Historic Bridge Foundation Facebook Archives

Did You Know… That rivets are a viable, cost-effective, safe, and historically correct fastener for use in the restoration of historic metal truss bridges and other historic metal bridge types?

April 2015

Surviving metal bridges utilizing rivets have construction dates ranging from the middle of the 19th Century through around 1970. The fact that rivets were used in metal bridge construction for over 100 years, and that bridges built using rivets (many well over 100 years old) survive today suggests that rivets are both a safe and functional fastener type. However, engineers and government officials are often not convinced by this evidence alone, and have often claimed that the only way to rehabilitate a historic metal bridge is to use bolts or welds whenever rivets are replaced.

Historic bridge expert Vern Mesler, working in cooperation with Lansing Community College (LCC), has for several years directed research and hosted conferences related to promoting riveting as a viable restoration method. Information about the conference is at http://www.lcc.edu/manufacturing/welding/ISPCConference/ and information about Mesler's research is at http://www.historicbridgerestoration.com/

Mesler and LCC have also similarly promoted other techniques for in-kind restoration of historic metal bridges, which aims to preserve original materials and design to the greatest extent possible. This approach to preservation is in best keeping with the spirit of the Secretary of Interior's Standards for Rehabilitation, which outlines general concepts for the preservation of historic structures, although it does not outline specific suggestions for bridges.

Riveting is not a "lost art" as some uninformed engineers and government officials claim. Indeed, the truth is exactly the opposite. Enough companies willing and capable of riveting exist to allow for an increasing number of states to not only complete preservation projects involving riveting, but to do so after entertaining multiple competitive bids for riveting and other in-kind restoration techniques. Since most prime contractors in a state do not specialize in riveting, companies specializing in riveting and in-

kind restoration are often called out in the special provisions of a contract proposal to allow a prime contractor to contact these companies for a bid as a subcontractor for the restoration and riveting work. Some of the states that have recently completed bridge projects involving riveting include Michigan, Indiana, Texas, and Ohio. Additionally, Pennsylvania just this year awarded its first modern-day contract that specifies riveting.

The following link includes a video showing the riveting process.
http://www.historicbridgerestoration.com/restorationmedia/video1.htm

Ohio Department of Transportation has developed some guidelines for riveting in bridge projects:

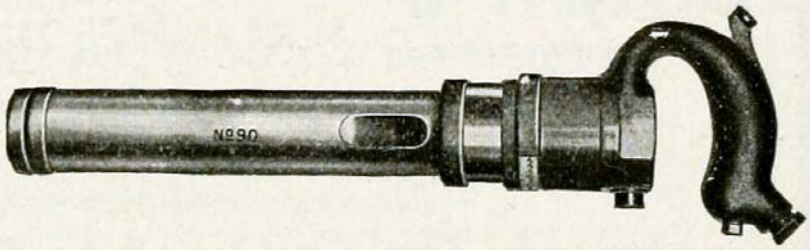
http://goo.gl/g6n1jx

New rivets driven on the base of a truss bridge end pos. Photo Courtesy Nels Raynor, Bach Steel

The State Street Bridge in Bridgeport, Michigan was restored in-kind and made extensive use of riveting.

The Pierceville Bridge in Pennsylvania is scheduled to be relocated and restored using new rivets during the restoration process.

The Boyer Riveting Hammer



Is PREFERRED by the MAN who KNOWS

Because it drives rivets better than any other.
Because it vibrates less and is not so hard on tre nerves.
Because he knows that when he undertakes a piece of work he will finish it, not by hand, not with some other pneumatic hammer, but with the same BOYER HAMMER with which he started.
Because the rapidity with which it drives the rivets, and the skillful, untiring way in which IT WORKS, commands his respect.
Because the energetic way in which it performs its duty inspires him and thrills him with the TRUE DIGNITY OF LABOR.
OUR SPECIALTY is the manufacture and sale of Pneumatic and Electric Tools that WORK.
Read our catalogues and see how our Boyer Hammers, Little Giant Drills, Duntley Electric Drills and Chicago Pneumatic Air Compressors will save you labor and reduce your costs.

Chicago Pneumatic Tool Co.

Fisher Building
CHICAGO

Branches Everywhere

50 Church St.
NEW YORK

Pneumatic Riveting Hammers Were A Common Sight Anywhere Riveting Was Done In The Field. Chicago Was Home To A Major Producer Of These Hammers.

Source: Official Proceedings of Railway Club of Pittsburgh, 1912, Vol. 12, No. 1. Digitized By Internet Archive

A historical advertisement showing a pneumatic rivet hammer. Modern rivet hammers are very similar.

Driving rivets for a new top chord cover plate on a truss bridge.

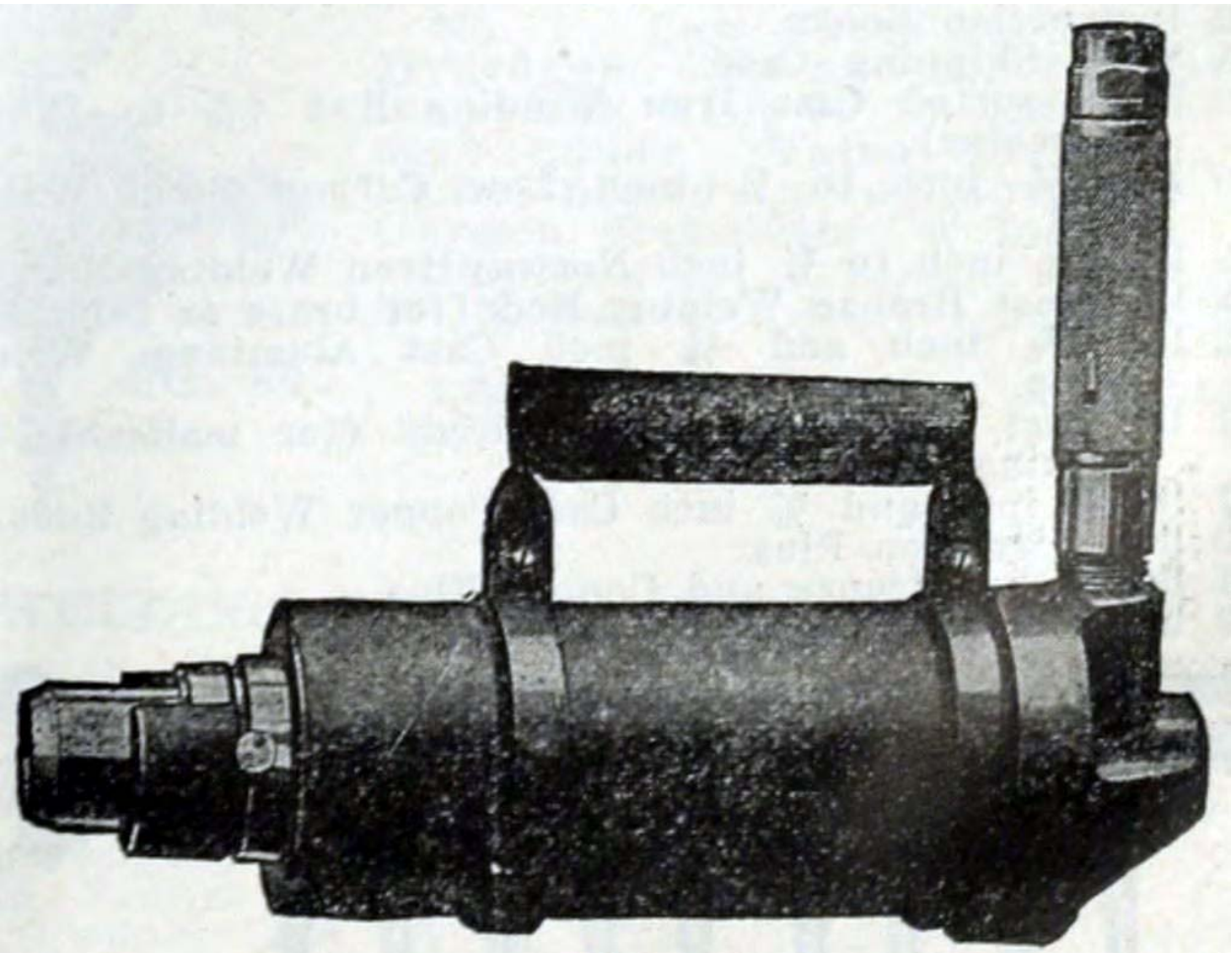


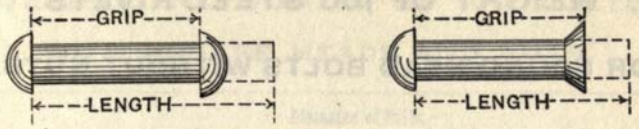
Fig. 40
Holder On

During Field Riveting, A Holder On Held The Rivet In Place While It Was Driven At The Other End

Source: Geo B Carpenter & Co. Catalogue No. 110, 1917 Digitized By Internet Archive

A historical advertisement showing a pneumatic holder-on.

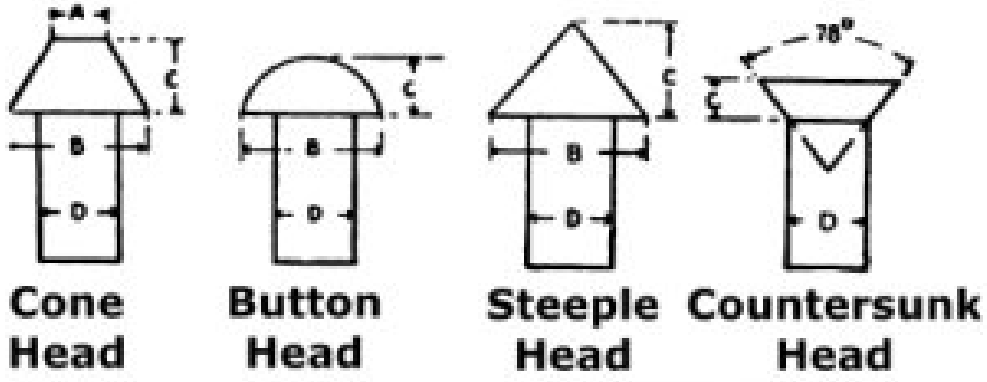
LENGTHS OF RIVETS FOR VARIOUS GRIPS.



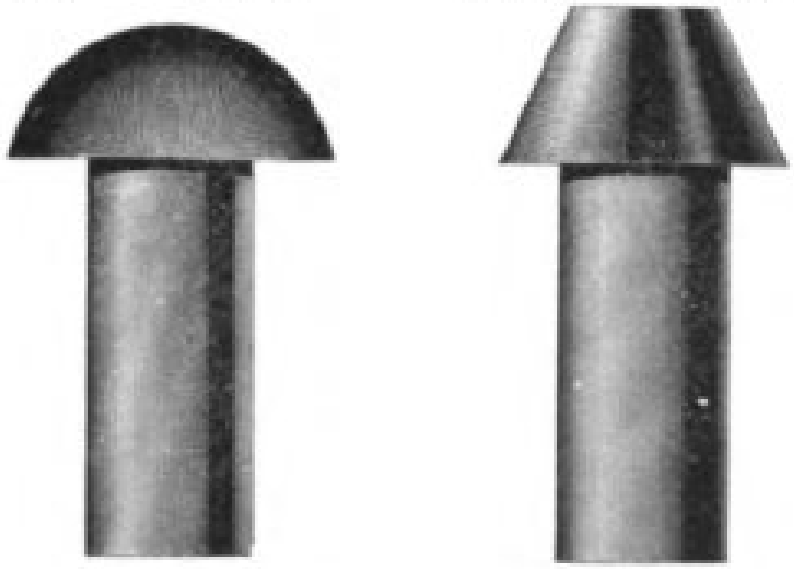
Grip of Rivet, Inches.	DIAMETER OF RIVET. ½″	⅝″	¾″	⅞″	1″	DIAMETER OF RIVET. ½″	⅝″	¾″	⅞″	1″	Grip of Rivet, Inches.
½	1½	1¾	1⅞	2	2⅛	1⅛	1¼	1¼	1⅜	1⅜	½
⅝	1⅝	1⅞	2	2⅛	2¼	1¼	1⅜	1⅜	1½	1½	⅝
¾	1¾	2	2⅛	2¼	2⅜	1⅜	1½	1½	1⅝	1⅝	¾
⅞	1⅞	2⅛	2¼	2⅜	2½	1½	1⅝	1⅝	1¾	1¾	⅞
1	2	2¼	2⅜	2½	2⅝	1⅝	1¾	1¾	1⅞	1⅞	1
1⅛	2⅛	2⅜	2½	2⅝	2¾	1¾	1⅞	1⅞	2	2	1⅛
1¼	2¼	2½	2⅝	2¾	2⅞	1⅞	2	2	2⅛	2⅛	1¼
1⅜	2⅜	2⅝	2¾	2⅞	3	2	2⅛	2⅛	2¼	2¼	1⅜
1½	2⅝	2⅞	3	3⅛	3¼	2⅛	2¼	2⅜	2⅜	2½	1½
1⅝	2¾	3	3⅛	3¼	3⅜	2¼	2⅜	2½	2½	2⅝	1⅝
1¾	2⅞	3⅛	3¼	3⅜	3½	2⅜	2½	2⅝	2⅝	2¾	1¾
1⅞	3	3¼	3⅜	3½	3⅝	2½	2⅝	2¾	2¾	2⅞	1⅞
2	3⅛	3⅜	3½	3⅝	3¾	2⅝	2¾	2⅞	2⅞	3	2
2⅛	3¼	3½	3⅝	3¾	3⅞	2¾	2⅞	3	3	3⅛	2⅛
2¼	3⅜	3⅝	3¾	3⅞	4	2⅞	3	3⅛	3⅛	3¼	2¼
2⅜	3½	3¾	3⅞	4	4⅛	3	3⅛	3¼	3¼	3⅜	2⅜
2½	3⅝	3⅞	4	4⅛	4¼	3⅛	3¼	3⅜	3⅜	3½	2½
2⅝	3¾	4	4⅛	4¼	4⅜	3¼	3⅜	3½	3½	3⅝	2⅝
2¾	3⅞	4⅛	4¼	4⅜	4½	3⅜	3½	3⅝	3⅝	3¾	2¾
2⅞	4	4¼	4⅜	4½	4⅝	3½	3⅝	3¾	3¾	3⅞	2⅞
3	4¼	4½	4⅝	4¾	4⅞	3¾	3⅞	3⅞	4	4⅛	3
3⅛	4⅜	4⅝	4¾	4⅞	5	3⅞	4	4	4⅛	4¼	3⅛
3¼	4½	4¾	4⅞	5	5⅛	4	4⅛	4⅛	4¼	4⅜	3¼
3⅜	4⅝	4⅞	5	5⅛	5¼	4⅛	4¼	4¼	4⅜	4½	3⅜
3½	4¾	5	5⅛	5¼	5⅜	4¼	4⅜	4⅜	4½	4⅝	3½
3⅝	4⅞	5⅛	5¼	5⅜	5½	4⅜	4½	4½	4⅝	4¾	3⅝
3¾	5	5¼	5⅜	5½	5⅝	4½	4⅝	4⅝	4¾	4⅞	3¾
3⅞	5⅛	5⅜	5½	5⅝	5¾	4⅝	4¾	4¾	4⅞	5	3⅞
4	5¼	5½	5⅝	5¾	5⅞	4¾	4⅞	4⅞	5	5⅛	4
4⅛	5⅜	5⅝	5¾	5⅞	6	4⅞	5	5	5⅛	5¼	4⅛
4¼	5½	5¾	5⅞	6	6⅛	5	5⅛	5⅛	5¼	5⅜	4¼
4⅜	5⅝	5⅞	6	6⅛	6¼	5⅛	5¼	5¼	5⅜	5½	4⅜
4½	5¾	6	6¼	6⅜	6½	5¼	5⅜	5½	5½	5⅝	4½
4⅝	6	6¼	6⅜	6½	6⅝	5½	5⅝	5⅝	5⅝	5¾	4⅝
4¾	6⅛	6⅜	6½	6⅝	6¾	5⅝	5¾	5¾	5¾	5⅞	4¾
4⅞	6¼	6½	6⅝	6¾	6⅞	5¾	5⅞	5⅞	5⅞	6	4⅞
5	6⅜	6⅝	6¾	6⅞	7	5⅞	6	6	6	6⅛	5

For field rivets add ⅛ inch to tabular lengths.

Historical chart showing various rivet sizes offered by the Bethlehem Steel Company.

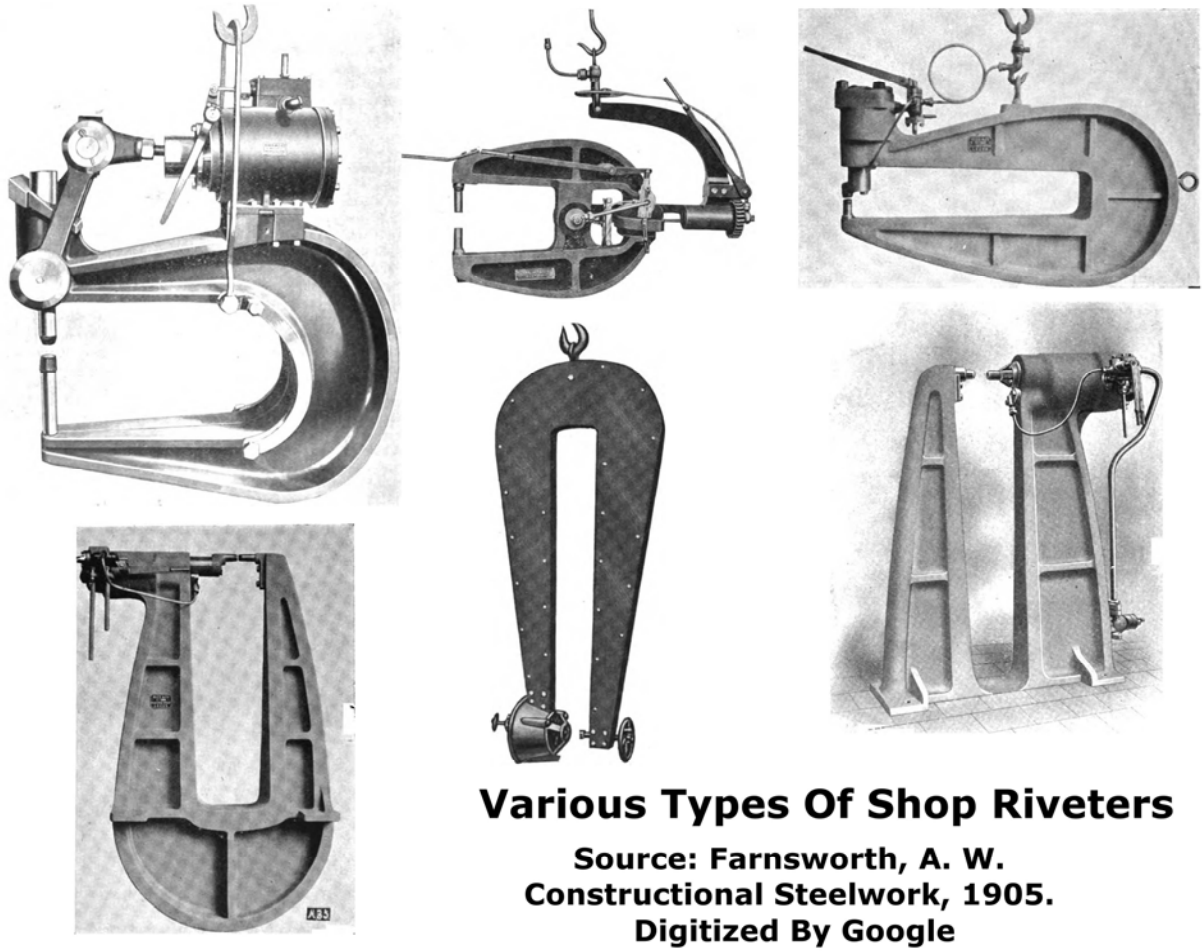


Cone Head | Button Head | Steeple Head | Countersunk Head



Rivet illustrations from the early 20th Century *Maintenence of Way Cylopedia.*

Historical article showing different head shapes for rivets. The button head is the most common type used on bridges.



Various Types Of Shop Riveters

Source: Farnsworth, A. W.
Constructional Steelwork, 1905.
Digitized By Google

Historical photos of various types of shop riveters. Rather than use hand-held pneumatic riveters, these much larger hydraulic riveters were often used in the shop.