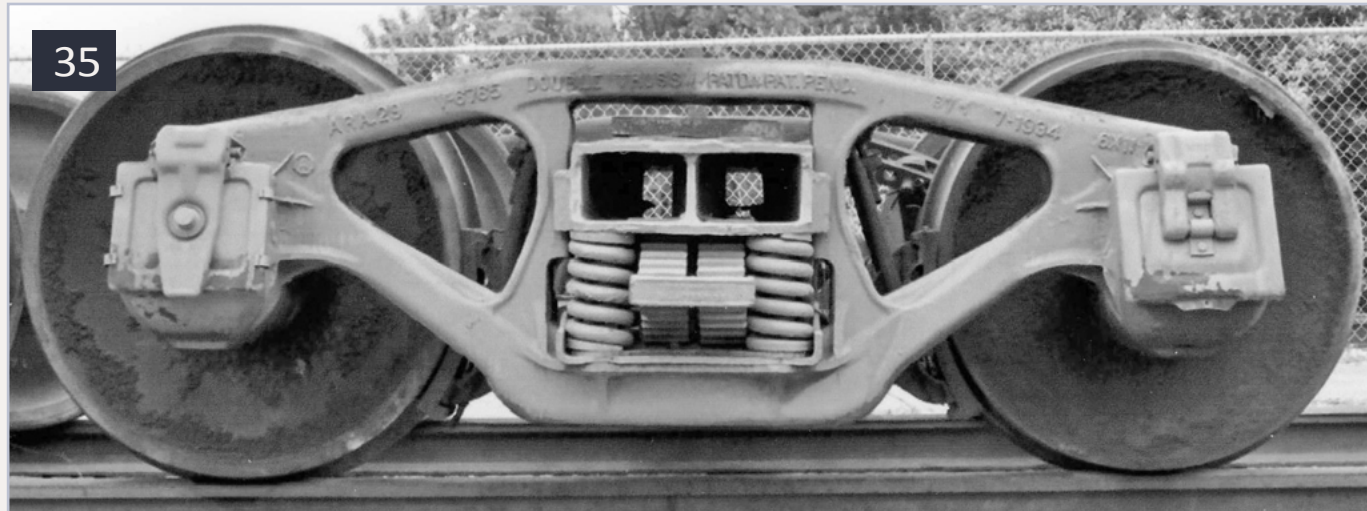
National B-1 trucks

A much more successful innovation was the National Type B-1 truck, introduced in 1931 by the National Malleable and Steel Castings Co. (33 and 34). The bolster and side frames of

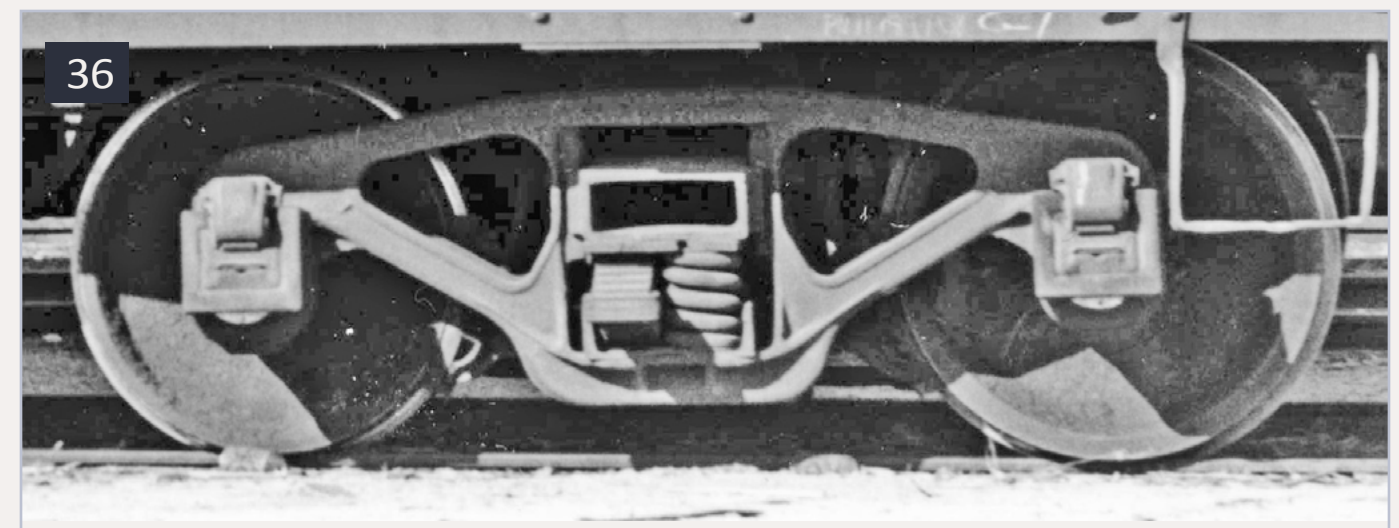
this truck interlocked so that the truck was self-aligning; no spring plank was required, resulting in a significant reduction of unsprung weight. Though distinctive in appearance, the National B-1 truck conformed in all respects to ARA/AAR specifications. Competitive in price and performance, it was widely adopted by many railroads in the 1930s and 1940s until it was rendered obsolete by trucks with built-in friction snubbers such as the Barber S-2 and ASF A-3 (see below).

Coil-elliptic trucks

Several truck manufacturers, notably Gould and Buckeye, began in the late 1920s to offer ARA/AAR standard trucks with a combination of coil and elliptic springs (35). The Pennsylvania Railroad also applied coil-elliptic spring packages to many of its later ARA type trucks (36). The advantage of this arrangement was that elliptical leaf springs had inherent friction between



35: An ARA truck with a combination of coil and elliptical leaf springs. Motion dampening was provided by the inherent friction of the leaves in the spring. Note that this particular truck had double-truss side frames, with the lower chords boxed-in, but was not self-aligning and still employed a spring plank.



36: Applied to a car built in 1936, this Pennsylvania Railroad truck with coil and elliptical springs was a direct descendant of the ca. 1920 2DF8 design, which the Pennsy continued to use long after other railroads (and the ARA itself) had abandoned it because its side frames tended to crack.

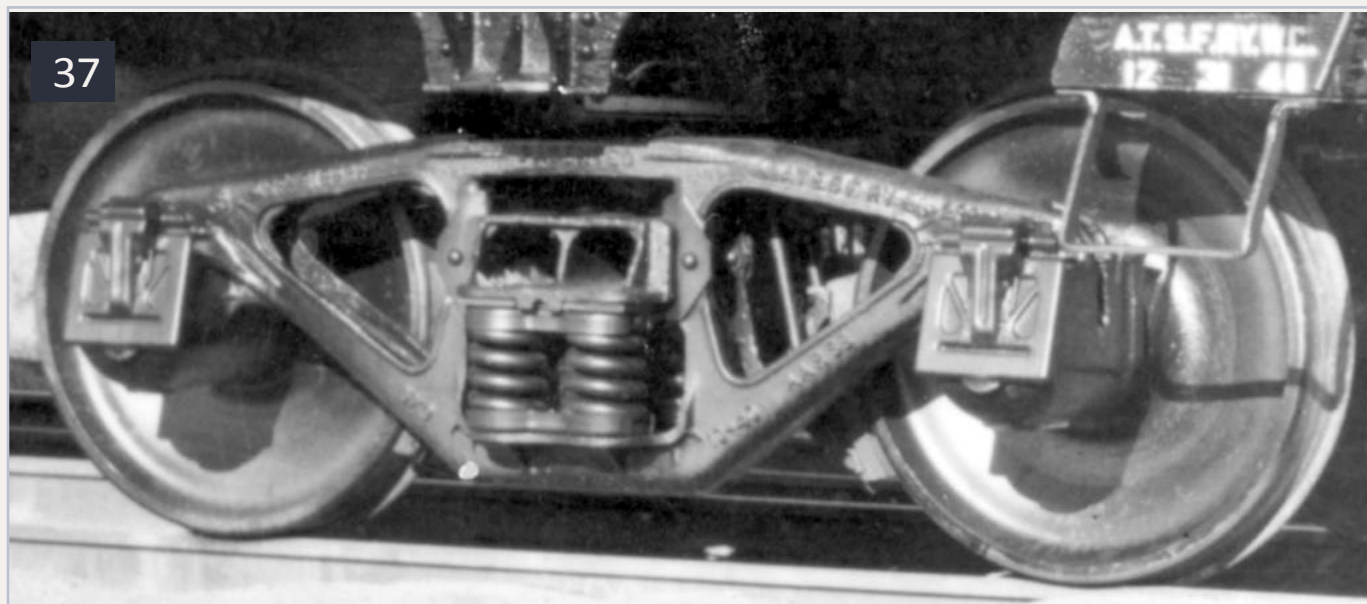
the leaves so that they tended to act as snubbers and damp out excessive jolts and oscillation.

AAR Self-Aligning Spring-Plankless trucks

The need for further research and development in the design of freight car trucks continued into the early 1930s, but owing to the effects of the economic depression, individual truck manufacturers lacked the capital to pursue it on their own. This led to formation of a consortium of truck manufacturers under the Four Wheel Railway Truck Agreement. All of those who participated in that agreement contributed to the research, and all were able to employ the resulting improvements without paying royalties.

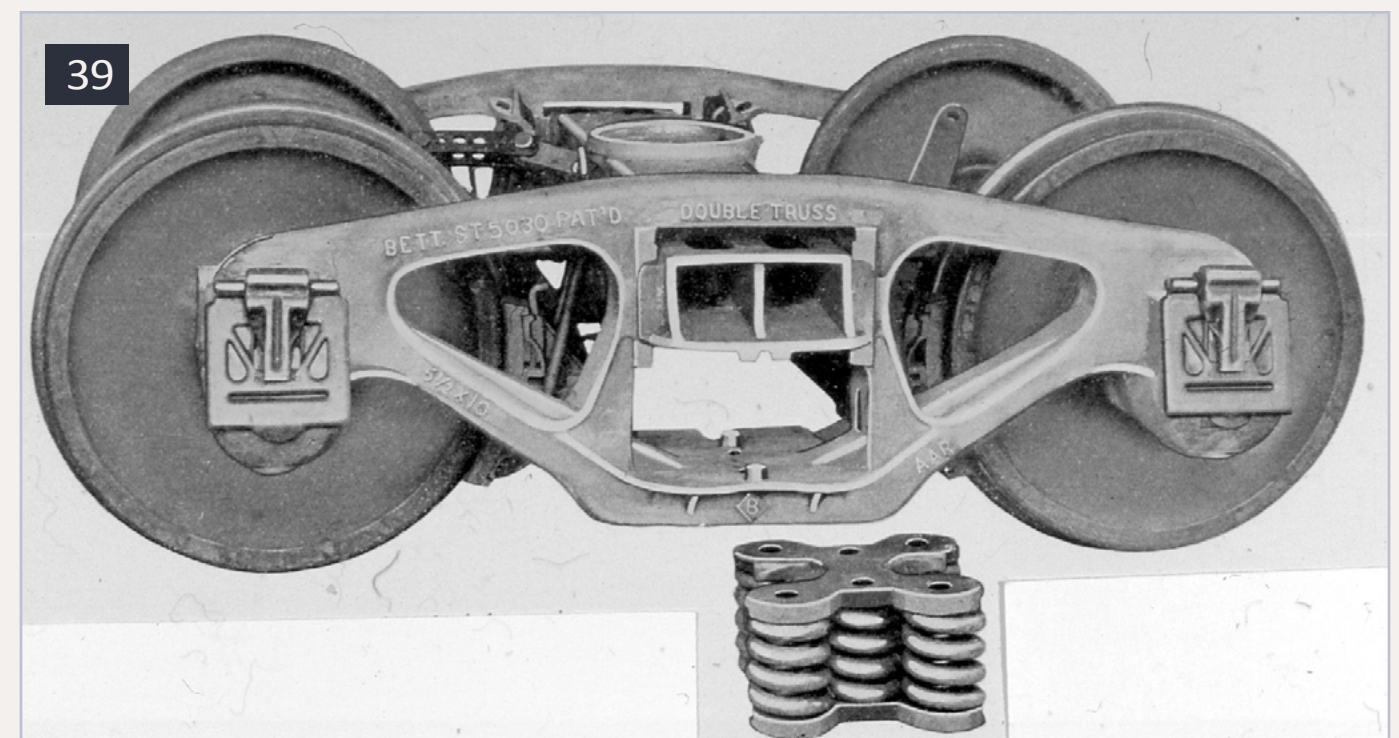
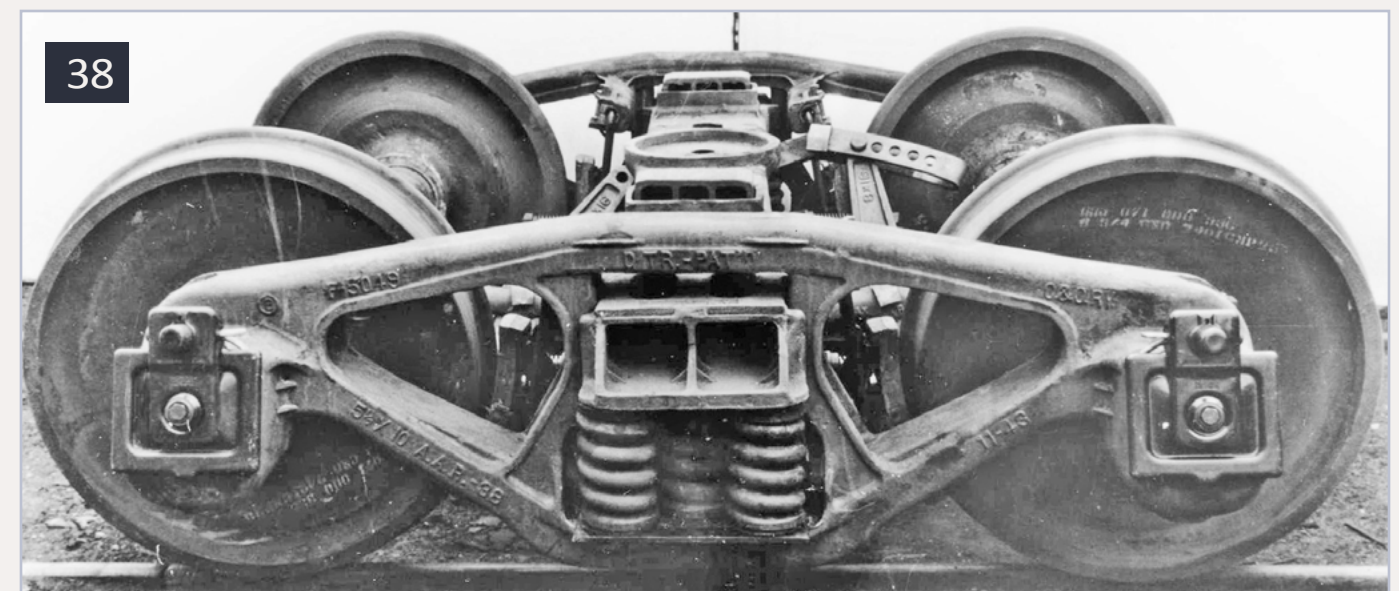
The outcome of this initiative was the Self-Aligning Spring-Plankless Double Truss truck, whose innovations combined to

improve performance, increase strength, and reduce weight. Self-alignment was accomplished by attaching the bolster to the side frames with interlocking, precisely-machined joints, thus eliminating the need for the spring plank (37). The double truss eliminated side frame cracking problems by boxing in the lower chords and extending a rib down the tops of the chords into the spring box (38 and 39). In the mid-1930s and '40s Self-Aligning Spring-Plankless Double Truss trucks replaced earlier truck designs on many new freight cars, despite their somewhat increased cost.



37: Made by American Steel Foundries in the 1930s, this truck was self-aligning and spring-plankless but did not have double-truss side frames; the lower chords had open u-sections and were not boxed in. Note the replaceable wear plates between the bolster and side frame.

38: A 50-ton self-aligning spring-plankless double-truss truck, employing all the features developed by the consortium of truck manufacturers under the four-wheel Railway Truck Agreement. The arrangement of five spring clusters with one in the center was an



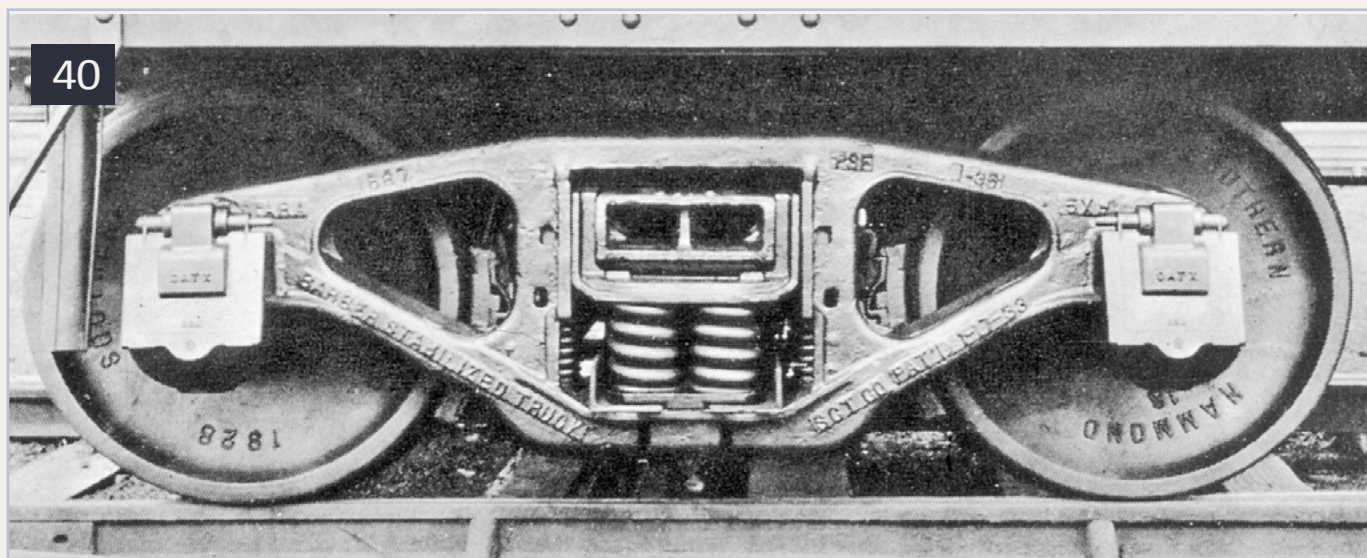
alternative to the equally-common four-spring clusters on 40- and 50-ton trucks.

39: The double-truss side frame design, with the ribs extending into the spring box, is clearly visible in this view with the spring package removed. Note also the absence of a spring plank. In the spring package, the inner springs are barely visible inside the outer ones; few modelers seem aware that truck springs had both inner and outer coils.

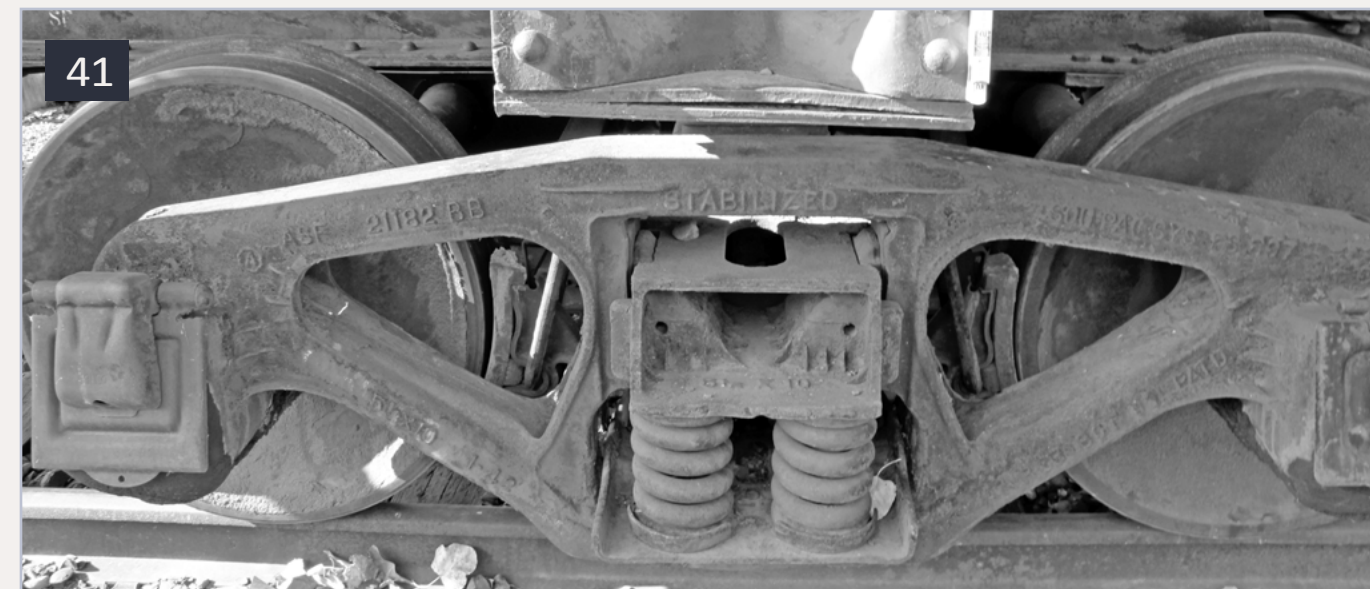
Barber stabilized trucks

With the example of after-market friction snubbers before them, all of the major truck manufacturers began to explore the design of trucks with built-in snubbers. The first such truck to reach the market was the Standard Car Truck Co.'s Barber Stabilized S-1, which appeared in the early 1930s (40). It had a spring plank and was not self-aligning, but it incorporated spring-loaded triangular steel wedges between the bolster and side frames which snubbed out excessive motion and harmonic oscillation. It rapidly demonstrated superior riding qualities and doubtless would have been more widely adopted if the depression had not severely reduced the production of new freight cars.

By the late 1930s, an improved version of the Barber Stabilized truck, the Barber S-2, was introduced. At first it also had a



40: An early '30s Barber Stabilized S-1 truck with spring-loaded friction wedges between the bolster and side frame; note the small springs just visible at the edges of the spring box which applied pressure to the wedges. This truck had a spring plank as well as Barber lateral motion devices.

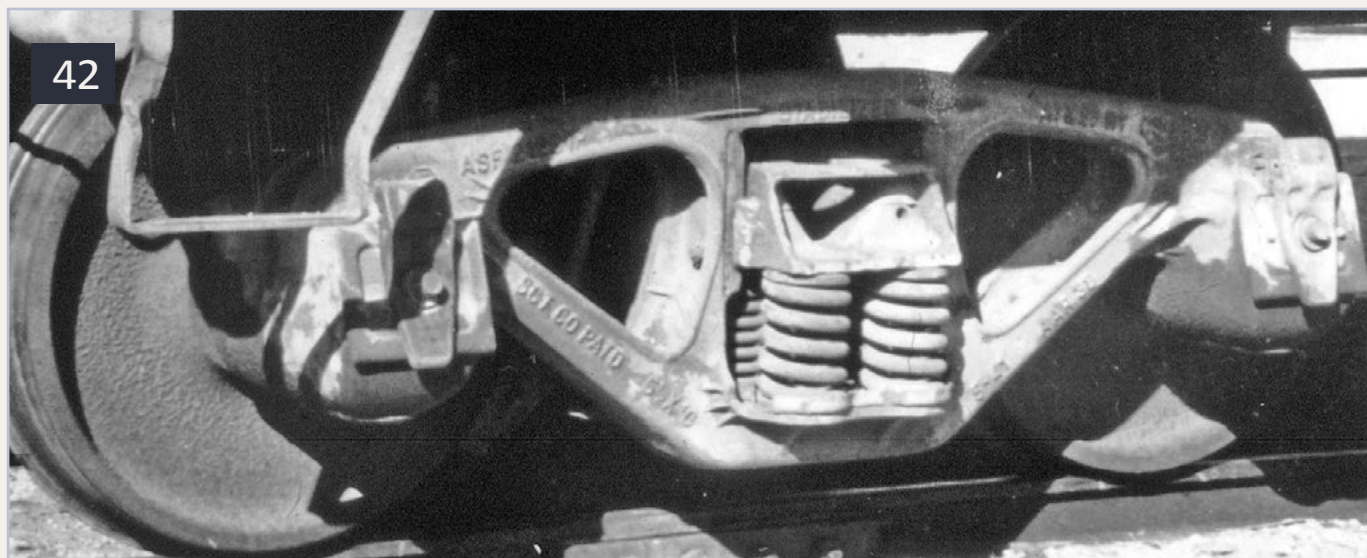


41: A later S-2 version of the Barber Stabilized truck, still with a spring plank. The small springs bearing on the friction wedges had been moved in so they were behind the front row of main truck springs; note the wedge pockets inside the bolster and the tops of the wedges that are just visible between the bolster and side frame.

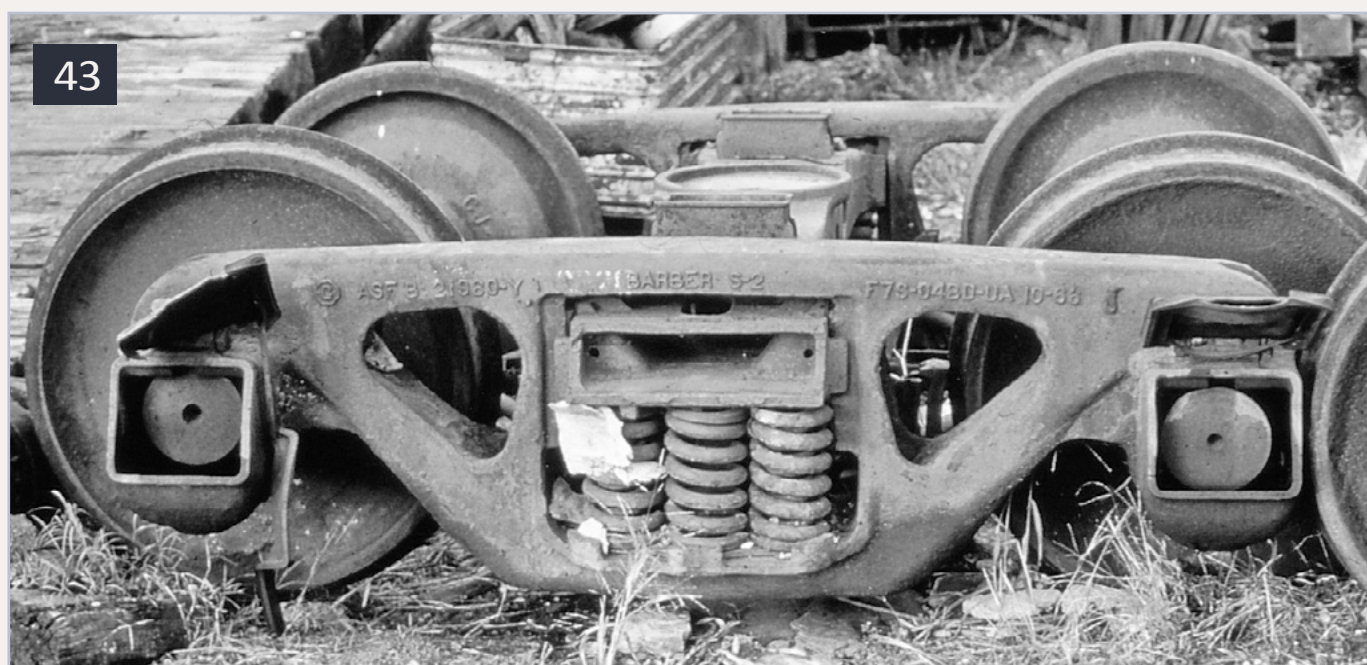
spring plank (41), but a self-aligning spring-plankless S-2 quickly followed (42), as well as the 70 ton Barber S-3 (43). The S-2 was so successful that it was licensed to other truck manufacturers and, following World War II, became one of the two most widely-used freight car trucks, the other being the ASF A-3 (below). The Barber S-2 design was easily modified for roller bearings, and as a roller bearing truck, it remains in production today.

ASF A-3 Ride Control trucks

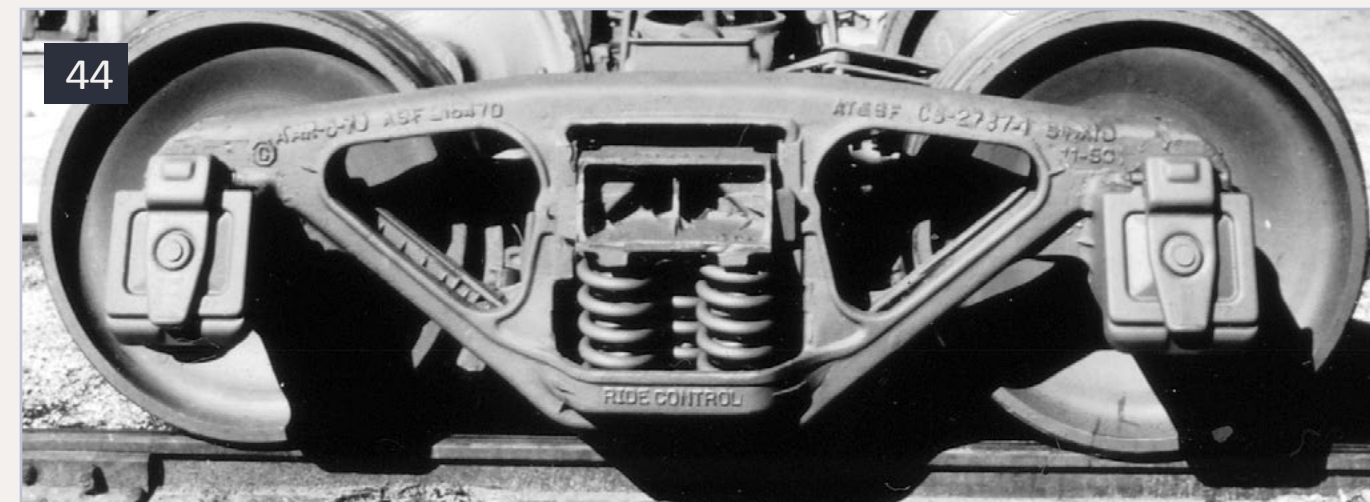
American Steel Foundries developed the ASF A-3 Ride Control truck in the early 1940s, but before it could be placed on the market World War II broke out, and the federal government



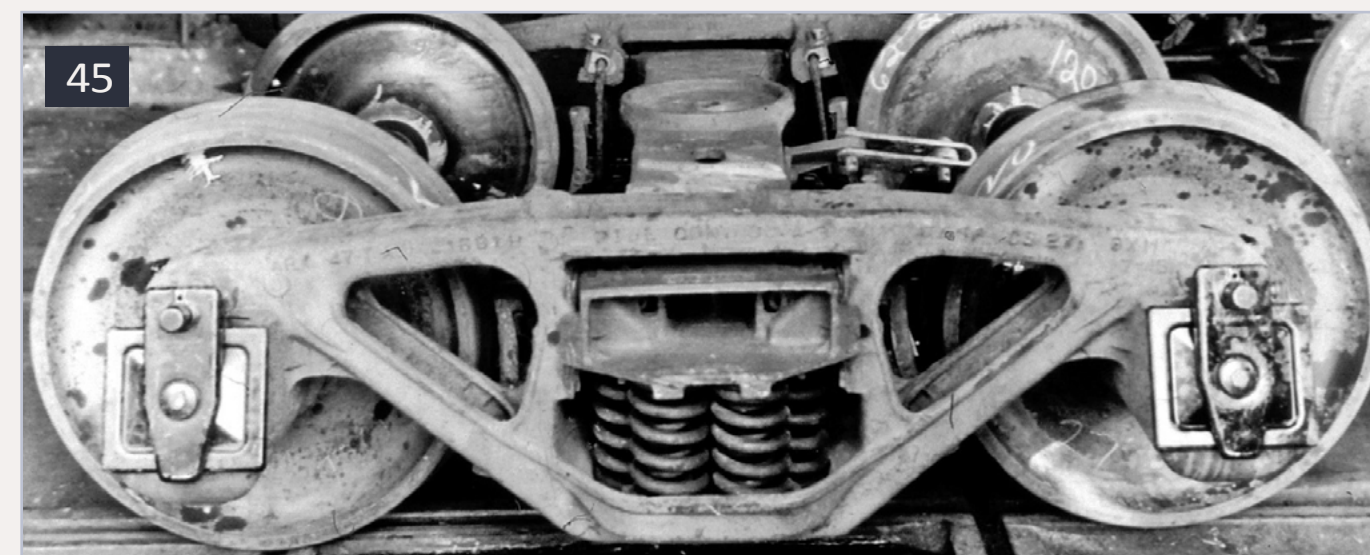
42: The final development of the Barber Stabilized design, this S-2 truck was self-aligning and spring-plankless. In this view a friction wedge spring can be seen behind the left front main spring. Note that this truck was made by American Steel Foundries under license from the Standard Car Truck Co.



43: Though battered and long out of service, this 70-ton Barber S-3 truck has the friction wedge pockets of the Barber Stabilized design visible inside the bolster casting and the large journal boxes, longer wheelbase, and six spring cluster that were characteristic of 70-ton trucks.



44: A typical truck of ASF A-3 Ride Control design, which was first introduced in the mid-1940s and rapidly become the most popular freight car truck on North American railroads. Distinctive features were long travel springs (note that the inner springs are clearly visible) and the bulge at the bottom of the side frame which enclosed the lower part of the spring package.

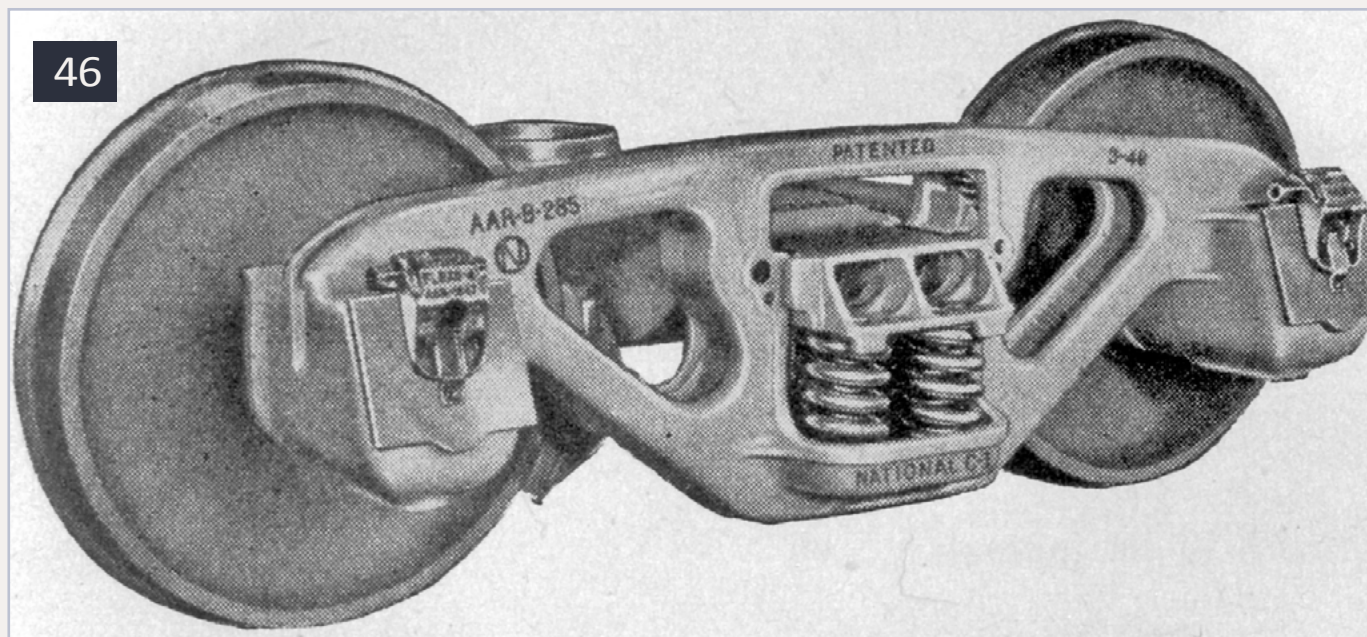


45: A 70-ton version of the ASF A-3 design with 5'8" wheelbase. The triangular pockets for the friction wedges between the side frame and bolster are apparent inside the bolster. What was different from the Barber Stabilized design was that, instead of separate friction wedge springs, the small springs inside the outer main springs applied pressure to the wedges.

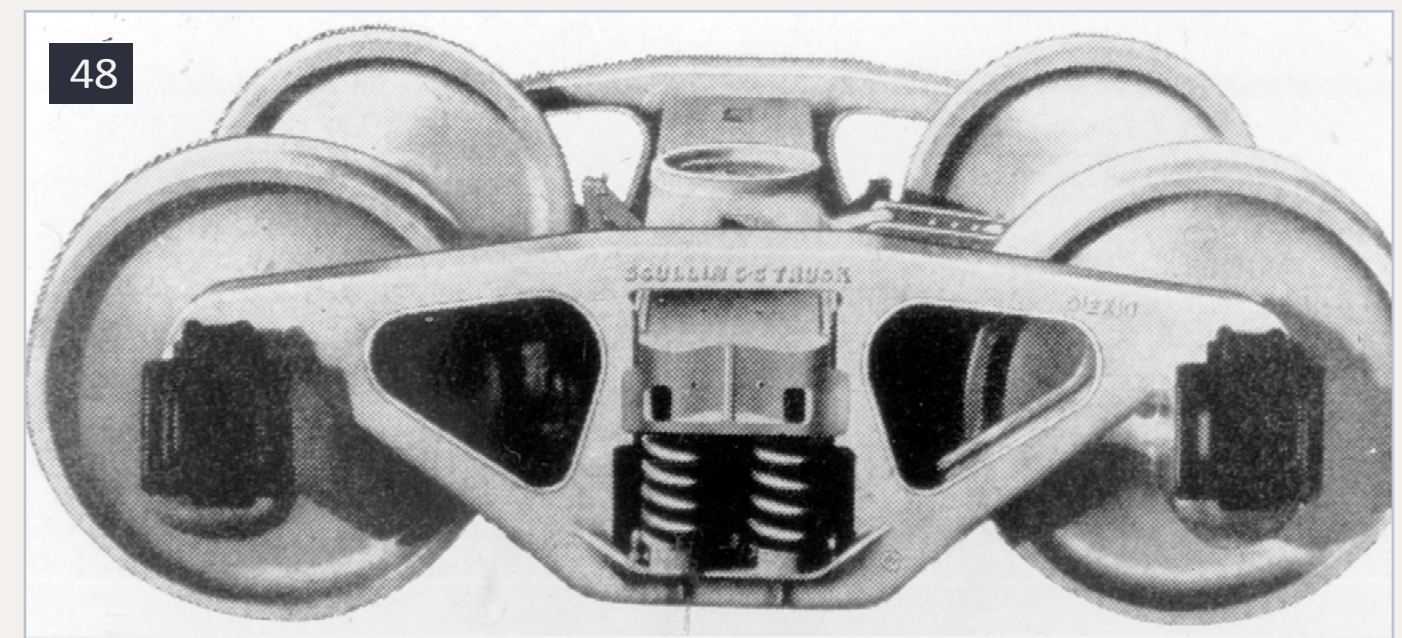
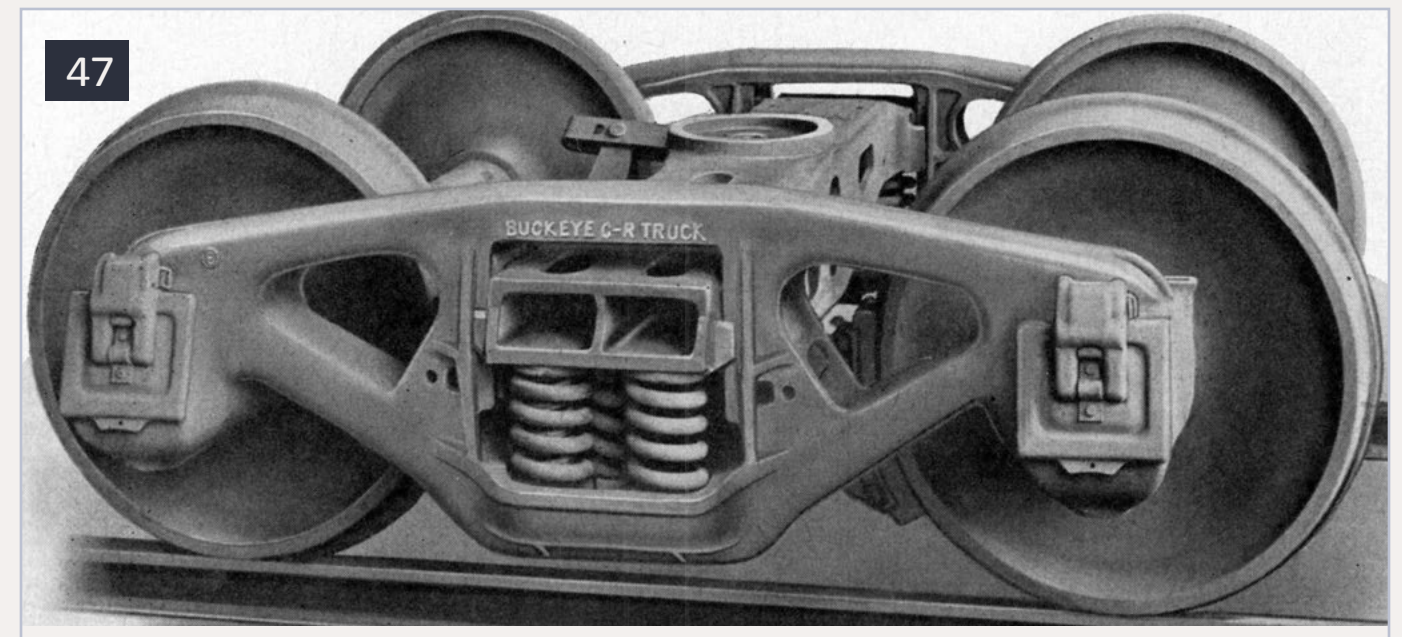
prohibited the production of new and unproven designs with what were then scarce materials. This restriction was withdrawn by 1944, however, and the A-3 truck quickly rivaled and eventually exceeded the popularity of the Barber S-2. It was a self-aligning spring-plankless truck and, like the S-2, it employed spring-loaded wedge type snubbers between the bolster and side frames for ride control (44 and 45). As with the Barber S-2, the ASF A-3 was licensed to other truck manufacturers, readily lent itself to the application of roller bearings, and continues to be produced as a roller bearing truck.

Other postwar trucks with ride control features

Following World War II, the success of the Barber S-2 and ASF A-3 trucks led a number of other truck manufacturers to design their own trucks with built-in friction snubbers. Several examples

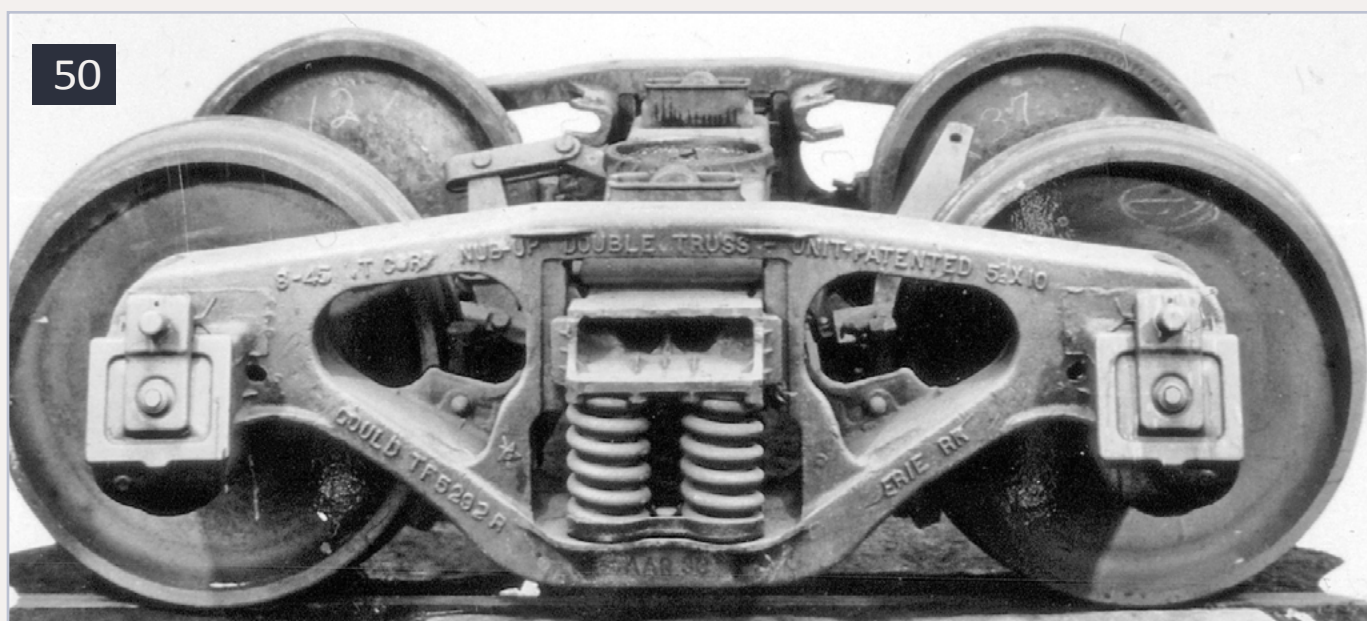
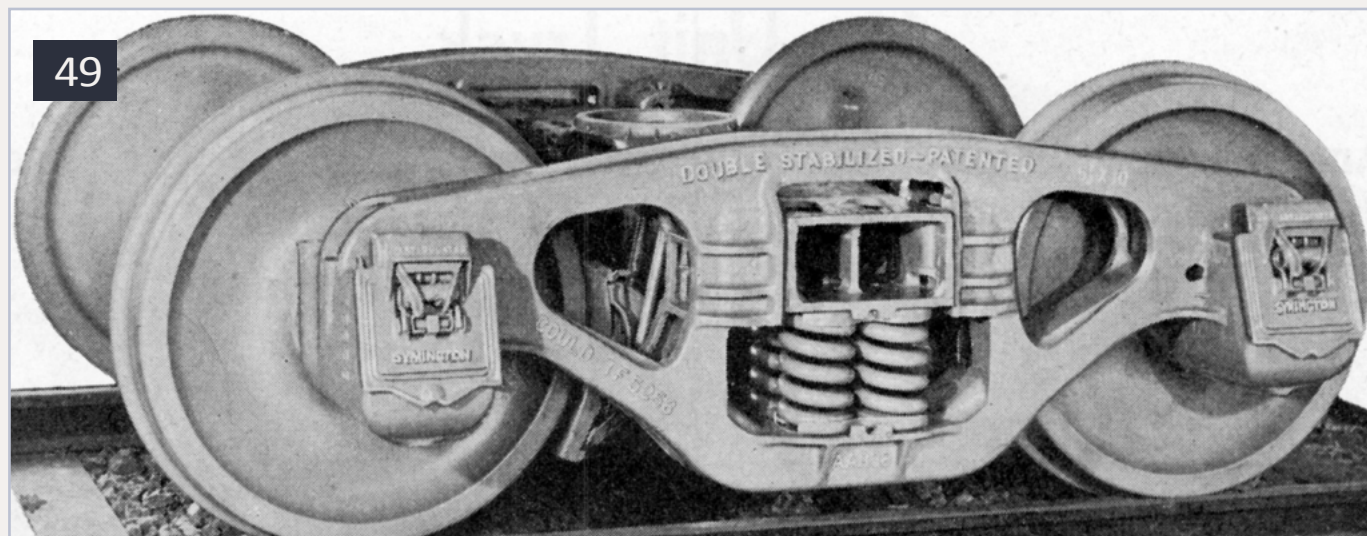


46: Another postwar truck design with built-in snubbers that enjoyed some success was the National C-1. It was similar to the ASF A-3 except that the friction wedges between bolster and side frames were inverted, with the wedge springs above them.



47-50 (following page also): Other postwar trucks with spring loaded snubbers included the Buckeye C-R, the Scullin S-S, the Gould Double Stabilized, and the Snub-Up. All rode better than conventional trucks, but cost more and failed to attract a large share of the market.

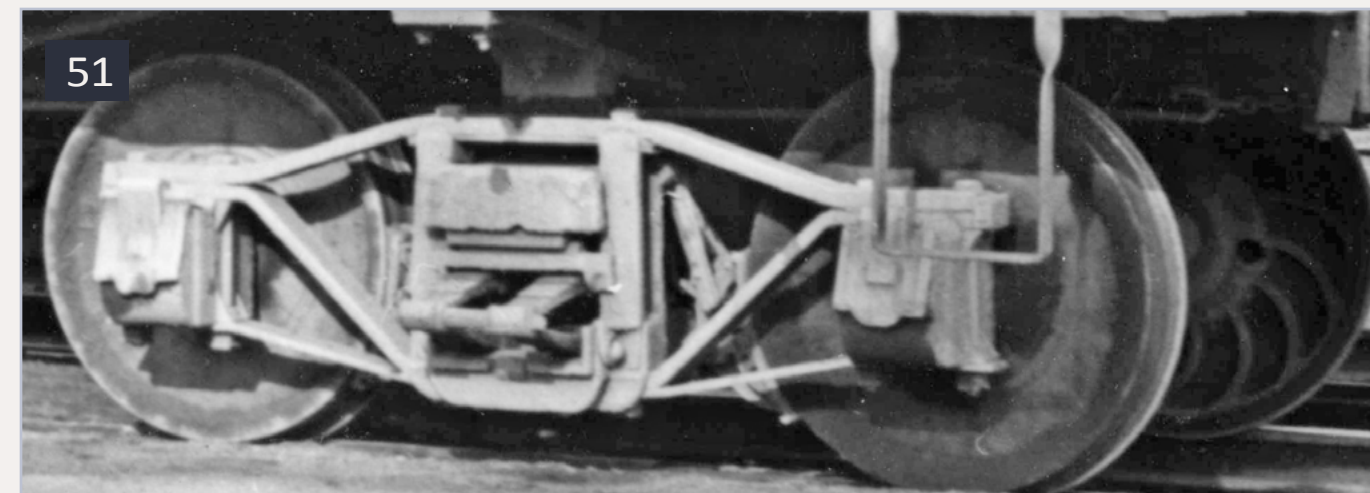
are shown here and on the following page (46 through 50) although none were remotely as successful as the S-2 and A-3.



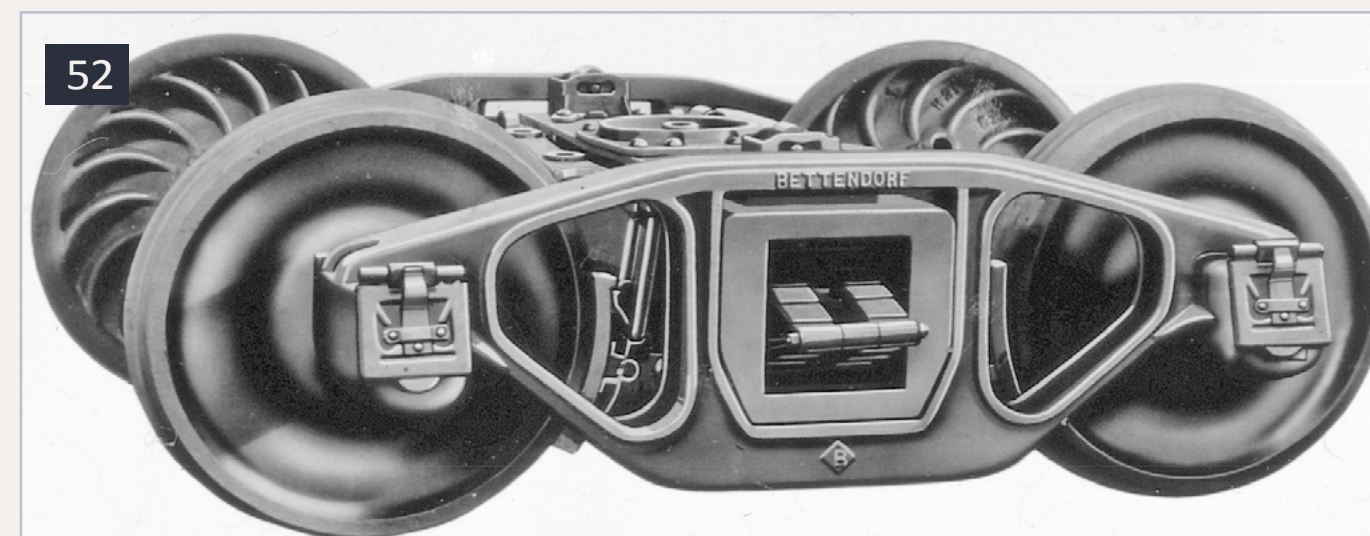
See previous page for caption.

Caboose trucks

Cabooses were easy on trucks, as they were lightly-loaded and received regular maintenance, but good riding qualities were, for obvious reasons, desirable. In the first quarter of the 20th century, most cabooses rode on arch bar or Andrews trucks with elliptical leaf springs (51). Then, in the 1920s, the Bettendorf Swing Motion caboose truck was developed. This truck improved riding qualities and durability by combining cast steel integral-journal-box side frames with leaf springs

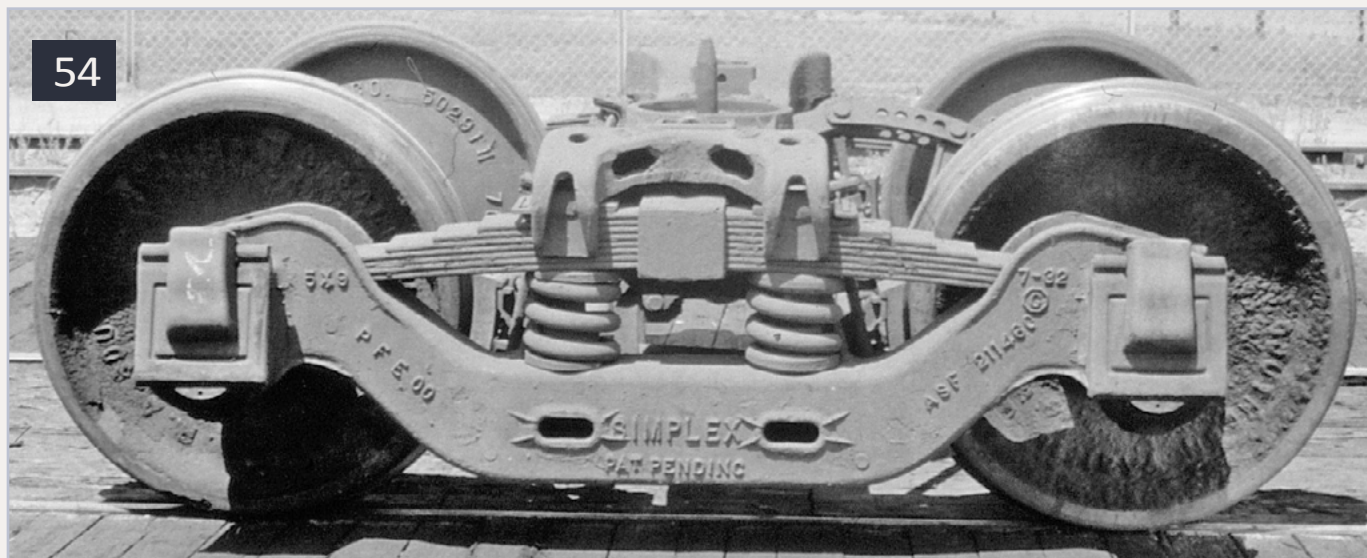
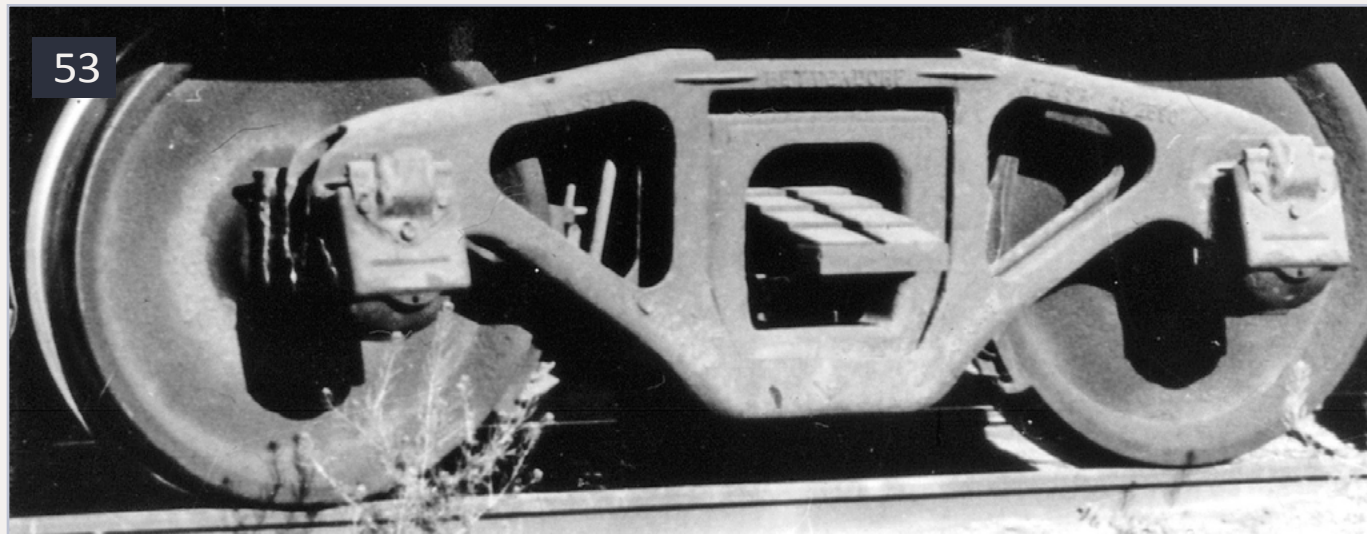


51: Prior to the mid-1920s, most cabooses rode on arch bar trucks with elliptical leaf springs, as shown here. The problems with arch bars when not consistently maintained were not an issue with lightly-loaded caboose trucks which never went off line, and the leaf springs provided damping action to reduce excessive jolts and bounces.



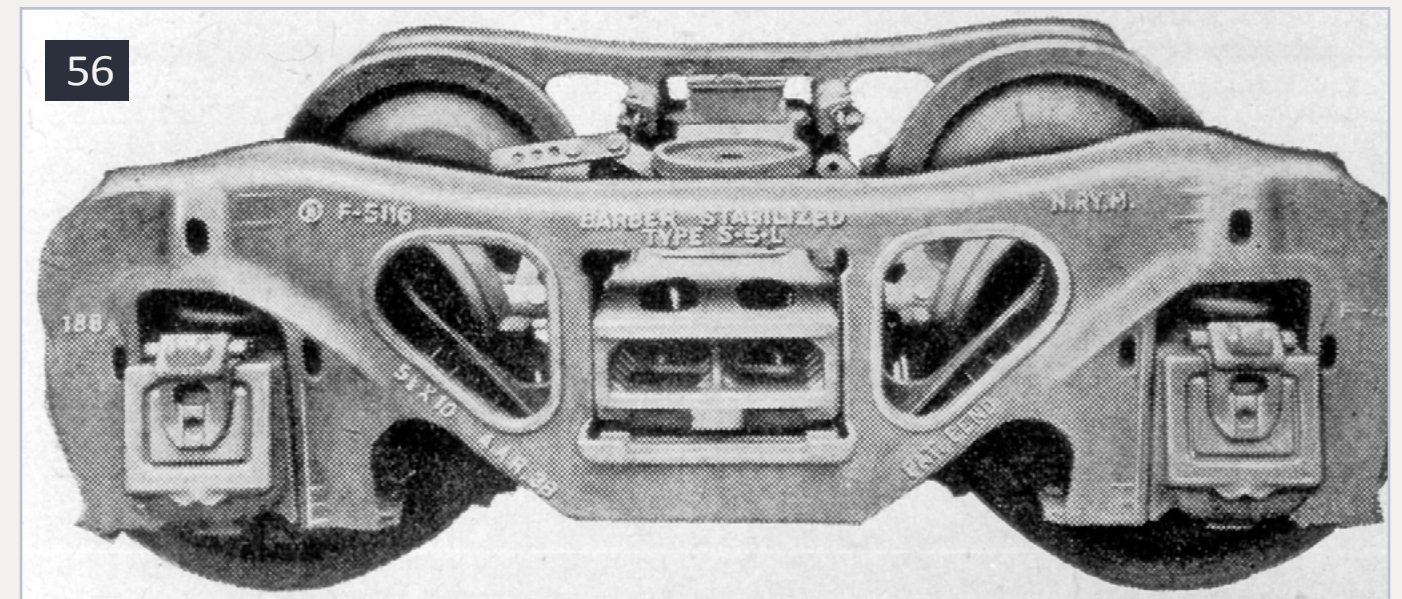
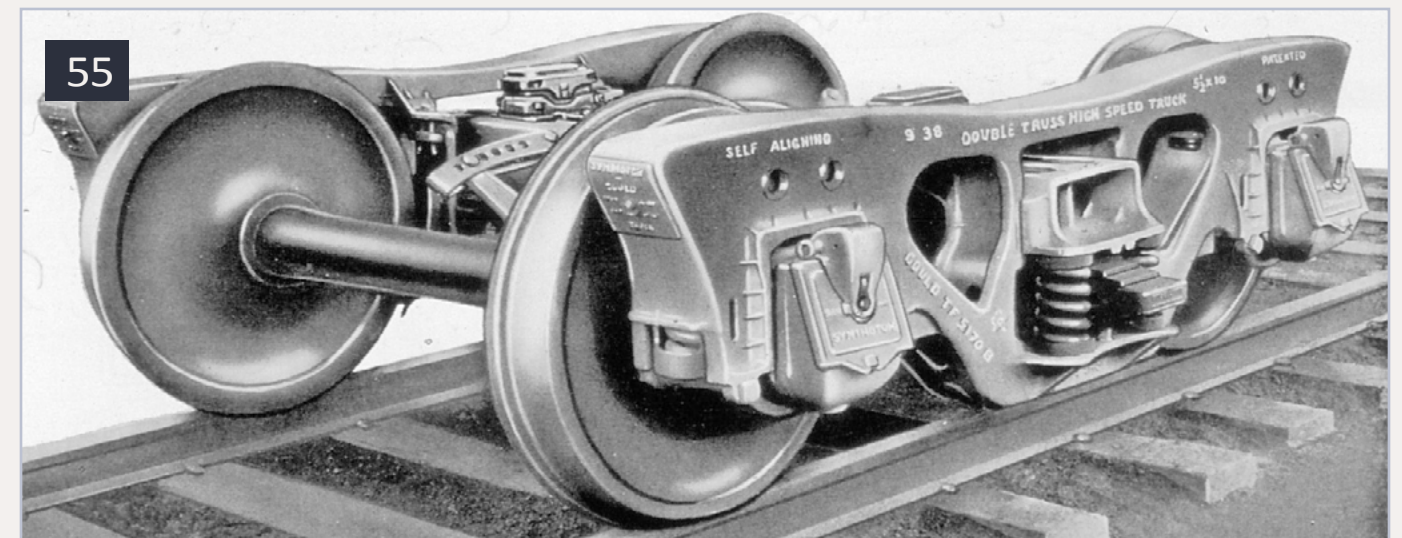
52: In the 1920s, Bettendorf's swing motion caboose truck was a major step forward in riding qualities for cabooses. It featured cast steel side frames with integral journal boxes, leaf springs, and a swing motion bolster.

and a swing motion bolster (52). A decade later, Bettendorf made some improvements in the swing motion truck, and soon thereafter the design was sold to the Standard Car Truck Co., which marketed it in the 1940s and later as the Barber-Bettendorf caboose truck (53).



53: Bettendorf made some minor improvements to its swing motion caboose truck in the 1930s and then sold the rights to the design to the Standard Car Truck Co., which renamed it the Barber-Bettendorf swing motion caboose truck and continued to offer it through the 1950s.

54: Introduced in the 1930s, the Simplex truck employed long leaf springs, in addition to coil springs,



(54 Continued): to improve riding qualities at high speeds. Apparently it rode better but cost more than conventional trucks, and was not widely adopted.

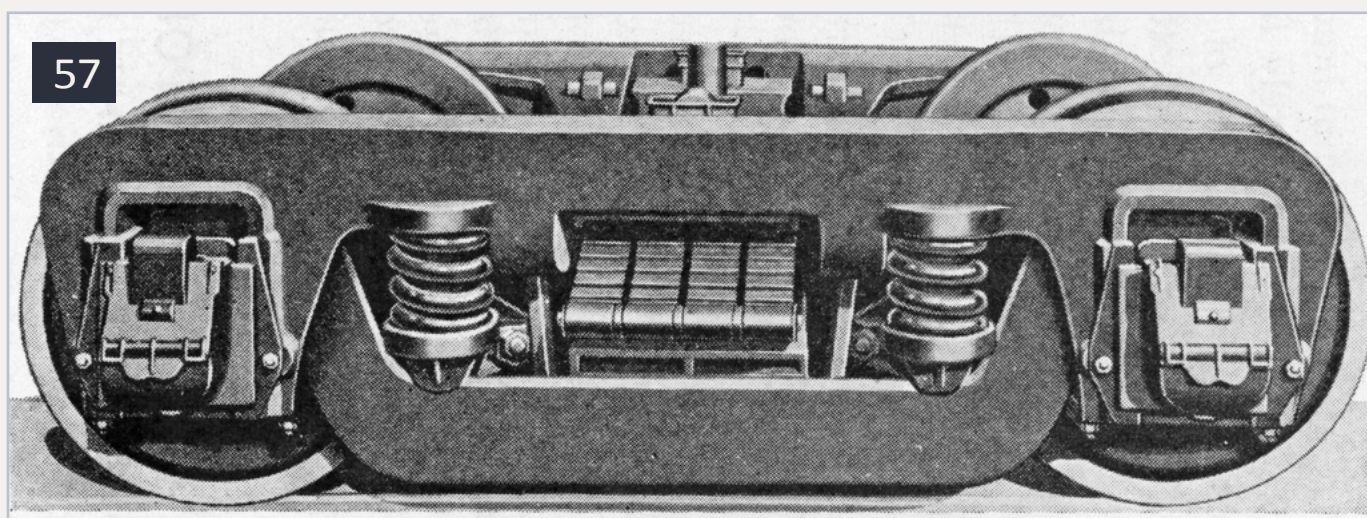
55: The Gould high speed truck had sprung journal boxes in pedestal jaws, as well as both coil and leaf springs between the side frames and bolster. A self-aligning spring-plankless double-truss truck, it employed all of the innovations developed in the 1930s by the four-wheel railway truck consortium.

56: Another high-speed truck that employed sprung journal boxes sliding vertically in pedestal jaws was the Barber S-5-L, which also had Barber lateral motion devices.

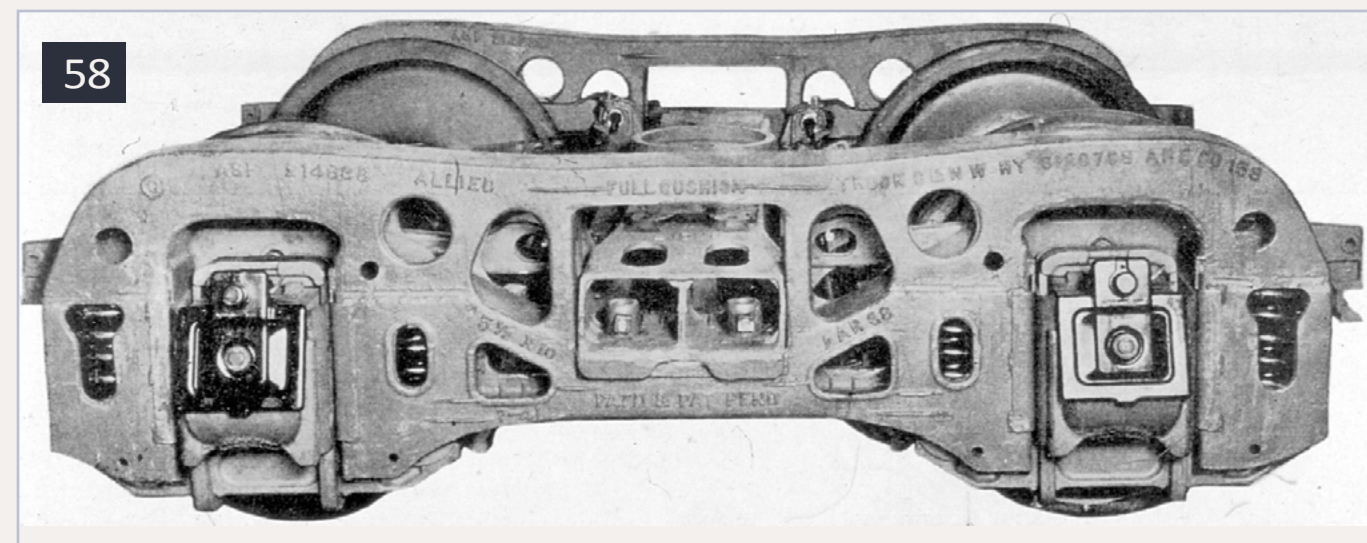
High-speed trucks

In the 1930s, as a number of railroads began using box and refrigerator cars in passenger express service, freight car trucks began to be developed for operation at passenger train speeds. The ASF Simplex truck, with its long and flexible leaf springs, was an example of a truck developed for this purpose (54). Other efforts to produce a high-speed freight car truck resulted in the Barber S-5 and Gould trucks with sprung journal boxes in side frame pedestal jaws (55 and 56). Commonwealth also offered a short wheelbase passenger-car-type truck with drop equalizers which had both coil and leaf springs (57).

The Allied Full Cushion truck, introduced in 1940, provided a better ride at higher speeds and was applied by a number of railroads to freight cars in passenger train service, as well as to a large number of freight-car-based troop sleepers and kitchen cars built during World War II for the federal government (58). However, it turned out that Allied trucks had derailment



57: Commonwealth, primarily a maker of passenger car trucks, offered this high-speed truck whose drop equalizers and combination of coil and elliptic springs gave it the appearance of a short wheelbase passenger car truck.



58: When it first appeared ca. 1941, the Allied Full Cushion truck was a revolutionary effort to provide a better riding high-speed truck for freight cars in passenger express service. However, its tendency to derail proved impossible to correct completely, and it was outlawed in interchange in 1955.

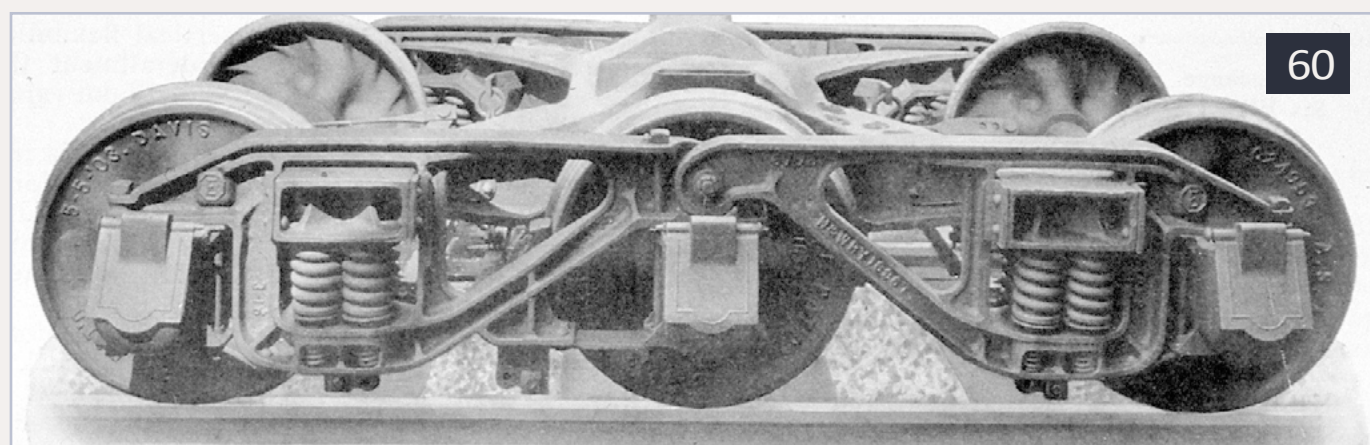
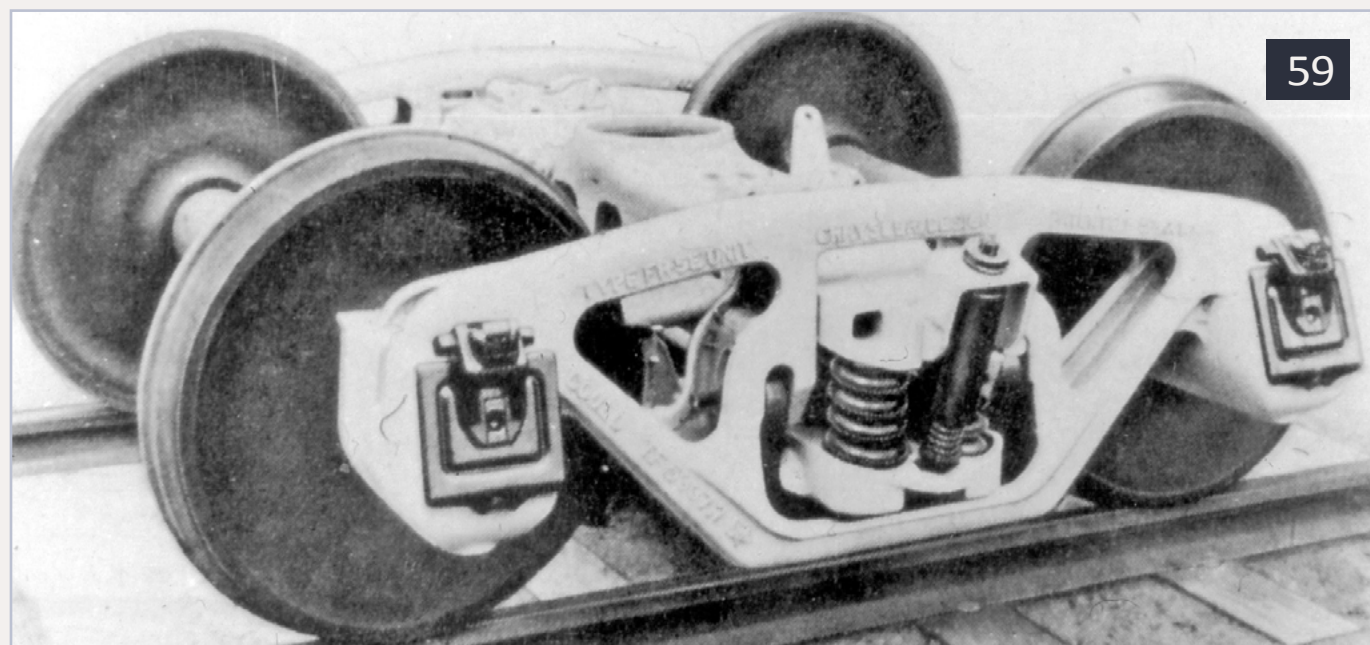
problems, and intensive efforts to cure this shortcoming were only partly successful, so they were little-used after the war, and finally were banned in interchange in 1955.

After World War II, the Chrysler Corporation attempted to improve truck performance by the use of automotive technology in the Chrysler FR-5 truck (59). This truck had a swing motion bolster and hydraulic shock absorbers, among other features, but these innovations did not compensate for its additional cost and increased maintenance requirements, and it was not widely adopted.

Heavy-duty trucks

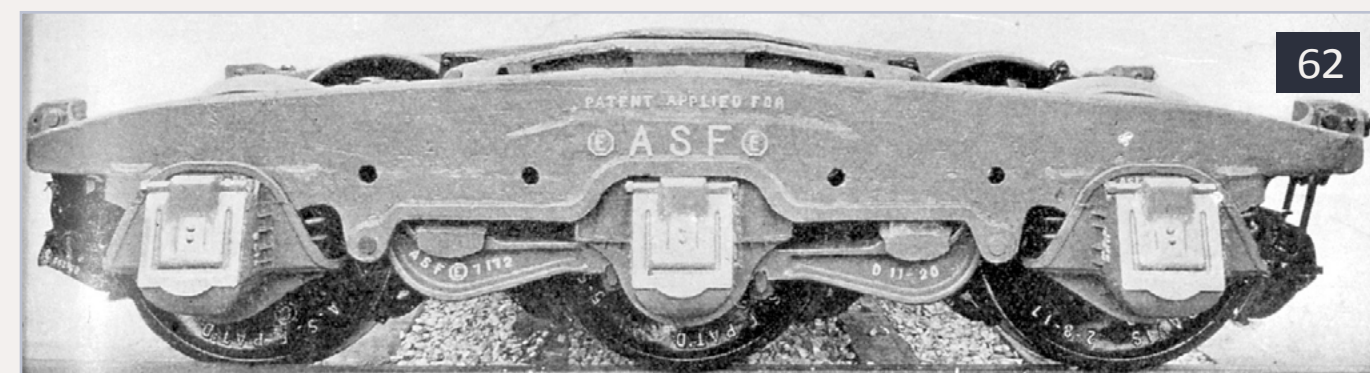
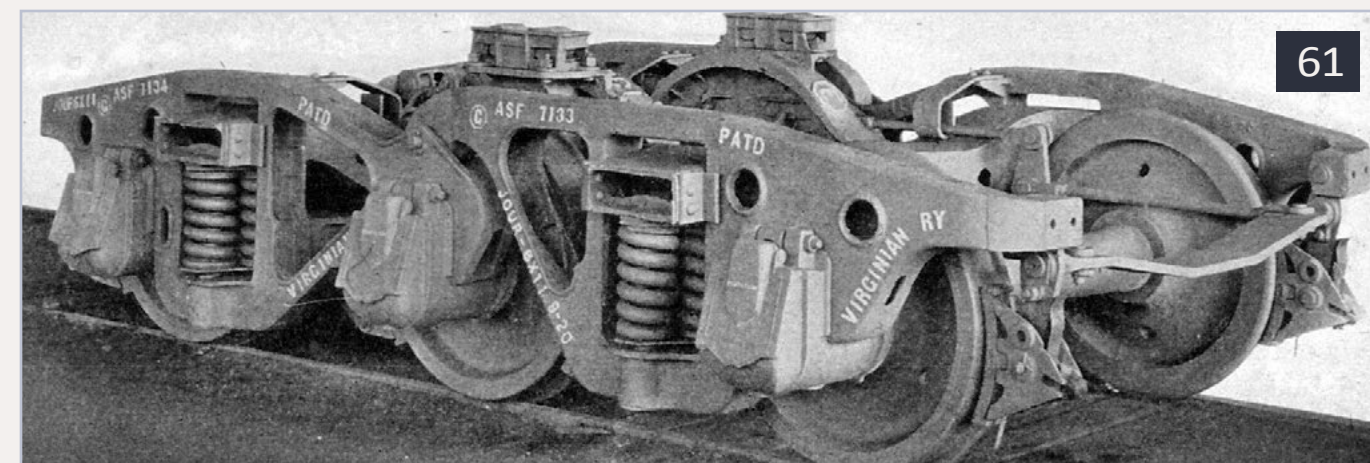
Relatively few freight cars built between 1900 and 1960 had nominal capacities exceeded 70 tons. However, early in the 20th century some very large coal hoppers and gondolas were constructed with capacities of up to 100 tons, and those cars required special high-capacity six wheel trucks. Usually these

were especially designed for the cars they were used on, and none were made in large numbers. Some examples of those trucks were the ASF, Lewis, and Lamont trucks (60, 61, and 62).



59: After World War II, Chrysler designed a high-speed truck using some concepts from automotive technology. The Chrysler C-5E truck had lateral-motion rocker arms connecting its side frames and bolster, and snubbing was provided by a tubular hydraulic shock absorber. It worked well but cost more and required periodic maintenance, so it was not adopted in large numbers.

60-62: High capacity freight cars were often equipped with six-wheel trucks. Here are three from early in

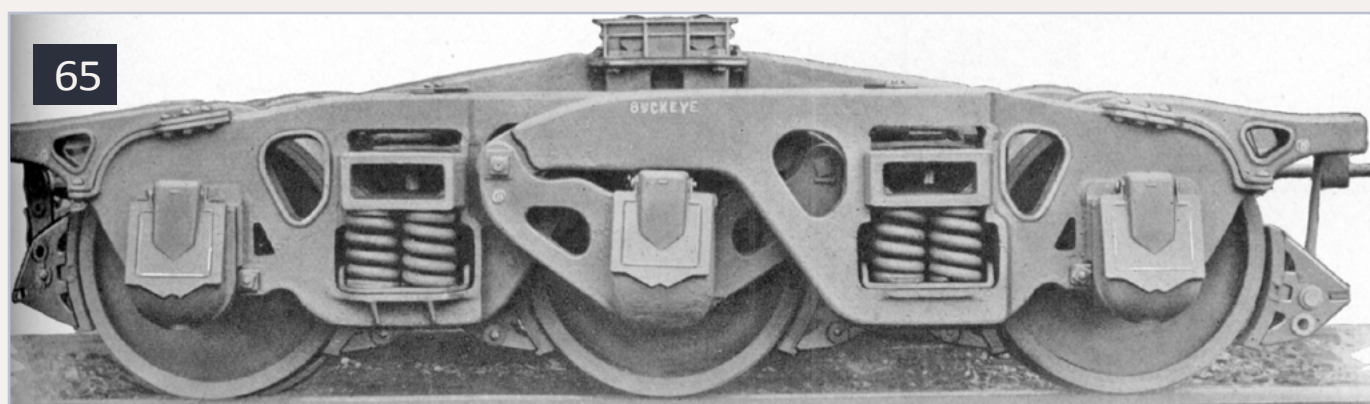
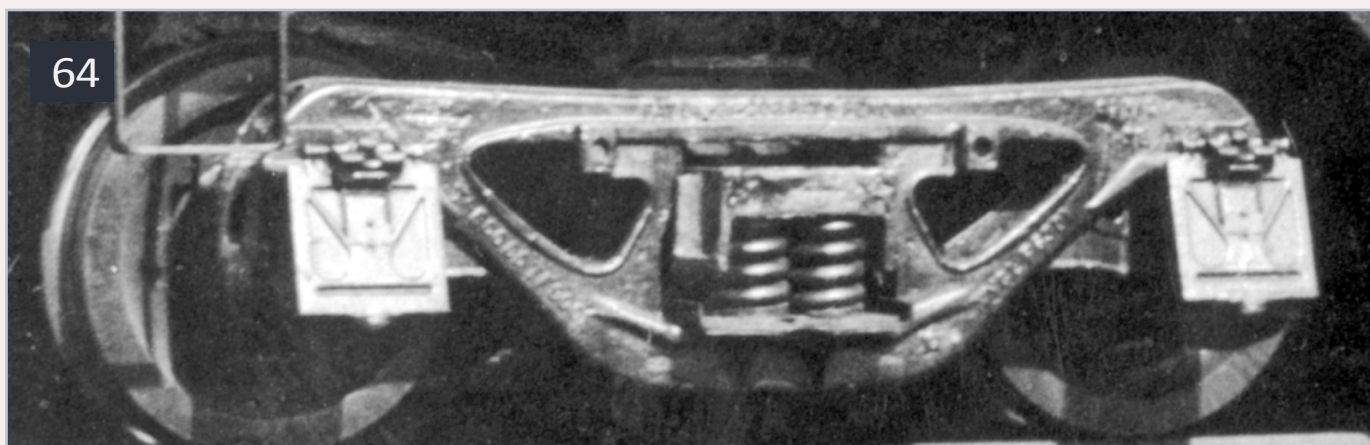
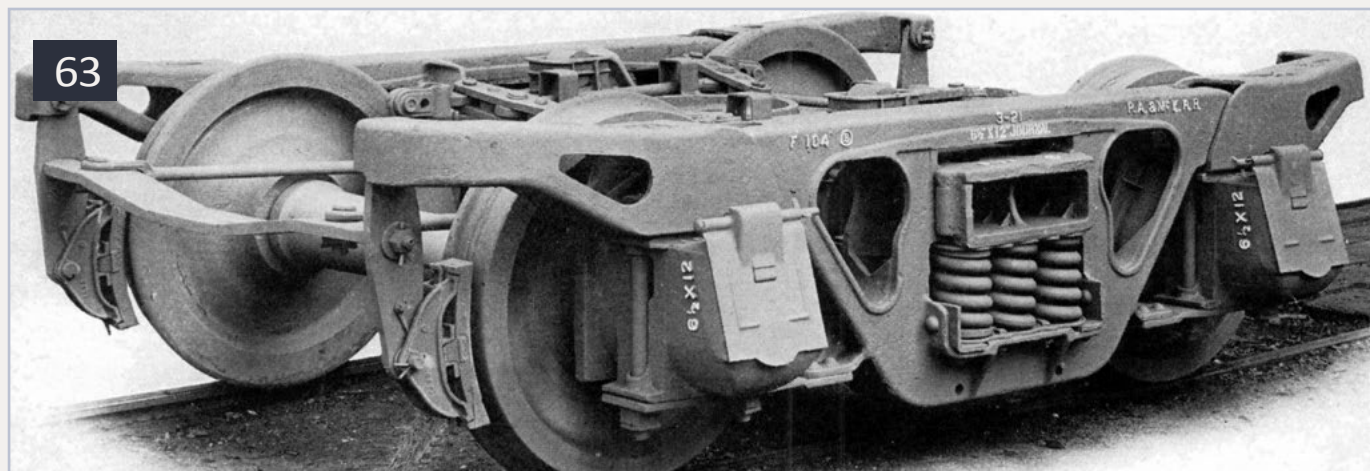


(60-62 continued) the 20th century, the ASF, Lewis, and Lamont trucks, all designed for 100-ton coal hoppers and gondolas. None were produced in large numbers.

In the 1920s, a small number of high-capacity flat cars began to be built to carry very heavy industrial loads, and these cars also required special heavy duty trucks. Cars of 90 tons nominal capacity usually had four-wheel trucks (63 and 64). Cars with 100 ton or higher capacities used six-wheel trucks (65 and 66). In a few extreme cases, two four-wheel trucks connected by a massive span bolster were used at each end of the car (67).

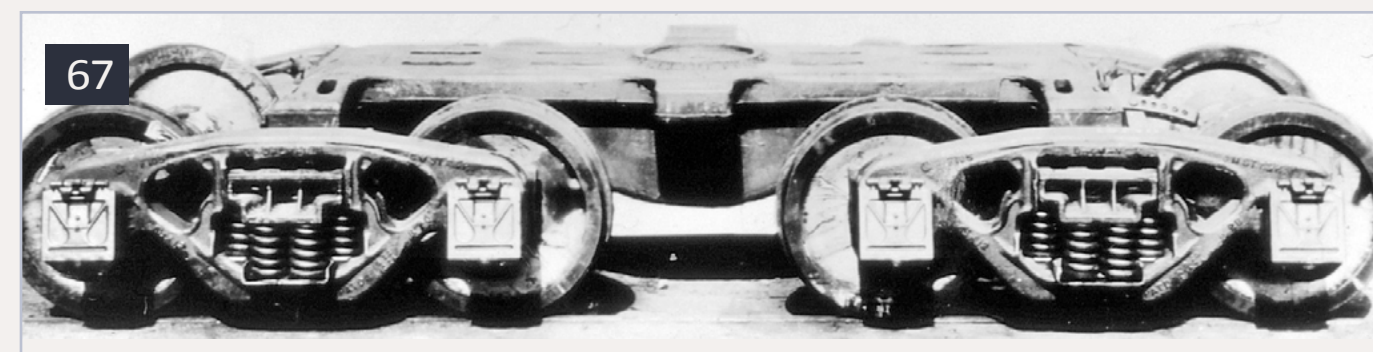
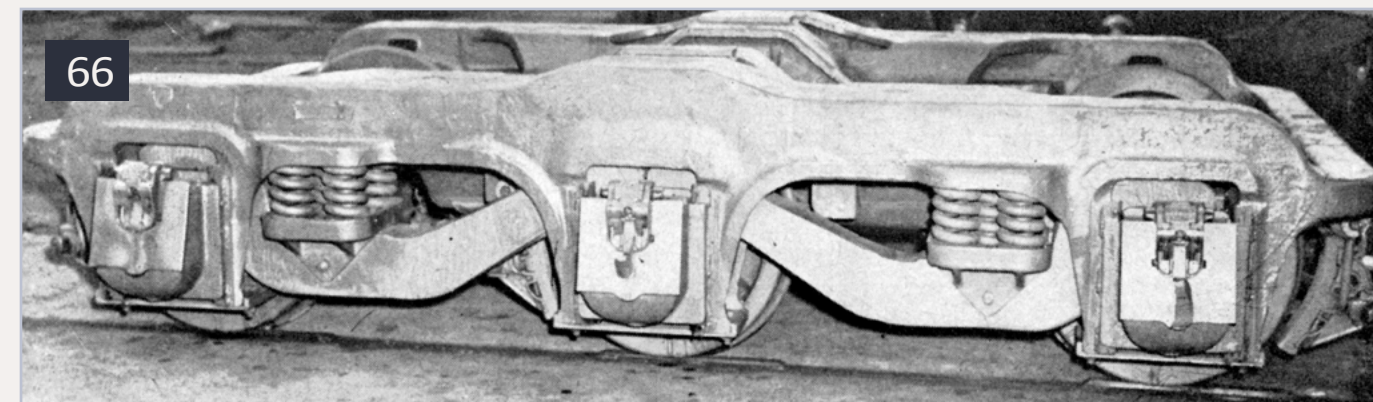
Early roller bearing trucks

Roller bearing trucks existed earlier than many modelers realize; the Stafford Roller Bearing Car-Truck Corporation introduced a roller bearing arch bar truck in the early 1920s (68). Those early roller bearings were costly and did not wear well,



63: This 90-ton truck, built in the early 1920s and essentially of Andrews design, had very large journal boxes and side frame extensions to support the outboard brake rigging for clasp brakes.

64: Used under a 90-ton drop center flat car, this truck looked like an ARA standard truck on steroids. Although the design was essentially the same, its journal boxes were huge and the side frame and bolster castings had much heavier sections than on a truck of less capacity.



65: With articulated side frames for better weight distribution, this Buckeye six-wheel truck had a nominal capacity of 100-tons (i.e., a pair of them could support a hundred-ton load).

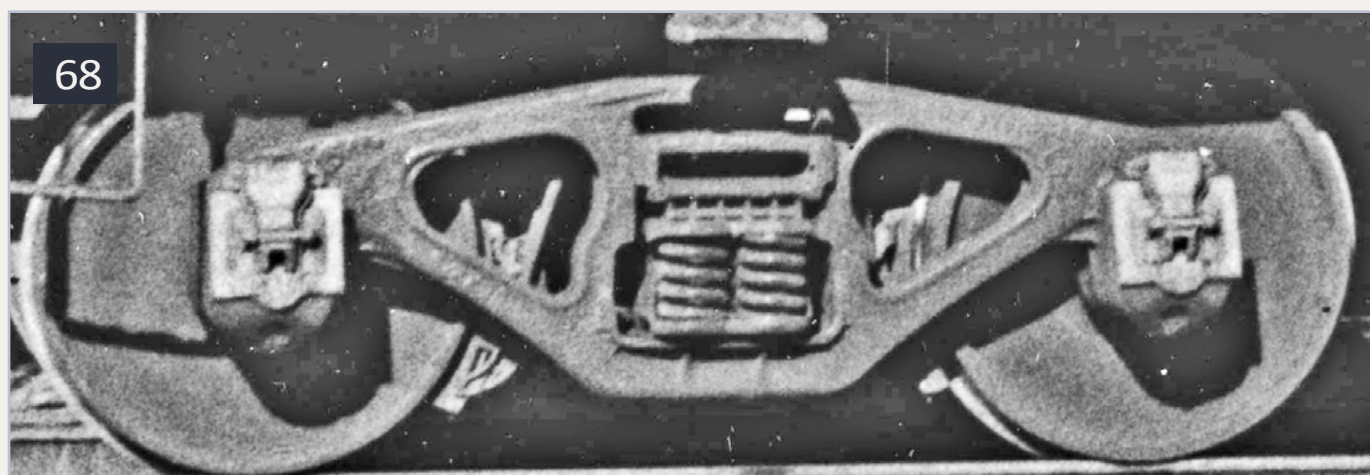
66: Drawing from passenger car truck practice, Commonwealth produced this heavy-duty six-wheel freight car truck with drop equalizers.

67: When even six-wheel trucks weren't enough to support a car's intended capacity, it was possible to put two four-wheel trucks under each end, with each pair connected by a massive span bolster. In this case, the trucks were Dalman Two Level.

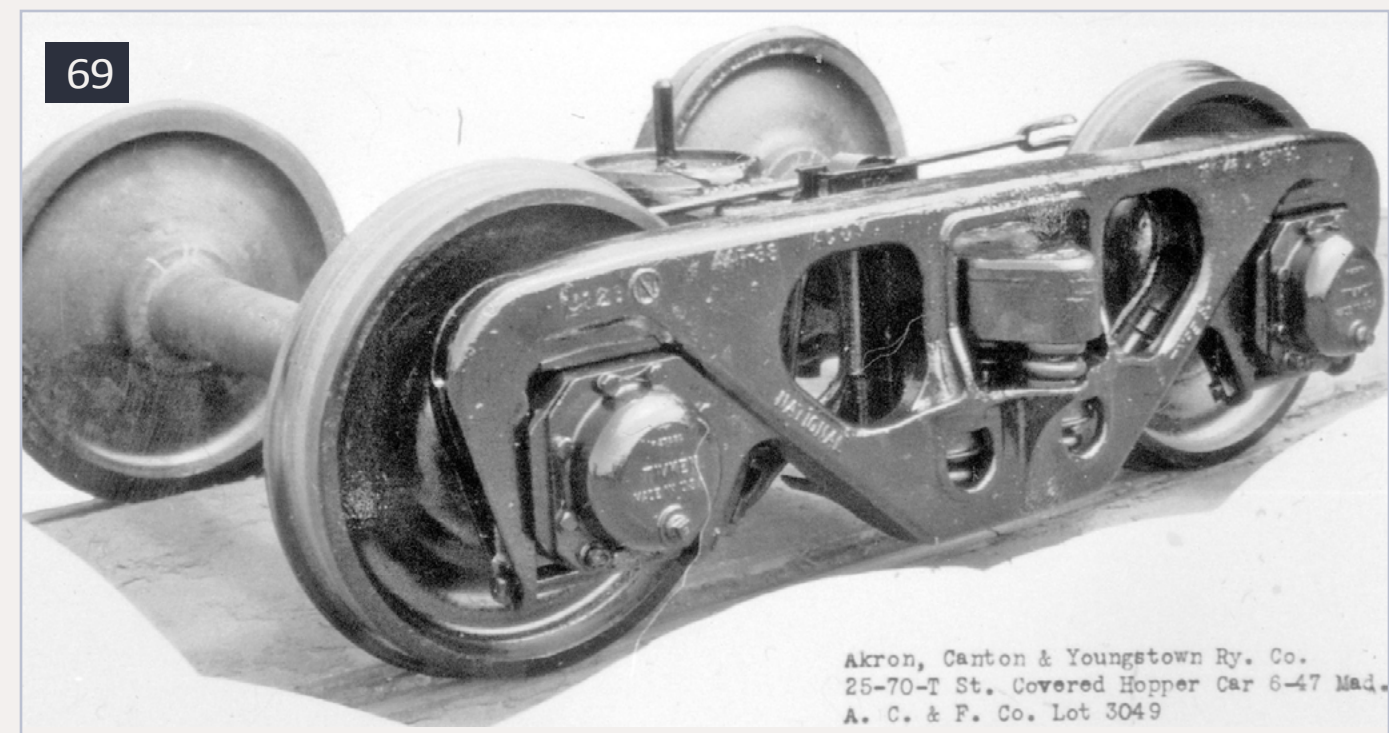
however, it was not until advances were made in roller bearing technology in the 1930s and, especially, during World War II that roller bearings became available which were more suitable for use on railroad cars.

Following the war, roller bearing manufacturers engaged in a vigorous promotional campaign to market their wares to the railroads, even going so far as to describe roller bearings as "anti-friction" bearings in contrast to "friction" (i.e., plain) journal bearings. This terminology was nonsense, of course; all bearings have friction, and though roller bearings have less resistance to starting and at low speeds, their advantage was relatively slight at normal train speeds.

In any case, railroad officials weren't inclined to spend money putting roller bearings on cars that spent much of their life off-line in interchange, so the relatively few cars that received roller bearing trucks were in assigned service and seldom or never left their owners' rails. One such example was the Union Pacific's DLS livestock trains from Salt Lake City to Los Angeles; in this case, roller bearings were fitted to existing trucks, and the only evidence of their presence was aluminum-painted journal box covers (68). Another was a small number of Akron,



68: The simplest way to get roller bearings was to retrofit them in existing trucks, as the Union Pacific did on their DLS stock cars. As the bearings were invisible inside the original journal boxes, the journal box covers were painted aluminum so carmen would know not to pour journal oil into them.



69: This roller bearing National B-1 truck for was applied to covered hoppers built by AC&F for captive service on the Akron, Canton & Youngstown. The side frames had pedestal jaws into which the Timken bearings were fitted.

Canton & Youngstown covered hoppers for on-line service which came from American Car & Foundry in 1947 with roller bearing National B-1 trucks (69).

In the late 1940s through the 1950s, applications of roller bearings to existing truck designs continued to be relatively isolated experiments (70 and 71). What apparently tipped the scales in favor of roller bearing trucks was the construction, beginning in the late 1950s, of growing numbers of 90 and 100 ton covered hoppers for grain service. On these cars, four-wheel plain journal trucks were overloaded, and they were very prone to overheated journals, the dreaded "hot boxes" which required them to be set out of trains at the earliest opportunity while en route. Roller bearing trucks solved

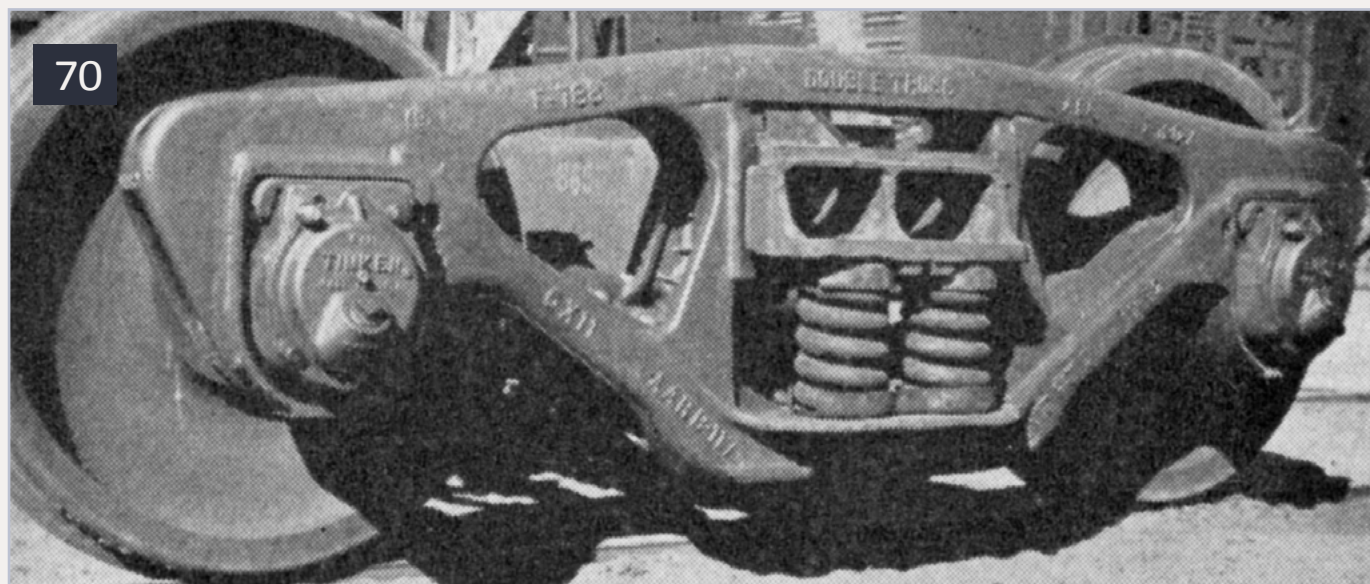
the hot box problem, and once larger numbers of them were in interchange service, many railroads began equipping all their new freight cars with roller bearings.

Continued use of plain journal trucks

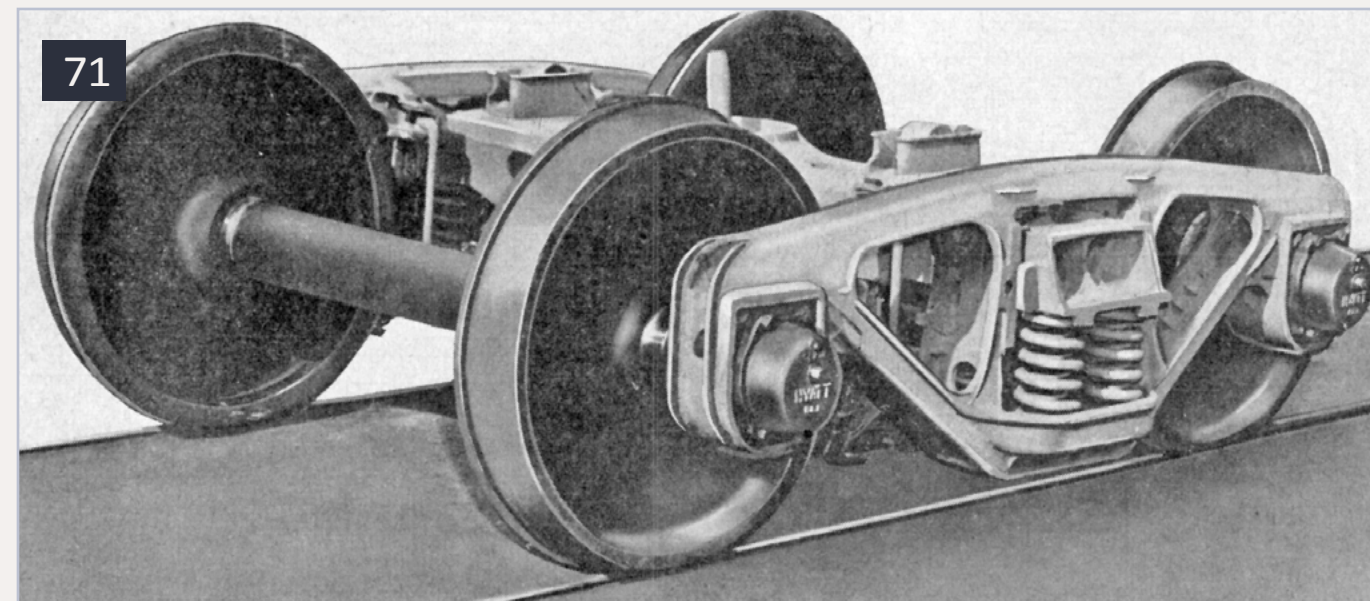
Though the use of roller bearing freight car trucks increased rapidly in the early 1960s, well over a million cars remained in service with plain journal trucks. Intensive efforts were made to improve lubrication so that these cars would run for longer distances between journal box oiling and also be less prone to hot boxes. In the 1950s, a variety of patented lubricators and waste packing retainers were introduced which at least partially accomplished this objective, and by the 1960s most cars in interchange service were equipped with one or another of these devices. Thus improved, large numbers of plain journal trucks continued in service for many years and the last of them were not outlawed in interchange until the 1980s.

HO scale freight car trucks

I am reluctant to describe the available HO scale trucks because the list of what is available keeps changing as model



70: Here Timken roller bearings were fitted into an otherwise standard AAR self-aligning spring-plankless double-truss truck.



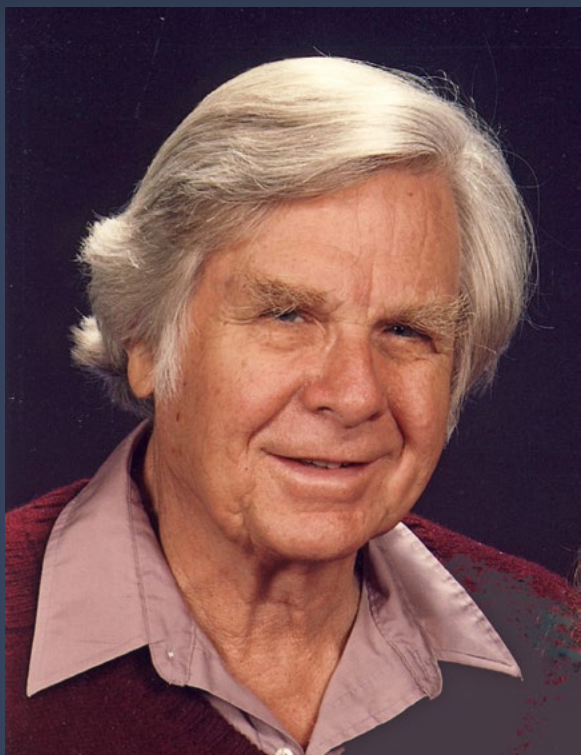
71: An ASF A-3 Ride Control truck reconfigured with pedestal jaws instead of journal boxes to accept Hyatt roller bearings.

manufacturers continue to introduce new freight car trucks. The solution has been to put a description on the Internet which can be revised as often as necessary to keep it current. That description can be found at: docs.google.com/file/d/0Bz_ctrHrDz4wMkpBYUw1RjhmRkE/edit?pli=1.

There is also a good description of available N scale trucks at: model160.com/n-scale-news-blog/freight-car-trucks-in-n-a-pictorial-comparison/.

although I can't say whether it will be kept current. ☒





Richard Hendrickson grew up around the Santa Fe Railway in Southern California during and after World War II, when most trains were still steam powered.

Richard has authored or co-authored several books, several hundred periodical articles, and numerous seminar clinics.

When not busy with research and writing activities, Richard works on an operating diorama representing Rivera, CA on the Third District of the Santa Fe's Los Angeles Division in October of 1947.

Since the turn of the century, Richard and his wife Sandra have lived in Ashland, Oregon.



PWRS Club Lounge

MICRO-TRAINS®
LINE

PWRS Club Lounge Micro-Trains® Car #2 MILW Stormin Norman 50' Rib Side Boxcar



CLICK HERE FOR
Stormin Norman

NOT FOR \$ALE!... at any price!

PORTERS Club Lounge exclusive

PWRS Special Run

MICRO-TRAINS®
LINE

Canadian Pacific 40' Boxcar with Coopered Doors 4-pack

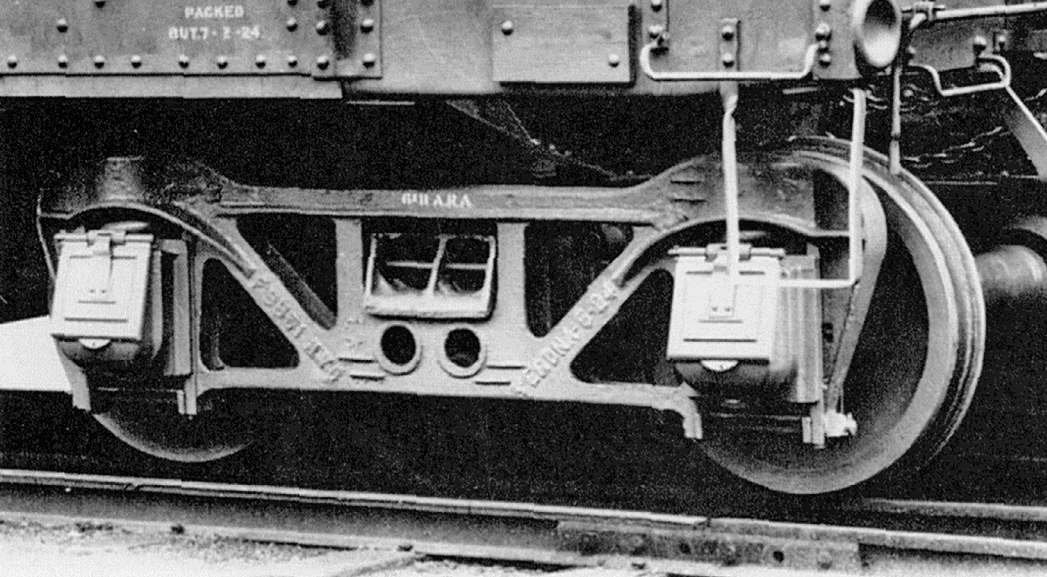


2 wood door
2 cardboard door

CLICK HERE FOR
Coopered Door

Pacific Western Rail Systems





Freight car trucks

OF THE 20TH CENTURY

Model Railroad Hobbyist | June 2018 | #100

RICHARD BALE'S definitive modeler's guide to prototype freight car trucks ...

SINCE THE EARLIEST DAYS OF RAILROADING, A GREAT variety of manufactured components have been available to those responsible for building and maintaining rolling stock. Early builders could do wonders with wood but most lacked the ability to fabricate sturdy metal parts such as car ends, doors, brake components, and trucks. By the early 1900s specialty manufacturers offered a wide range of cast, stamped, forged, and machined items for new car construction, as well as for the repair and maintenance of railroad equipment.

FREIGHT CAR TRUCKS | 2



Many railroad modelers find the variety of prototype equipment bewildering, and lots of items tend to look alike. A freight car door is a freight car door, a car end is a car end, and a truck is a truck. Beginning in the 1960s some railfans, museum curators, and serious model builders began to look at common railroad equipment with greater curiosity, and discovered a new world of detail in greater variety than previously imagined.

Importers of brass models were among the first to include accurate fixtures and appliances in their models. Slowly, a few mass producers of plastic freight car models began to incorporate greater prototype authenticity into their products. That trend continues today. This article will help modelers identify commercial freight car trucks in use throughout the 20th century.



PREVIOUS ARTICLES IN THIS *MRH* SERIES CAN BE ACCESSED ONLINE. THEY INCLUDE:

Hand Brakes:

mrhmag.com/magazine/mrh-2013-11-nov/guide-to-hand-brakes

Freight Car Ends:

mrh-online.com/2014-10/index.html?page=182

Freight Car Doors:

mrh-online.com/2016-03/index.html?page=238

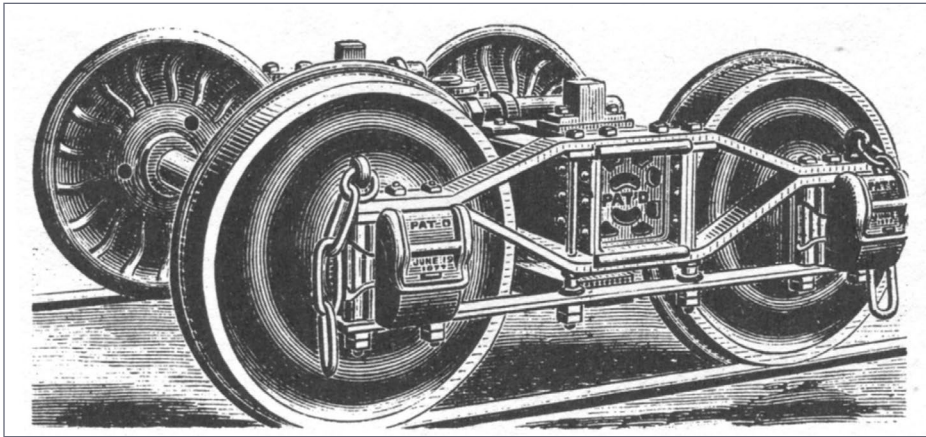
Freight Car Roofs:

mrh-online.com/2016-12/index.html?page=215

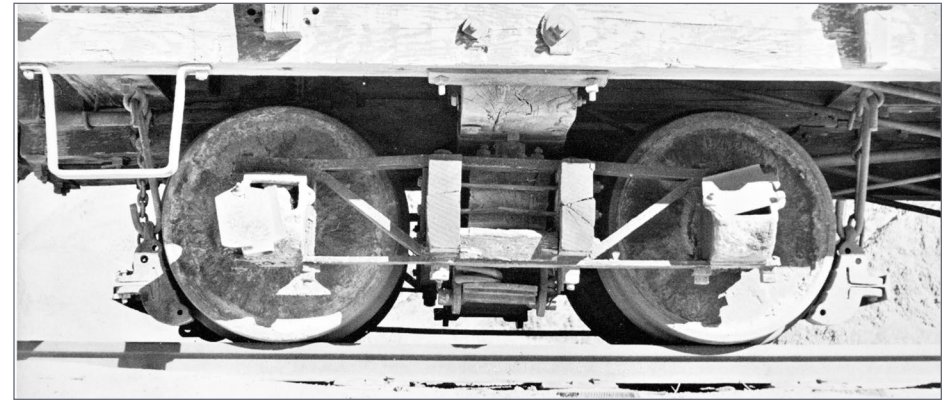


Freight car trucks

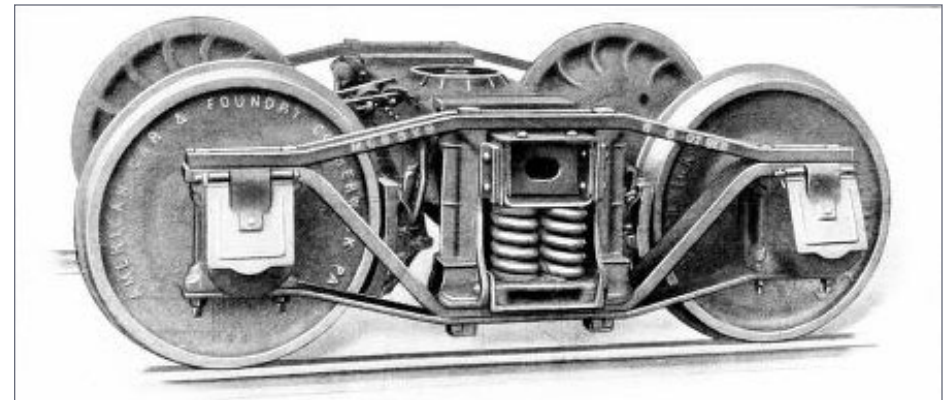
Arch bar trucks were the dominant type of freight car truck on American railroads from the era of the Civil War until the development of cast side frames in the early 1900s. The arch bar arrangement of three steel bars formed a truss that held the individual cast journal boxes [5] in place. Bolsters and spring planks were fabricated of oak or steel, or a combination of both materials. Arch bar trucks were lightweight and inexpensive. They were relatively easy to maintain, which was a good thing since they needed lots of attention.



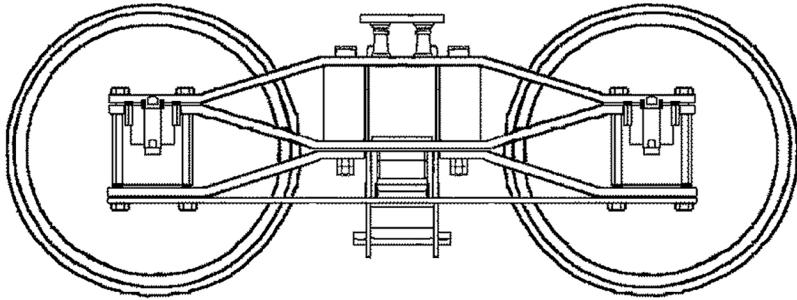
1. Thielsen arch bar trucks were popular from 1875 to the early 1900s. It featured a cast iron transom. This one is equipped with safety chains, indicating it was for a tender. In 1884 the Master Car Builders (MCB) standardized the wheelbase of arch bar trucks at five feet.



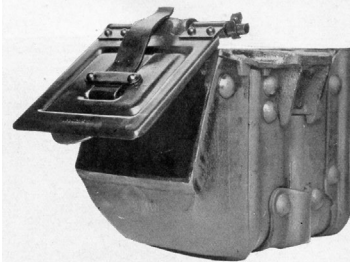
2. The principal drawback with arch bar trucks was that over time the rivets and bolts that held the side frames together tended to loosen, often with disastrous results. This well-traveled arch bar truck has a straight upper chord and swing hangers between parallel wood transoms.



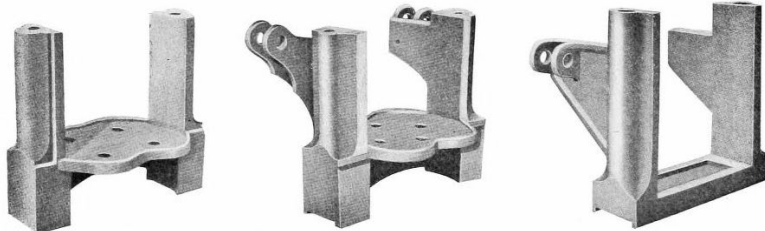
3. From the late 1800s through the 1920s, the American Car & Foundry Company (ACF) produced arch bar trucks for 30- to 50-ton capacity cars. This one is for a 40-ton car. The MCB defined the bars of the frame as the arch bar (top), the inverted arch bar (middle), and the pedestal tie bar (bottom).



4. Some early trucks were fabricated with four bars. MCB named it the auxiliary arch bar (third from the top).



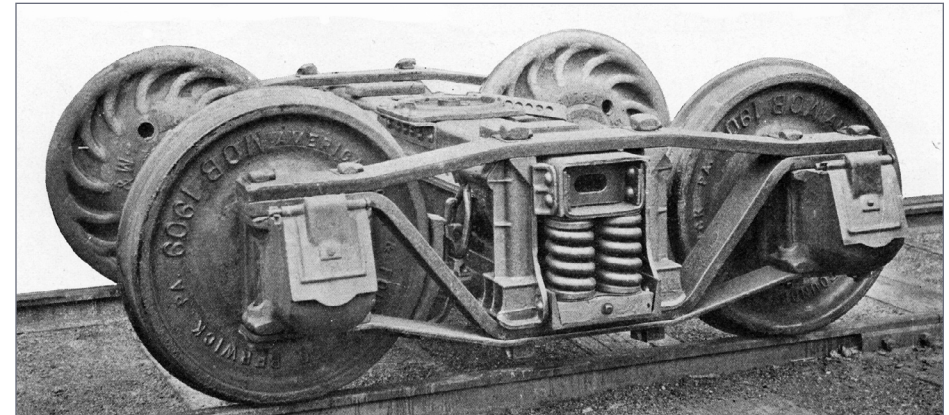
5. Cast journal boxes surrounded the end of the axle, held the bearing in place, and provided a small reservoir for lubricant. The spring-loaded lids could be flipped up to view the bearing and add oil if needed.



6. Cast spring seats and bolster column guides for arch bar trucks were offered by several companies. These are from American Steel Foundry (ASF).

MASTER CAR BUILDERS CHART FROM 1900 SPECIFIED THE MINIMUM STANDARD FOR ARCH BAR FRAME MEMBERS

Car Capacity	40-ton	50-ton
Arch bar	1.5" x 4.5"	1.5" x 5"
Inverted arch bar	1.375" x 4.5"	1.5" x 5"
Pedestal tie bar	.625" x 4.5"	.625" x 5"



7a. This arch bar truck with large journal boxes is rated for a 50-ton capacity car. Upper and lower arch bars are 1.5 inches thick by 5 inches wide; the tie bar at bottom is 0.625 inches thick.

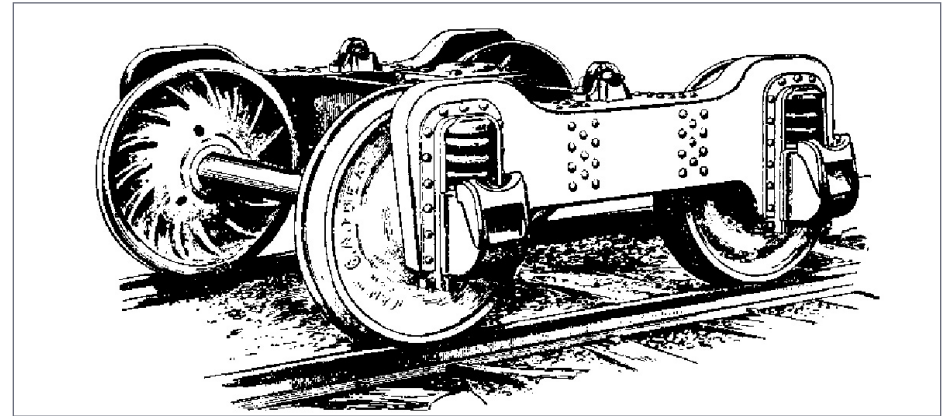


7b. The assembled frame of arch bar trucks tended to work loose. Rivets and bolts needed constant attention. In this Oregon repair yard at the turn of the century, the man standing second from left is heating a replacement rivet at a portable forge. Arch bar trucks were banned from interchange in December 1939, but implementation was delayed until 1941. They continued in non-interchange use through the steam era, including under tenders. Overseas railroads continued to purchase arch bar trucks from American manufacturers into the early 1960s.

**VIEW READER
COMMENTS**

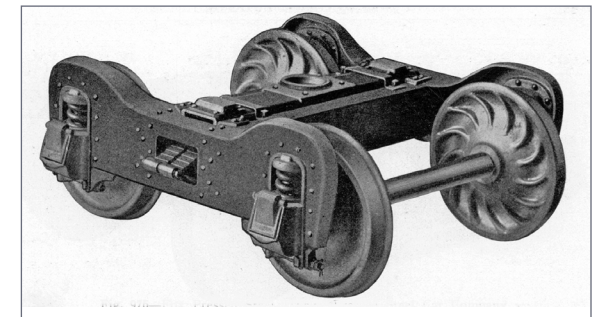
click here

Stamped metal side frames

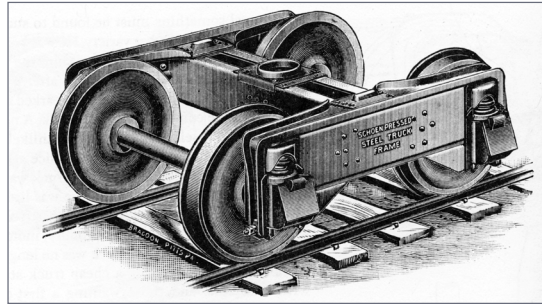


8. Trucks with stamped metal side frames were introduced in an attempt to overcome the inherent problems of the arch bar concept. Several designs were offered, with the most successful being the Fox truck with stamped side frames riveted together to form a rigid truck. Fox was an established British company that sold its products throughout Europe. It met considerable resistance to its products in the U.S.

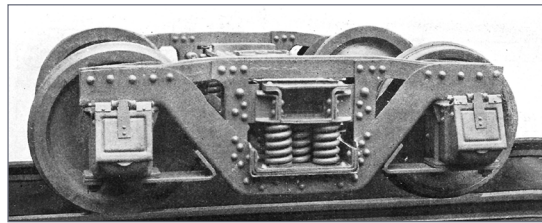
9. In addition to coil springs above the pedestal journals, this version of the Fox truck utilizes full elliptical springs under the bolster. After a slow start in America, the Fox Pressed Steel Equipment Co., finally scored a sizable order from the New York Central Railway in 1888.



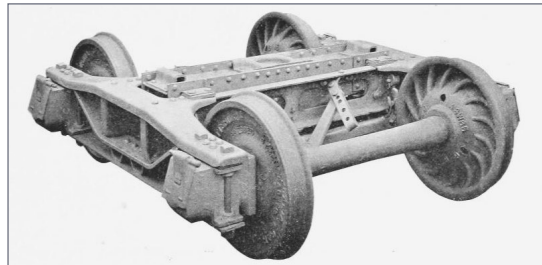
10. Schoen Pressed Steel Company offered a stamped truck with sprung pedestals in the early 1890s. In 1899 Fox and Schoen merged into the Pressed Steel Car Company, which dropped the Schoen design but continued producing the Fox truck. As trains grew in size, weight and speed, the lack of flexibility in stamped metal trucks and the tendency for the journal to jam in the spring pedestal spelled their demise.



11. The Slick truck, manufactured by the Cambria Steel Company in the early teens, emulated the arch bar idea with stamped components. As with other fabricated trucks, the multitude of rivets was problematic.



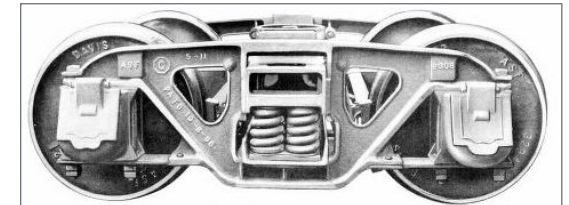
12. Arch bar trucks could get out of line easily, i.e., one side frame could get slightly ahead of the other. The Pressed Steel Car Co. attempted to solve this problem with a stamped bolster that was riveted to the stamped upper arch bars. It garnered little interest. Freight car trucks take a beating, and with the myriad of parts in a pressed metal truck, too many things could go wrong. A better idea was needed.



Andrews cast side frames

American Steel Foundries Company (ASF) introduced the revolutionary Andrews cast steel truck in 1892. Although the Andrews truck had fewer parts than an arch bar, and was far better at keeping things dimensionally square, use of a truck with a cast steel frame did not begin to gain wide acceptance until about 1910.

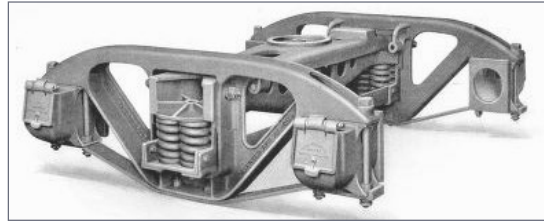
13. The Andrews cast truck provided a dimensionally rigid frame to which journal boxes could be securely bolted. A bottom strap kept the journals in alignment. Although more expensive than arch bar trucks, the Andrews design offered some economy in that journal boxes could be recycled from discarded arch bar trucks.



14. The original Andrews frames made by ASF were cast with T-section chords. They were soon replaced with a stronger L-section [13] profile. The design evolved into a double-truss U-section [15]. Wide acceptance of the Andrews design came during World War I, when more than 100,000 USRA cars were equipped with Andrews trucks. To meet the demand, ASF licensed their Andrews design to other manufacturers.

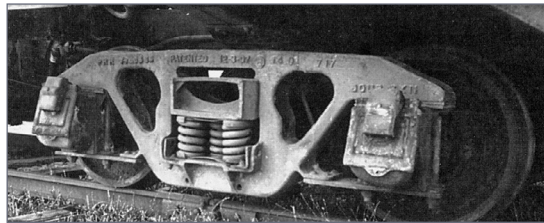


15. The spotting feature of the cast Andrews truck is the retaining bar that links the bolted-on journal boxes to the frame.



The designs included a single steel strap that extended under the frame as shown above on a truck manufactured in 1905 by ASF, and short straps that were riveted to anchor lugs cast in the frame [13]. Andrews trucks continued to be produced until about 1931.

16. This 70-ton Crown truck is a heavy-duty variation on the Andrews principle developed by the Pennsylvania Railroad. Spotting features include the arched upper corners and deep section below the spring plank.



EARLY CAST FRAMES BANNED

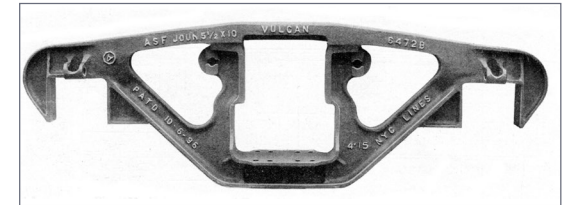
In 1957 all truck side frames cast with an I, T or L-section truss were prohibited from interchange service.

Andrews trucks with cast U-section side frames were banned by the AAR on new and rebuilt cars in 1965.

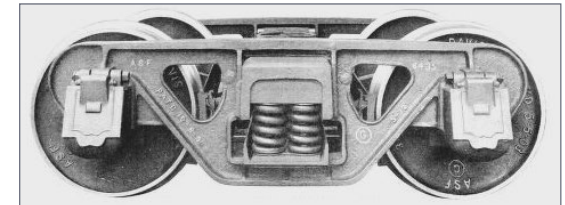
Vulcan truck

ASF introduced the Vulcan cast truck in 1905. It was a further development of the Andrews design with an improved method of keeping the independent journal boxes in alignment.

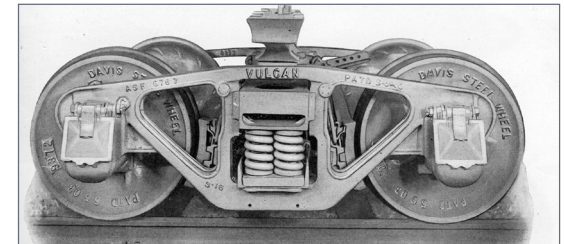
17. The Vulcan cast truck had inverted U-shaped jaws that secured the journal box on three sides. Journal boxes from old arch bar trucks could still be used, but a stabilizing bar across the bottom was no longer needed. In promoting their Vulcan truck, ASF claimed it had fewer parts than an Andrews and was inherently stronger.



18. Manufactured under license by the Scullin Steel Co. in 1910, this 50-ton version of a Vulcan cast T-section pedestal truck has strengthened sections at the upper corners of the inverted jaw.



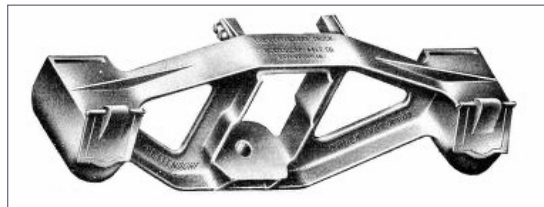
19. This World War I-era Vulcan truck cast with a double-truss U-section frame can easily be confused with a Bettendorf design. The differences are the individual journal boxes and the bolts that retain them to the frame. Although less popular than the Andrews design, the production of Vulcan trucks continued through the teens.



Bettendorf side frame cast with integral journals

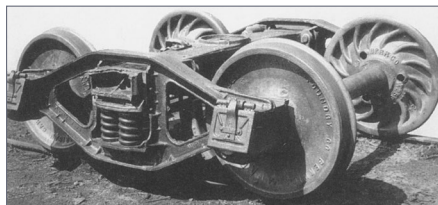
The Bettendorf Axle Company introduced a one-piece side frame cast with integral journal boxes in 1903. The revolutionary concept became the basis of standardized trucks for the next 100 years.

20. An early Bettendorf side frame with integrally cast journal boxes. The L-section struts were soon replaced with a sturdier T-section [22]. The design advanced to a U-section for greater strength [23].



21. Although initially more costly than arch bar or Andrews trucks, the economy of the one-piece frame was realized through reduced maintenance and improved safety. This Bettendorf ad is from 1905.

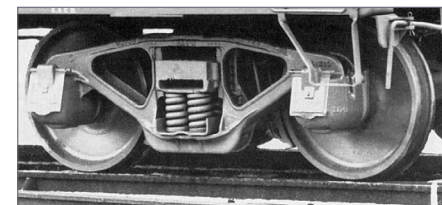
22. This Bettendorf truck from the World War I-era had heavy T-section frame chords. It was rated for a 40-ton capacity car. The Bettendorf concept of combining journal boxes and a rigid one-piece frame grew increasingly important as freight trains had more cars carrying heavier loads at increased speed.



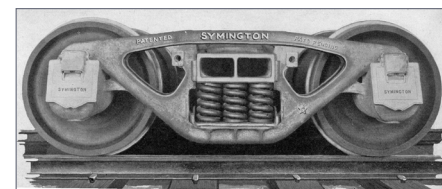
23. The double-truss version of Bettendorf one-piece truck with a U-section frame was introduced in late teens. Bettendorf licensed the design to other truck makers and eventually the essentials of the design were adopted as a standard by the American Association of Railways-AAR (later reorganized as the ARA-American Railway Association).



24. Bettendorf-type trucks were produced under license by several manufacturers, resulting in numerous subtle variations in appearance. This 2D-F8 truck produced by the Pennsylvania Railroad is rated at 50 tons. Note the thick section below the channeled spring plank. Most PRR X29 boxcars received this truck.



25. Symington version of the Bettendorf cast double-truss designed for 70-ton journals. Note the wide channel spring plank supporting the nine unit spring pack. Only the three front springs are visible.



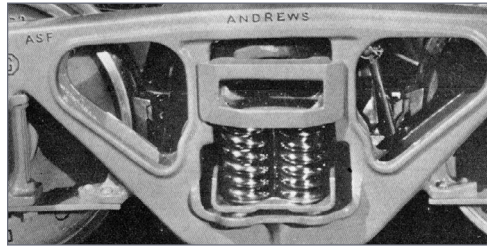
BRITISH VS AMERICAN DESIGN



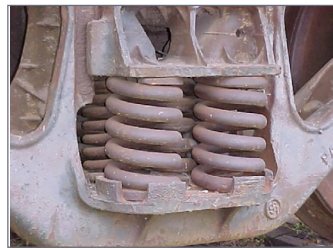
The introduction of a pair of swiveling trucks by Ross Winans on a Baltimore & Ohio passenger car in 1831 ushered in the eight-wheel car and marked the beginning of a radical difference between British and American car design.

Truck Springs

26. Truck side frames were held together by the bolsters which rode on springs that were held in place by a spring plank, which also helped hold the truck frames in alignment. Early spring planks were made of wood [2]. Metal spring planks (above) were made of a wide U-shaped channel.

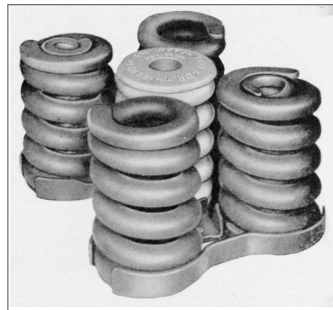


27. As more sophisticated bolsters were developed, the need for a heavy spring plank was no longer necessary. This sprung plankless truck has lugs cast into the platform that hold the spring pack in place.

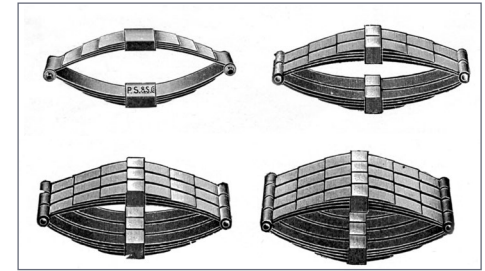


As freight train speeds increased in the 1920s and '30s, it was found that trucks with springs that cushioned loaded cars rode extremely hard when empty, sometimes setting up oscillating harmonics that caused the trucks to bounce dangerously. Various types of snubbers were developed to help mitigate the oscillations.

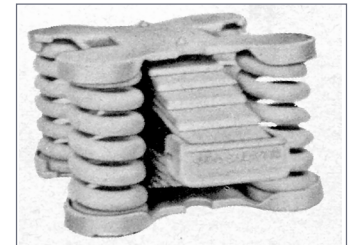
28. Friction snubbers and combination snubber-spring packs were offered by a variety of manufacturers, but most are not discernable in modeling. This five-coil group has two single springs, two dual springs, and a harmonic snubber in the center.



29. The action of elliptic springs sliding against each other is somewhat self-dampening. They were generally used in caboose and passenger trucks, where smoother rides were desired. Depending on the nominal weight of the car single, dual, triple, and quadruple elliptic groups were used.



30. Self-dampening elliptical and coil springs were combined to provide a softer ride and reduce bounce from harmonic oscillation. The PRR 2D-F12 truck is a notable example of this design. Note how the spring pack is held together with stamped-metal retainer plates.

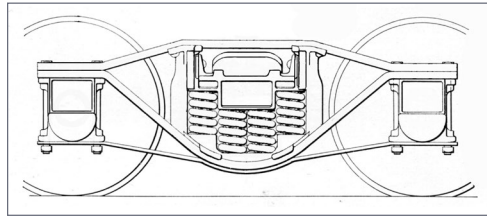


DALMAN TWO-LEVEL SPRING PLANK

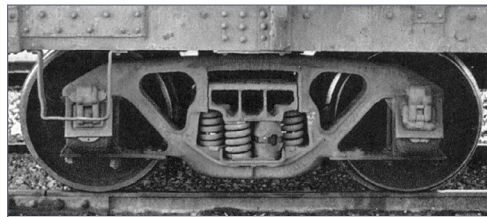
Numerous ideas were tried in an effort to minimize the problems of stiff riding and harmonic induced bouncing in freight cars. One successful idea was the Dalman two-level bolster developed by ASF in the early 1920s. It provided room for additional springs for greater control. The concept was widely accepted and manufacturers applied the Dalman bolster to arch bar, Andrews and Bettendorf-type trucks.

Improving the ride

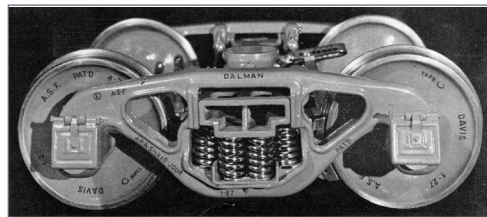
31. A Dalman two-level spring plank and bolster assembly was applied to a few arch bar trucks in the early 1920s. Note the curve in both the inverted arch bar and the lower pedestal tie bar.



32. There are three coil springs and a snubber assembly in the visible springs on the Dalman multi-level spring plank of this Andrews truck.



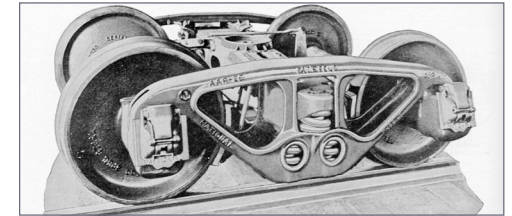
33. The additional width of the Dalman stepped-spring plank on this ASF truck provided room for groups of eight to 12 softer springs, rather than the typical pack of four or five.



GRAVITY

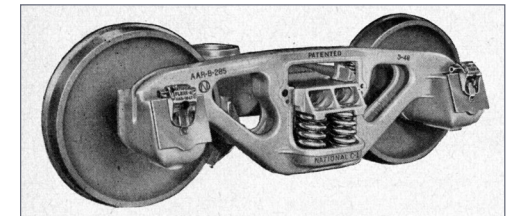
Trucks are held in place on a model by screwing them to the floor of the car. Gravity does the job on real railroad cars with a skinny 1.75-inch free-floating center pin under the car guiding the truck.

34. One of the most successful designs to reduce the weight of trucks was the National B spring-plankless truck introduced by National Malleable & Steel Castings Co. in 1931.

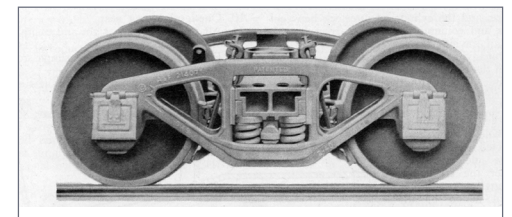


A unique trunnion design kept the bolster and side frame in alignment, and eliminated the need for a heavy transverse spring plank that could weigh up to 300 pounds. Spotting features of National B trucks are the end pocket in the bolster that keeps the spring group in position, and the pair of round holes in the side frame. Some National B trucks were later fitted with roller bearings.

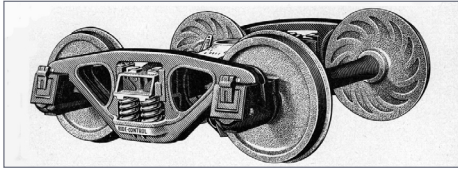
35. National's C-1 truck introduced in the late 1940s featured a new and improved spring snubbing system that had friction wedges located behind the bulge in the side frame near the bolster end. That bulge and the protruding bottom lip that retains the spring pack give the C-1 its unique appearance.



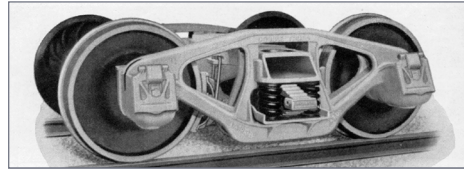
36. During the 1930s and 40s, ASF's catalogue included a self-aligning spring-plankless truck with a Simplex snubber between the coil springs. Note the protruding lower lip on the cast side frame that supports the spring pack.



37. The A-3 Ride Control truck was introduced by ASF in 1943. To limit spring oscillation, steel wedges between the side frame and bolster acted as a shock absorber and snubbed uncontrolled springing. By the early 1950s the A-3 had become one of the most widely used trucks in the industry.

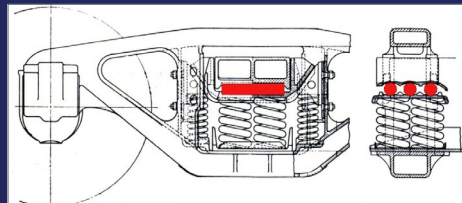


38. In the mid-1930s the Buckeye Steel Casting Co. cataloged this double-truss Bettendorf-type truck that combined elliptic and coil springs to reduce bouncing due to harmonic oscillation. Note heavy section below the flat channel spring plank.



BARBER LATERAL-MOTION SYSTEM

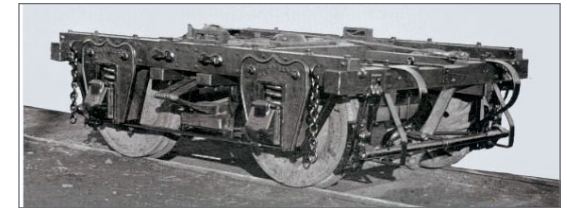
John C. Barber, founder and chief engineer of the Standard Car Truck Company, received a patent in 1909 for a practical centering system that used case-hardened steel rollers to control a limited amount of sideways motion between the bolster and the side frame of the truck. The rollers, shown here in red, were a simple and effective alternative to the use of swing hangers. The Barber system was licensed and used by many truck manufacturers through the 1930s and into the 1950s. It was applied to freight car trucks as well as locomotive trailing trucks.



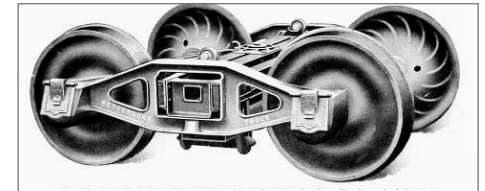
Caboose trucks

Early cabooses generally had standard arch bar trucks, but as train speeds increased, the hard bouncing and lateral jolting became intolerable. By the 1920s trucks with a softer ride were available for cabooses. Designing for load variations was not a factor. Many caboose trucks had elliptic springs or a combination of elliptic and coil springs, and most incorporated a snubbing system to reduce spring oscillation.

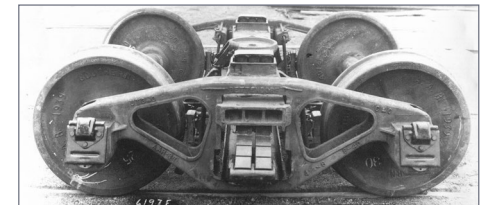
39. This early caboose truck with pedestals bolted to a wood beam frame was essentially a light-weight version of a four-wheel passenger truck with a short wheelbase.



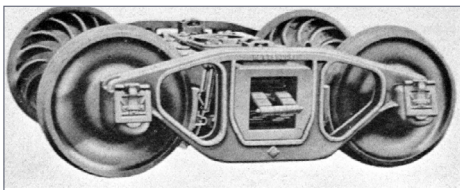
40. This Bettendorf T-section cast truck with elliptic bolster springs hidden in the transom was designed for a 30-ton caboose. Note the swing-motion link hanging beneath lower chord.



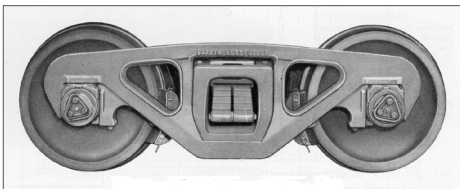
41. This Bettendorf caboose truck with a double-truss U-section frame and elliptic springs was built in 1941.



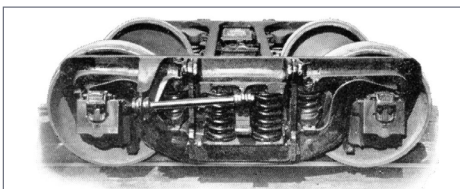
42. During the 1920s and '30s Bettendorf offered a caboose truck with elliptic springs and Barber swing-motion links.



43. A roller bearing caboose truck produced by Standard Car Truck Co. combined the Barber-Bettendorf swing-motion with elliptic springs to mitigate shocks. The inverted U-shaped jaws that retained the roller-bearing journal harkened back to the Vulcan design.



44. Caboose trucks reached their zenith in the early 1950s with this easy-riding equalized truck with outside swing hangers and a bolster anchor. It was produced by GSI which cast the frame, pedestal jaws and transom in one-piece. This truck was also available with roller bearings. Bolster anchor rods stabilize the bolster longitudinally with the truck frame and guide the vertical and lateral movements of the bolster.



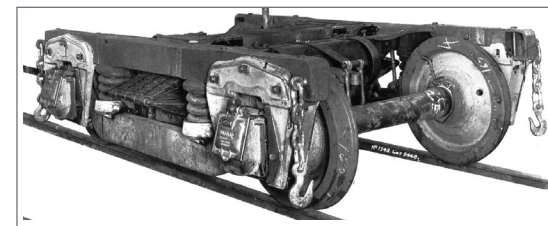
REPAIRING TRUCKS

Car re-builders and truck maintenance supervisors didn't buy complete trucks, they bought truck parts. There were many sources for basic castings and the numerous parts that make up a truck. One foundry might supply both side frames and bolsters, or the customer might choose to order bolsters from a third party. Springs came from a different vendor, as did all of the brake components. Wheels and axles, bearings, dust guards, and journal covers could all be purchased from specialty suppliers. – *Dennis Storzek.*

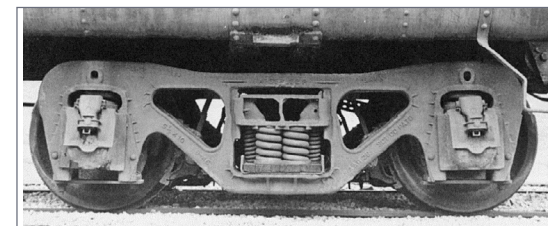
High-speed trucks

Express cars, reefers, and other types of freight equipment assigned to passenger trains required high-speed trucks. There was a great variety of designs.

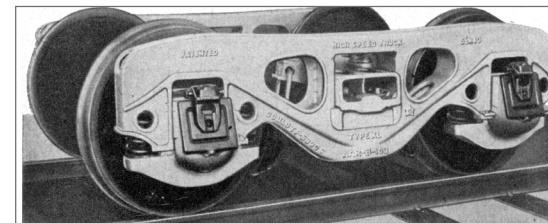
45. Many wood-sheathed express cars built by Pullman in the 1920s rode on high-speed equalized trucks with independently sprung pedestals bolted to a cast steel frame. This truck was produced by General Steel Casting Company.



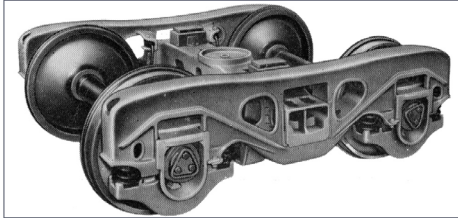
46. Barber S-2-P high-speed truck with individually sprung pedestals. Note the wood board between the springs and the U-shaped spring plank.



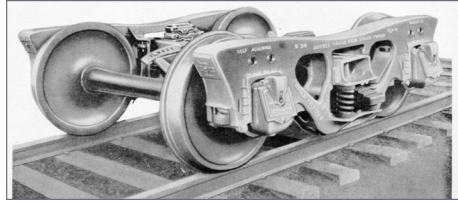
47. Symington-Gould's XL series of high-speed trucks featured pedestal style journal boxes with unique bottom retainers that allowed lateral axle movement independent of the side frames. Early units produced in the 1920s had plain journal bearings while post-war models [48] had roller bearings.



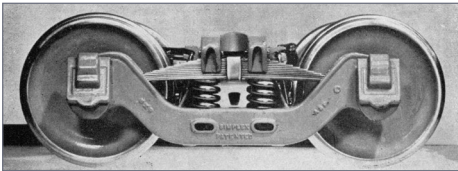
48. Roller bearing version of Symington XL high-speed truck. Also see [47].



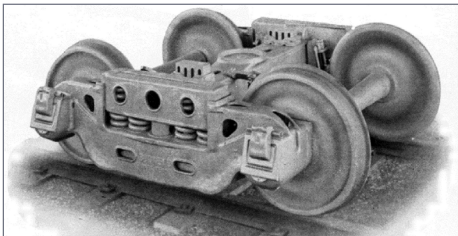
49. Symington-Gould introduced this 50-ton high-speed self-aligning double-truss truck in the early 1930s. The "ears" at the upper corners of the casting enclosed an elliptic spring and two coil springs over each journal box. The bolster is supported by a non-harmonic combination of coil and elliptical springs. These trucks were favored by the New York Central. Subsequent versions were fitted with roller bearings.



50. This Simplex high-speed truck with a drop frame and a long elliptic spring was developed in the mid-1930s by American Steel Foundries. The distinctive design was widely used on express refrigerator cars.

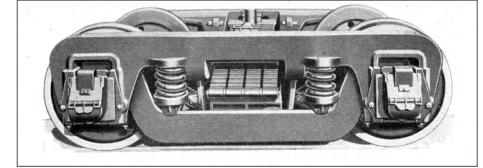


51. Also from the 1930s is this Buckeye high-speed truck that utilized a row of four coil springs and a snubber, plus an elliptic spring. This was a soft-riding truck with the combination of springs providing movement of nearly three inches.

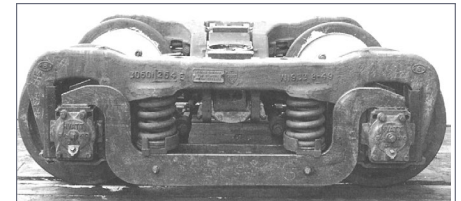


52. The Commonwealth equalized, high-speed, swing-motion, pedestal-type trucks, produced by General Steel Casting Co., employed both coil and full-elliptical springs.

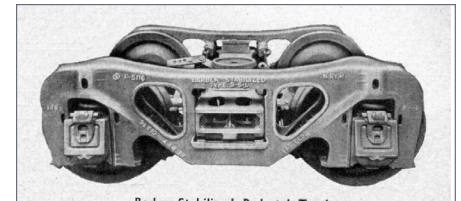
The truck was available with an inside drop equalizer (above) or with an outside equalizer [53]. Both types were widely used on express cars. Note the quadruple elliptic bolster spring.



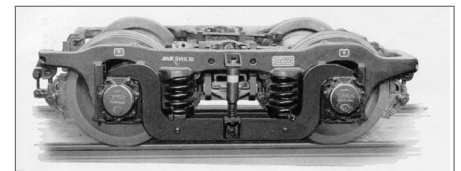
53. This version of the Commonwealth high-speed swing-motion pedestal truck had an outside dropped equalizer and roller bearings. It was essentially a Commonwealth passenger truck with a shorter wheelbase.



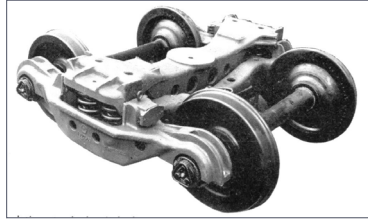
54. The Standard Car Truck Co. introduced this Barber S-5-L stabilized high-speed pedestal truck in the late 1940s. It featured a Barber lateral-motion device. It was subsequently available with roller bearings.



55. General Steel Casting Co. introduced their BX series high-speed truck in the 1960s. Spotting features include a deeply dropped outside equalizer bar, roller bearings, and a Houdaille friction snubber that is similar in appearance to an automotive shock absorber.

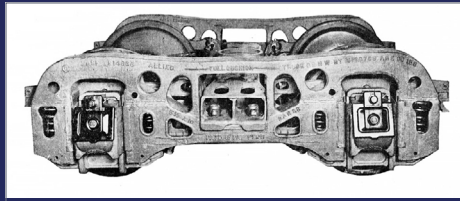


56. The Rockwell high-speed truck appeared on the market in the late 1960s. Coil springs at the bolster were augmented by rubber sleeves around the journal that provided some vertical cushioning to the unsprung journal bearing. Replaceable snubbers were a composite of asbestos and phenolic. This unusual-looking truck was produced by the LFM-Atchison Division of Rockwell Manufacturing.



THE ILL-FATED ALLIED FULL-CUSHION TRUCK

57. Allied Railway Equipment Co. introduced its Allied Full-Cushion truck in 1940 with considerable fanfare. Promotional material touting the radical design claimed it delivered *"high-speed freight with passenger car smoothness."* The complex truck performed well in early tests, and was selected for application to 1200 troop sleepers and 400 troop kitchen cars built by Pullman-Standard during WWII. Allied's revolutionary truck fell into disfavor after it was targeted as the cause of a number of serious derailments. Allied's Full-Cushion truck was banned from interchange in 1955.

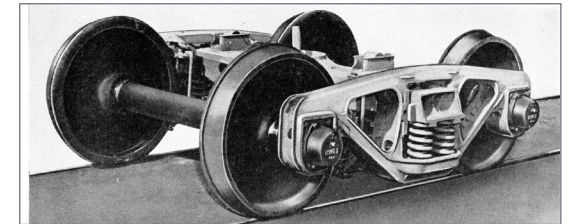


Plain bearings and roller bearings

Through the 1950s, the vast majority of trucks used plain bearings that were lubricated by waste packing acting as a wick to distribute oil up to the bearing surface inside the journal box. They required constant attention. Inspection and adding lubricant was achieved by lifting a spring-loaded lid on the journal box [5]. If not kept lubricated, the waste material could dry out, resulting in a hot-box that could ignite with sometimes disastrous results.

Roller bearing freight car trucks were available as early as the 1920s, but railroads were reluctant to bear the expense of installing them on cars that would spend considerable time off line. In addition to cost, roller bearings from that period often failed to hold up in the tough railroad environment.

58. Manufacturers of roller bearings offered kits to update trucks built with plain bearing journals. This Bettendorf-type truck has been retrofitted with Hyatt roller bearing assemblies. Note the plankless spring base.

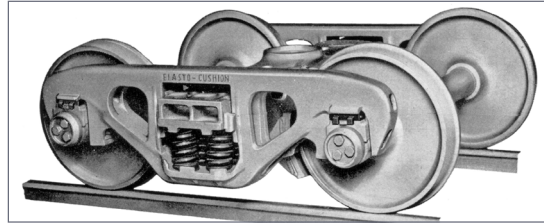


PAINTING TRUCKS

The ARA/AAR prohibited the use of heavy paint, tar, or cement-based paint on trucks. The application of light-bodied paint to truck frames and bolsters that did not prevent detection of flaws or cracks during ordinary inspection was allowed. Car wheels were not permitted to receive paint of any kind.



59. Roller bearing trucks can be identified by the end caps on the axles which are generally round or triangular. Many contemporary bearing caps rotate with the axle. In promoting their product roller bearing manufacturers including Timken, Fafnir, Hyatt, and SKF disparaged plain bearings by referring to them as *friction* bearings in their ads. The term continues today with modelers and hobby manufacturers.



Roller bearing salesmen had a better product after WWII, and met with greater success, but it was a slow process. In 1956 less than one percent of freight cars in interchange had roller bearing trucks. Their use increased significantly with the construction boom of 100-ton covered grain hopper cars in the late 1950s.

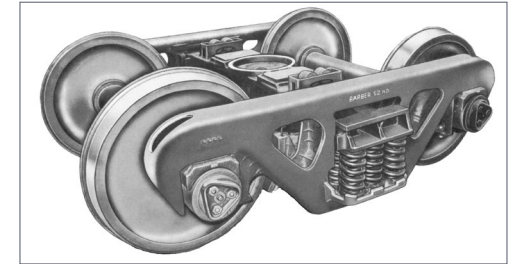


AAR BEARING REGULATIONS

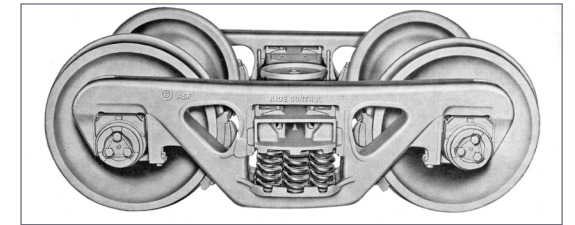
In 1966 the AAR ordered all rebuilt or new cars rated for 100 tons or more to be equipped with roller bearing trucks. Trucks with plain bearings became illegal on all new cars built after 1968 and were banned from interchange in January 1994. Cars with journals converted from plain to roller bearing were banned from interchange in 1991, but implementation of that ruling was extended to 1995.

Modern roller bearing trucks made by various manufacturers are similar in appearance and can be difficult to tell apart. Most designs have inverted U-shaped jaws on the cast side frame that hold the journal bearing assembly in place; similar to the old Vulcan design. Many contemporary bearing caps rotate with the axle.

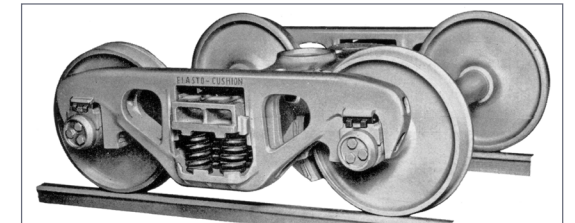
60. One of the most common trucks seen on contemporary equipment is this Barber stabilized S-2-HD roller bearing truck manufactured by Standard Car Truck Co. Note the triangular shaped axle end cap.



61. Also popular is the ASF100-ton Ride Control truck. This photo clearly shows the inverted U-shaped jaws on the cast side frame that hold the journal in place. This truck was produced by American Steel Foundries in the 1970s.



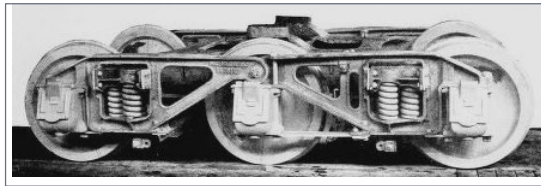
62. Another popular modern roller bearing trucks is the Buckeye C-R Elasto-Cushion stabilized truck. A self-centering pad located above the roller bearing journal allows a controlled amount of lateral movement of the axle. The three axle bolts are surrounded by a round end cap.



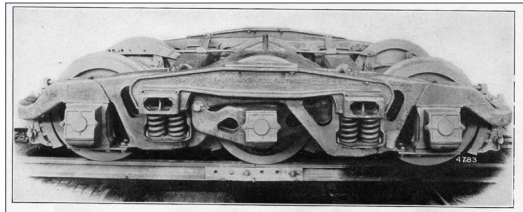
Heavy-duty trucks

Freight cars with a rated capacity greater than 70 tons require heavy-duty trucks. To handle heavier loads, trucks were built with larger axles and bearings, heavier frames, and beefed up spring packages. Many used wrought steel 36-inch wheels rather than the usual 33-inch size. The standard wheelbase of five-feet, six inches was expanded to five-feet 10 inches. Some six- and eight-wheel trucks used bizarre equalizer arrangements to spread the weight evenly to all axles.

63. Articulated six-wheel truck developed just prior to World War I by ASF for Norfolk & Western 100-ton gondolas. Note the cast L-section frame and the bolted-on journals.



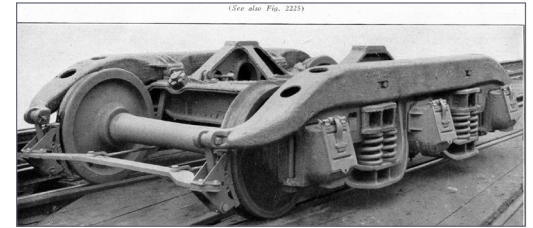
64. This Buckeye heavy-duty, equalized six-wheel plain bearing truck with heavy outside top equalizer, was introduced in the late 1920s. The journals are bolted-on, and hangers for outside brakes are incorporated into the cast frame.



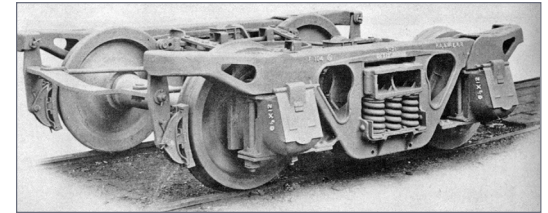
MODERN AXLES

Modern axles typically weigh from 1,100 to 1,200 pounds. They are forged from medium-carbon steel and are machined all over to reduce surface fatigue.

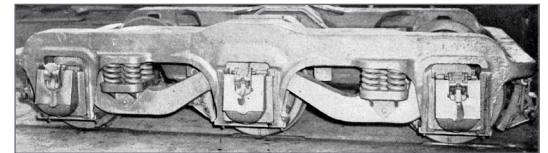
65. The extended frame on this Pennsylvania Railroad six-wheel heavy-duty freight truck serves as a support for the brake hanger. Specialty trucks, including this one, favored bolted-on journals, since a broken one could be easily replaced without junking the expensive main frame. This truck was built in the early 1930s.



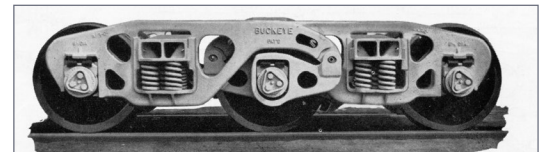
66. Buckeye four-wheel heavy-duty truck with bolted-on journal boxes. This robust version of an Andrews truck with outside brake hangers integrally cast in the side frame was introduced in 1921.



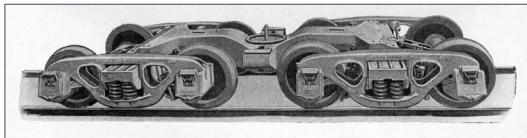
67. GSI developed this Commonwealth six-wheel plain-bearing equalized truck for depressed-center and heavy-duty flat cars in the late 1940s. It has exceptionally large journal boxes in a frame similar to a passenger car truck.



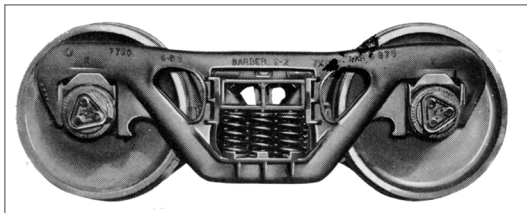
68. Buckeye showed this six-wheel Elasto-Cushion equalized high-capacity truck with roller bearings in its 1970 catalogue. An earlier version with plain bearings was virtually identical. Both types were also available in a 12-wheel tandem arrangement with a span bolster.



69. Gould offered several versions of eight-wheel heavy-duty trucks with an equalized span bolster. This one was developed during World War II. It was rated for cars with a capacity of 200 tons.



70. The Scullin Steel Co. of St. Louis, MO offered this heavy-duty version of a Barber S-2 truck in the late 1960s. It was cast in high-tensile heat-treated steel, and was for 125-ton service.



**VIEW READER
COMMENTS**
click here



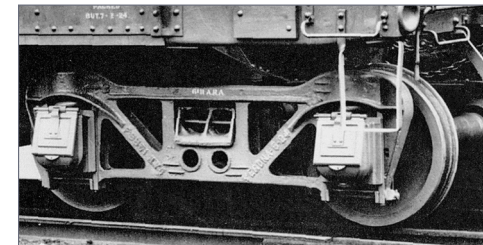
WHEEL SIZES

Wheels for freight cars of up to 70-ton capacity have been standardized at 33-inch diameter for many years. Larger wheels (36-inch for 100-ton and 38-inch for 125-ton cars) are used to help spread heat and weight at the contact point between wheel and rail head. To accommodate tall truck trailers on routes where clearances are tight, some piggyback flat cars have 28-inch wheels.

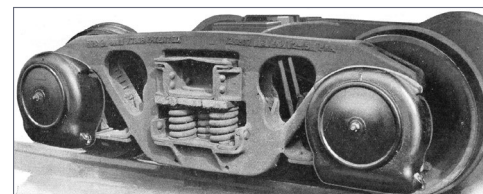
Miscellaneous freight car trucks

Although the vast majority of trucks on North American freight cars have been of standard design, a few unusual iterations have appeared from time-to-time. None of them evolved into common practice, but they are no less interesting to study.

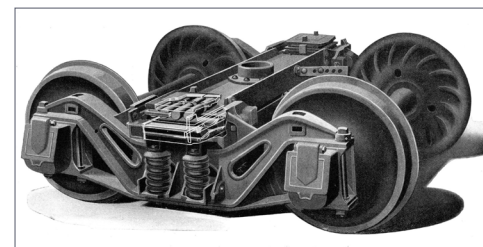
71. The Verona freight car truck, introduced by the Standard Steel Car Co. prior to World War I, consisted of a cast frame with bolted-on journal boxes. It reportedly suffered from cracks in the chord structure and achieved little success.



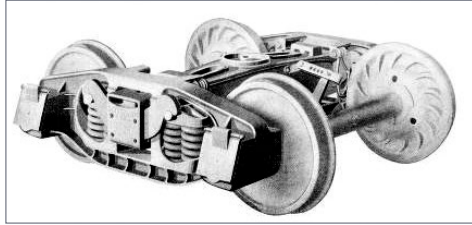
72. The loss of oil and dried out cotton waste in a journal box was an ongoing problem for the railroads. In the early 1930s the Isothermos Corporation offered a solution to end the problem with an innovative lubricating system attached to the axle that continuously splashed oil on the bearing. The journal boxes were sealed with a unique round housing shown here applied to an Andrews truck.



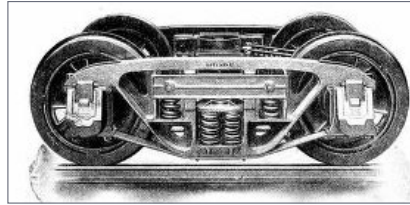
73. In the late teens, Standard Car Truck Co. introduced the Double-Action truck that featured both lateral and radial Barber motion roller devices. It employed unique cast side frames that followed the Andrews principle.



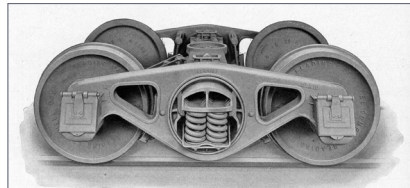
74. This unique 70-ton truck produced by Bettendorf in the mid-teens featured an outside equalizer with separate coil spring packs between each journal and the bolster.



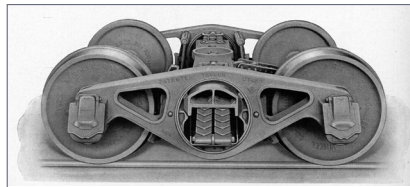
75. The Bulhoup freight car truck was briefly promoted in the early 1930s by the McConway & Torley Co. The cast side frame follows the Andrews principle with a continuous journal tie strap at the bottom. It was claimed that the multiple levels of coil springs gave the truck great flexibility even on less-than-perfect track.



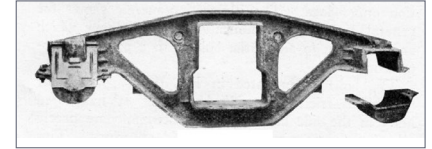
76. In the late 1920s the Flexible Truck Co. of Reading, PA introduced the Taylor freight car trucks with round holes in the frame that permitted the bolster and spring pack to rotate over various track conditions.



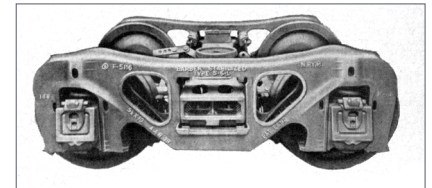
77. The caboose version of the Taylor truck had a pair of full elliptical springs. The only major user of the distinctive truck was the Reading Railroad which, coincidentally, served the Taylor factory.



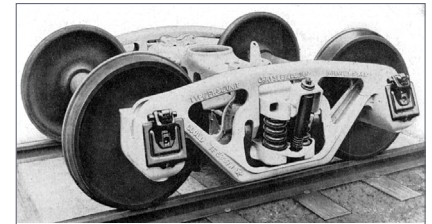
78. The independent journal boxes in arch bar and Andrews trucks made changing wheels sets relatively easy. To change a wheel set in a Bettendorf truck with integrally cast journals was considerably more complicated. Scullin Steel attempted to ease the problem with the introduction of a cast steel truck frame with a two-part journal. Although the idea seemed logical, not much was heard about the idea following its introduction in 1918.



79. The Barber S-5-L stabilized truck, launched by Standard Car Truck Co. just prior to World War II, featured pedestal-type journals that rode in vertical jaws in the double-truss cast side frame. A Barber lateral motion system was installed between the side frame and the bolster.

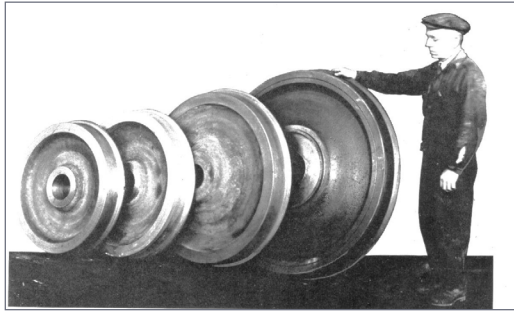


80. In the late 1940s the Chrysler Corporation and Symington-Gould jointly developed a high-speed truck that utilized a swing-motion spring seat and a tubular friction snubber that looked like an automotive shock absorber. Although the Chrysler FR-5 truck rode well, its high initial cost and heavier-than-normal maintenance limited its acceptance.

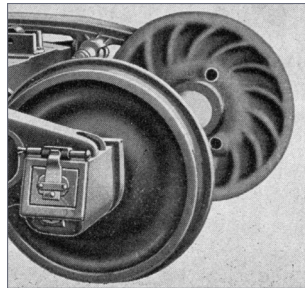


Wheels

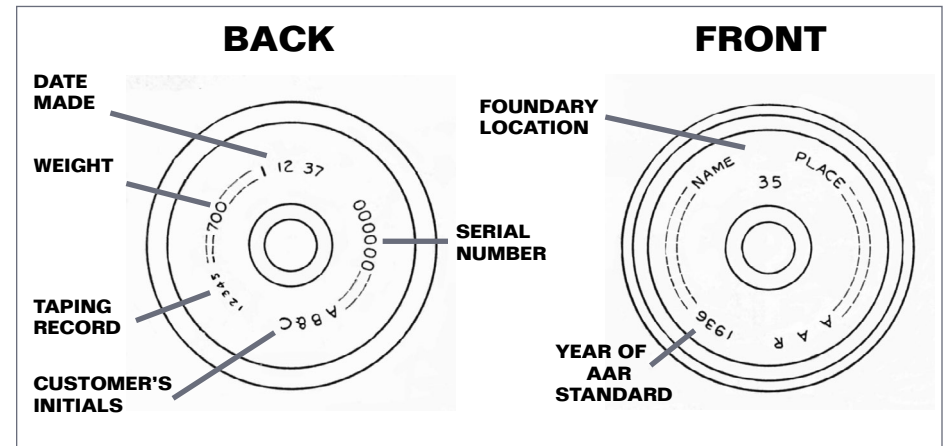
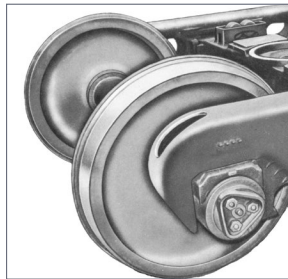
81. Cast iron wheels in a variety of sizes were universally used from the earliest days of American railroads until post WWII. In addition to normal wear, they were subject to failure due to imperfections in the casting process, as well as extremes of temperature such as being overheated by dragging brake shoes.



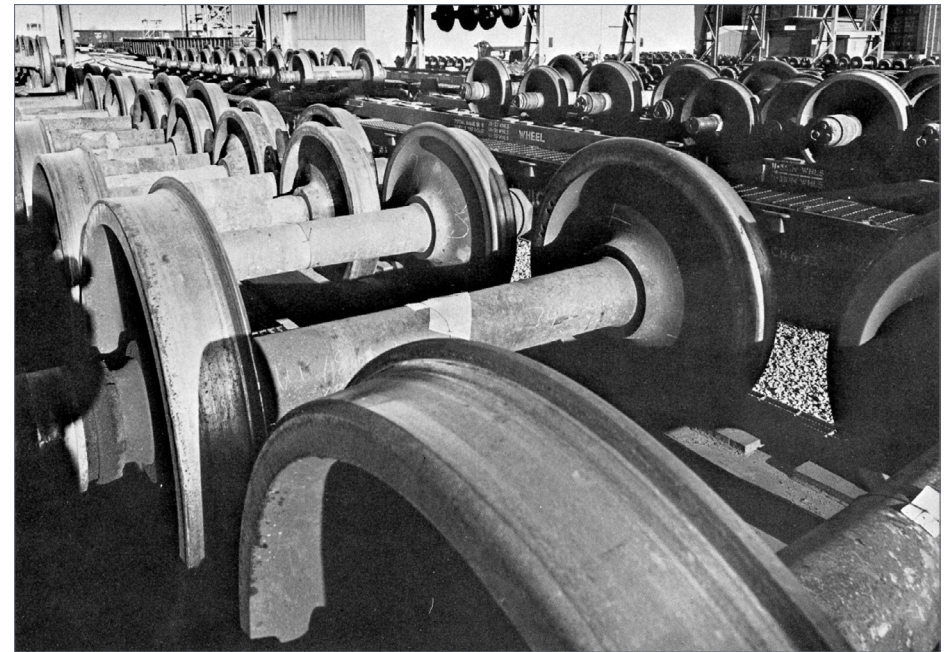
82. Some foundries, but not all, incorporated spiral ribs on the back of the iron wheel to help strengthen the casting while keeping the weight of a standard 33-inch wheel in the range of 750 pounds. Cast iron wheels were prohibited on new cars in 1958. They were prohibited as replacement wheels after 1963, and outlawed from interchange in 1968.



83. Wrought steel wheels, which had a much better safety record than cast iron, were specified for new passenger equipment in the 1920s. Although more expensive, wrought steel wheels were considered far safer. The application of wrought steel wheels on freight trucks started selectively in the early 1930s and became widespread after World War II.

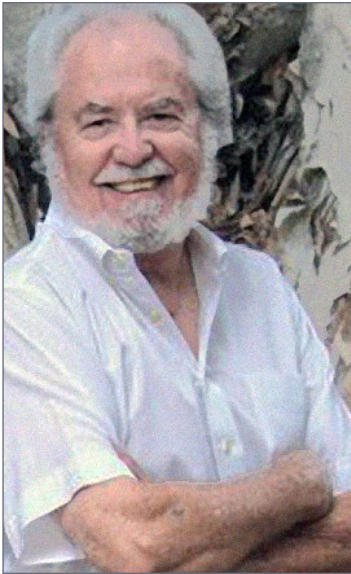


84. To meet AAR standards, foundries were required to follow these guidelines to identify wheels.



85. Union Pacific wheel yard at Pocatello ID. ☒

RICHARD BALE



Author Richard Bale's interest in freight car trucks began several decades ago while he was interviewing George Hook of Central Valley Models for an article in the NMRA Bulletin. George went into considerable detail about CVM's trucks as well as the earlier Micro-Motive trucks George and his partner Bob Lindsay manufactured. Richard became curious about prototype trucks and has been gathering information about them ever since. He lives in Oceanside, CA where he serves as a director for the North County Model Railroad Society. ■



click here

THERE'S MORE!

Check out the Subscriber
bonus extras

**VIEW READER
COMMENTS**

click here



Now available!

Issues 1-50 - Issues 51-99

**Model Railroad
Hobbyist magazine™**

Save
yourself
endless
hours of
downloading

Send me 1-50

\$12

Shipping:

FREE in the US

Send me 51-99

\$12

50% off foreign

Over 7,000
pages of
how-to
information
on model
railroading
on each
disk!

