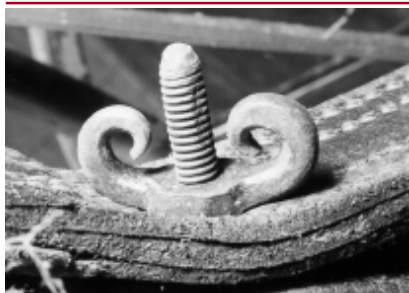


Carriage Museum of America-Library

ANNUAL NEWSLETTER

Librarian Susan Green Post Office Box 417, Bird-In-Hand, Pennsylvania, United States of America 17505
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This type of hand made wing nut was seen on two vehicles circa 1770-1800 to fasten the leather straps.

NUTS AND BOLTS



This is an early hand made wing nut used to hold the body of a circa 1800 sleigh to the runners.



This nut with square corners on an early pleasure wagon appears to have been hand made with the hole off center.

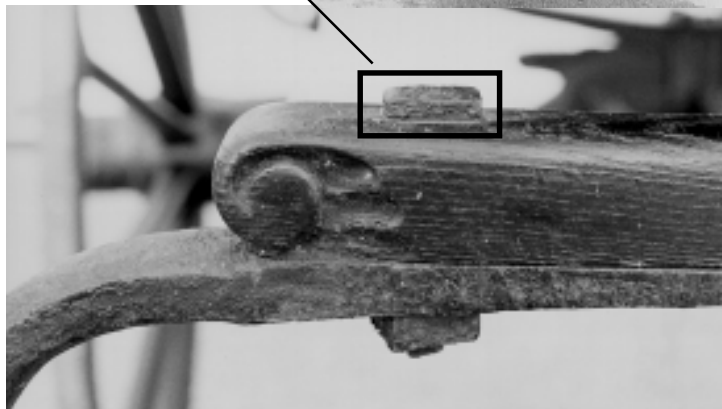


The blacksmith making this sleigh in Scarborough, ME in the 1800s saw an opportunity to be extra artistic by using wing nuts for fastening the supports for the runners throughout the entire sleigh.

This circa 1835 Pleasure Wagon uses handmade bolts that have a rectangular head throughout.



Rectangular head on bolt



Pleasure Wagon, c. 1835



Cutter, c. 1800

NUTS AND BOLTS

For something as small as a nut and bolt it has a rather large job, and comes in many variations throughout the history of the carriage era. In looking through the carriage collection of the Carriage Museum of America in storage we noticed the nuts on vehicles built in the early 1800s were proportionally flatter and squarer than those built later which had chamfered corners on the nuts. On the earlier vehicles less care was taken to trim off the bolts flush with the nuts as the later vehicles often had the bolts trimmed flush with the nuts with a little burr on the end of the bolt to keep the nut from coming off. For further matters that are not visible and more factual information there is "The History of the Nut and Bolt Industry In America" by W. R. Wilbur in 1905. The first application of machinery for making bolts and screws was made by Besson in France in 1568, who afterwards contrived a screw-cutting gauge or plate to be used on lathes. In 1641, almost a century later, this device was further improved by Hindley of York, England, and for many years was in general use.

The notion of a nut and bolt manufactory in America originated with Mr. Micah Rugg, a small country blacksmith, in the village of Marion, Southington Township, Connecticut in 1818. In studying the best methods of making tools to manufacture implements, he invented and brought out two machines for making carriage bolts.

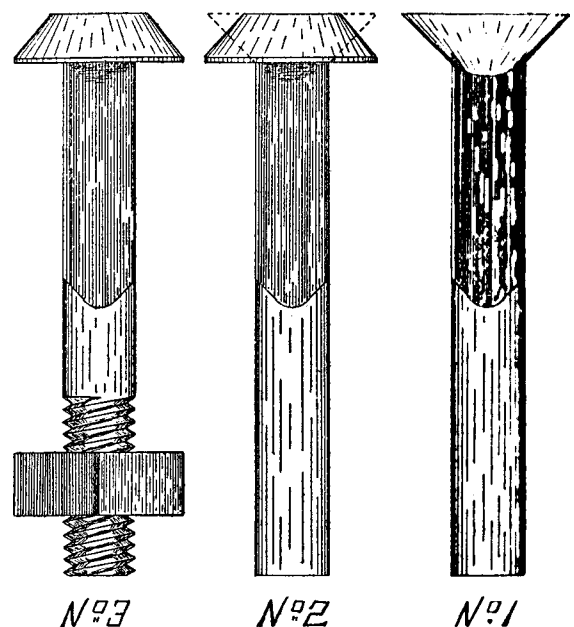
In the New York Coach-Maker's Magazine, March 1868, page 151 we find the following description: "His first operation was to cut up bars of square iron into suitable lengths to form the intended bolts, then heating one end of these pieces, he rounded them with die and swage which were inserted in the mortise of his anvil. The next operation was to head these pieces, and disdaining the old method of the heading-tool, he employed for that purpose an improved drop-die. The surplus metal which formed around the head of the bolt by the drop he trimmed off with a die in a hand-press. Then with a winch, which carried the necessary fixtures upon one end of a shaft to which it gave motion, the bolt being held in this fixture, the threads were cut between dies, which were hinged at one end and had a weight attached to the other to hold them together with sufficient power to enable the die to cut the thread. It was several years before power was applied to perform this operation, and when that was done a boy could accomplish more and with greater ease than half-a-dozen men could previously with the old fixtures. It was about this time that the turned head was introduced, and, if we are not mistaken, it was to circumvent the patented process of the drop. The bolt-heads were headed with an appropriate tool, and the edges or sides beveled, about fifteen blows of the hammer generally performing the operation, and ten they were inserted in the end of a revolving mandrel, held there by a screw, and a tool similar to quadrangular deck-scraper employed to fashion this head like the one as formed with the drop, water flowing in a succession of drops upon the head during the process to prevent the friction destroying the turning-tool. These bolts were then

packed in paper envelopes and sent to market."

Up to 1839 Mr. Rugg's books showed a total manufacture and sale of about 3,000 bolts. During this year he devoted his whole attention to machine bolts and nuts. The following year, 1840 he took in as partner Mr. Martin Barnes, constituting the firm of Rugg & Barnes, the first company to manufacture bolts and nuts in America. Six operatives were employed, with a daily production of 500 bolts, consuming less than 60 pounds of Stitt's best brand of refined English bar iron, purchased at \$140 per ton in New Haven and hauled with ox teams to Marion, a distance of 18 miles. About 300 pounds of Lehigh lump coal was used, costing \$12 per ton on the docks and also transported to the factory by teams of oxen. The monthly pay roll amounted to \$150, payable largely in due bills and store orders; there being no regular pay day, notice was required to get cash as part payment.

He secured a patent on the second machine for carriage bolts for trimming bolt heads, dated October 22, 1842. The machine was operated with a hollow punch, in which the bolt was placed and forced through a trimming die. This was the starting point that led to bolt turning. As with many new and progressive ideas it was looked upon with suspicion--carriage smiths pronounced the bolts good for nothing and manufactured from "pot Metal," made malleable by some mysterious and fraudulent "Yankee" process--and it took some good marketing and hard work to sell this new idea of manufactured bolts and nuts.

Once the idea of manufactured nuts and bolts caught on this led to a period of ingenious efforts to achieve economy and rapidity in the production of bolts. Bolts made by machinery were forged from square iron, the head being forged, the square neck being left intact, and the remainder was rounded and threaded to the required length. For a number of years all bolt forging machinery was designed to form bolts from the square rod on this principle.



The Rugg & Barnes method of fashioning bolts from square iron.

The foregoing cuts illustrate the Rugg & Barnes method of fashioning bolts from square iron. No. 1 represents the blank with countersunk head formed in a hand tool by driving the stock down with a hand hammer. No. 2 represents the same blank with head turned down to proper shape by the operation of a foot-power drop hammer, as indicated by dotted lines. No. 3 represents the finished product.

Due to the ingenuity of Mr. William J. Clark of Milldale, Connecticut, the method of forging carriage bolts was completely revolutionized in the early 1860's.

The records of the Patent Office show that in October, 1859, he constructed dies and produced carriage bolts made from round iron, having the angular neck and under the head of the bolt formed by "lateral swaging" or compression of the dies at the same operation by which the head was formed on the bolt by the upsetting die or "plunger."

In the fall of 1861 a few "pinched neck bolts" were put on the market, and more in 1862, and the great saving in the cost of forging them was in part given to the customers, and the reduction on prices led the trade rapidly from the full square bolts that could not compete in the cost of manufacturing.

Mr. Clark was granted other patents Nos. 43,669, Aug. 2, 1864 and 40,327, October 20 1863 one of which permitted the metal forming the angular neck of the bolt blank to be

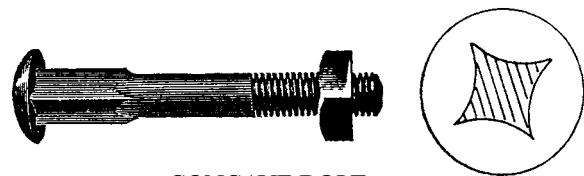
projected to the corners as large as the full square iron would make, and when driven into wood was less liable to split the wood by side-pressure.

This "concaved neck bolt" met with much more favor in the market than the "pinched neck bolt," as it was less liable to turn in the socket when the nut was screwed on or off, and it commanded a better price. Mr. Clark fortified this invention a year later by taking out a patent on the "Dies" forming the concaved neck.

An extensive demand for a cheaper grade of bolts, suitable for constructing the commoner class of vehicles was first met by Alvin Pond's "pinched neck" carriage bolts,



CLARK'S ORIGINAL PINCHED NECK BOLT



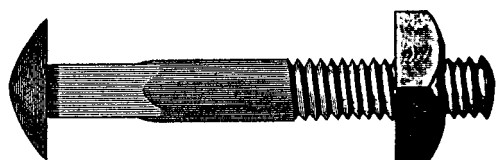
CONCAVE BOLT



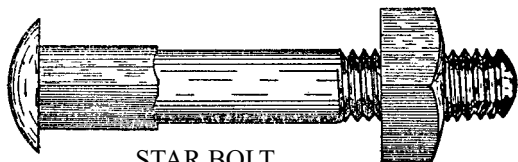
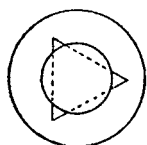
1860 G. & D. Cook & Co.'s Illustrated Catalogue of Carriages. Note the chamfered corner of nuts are facing the bolt head.

introduced by Thos. H. Lamson and Walter H. Woodruff, who purchased the patent which merely covered the style, the method of manufacture being covered by Clark.

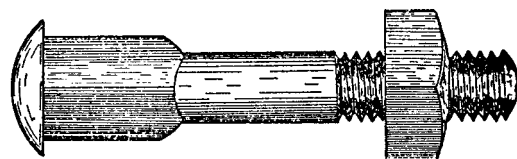
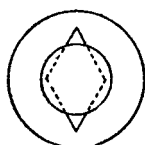
This was soon followed by the star bolt, manufactured



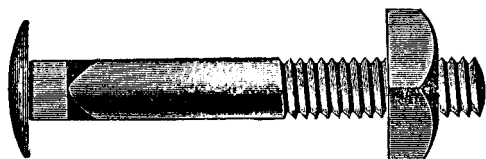
POND PINCHED NECK BOLT



STAR BOLT



DIAMOND NECK BOLT



BASTARD NECK BOLT

by The Plant Manufacturing Co. This was of the pinched neck variety, closely resembling the ordinary pinched neck, and used by the same class of manufacturers and also came under the Clark patent.

Following this came Orrin C. Burdick's diamond neck bolt on which he secured a patent, as the diamond form evaded Clark's patent.

Then came the bastard square-neck bolt, made with a thin head and short square, and manufactured in large quantities by Hotchkiss & Upson.

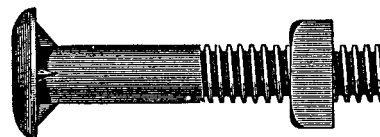
Another notable novelty in the fashioning of bolts occurred in 1890, when Russell, Burdsall & Ward began manufacturing their cold-forged "fin-head" bolt, constructed with headfins, or thin lugs, under the head, to be driven into the woodwork, serving instead of the square to hold the bolt stationary, while the nut was being screwed on or off.

To compete with the fin-head. The Upson Nut Co. brought out a cold-forged bolt with four fins, or more properly speaking with a corrugation under the head, operating the same as the fin-head.

The North cold-forged bolt, invented by W. C. North, of Cleveland, was, in a certain sense, the legitimate offspring of the fin-head and the corrugated head with which it was intended to compete. Instead of fins or other attachments to the head, the North bolt has a corrugated neck that replaces the



FIN-HEAD BOLT



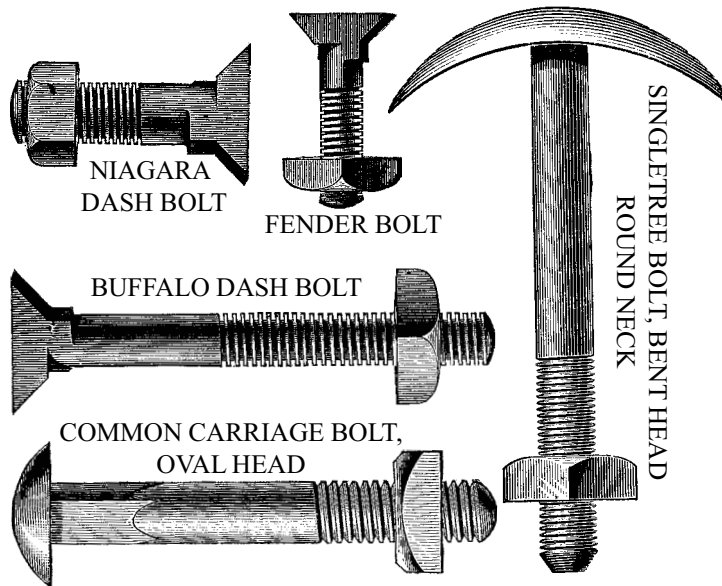
WOODFORD FIN-HEAD BOLT



CORRUGATED-NECK BOLT

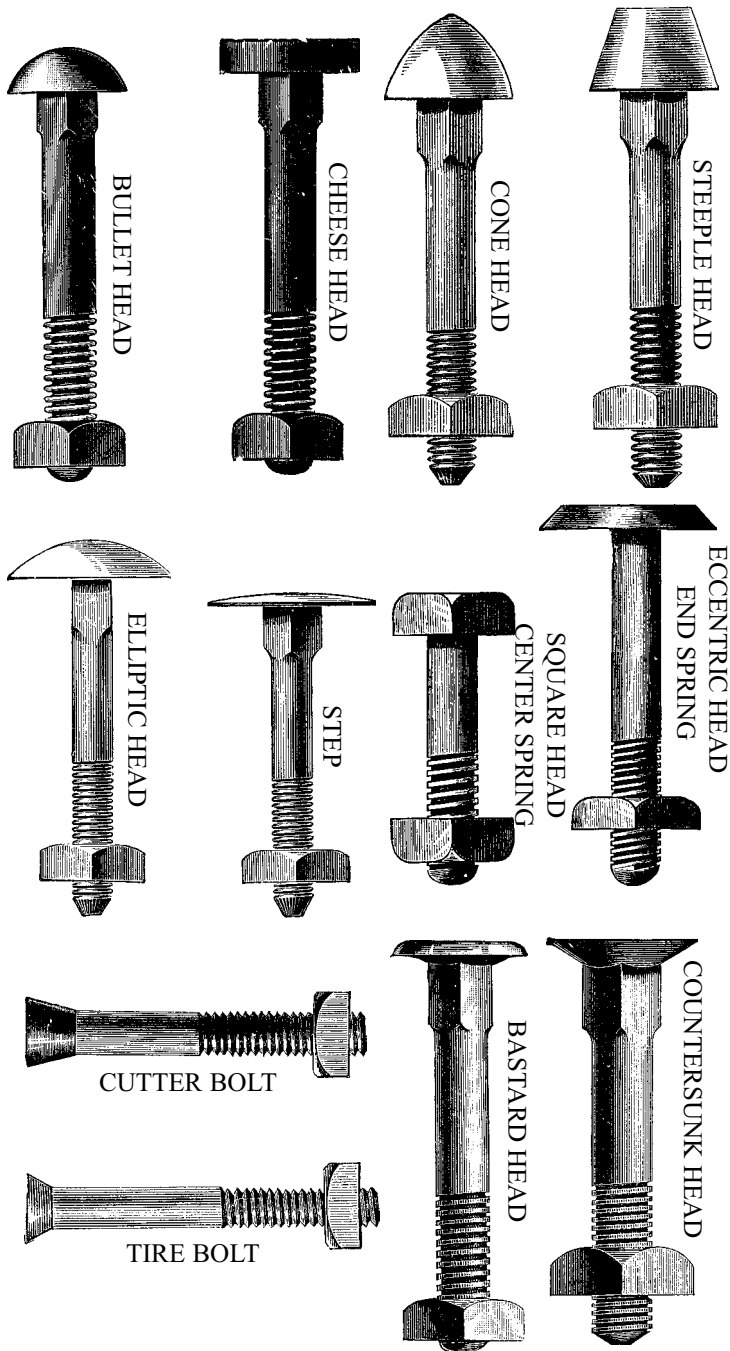
or NORTH BOLT patented May 8, 1894

square neck on the ordinary carriage bolt. The round of the bolt is, of course, smaller than the corrugated or ribbed neck. The hole to receive the bolt is bored to the size of the round section, and the corrugated neck is driven in. This bolt can be driven through metal surfaces and into solid metal, a thing impossible to either the fin or common bolt. The demand for this popular bolt at once found in the general market testified to its merit. In 1905 there were 510 establishments in America engaged in the manufacture of bolts and nuts, which number includes manufacturers of bolt and nut machinery. *Information from History of the Nut and Bolt Industry In America*



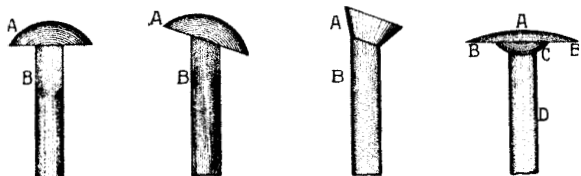
As to the finishing of the threaded end of the bolt the Carriage Monthly, December 1873, page 159 gives the following information about a change in carriage bolts: The change for the better is comparatively small, yet it is nevertheless worthy of notice. We refer to the turned end of the Skelly-made bolts. Formerly the projecting ends of bolts were pointed so as to facilitate the application of the nuts. The ends were merely hammered out leaving irregularities, which

interfered to some extent in starting the nut, still this was a step in advance of the old method of leaving them square. Mr. T. Skelley, of Philadelphia has recently introduced into his factory machinery where with he is enabled to turn off the ends of bolts, thus adding to their neatness of finish, and the ease with which the nut may be applied.



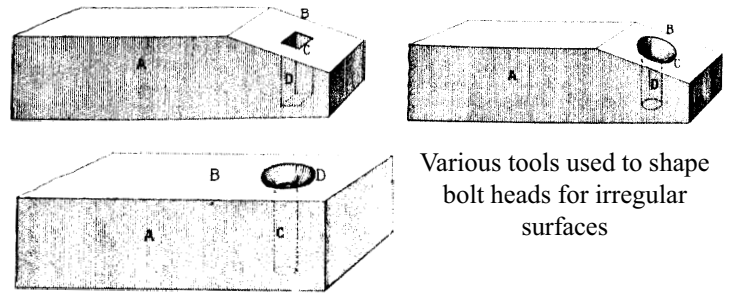
APPLYING BOLTS TO IRREGULAR SURFACES

In applying bolts to the various carriage parts, care should be taken that the heads of bolts are flush with the surface so that water does not get in and rust the metal surface



Bolt heads need to be flush with the surface

or rot the wooden surface. Not all carriage parts have flat surfaces some are rounded or angular. In order to do the best job of having the bolt head flush to irregular surface we found instructions given in the February 1902 Hub page 495. In summary the bolt heads are first heated--using an inexpensive



Various tools used to shape bolt heads for irregular surfaces

tool made by the blacksmith to the angle of the carriage part surface--and shaped in the tool before they are put in the carriage part. Countersunk bolts in Rocker plates seem to be an especially vexing problem to get the head to fit tight enough that the water did not get in and rot the wood. A specially design bolt was made that had a large round thin head. The head being thin so that the trimming could be applied over top.

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Carriage Monthly June 1895

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2. The increased strength due to the helicoid ribs on the shank.
3. The superior finish and symmetrical appearance of the goods.



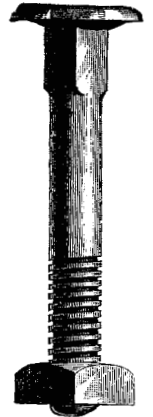
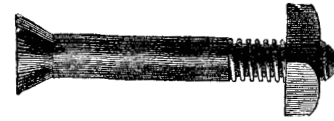
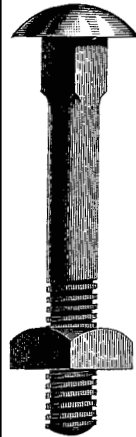
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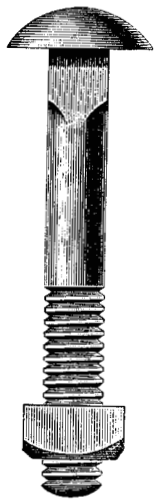
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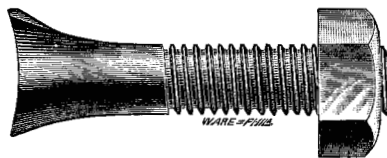
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