ROSE CITY GARDEN RAILWAY SOCIETY

NEWSLETTER

See our Web page at http://www.rcgrs.com/

May 2009

Truss Bridges

From Wikipedia

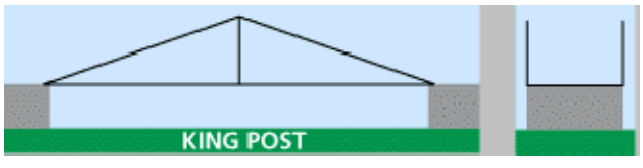
Bridges are one of humankind's more spectacular achievements. The development and engineering of bridges covers many centuries and their history is richly documented in many books and articles. This article describes some of the types of truss bridges, but is very basic in scope because of the huge variety within each type of bridge.

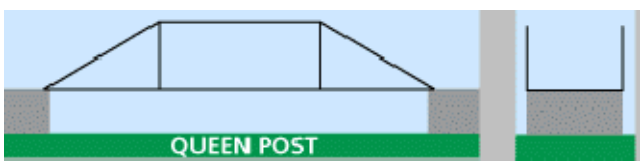
A bridge is a structure built to span a valley, road, railroad track, river, body of water, or any other physical obstacle, for the purpose of providing passage over the obstacle. Designs of bridges will vary depending on the function of the bridge and the nature of the terrain where the bridge is to be constructed.

What is a bridge? Generally a span of more than 20 feet is considered a bridge. There are six main types of bridges: beam bridges, cantilever bridges, arch bridges, suspension bridges, cable–stayed bridges and truss bridges. The definition of these types can become blurred when the elements of two types are blended together. Such an example would be the truss–arch bridge illustrated in the preceding picture.

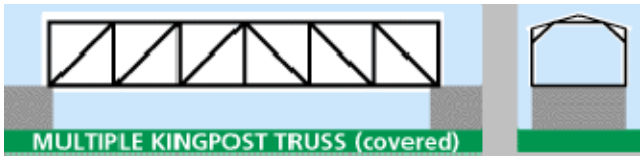
Truss bridges are composed of connected elements. They have a solid deck and a lattice of pin–jointed girders for the sides. Early truss bridges were made of wood, and later of wood with iron tensile rods, but modern truss bridges are made completely of metals such as wrought iron and steel or sometimes of reinforced concrete. The Quebec Bridge shown below is mentioned as a cantilever bridge, but is also the world's longest truss bridge.

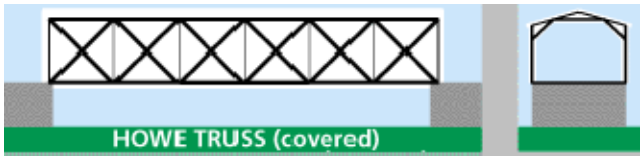
Two of the most simple truss bridges are the king post bridge and the queen post bridge. The signature of these two bridges are the verticals. Without these vertical elements, the truss will be another type.



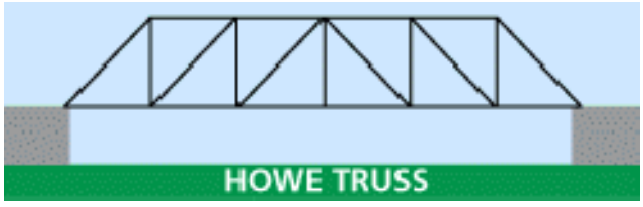


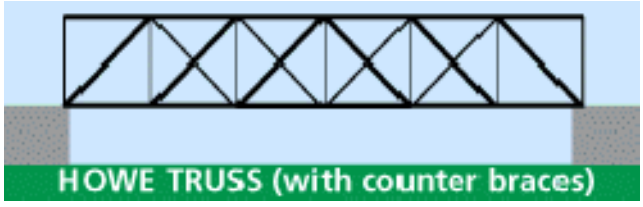
One of the more common methods used for achieving longer spans was the multiple kingpost truss. A simple, wooden, kingpost truss forms the center and panels are added symmetrically. With the use of iron in bridge construction, the Howe truss — in its simplest form — appears to be a type of multiple kingpost truss.

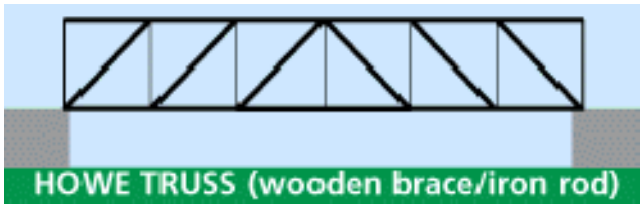




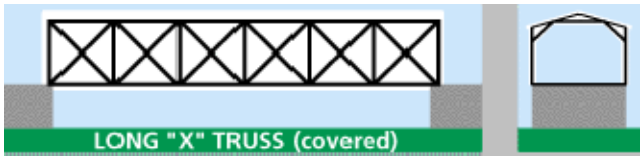
A Howe truss at first also appears similar to a Pratt truss, but the Howe diagonal web members are inclined toward the center of the span to form A–shapes. The vertical members are in tension while the diagonal members are in compression, exactly opposite the structure of a Pratt truss. Patented in 1840 by William Howe, this design was common on early railroads. The three drawings show various levels of detail. The thicker lines represent wood braces; the thinner lines are iron tension rods. The Howe truss was patented as an improvement to the Long truss which is discussed below.



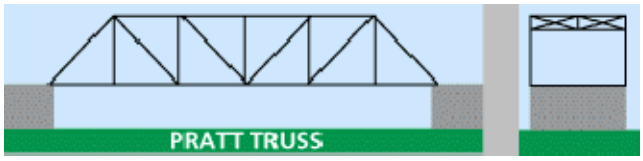




Stephen H. Long (1784–1864) was one of the U.S. Army Topographical Engineers sent to explore and map the United States as it expanded westward. While working for the Baltimore and Ohio Railroad, he developed the X truss in 1830 with further improvements patented in 1835 and 1837. The wooden truss was also known as the Long truss and he is cited as the first American to use mathematical calculations in truss design.



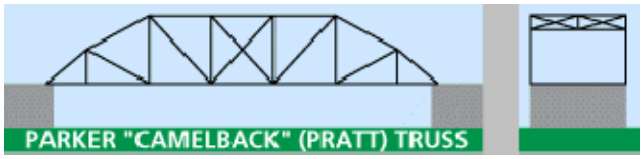
The Pratt truss is a very common type, but has many variations. Originally designed by Thomas and Caleb Pratt in 1844, the Pratt truss successfully made the transition from wood designs to metal. The basic identifying features are the diagonal web members which form a V–shape. The center section commonly has crossing diagonal members. Additional counter braces may be used and can make identification more difficult, however the Pratt and its variations are the most common type of all trusses.

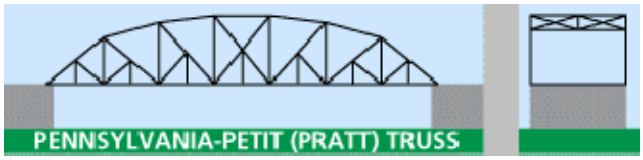


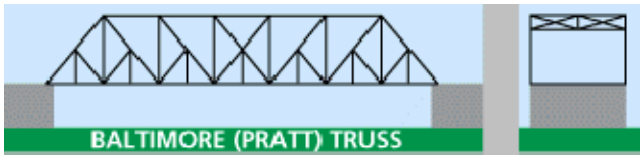
Charles H. Parker modified the Pratt truss to create a “camelback” truss having a top chord which does not stay parallel with the bottom chord. This creates a lighter structure without losing strength; there is less dead load at the ends and more strength concentrated in the center. It is somewhat more complicated to build since the web members vary in length from one panel to the next.

When additional smaller members are added to a Pratt truss, the various subdivided types have been

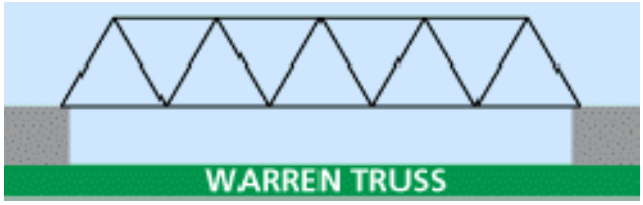
given names from the railroad companies which most commonly used each type, although both were developed by engineers of the Pennsylvania Railroad in the 1870s.

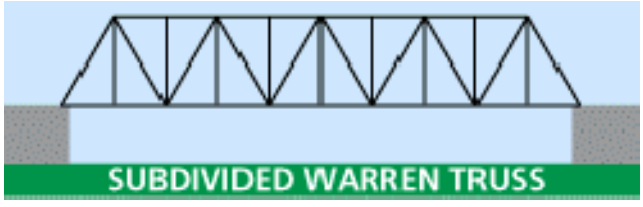


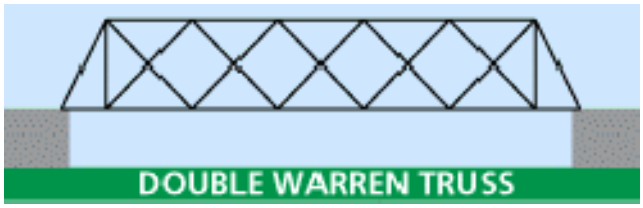




A Warren truss, patented by James Warren and Willoughby Monzoni of Great Britain in 1848, can be identified by the presence of many equilateral or isosceles triangles formed by the web members which connect the top and bottom chords. These triangles may also be further subdivided. The Warren subdivided truss can easily be mistaken for an extended king post or queen post truss. The double Warren truss looks very much like the Howe truss.







Before the use of computers, the interaction of forces on spans which crossed multiple supports was difficult to calculate. One solution to the problem was developed by E. M. Wichert of Pittsburgh, PA, in 1930. By introducing a open, hinged quadrilateral over the intermediate piers, each span could be calculated independently. The first Wichert truss was the Homestead High Level Bridge over the Monongahela River in 1937.

A cantilever is a structural member which projects beyond its support and is supported at only one end. Cantilever bridges are constructed using trusses, beams, or girders. Employing the cantilever principles allows structures to achieve spans longer than simple spans of the same superstructure type. They may also include a suspended span which hangs between the ends of opposing cantilever arms.

Some bridges which appear to be arch type are, in fact, cantilever truss. These may be identified by the diagonal braces which are used in the open spandrel. A true arch bridge relies on vertical members to transfer the load to the arch. Pratt and Warren bracing are among the most commonly used truss types.

Whiskey Creek & Bear Mountain RR

T'was the day before Easter and all along the tracks were evidence that the Easter Bunny (Easter Chicken?) had been by. Colored eggs, candy eggs, and chocolate coins were in evidence in the railroad cars and along the trackways for the members and guests at Ron and Merlene Bacon's house. A short rain sprinkle did not diminish the activity and operations of the railroad. A delicious lunch was enjoyed by all.

The "candy egg special" makes the rounds.

The "EggLiner" makes its appearance in keeping with the season

The square dancers celebrate the nice day.

A model of Walt Disney's "Chloe" is all loaded and ready to go. It was the "Chloe" that helped define and set the standard for the 7–1/2 inch gauge live steam in the U.S.

Mike Greenwood's live steamer in its beautiful pristine livery begins a run.

The train is supposed to come out of the tunnel!

Ron Bacon has just received a new “Daylight Special” 4449. Since it will not run on his current layout, Ron may have some interesting decisions on layout design ahead.

Switch Numbers

Have you ever wondered what a switch number means? For example, what is a Number 6 switch?

The divergence and length of a switch is determined by the angle of the frog (the point in the switch where two rails cross, see below) and the curvature of the switch blades. The length and placement of the other components are determined from this using established formulas and standards. This divergence is measured as the number of units of length for a single unit of separation.

In North America this is generally referred to as a switch’s “number”. For example, on a “number 12” switch, the rails are one unit apart at a distance of twelve units from the center of the frog.

In the United Kingdom points and crossings using chaired bullhead rail would be referred to using a letter and number combination. The letter would

define the length (and hence the radius) of the switch blades and the number would define the angle of the crossing (frog). Thus an A7 turnout would be very short and likely only to be found in dockyards etc. whereas an E12 would be found as a fairly high speed turnout on a mainline.

An example to find the number of a North American switch: In the model switch shown below, the units are in inches. Measure the divergence of the rails at one inch and then measure the distance from the frog point to the divergence is the switch number. (Metric measurements should give the same switch number.)

If you are measuring a prototype switch, you would use feet. Measure the distance where the two rails diverge at one foot and then measure the distance in feet from the frog point to the one foot divergence point. Again, that distance number is the switch number.

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Editor's Note: The deadline for the June 2009 newsletter is May 25, 2009.

Schedules & Timetables

Make sure you check the calendar on our Website at **http://www.rcgrs.com/** for the most up–to–date schedules and timetables.

It is the Society's policy to attempt to have an event or open house on every second Saturday of the month. Other and additional dates during a month are also available and encouraged. Anyone interested in having an Open House or sponsoring an event, please contact **Christina Britain.**

OPEN HOUSE INFO NEEDED FROM HOST:

Layout info for those who want to run their own trains?
Can members run trains? Any limitations, ie., nc steam?
What is minimum track radius?
What is power supply?
Is layout Fn^3 compatible?
Education: Is there a topic of interest host will present?
Unusual or crafted feature that makes RR unique?
Directions:
What Host will provide:

May 17, 2009, Sunday, 1:00 to 5:00 p.m.: Dave and Margaret Kooken, Vancouver, WA. A few members have seen our new outside loop railroad, probably none have seen the major changes in our yard. We think almost everyone will be pleasantly surprised by what they see. Hosts will provide lasagna, rolls, and coffee. Please bring salads, side dishes, desserts, snacks, and beverages of your choice.

Members may run trains on either or both railroads. The new outside railroad has 8' radius, and the original railroad has 4' radius. Track power uses Train Engineer and a 10 amp MRC power supply. Steam is permitted on the new railroad with the hope that operators will do a little wipe–up afterward.

June 20, 2009, Saturday: RCGRS Annual Tour of the Garden Railroads. Bill Derville is chairman for the tour. It is expected that there will be at least eleven railroads open to the public tour this summer. The tour books will still be $10 per family (or carload) and are expected to be available at the same hobby shops and garden centers as last year. In addition to the hosts/hostesses for the garden railroads open for the tour, usually 3 or 4 helpers are needed for each site to help run the trains and for crowd control. You are all needed to help with this event.

July 5 through July 11, 2009: National Garden RR Convention, Denver, CO.

July 11, 2009, Saturday: Gary and Jonette Lee, Corbett, OR

July 25, 2009, Saturday:
From Tom Gaps: I've scheduled the club for "A Picnic at the Meadows & Lake Kathleen Railroad." I hope to have more details in about two weeks but I wanted to at least get the Event and Date to you for the May Newsletter.

My wife and I are planning a trip to the site on 26–April, weather permitting, to scout out the area. The owner, Ray Robinson, has asked that the club arrive all at the same time, as a group, so I'm going to find a location near the site where we can assemble and travel to the site as a caravan. The owner is very protective of his privacy and has asked that I limit distribution of directions to his railroad to only those who are actually planning to attend. To that end, I will need to have people RSVP to me only if they are sure they will attend so that I can send the directions to just those people. The list of RSVP responses will also give us a check off list to know that everyone has arrived at the assembly location before we caravan off to the site. I'll send you an update for the June Newsletter, after we return from our 26 April visit to the site.

August 2nd weekend: Nick Kelsey, Canby, OR

September 2nd weekend: Doug and Marilyn Watson, Tigard, OR

October ? weekend: Annual Ghost Train Event. Plan now to decorate a car or locomotive (or train) with a ghoulish delight. Mike & Teri Greenwood

November 14, Saturday: Annual Buffet/Banquet

December 5, 2009, Saturday, 4:00 to 9:00 p.m.: Shannon and Millie Pratt are hosting a Christmas train Open House/Potluck dinner.

December Friday Evening: Jan and Rae Zweerts