

Wheelmaking: Wooden Wheel Design and Construction.

Mendham, NJ : Astragal Press.

List of articles included in the book:

Coach-makers' Magazine.

Oiling Wheels. *Coach-makers' Magazine* July **1855** page Note: Soaking the rims of the wheel in oil before painting.

Hayes Hub Boring and Mortising Machine. *Coach-makers' Magazine* February **1858** page Note: Two illustrations on page plus a page of text with description.

[Harper, Henry]. Dished Compared With Straight Wheels. *Coach-makers' Magazine* June **1861** ? page Note: Is in disagreement with an article published in Volume 3 of the *New York Coach-makers' Magazine* which was reprinted from the *Carriage Builders' Art Journal* in which it is stated. "The advantages of dish wheels: First, there is a tendency to keep the tire tight. Second, the bearing of the wheel and axle-box is against the collar of the axle instead of on the axle-nuts."

Composition For Welding and Restoring Burnt Steel Tires. *Coach-makers' Magazine* May **1863** page Note: Recipe of borax, salammoniae, potash, water, and alcohol.

Rack for Rims and Hubs. *Coach-makers' Magazine* November **1864** page Note: Arrangement for preserving bent rims in a proper shape until used. Factory of Charles S. Caffrey, Camdem, New Jersey. Illustrated.

Box Setting Machine. *Coach-makers' Magazine* November 1866 page Note: Fisher's Box-setting Machine illustrated with description. Made by P. A. Fisher & Son, Beardstown, Illinois.

HUB.

Porter, Henry F. Dishing Of Wheels. *Hub*, September **1872** page . Note: Vertical spoke and its dangers, why wheels are dished, how to make wheels durable, the consequences of insufficient dish, the long-rim theory exploded, dish in Germany, dish of the principal kinds of carriages, the track question. Illustrated and table with proportions for 12 different wheels.

Should Tenons Be Flush With the Rim. *Hub* September **1872** page Note: "Make the tenon of the spoke so very nearly flush with the outside surface of the rim, that you know it will become perfectly so when drawn together by the tire."

History of Patent Wheels and How the Matter Now Stands. *Hub* September **1872** page Note: Mentioned are: J. D. Sarven, Woodburn & Scott, St. Louis, New Haven Wheel Company, Sarven Wheel Company, Indianapolis, Royer Wheel Company, Cincinnati, Warner, Thresher, Whelan, Wallingford Wheel Company.

Kettwell, R. Wheel-Building. *Hub*, May **1873** page Note: Of what material shall our Hub be? How large shall our Hub be in diameter to the Spoke? Shall our Front and Hind Wheel have the same Dish drove in them? What Drive shall my Spoke have? Of what Material shall the Rims be? What Size shall my Rim be in Depth?

Palmer Patent Wheel. *Hub* May **1873** page Note: Full page advertisement for wheels manufactured by the Davis Wheel and Palmer Fork Company, New York, NY. Gives 10 illustrations of the various sections of the Palmer Patent Wheel.

Mosier, John L. H. Proposed Improvements In Heating Tires. *Hub* May **1874** pages Note: Mr. Mosier was foreman blacksmith with Brewster & Co., New York, NY. Gas and the compound blow-pipe, heating of tires in water, in oil, by means of steam, the molten-lead bath, will molten lead deteriorate steel?, hardening files by lead bath, read's gas tire-heater, its advantages and defects, proposed improvements, heater with rotary table and stationary burners, heater with stationary table and rotary burners. 8 illustrations.

Securing Axle-boxes With Sulphur. *Hub* November **1874**, page Note: Sulphur was employed to harden leather boxes many years ago and is no longer employed and a better way is given. Sulphur disintegrates iron axle boxes.

Destroying Rims By Reason Of Bur On the Tires. *Hub* December **1874** page Note: Caused by improperly shaped drill, and gives recommendation for properly shaped drill.

Stewart, William H. Dishing Wheels and Axle-setting. *Hub* November **1875** page Note: William H. Stewart is from Orion, Wisconsin. "It is absolutely indispensable that we take into consideration all positions in which the spoke is obliged to stand to hold its burden." Illustrated.

Richardson, Henry. Circumference Of Wheels and Distance Between Spokes. *Hub* November **1875** page Note: Table from the book by Henry Richardson titled Notes On the Construction of Carriages, and Suggestions For the Improvement of the Same: A Table of the Weight of Load That Wheels of Different Circumference of Spokes will Carry, With a Table Of Circumference of Wheels From 2ft. 8in to 5ft. Diameter, Showing the Distance Apart of Spokes In the Rims, and Giving the Sizes of Wheels Suited to Horses of Different Heights, Also the Amount of Load In Proportion to the Weight of Carriage and Horse. Published in York, England in 1878.

Norton, David. Simple Mode of Getting Diameter of Wheel. *Hub* November **1875** page Note: Illustration of apparatus and short description.

Stotler, M. S. Boiling Felloes In Oil. *Hub* November **1875** page . Note: Does not find any benefit in placing wheel rims in hot oil.

Smallwood, Scott. Difficulty In Hooping Patent Wheels. *Hub* November **1876** page Note: The dish in patent wheels.

Smallwood, Scott. Hooping Or Tiring Wheels. *Hub* April **1877** page Note: Welding of tire, does not use rivets. Puts the tire on warm and then by the use of hammer and tongs fits the tire close to the rim.

Cain, Tubal. Regulating the Dish Of Wheels. *Hub* July **1877** page . Note: Three different people give their opinion as to tire setting.

Riveting vs. Bolting Tire On the Rims. *Hub* July **1877** page Note: Considers bolts quite safe for use with tires and rims.

Fastening Of Felloe Joints. *Carriage Monthly* October **1877** page Note: Illustration of a special fastening device and description.

Cain, Tubal. Discussion About Setting Tires. *Hub* December **1877** page Note: What is the correct dish for Sarven wheels.

Shelling Of Hubs. *Hub* January **1878**, page Note: Need to properly fit the bands in order to prevent shelling of hubs on the front end, where the band score connects with the beginning of the swell of the hub. Illustrated.

Case of Rim-bound Wheels. *Hub* February **1878** page Note: In most cases due to the condition of the hub.

Stotler, M. S. Patent or Wood-hub Wheels. *Hub* March **1878** page Note: Merits of the wood hub wheel verses the patent hub wheel. Claims tires become loose and rim-bound with patented hubs.

How To Box Wheels With Rubber-cushioned Axles. *Hub* May **1878**, page Note: Rubber-cushioned Axles was a very popular idea for a short time. A special wrench designed by John L. H. Mosier, foreman blacksmith with Brewster Co., is illustrated along with other illustrations. For illustration of Rubber Cushioned Axle see *Hub* February 1877 page ??? or *Carriage and Wagon Axles for Horse-drawn Vehicles* page 116.

Heating Tires With Illuminating Gas. *Hub* September **1878** page Note: Reid's improved gas tire heater, which a description is given in detail.

Long Rim Plan. *Hub* October **1878** page Note: For the long rim plan. "The wheel does not become rim-bound. The extra length of rim is lost by contraction, or "upsetting," and if the rim be not thoroughly seasoned, you will find on removing the tire=96two days after setting=96that your extra length of rim has disappeared, and instead of overlapping as formerly, that an open space exists."

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter I.=96Ancient Art and Modern Timber. *Hub*, May **1878**-August 1879. Note: Writes about the different varieties of hickory and the cutting of.

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter II.=96Material for and Proportions of Hubs. *Hub* May **1878**-August 1879 pages Note: Writes about elm, and sour gum for hubs and illustrated are different pattern of hubs along with a chart of proportions for bands, width of bands and length of hub in proportion to diameter.

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter III.=96Principles Involved In Motising Hubs. *Hub* May **1878**-August 1879 pages Note: Illustrations include a mortising gauge, and table of proportions: Height of wheels, size of spokes, and number of mortises.

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter IV.=96Spokes, and their Proportions. *Hub* May **1878**-August 1879 pages Note: Writes about the spokes of ancient carriages, and having the proportions of Tenon, Shoulders, Face, Back, Throat, Body, and Point all correct. Included is a table and illustration of spoke gauge.

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter V.=96American vs. Foreign Spokes. *Hub* May **1878**-August 1879 pages Note: Writes about the sharp face or European style, American or ovate style of spoke, German spoke, and English spoke and the tests of strength made on the spokes. Illustrated are different styles of spokes.

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter VI.=96Bent Timber for Rims. *Hub* May **1878**-August 1879 pages Note: Writes about Edward K. Reynolds first bending timber in 1838. The difficulty of breakage was overcome in 1849 by Thomas Blanchard. Illustrated are two rim bending machines.

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter VII.=96 Appliances Used In Driving the Spokes. *Hub* February Note: Writes about the driving horse or neat bench and the ease at which it can be made and usefulness of it. Illustrated.

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter VIII.=96 Driving the Spokes. *Hub* May **1878**-August 1879 pages Note: Writes about the seasoning of wood, tenons to proper length, fullness to give tenons sidewise, proper shape of the shoulder, sawing the spokes, attention to the hub, straight edge used, mortising chisels, hand-mortising machine, making the mortises, glue, and driving the spoke.

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter VIX.=96 Rimming. *Hub* May **1878**-August 1879 pages Note: Writes about getting a perfect circle. Illustrated with a diagram and work bench used for rimming. The tools used for boring the wholes in the rims.

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter X.=96 Oaks. *Hub* May **1878**-August 1879 pages Note: Illustrated with 11 different species of oaks and two varieties of insects that are harmful.

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter XI.=96 Wheels of Oak. *Hub* **1878-1879** Note: Writes about the skill needed to build wheels in order to kept the spokes from coming out of the hub and the science to keep the spokes from working into the hubs of heavy wheels. First considered are heavy coach wheels. Second, heavy wheels with square-shouldered straight-tenoned spokes. Third, heavy wheels with spokes having shaved or curved shoulders and tapered tenons. Fourth, wheels with "Jersey spokes."

DuBois, Howard M. Applied Mechanics In Wheel-Making. Chapter XII.=96 Wheels Of Oak. *Hub* May **1878**-August 1879 pages Note: Writes about heavy wheels, with spokes having tapered tenons and shaved shoulders.

DuBois, Howard M. Jones-Lewis Prize Essay On Carriage Wheels. The Best Material for, and Best Mode of Manufacturing. *Hub* **1878-1879** Note: HUBS=96 Rock Elm, Cutting and Seasoning, Sour Gum, Treatment of Hubs after Turning. SPOKES AND RIMS=96 Hickory, Felling Hickory, Decreasing Supply of Hickory. IS MACHINERY AVAILABLE?=96 Decrease of Skilled Labor, Machine-made vs. Hand-made Wheels.

DuBois, Howard M. Jones-Lewis Prize Essay On Carriage Wheels. What Is the Best Manner of Constructing A Wheel? *Hub* May **1878**-August 1879 pages Note: Laws Governing the Construction of Wheels, Proportioning the Different Parts, Hub, Proportions of Hub-bands, Mortises, Dodge of the Spoke, Proportions of Spokes, Rims.

DuBois, Howard M. Jones-Lewis Prize Essay On Carriage Wheels. Part III. Putting the Wheel Together. *Hub* May **1878**-August 1879 pages Note: Different Modes of Using Tools, Conditions to Be Observed, Relative Merit of Wood-hub and Patent Wheels, Merits of Each Compared, Demerits of Patent Wheels Belonging to Class First, Demerits of Patent Wheels Belonging to the Second Class.

Note: Howard M. DuBois owned a wheel making company in Philadelphia, Pennsylvania. He was honored by the Carriage-Builders' National Association by the award of the "Jones-Lewis Prize" (fifty dollars), for his essay on "Carriage Wheels."

DuBois, Howard M. Shrinking of Spokes In the Hub. *Hub* August **1879** page Note: In order to fix problem the spokes need to be removed from the hub and wedges glued in with cement (recipe provided), and woodbury duck. Article gives great detail.

Scale Drawing As Applied To Carriage-building. Chapter IV.=96Drawing a Wheel. *Hub* September **1879** page Note: Illustrated with a light buggy wheel giving the four different elevations of the wheel.

Mason Patent. *Hub* September **1879** page Note: Half page advertisement for the Mason Patent Wheel Co., Crown Point, New York. Sectional view of hub illustrated.

Mason's Patent Spoke-saw & Tenoning Machine. *Hub* September **1879** page Note: Advertisement with illustration, not much description.

Skelly's Philadelphia Bolt Works. *Hub* September **1879** page Note: Advertisement for bolts, established in 1855.

How To Box Cushioned Axles. *Hub* December **1879** page Note: Rubber-cushioned Axles was a very popular idea for a short time. Step by step instructions given plus two illustrations. For illustration of Rubber Cushioned Axle see *Hub* February 1877 page ??? or *Carriage and Wagon Axles for Horse-drawn Vehicles* page 116.

Cracking Of Hubs. *Hub* February **1880** page Note: Cracking can be caused by hubs that aren't dry enough, spokes to tight sidewise, or carriages housed imperfectly.

Wear Of Tires. *Hub* August **1880** page Note: How to prevent the tire from wearing unevenly.

DuBois, Howard M. Bushing Wheels. *Hub* February **1881** page Note: How to cut out the whole in the hub for the axle box.

DuBois, Howard M. Mechanical Limit In the "Dish Of Wheels." *Hub* March **1881**. Note: Advantages of dish, but disadvantages if carried beyond a certain limit. Illustrated.

Spence, N. C. Repairing Sarven Patent Wheels. *Hub* October **1881** page Note: First takes off the tire, cuts the rivets in the flanges and knocked them off. Draws the spokes and canvasses the tenons and drove them back with glue.

DuBois, Howard M. How To Rim Wheels Properly. *Hub* December **1881** page Note: Dry material, strength of the rim, wooden dowels in the ends of rims, all the spokes are solidly down on upon the rim.

Tire Bolt-wrench. *Hub* January **1882** page Note: Illustration and description of wrench made by Wiley and Russell Mfg. Co., Greenfield, Massachusetts.

DuBois, Howard M. Valuable Wheel Tables. *Hub* April **1882** page Note: Table No. 1. DuBois Table of Comparative Proportions of Carriage Wheels, Based on approximate carrying capacity of mathematically proportioned Spokes, and representative style of Vehicle for which they are popularly used.

Gibbons's Wheel Chart. *Hub* May **1882** page Note: Prepared by John D. Gibbon, of New York, principal of the Class in Carriage Drafting and Construction. Standard Proportions of Light and Heavy Wheels. Table for 80 different sized and weight vehicles.

Furnaces For Heating Tires. *Hub* May **1882** page Note: Gives illustrations of two gas furnaces and description.

Jenkyn, T. A Simple Form of Tire Upsetter. *Hub* June **1882** page Note: Illustration and description of hand made tire upsetter.

Which Spoke Should Be Plumb? *Hub* July **1882** page . Note: Set the outside spoke so that it will be plumb when on the ground.

DuBois, Howard M. *Whys and Wherefores in Wheel-making. Hub*, August **1882** pages October 1882 pages November 1882 pages . Note: Verbatim report of lecture delivered before the class in carriage drafting, New York, May 17th, 1882. How to proportion the length of hub. Carrying of weight of inclines with illustration. Longitudinal section through hub and axle, illustration. How to proportion the diameter of Hub. Cross section through mortised hub, illustration. How to proportion the hub mortises. How to proportion hub-bands. Showing line of front band in relation to spoke tenon, illustration. How to proportion and shape hub mortises. What are the requirements of spokes. How to get out spoke material. How to proportion spokes. How to throat out spokes. How to drive spokes. How to proportion the dish. How to proportion rims. How to proportion the tread. Boring the rims. Complete measurements for a light wheel, table. Specimen wheel embodying the principles described.

Rupp, Daniel. *Wheels Adapted For Country Roads. Hub* August **1882** page Note: Comments on the *Wheel Chart of Hub* May 1882 by John D. Gribbon as being suitable for city vehicles but not for country vehicles as the dish is wrong for rough roads.

DuBois, Howard M. *Which Spoke Should Stand Plumb=96Beveling the Face of Rims=96Spoke Tenons Generally Too Large. Hub* November **1882** page Note: Writes about how wheels are made wrong with a bevel on the face of the rim, while the face should be straight. Bore tenons on with the shoulder the largest on the back side of the spoke. ...the tire will stay on the rim better.

How To Force Spokes From A Sarven Hub. Hub December **1882** page Note: Gives 5 illustrations and description of apparatus for forcing spokes from Sarven hub.

Klaer, John. *Proposed Tables For Grading Spokes. Hub* January **1883** page Note: Table for: Hickory spokes, 26 inches long, 60 in set=96White oak wagon spokes, long and short, 52 in set=96White oak spokes, 27 inches long, 28 in bundle. Graded from XXX, XX, X, No. 1 and No. 2.

Why Do Hubs "Shell?" Hub June **1883** page Note: Bushing of leather or canvas is one suggestion for a cure.

Welding Steel Tire. Hub October **1883** page Note: Blacksmith writes about his trouble sometimes in welding tires. Some solutions given are: "the lower the grade of steel, the greater amount of time necessary to produce a union heat." try very fluxes, first with borax..... "A good clear coke fire is always necessary to weld steel thoroughly."

Sykes, Tom. *Trueing Gauge. Hub* October **1883** page Note: Three illustrations of apparatus and short description.

Kerr, George W. *Improved Device For Truing Axle-boxes. Hub* January **1884** page Note: 4 illustrations and description with dimensions of an apparatus for truing axle-boxes. Mr. Kerr is foreman at the Bridgeport Cart Co., Bridgeport, Connecticut.

Recent English Novelties In Wheel Tires. Hub February **1884** page Note: Grooved felloe with a ribbed rubber tire made to fit into the groove. The tire can be easily be repair or replaced. 8 illustrations.

Carson, W. T. *English Opinion On Dishing Wheels. Hub* May **1884** page Note: Mr. Carson was a writer of a long serial on wheels appearing in the *Coach-builder's, Harness-makers and Saddlers' Art Journal*. Writer believes no hard and fast rules are laid down for dishing. Table for dishing of new wheels, diagram of dishing wheels and gauge for judging the dish in wheels. It is advisable to start with as little dish as possible because every time new tires are put on the dish increases.

Hansen, James. Who Made the First Bent Rim? *Hub* October **1884** page Note: James Hansen claims to have made the first bent rim in 1835.

How To Remove A Tight Tire Without Injury To the Wheel. *Hub* November **1884** page Note: Cuts several pieces of iron and heats one piece at a time. Putting a heated piece of iron on the floor he runs the tire of the wheel over it til it starts to loosen and then uses another piece of heated iron to loosen the tire further. Illustrated.

Lee, R. H. Simple Device For Drawing Rusty Screws >From Rims. *Hub* November **1884** page Note: Illustration and description of apparatus for removing rusty screws.

How To Make Hub -Bands. *Hub* May **1886** page Note: Illustration of a band mandril.

Beveling Hub Bands. *Hub* April **1886** page Note: How to bevel hub-bands by means of the ordinary modern drill and hub-borer. 7 illustrations.

Wm. J. Matern's Ready Hub-boxing Gauge. *Hub* September **1886** page Note: Advertisement with illustration and text about device.

Flowers, F. J. Tenoning and Mortising Wheels. *Hub* October **1886** page Note: Fitting the spokes to the hub, not making the spoke tenons to be for the hub mortise.

Hints About Welding Iron and Steel. *Hub* January **1887** page Note: Writes about the composition of iron, heating iron, and the various coals and fluxes.

New Wheel-tread Sanding and Equalizing Machine. *Hub* January **1887** page Note: Illustration and description of machine made by Bentel & Margedant Co., Hamilton, Ohio.

Hart, James H. How To Hold Tire-bolts Fast. *Hub* January **1887** page Note: Description and illustration of apparatus to hold tire-bolt.

DuBois, Howard M. Proportion of Wheels In Relation To Their Tires. *Hub*, February **1887** pages

Note: "There is no distinct mechanical trade so dependent upon another for success or failure, as that of the carriage wheel-maker upon the blacksmith to whom is entrusted the completion of the wheel by putting on the tires." How wheels should go to the smith. Illustrations and table of proportions of wheels in relation to axles and curves in dish.

DuBois, Howard M. Proportion of Wheels In Relation To Their Tires. *Hub*, March **1887** pages Note: "The proper shapes to be given to the spokes are all highly important, as their proportions in thickness of "body," "taper" and thickness of "throat" all play an important part in making the wheel what it should be when it goes to the smith-shop." Table and illustrations. Writes about proper proportions of spokes to give proper curves in tiring.

DuBois, Howard M. Question About Driving Spokes. *Hub*, January **1888** page Note: Mortising hubs of heavy wheels. Illustrated with diagram.

DuBois, Howard M. "Danger Line" For Wheel-makers. *Hub* June **1888** page Note: Comparing hand made wheels to machine made wheels. Illustrated. "With the above points carefully attended to, no reason remains why factory-made wheels should not be quite as durable as those made by hand, always providing that thoroughly dry material is used."

Table of Average Dimensions of English Carriage Wheels. *Hub* June **1887** page Note: Gives descriptions for: Drag or club coach, medium size elliptic-spring coach, full-size elliptic spring landau, small-size elliptic-spring landau, large-size elliptic-spring barouche, light elliptic-spring barouche, full-size elliptic-spring brougham, full-size elliptic spring single brougham, medium-size elliptic-spring victoria-phaeton, Large-size victoria-phaeton, Mail-phaeton, stanhope-phaeton, Dog-cart. Article reprinted from a serial article entitled "Treatise on the Manufacture of Carriage Wheels." by anonymous writer published in the London *Coach Builder*.

Two English Tables of Wheel Dimensions. *Hub* July **1888** page Note: Reprinted from the London *Coach Builder*. Table 1. Proportions of hubs and spokes, Table 2. Proportions of spokes.

How To Tire Wheels When Out Of Center. *Hub* August **1888** page Note: Gives a short remedy by which hubs which are out of center after tiring can be improved to some extent. 5 illustrations.

Small, James. Plough and Cartwright, of Mid-Lothian, Scotland. Originally published 1790. *Hub* January-April **1889** pages Note: Introduction by Howard M. Dubois. See James Small.

Smallwood, Scott. Setting Tires. *Hub* March **1889** page Note: How to keep the tire round. "Durability of a wheel depends largely upon the way in which the tire is set."

Simple Machine for Removing Tire. *Hub* April **1889** page Note: 3 illustrations and description with dimensions of apparatus for removing tires.

Irregular Dish of Wheels. *Hub* June **1889** page Note: Possible causes of irregular dishing: spokes seasoning differently, improper joining at the rims, and uneven heat of the tire.

Spoke Trestle. *Hub* June **1889** page Note: Illustration and description of spoke trestle.

Hubs. *Hub* October **1889**, page 493. Note: Use of smaller hubs for the front wheels and larger hubs for the back wheels.

Correct Size Of Hub As Per Axle. *Hub* December **1889** page . Note: Rule by which to get the diameter of the hub to suit its length of axle-arm.

Putting New Rivets In An Old Wheel. *Hub* January **1890** page Note: Illustrated with 3 diagrams and description of apparatus for putting rivets in.

Handy Tire Shrinker. *Hub* May **1890** page Note: Illustration and description of tire upsetter.

Wheel Making. : As Now Performed In Wheel Factories In the United States. *Hub* August **1891** pages Note: Starts with cutting of log for hubs and goes onto the various steps for making a hub and then the same for spokes. Illustrated.

Triumph of American Ingenuity. *Hub* August **1891** page Note: Illustration and description of Spoke Lathe, manufactured by Egan Company, Cincinnati, Ohio.

Brace Of New and Indispensable Wheel Machines. *Hub* September **1891** page Note: Illustrations and descriptions of Wheel-tread sanding and equalizing machine and wheel polishing machine made by Bentel & Margedant Company, Hamilton, Ohio.

Streak Tire. *Hub* September **1891** page Note: Two illustrations a very early method of tiring wheels, but nailing sections of iron on the sawed rims. Found in use among farmers of Newton, Lower Falls, Massachusetts in 1891.

No. 1 Patent Automatic Hub Turning Machine. *Hub* January **1892** page Note: With friction clutch, roughing and cupping attachments. Description and illustration. Sold by Defiance Machine Works, Defiance, Ohio.

Improved Spoke Tenoner for Round Tenons. *Hub* February **1892** page Note: Illustration and description of machine made by Egan Company, Cincinnati, Ohio.

M'Farlane Tire Furnace. *Hub* May **1892** page Note: Illustration and description of tire furnace sold by M'Farlane of Chicago, Illinois, includes testimonies from two wagon builders.

Martin's Combined Rim, Wrench and Bolt Cutter. *Hub* June **1892** page Note: Illustration of work bench type machine for positioning wheel to work on it. Lengthy description. Manufactured by Silver Manufacturing Co., Salem, Ohio. Testimonials by C. P. Kimball & Co.

Tireing Wheels. *Hub* July **1892** page Note: What is the amount of dish a light wheel should have.

Setting and Resetting Tires. *Hub* February **1893** page Note: Illustration of machine plane and level for making sure the face of rim is straight. Gives dimensions for tires and dish.

Fitting Wheels For the Tires. *Hub* April **1893** page Note: Should the spoke tenon bear against the tire.

Improved Felly Rounding Machine. *Hub* April **1893** page Note: Illustration and description of machine made by Bentel & Margedant Co., Hamilton, Ohio.

Hosler's Patent Spoke Driving Machine. *Hub* June **1893** page Note: Illustration and description of machine made by J. A. Fay & Egan Company, Cincinnati, Ohio.

Automatic Combined Spoke and Handle Lathe. *Hub* July **1893** page Note: Illustration and description of machine made by Defiance Machine Co., Defiance, Ohio.

New Sectional and Bent Felloe Borer. *Hub* December **1893** page Note: Illustration and description of machine made by Egan Company, Cincinnati, Ohio.

West, J. B. Evolution of the Tire. *Hub* December **1893** page Note: J. B. West of Rochester, NY, was the inventor of the hydraulic tire setter. Gives a little verse to go with the history of tire setting.

No. 5 Heavy Double Hub Equalizing Machine. *Hub* February **1894** page Note: Illustration of two large saw blades cutting a log into lengths for hubs. Full page advertisement for Defiance Machine Works, Defiance, Ohio.

Dish In Wheels. *Hub* April **1894**. Note: "This dish puts the back bone int eh wheel for strength." Discussion of atmospheric changes and how it effects the wheels.

Perfected Cold Hydraulic Tire Setting Machine. *Hub* June **1894** page Note: Illustration and description of machine sold by Williams, White & Co., of Moline, Illinois.

Rim Roller For Shaping Pneumatic Tires. *Hub* November **1894** page Note: Illustration and description of machine made by Geo. W. Heartley, Toledo, Ohio.

Proportions of Spokes. *Hub* December **1894** pages Note: Illustrated and dimensions given in text.

Improved Spoke Tenon Compressing Machine. *Hub* December **1894** page Note: Illustration and description of machine made by Bentel & Margedant Co., Hamilton, Ohio.

An Idea for Fastening Loose Spokes. *Hub* January **1895** page Note: Illustrated with 5 illustrations of apparatus for dealing with loose spokes.

Comparative Tests With Steel and Pneumatic Tires. *Hub* May **1895** page Note: Description of test preformed. Ideal size for pneumatic wheels. Why the pneumatic sulky is speedy. Relative advantages of cushion and pneumatic tires. Larger and wider field.

Rodgers Rubber Cushioned Vehicle Tire. *Hub* May **1895** page Note: Illustration of perfectly round solid rubber tire held in a channel by three wires. Description of tire. Made by the Tricycle Mfg. Company of Springfield, Ohio.

Perfect Rubber Tire. *Hub* May **1895** page Note: Illustration and description of solid rubber tire made by Lockwood & Brown, Amesbury, Massachusetts.

Patent Automatic Rim and Felloe Bending Machine. *Hub* July **1895** page Note: Illustrations and description of machine made by Defiance Machine Works, Defiance, Ohio.

Methods of Doweling and Tanging Wheels. *Hub* August **1895** page Note: Joining the ends of the rims together.

Patent Reverse Helicoid Tire Bolts. *Hub* August **1895** page Note: Advertisement for tire bolt made by Russell and Erwin Mfg. Co., New York.

Hydrostatic Graduated Stroke Hub Mortising and Boring Machine. *Hub* August **1895** page Note: Illustration and description of machine manufactured by Bentel & Margedant Co., Hamilton, Ohio.

Power Cam Press for Wheel Hub Bands, etc. *Hub* October **1895** page Note: Illustration and description of machine manufactured by Bentel & Margedant Co., Hamilton, Ohio.

Stevens' Combined Felloe Plate and Joint Supporter. *Hub* March **1896** page Note: Description of metal plate for rim joint made by A. E. Stevens & Co., Portland, Maine.

Patent Double Drum Felloe Polishing Machine. *Hub* April **1896** page Note: Illustration and description of machine made by Defiance Machine Works, Defiance, Ohio.

Rubber Tire. *Hub* May **1896** page Note: Illustration and merits of the Standard Tire Co.'s, of New York, new solid rubber tire. Thin bar of rubber with flange over the side.

Improve Rim Planner. *Hub* June **1896** page Note: Illustration and description of machine made by Bentel & Margedant Co., Hamilton, Ohio.

Novel Felloe-joint-plate. *Hub* September **1896** page Note: Illustrated with 3 figures and description.

Tire Pullers. *Hub* July **1898** page Note: Illustrated is the Smith Giant Tire Puller made by S. D. Kimbark, Chicago, Illinois. Describes the merits of.

Coach-makers' International Journal

Wheel Horse and Mallet. *Coach-makers' International Journal* February **1869** page Note: Fitting the spoke tenon in the hub and then driving the spoke in the hub.

Wheel Horse and Mallet. *Coach-makers' International Journal* March **1869** page Note: Cutting the finger tenon for the spoke for the rim, and fitting the rim to the wheel.

Wheel Horse and Mallet. *Coach-makers' International Journal*, May **1869** page Note: Boxing the wheel and using white lead.

Hooping Wheels. *Coach-makers' International Journal* June **1869** page Note: Size of tire for rims.

Long Rim Question. *Coach-makers' International Journal* November **1870** page Note: Leaving the rim one-quarter of inch longer than the net circumference of the wheel. Author seems to go on at great lengths against this practice.

Toomey, Samuel. Long Rim Plan. *Coach-makers' International Journal* November **1870** page Note: Bent rims for wheels are different then sawed rims when setting the tire, in order not to have rim bound wheels they need to be treated different.

Hooping Wheels Resumed. *Coach-makers' International Journal* November **1870** page Note: Refers back to previous articles and offers an opinion about.

Labor Saving Machine. *Coach-makers' International Journal* December **1870** page Note: Machine for making the tenon of the end of the spoke for the rim. Dole's Patent Spoke-tenoning machine, manufactured by Silver & Deming, Salem, Ohio. Two illustrations and description.

Toomey, Samuel. *Coach-makers' International Journal* January **1871** page Note: Mr. Toomey restates his case for the why he sets the tires on wheels. "On this point of contracting the rim endwise on the spoke tenon we claim a decided improvement."

Hub Bands. *Coach-makers' International Journal*, April **1872** page Note: Hub band should not be longer or wider than will cover the axle nut or cap safely.

Sarven Patent Wheel. *Coach-makers' International Journal*, June **1872** page Note: Summary of the decision of the courts in favor of James D. Sarven for his patented wheel.

Wheel Making. *Coach-makers' International Journal*, September **1872** page Note: Having seasoned timber, all a matter of fitting the spoke into the hub, writes about how to make the tenon on the spoke for the hub.

Hub Boring Machine. *Coach-makers' International Journal* March **1873** page Note: Illustration of the Kritch Patent Hub Boring Machine patented Feb. 23, 1864 and improved Oct. 1872. With description. Sold at Cleveland, Ohio.

West's American Tire Setter. *Coach-makers' International Journal* March **1873** page Note: Advertisement for Hand Machine and Power Machine, with Counter-shaft for setting tires cold. Early tire setting machine patented by West and sold and manufactured by Mowry Axle and Machine Co., Greenville, Connecticut.

Sarven's Patent Wheels. *Coach-makers' International Journal* March **1873** page Note: Full page illustrated advertisement for Sarven wheels made by Royer Wheel Company, Cincinnati, Ohio. 9 illustrations of the different stages of making the wheel.

Sandusky Wheel Co. *Coach-makers' International Journal* March **1873** page Note: Half page advertisement for Sandusky Wheel Co., Sandusky, Ohio. Illustration of wheel with patented hub, and their carriage bodies for slide seat.

Maris, Jared. Coating of Hubs. *Coach-makers' International Journal*, May **1881** ? page . Note: Coating of hubs with hot linseed oil.

CARRIAGE MONTHLY

Dole's Hub-boxing Machine. *Carriage Monthly* April **1871** ? page Note: Illustration and description of Hub-boxing Machine.

White and Red Hickory. *Carriage Monthly* May **1873** page Note: White hickory preferred by the majority of persons, as it is considered much tougher than the heart portion of the wood.

Spoke Driving Machine. *Carriage Monthly* July **1873** page Note: Illustration and description of machine made by J. A. Fay & Co., Cincinnati, Ohio.

Olds' Patent Wheel. *Carriage Monthly* **1874** page Note: Full page advertisement with two illustration of side and end elevation of the hub. Merits claimed by the company N. G. Olds & Sons, Fort Wayne, Indiana.

West Chester Wheels. *Carriage Monthly* **1874** page Note: Half page advertisement for Hoopes Bro. & Darlington, West Chester, Pennsylvania. This company was the largest wheel manufacture on the east coast. For more information about this company see Industrial Archeology of the Wood Wheel Industry In America by Peter Haddon Smith, 1971.

Sandusky Wheel Co. *Carriage Monthly* **1874** page Note: Half page advertisement showing a platform spring and stating they are manufacturers of the Dorman Patent Wheels. Company located in Sandusky, Ohio.

Setting Boxes. *Carriage Monthly* August **1874**, page Note: Gives the measurements for ordinary carriage wheels.

Heating Tires. *Carriage Monthly* September **1874** page Note: Whether or not to heat tires in the smith's forge, in a vertical furnace, or in a horizontal furnace? "Heating tires in a vertical furnace is a decided improvement over heating them on the forge....." Writes about the different degrees of temperature. Heating with gas. Mr. Mosier's rotary furnace.

Oil In Hubs. *Carriage Monthly* November **1874**, page Note: Two main causes of oil entering the hub and losing the spokes are: imperfect setting of the axle box, paint not being applied to the end of the hub to protect it.

Fitting Tires. *Carriage Monthly* November **1874** page Note: Step by step account of cutting the bar for the tire and applying the tire to the rim. Does not use any water when applying tire.

Good Tire-drag. *Carriage Monthly* November **1874** page Note: Illustration and description of tire -drag so that the rim wouldn't be marred.

Cherry-Heat Welding Compound. *Carriage Monthly* March **1875** page Note: Invention of H. Schierloh, Jersey City, New Jersey, greatly increases the ease at which thin pieces of steel can be welded.

Howard, Louis. Setting and Measuring Tires Correctly. *Carriage Monthly* March **1875** page Note: "A first-class smith never allows his wheels to leave him until the dish is regular." 2 illustrations: straight edge for rims and compass showing exact draft of tire. Consider the atmospheric temperature from the wood shop to the smith shop.

Improvement For Bending Tires. *Carriage Monthly* April **1875** page Note: Illustration and description of invention of Mr. Metzger of New York. Introduction on the history of tire bending.

Tugmutton, Timothy. To Prevent Boxes From Working In the Hub. *Carriage Monthly* August **1875** page Note: Mixes a paste compound to be spread on box before driving.

Wheel Pit. *Carriage Monthly* August **1875** page Note: Illustration and description with dimensions of Wheel Pit from the shop of H. G. Crum, Tiffin, Ohio.

Corris' Patent Wheel. *Carriage Monthly* February **1877** page Note: Half page advertisement for the Wm. Corris & Co., Rochester, New York. Illustrated showing the different sections of the hub.

Rubber Cushioned Axle. *Carriage Monthly* February **1877** page Note: Full page advertisement by the Rubber Cushioned Axle Co., New York, NY. Officers of the company are B. F. Britton, J. B. Sammis, G. W. Hayes. Illustrated with three sectional views. For directions for installing the rubber cushioned axle see: How To Box Wheels With Rubber-cushioned Axles. *Hub* May **1878**, page How To Box Cushioned Axles. *Hub* December **1879** page

Royer Wheel Company. *Carriage Monthly* February **1877** page Note: Full page advertisement for company located in Cincinnati, Ohio. Illustrated are the Sarven Patented Wheel and the Stoodard Wheel.

Piecing Tires. *Carriage Monthly* October **1877** page Note: Gives illustration of riveting and piecing tire.

Bleeck, Henry. Tire Upsetter. *Carriage Monthly* November **1877** page Note: 4 figures of tire upsetter with description.

Wheels and Wheel Material. *Carriage Monthly* December **1878** page Note: Quarter page advertisement for F. Seidle, Mechanicsburg, Pennsylvania. Illustrations of hubs for the Watson Patent Wheel and Phoenix Wheel.

Warner Patent Wheels. *Carriage Monthly* November **1880** page Note: Full page advertisement selling the patent rights of the Warner Patent wheel by B. A. Treat (Attorney of E. Hall & Co.), Wallingford, Connecticut. Two illustrations of hubs.

Tire-bender for One Dollar. *Carriage Monthly* February **1882** page Note: Illustration and description.

Breaking Of Tires. *Carriage Monthly* April **1882** page Note: Why heavy wheels break more often than lighter wheels. Maybe because heavier wheels are smaller and there less dodge or stagger and they will not yield or spring to concussion.

Boxing Wheels. *Carriage Monthly* April **1883** page Note: Getting the boxes centered in the hub.

Oiling Wheels. *Carriage Monthly* July **1883** page Note: Seems to be in favor of oiling the rims the only objection is it stains the wood.

Drilling Tires. *Carriage Monthly* October **1883** page Note: Illustration and description of a special drill bit made by Wiley and Russell Manufacturing Co., Greenfield, Massachusetts.

Boiled Hubs. *Carriage Monthly* April **1884**, page Note: Is against boiled hubs, as it interferes with the glue used.

Welding Steel Tire. *Carriage Monthly* April **1884** page Note: "Much depends in welding steel tires upon the kind of heat the blacksmith has. It should be a heavy borax heat, with a little fine white sand mixed in with the borax."

Maris, Jared. Wheels, Wheel Stock and Construction of Wheels. *Carriage Monthly* May 1883 - May **1884** Note: Illustrations include plain wheel, patent wheel, large hubs, small hubs, banded hubs. Writes about: wheels, small hubs, density of hubs, patent wheels.

Maris, Jared. Wheels, Wheel Stock and Construction of Wheels. *Carriage Monthly* **1884** Note: Patent flange wheels, how wheels should be made, size of spoke, shape of spoke, depth of spoke, rims (timber used), spokes (preparing timber used), framing wheels together, dish, sawing the timber for rims. "As wheels are now made the rim is the weak point." "Wind shakes, give more trouble in rims than any other cause and there is no means known to avoid them." Driving wheels, dish in wheels, boxing of wheels.

Hub Boxing Apparatus. *Carriage Monthly* June **1884** page Note: Illustration and description of hub boxing apparatus from the German magazine *Der Chaisen und Wagenbau*.

Silvester Patent Tire. *Carriage Monthly* July **1884** page Note: Full page advertisement of tire sold by C. B. Clarke, St. Louis, Missouri. Several illustration of the special tire made of open hearth steel.

Marking Bands. *Carriage Monthly* July **1884** page Note: Marking off the hub bands so the wholes will be equi-distant.

Cheap Tire Bender. *Carriage Monthly* February **1885** page Note: Illustration and description of a primitive tire bender.

Seasoning Elm Hubs. *Carriage Monthly* March **1885** page Note: Good results are produced by putting the hubs under hay for a year. Newer methods are practiced in wheel factories.

Setting Tires On Light Wheels. *Carriage Monthly* April **1885** page Note: Do not get the tire to hot and water is not used in cooling. If water is used it should not be more than the thickness of the tire and a description is given for making container for water.

Meaning Of the Word "Stagger." *Carriage Monthly* May **1885** page Note: States the two objectives of staggering spokes are stability and durability.

Dayton Patent Compressed Band Hub and Tenon Wheel. *Carriage Monthly* May **1885** page Note: Manufactured by Pinneo & Daniels, Dayton, Ohio. Illustrated with seven illustrations and lengthy description.

Our Tire Heater. *Carriage Monthly* June **1885** page Note: Illustrations and description of a circular brick walled furnace using wood or coal for fuel.

Cement For Axle Boxes. *Carriage Monthly* August **1885** page Note: Merits of different cements.

Draught For Light and Heavy Wheels. *Carriage Monthly* November **1885** page Note: Detailed description of table. Table in four sections: Amount of draught on plain wheels for steel tires=96amount of draught on patent wheels for steel tires=96amount of draught on plain wheels for iron tires=96amount of draught for patent wheels for iron tires.

Platform for Tire-setting. *Carriage Monthly* December **1885** page Note: 3 illustrations and directions for laying out a circle 1 to 2 feet longer in diameter than the largest wheel.

Fisthyler, D. A. Simple Way To Make A Box For Tapering Tenons On Spokes. *Carriage Monthly* June **1886** page Note: Illustration and description with dimensions.

Contrivance For Squaring Tires. *Carriage Monthly* January **1887** page Note: 3 illustrations writes about taking the twist out of tires after welded.

Royer Wheel Company. *Carriage Monthly* January **1887** page Note: Full page advertisement of company located in Cincinnati, Ohio. Illustrated with the Rouse Band Wheel showing 3 different sections of hub.

Reed's Patent Gas Tire Heating Machine. *Carriage Monthly* March **1887** page Note: Advertisement gas heating machine sold by Sherburne & Co., Boston, Massachusetts.

Bokop Patent Tire Setter and Cooler. *Carriage Monthly* April **1887** page Note: Advertisement for Bokop tire setter of Defiance, Ohio.

Securing Tires. *Carriage Monthly* June **1887** page Note: Goes into great detail and 11 illustrations on the use of tire bolts.

Excelsior Tire and Axle Upsetting Machine. *Carriage Monthly* July **1887** page Note: Advertisement for upsetter made by Combs and Bawden, Freehold, New Jersey.

Best Wheels for Light Work. *Carriage Monthly* September **1888** page Note: Detail description of wheels for first class buggies with dimensions for all. Number of mortises and sizes. Size and proportions of spokes, rims, etc.

Buffalo Patent Axle and Wheel Company. *Carriage Monthly* October **1888** page Note: 3 illustrations of the only perfect self-lubricating axle in the world.

Hub Borer. *Carriage Monthly* June **1889** page Note: Description and dimensions no illustration.

Uncle Steve. Making Bands. *Carriage Monthly* August **1889** page Note: How to draw a circle on a board.

T. J. Reid. *Carriage Monthly* August **1889** page Note: Advertisement for T. J. Reid tire setter sold by the Ontario Wheel Co., Gananoque, Ontario.

Uncle Steve. Tires and Tire Tools. *Carriage Monthly* October **1889** pages Note: How to get the exact length of the tire, and step by step instructions with 6 illustrations for tools needed to tire a wheel.

Uncle Steve. Hub Bands. *Carriage Monthly* December **1889** page Note: Hub bands need to be placed on the hubs before tiring. Putting on bugle bands. Size of iron to be used. 9 illustrations.

Replacing Spokes In A Sarven Wheel. *Carriage Monthly* December **1889** page Note: Takes tire off and cuts bolts or rivets in hub were spokes are to be replaced, takes out old spokes and puts in new spokes, put tire back on and replaces rivets in hub.

Old Fashioned Tire Trestle. *Carriage Monthly* November **1891** page Note: Illustration and description of tire trestle for setting tires, representing the most simple tire trestle that can be made.

Steam Power Tire Setter and Hub Bander. *Carriage Monthly* March **1892** page Note: Illustration and description of steam power tire setter manufactured by J. B. West, Rochester, New York. Patented in 1870 but put on the market in 1892.

Felloe Cut-off, Boring and Dowelling Machine. *Carriage Monthly* April **1892** page Note: Illustration and description of machine made by Bentel & Margedant Co., Hamilton, Ohio.

New Tire Upsetter. *Carriage Monthly* May **1892** page Note: Illustration and description of tire upsetter made by Butts and Ordway, Boston, Massachusetts.

Sweet's Concealed Band. *Carriage Monthly* May **1892** page Note: Manufactured by the Batavia Carriage Wheel Co., Batavia, NY. Illustrated with a cross section of the hub.

Improved Lever Feed Power Drill. *Carriage Monthly* June **1892** page Note: Illustration and description of drill manufactured by George Burnham & Co., Worcester, Massachusetts.

Box Wheels With Hydraulic Power. *Carriage Monthly* October **1892** page Note: Hydraulic pressure vs. hand driven with hammer.

West's Steamo-Hydrostatic Tire Setter. *Carriage Monthly* October **1892** page Note: Advertisement for tire setter made by J. B. West, Rochester, New York.

National Combination Drill Press. *Carriage Monthly* November **1892** page Note: Illustration and description of drill press made by National Hardware Co., Cincinnati, Ohio. Capable of drilling several holes in the rim and tire at one time.

Improved Spoke Facing Machine. *Carriage Monthly* March **1893** page Note: Illustration and description of a machine made by Bentel & Margedant Co., Hamilton, Ohio.

Rotary Feed Double Spoke Throater. *Carriage Monthly* August **1893** page Note: Illustration and description of machine made by Empire Machine Works, Mount Morris, New York.

Morton Band Wood Hub Wheel. *Carriage Monthly* November **1894** page Note: Full page advertisement for the New Haven Carriage Co., New Haven, Connecticut. Large illustration of exterior of hub.

DuBois, Henry L. Early Recollections of Wheel Making. *Carriage Monthly* January **1895** page Note: Writes about the use of the Reynold's patent rim bender in wheel factories. The invention of the Mr. Blanchard for bending rims. The search for hickory stock and meeting Henry Hoopes. The first spokes turned on lathe. Patented process for seasoning hubs.

New Tire Shrinker. *Carriage Monthly* June **1895** page Note: Illustration and description of tire shrinker made by S. D. Kimbark, Chicago, Illinois.

Mitchell, T. H. New Features In Wheel Making : Laminated Rims. *Carriage Monthly* December **1895** pages Note: Patent # 536,089, the rim is laminated and made in a single piece joined together by a scarf-joint.

Proportions of Wheels, Tires and Axles. *Carriage Monthly* September **1896** page Note: Description of tables and tables for: wheels with hubs three inches in diameter, wheels with hub three and three-quarter inches in diameter, wheels with hubs four inches in diameter, wheels hubs four and one-quarter inches in diameter.

Tire End Setter. *Carriage Monthly* June **1900** page Note: Illustration and description of machine made by Morgan & Wright, for bringing the ends of solid rubber tires together.

Cement For Axle Caps and Boxes. *Carriage Monthly* September **1900** page Note: General rules for using cements and cement for axle boxes and other purposes.

Kelly Springfield Rubber Tire Co. *Carriage Monthly* July **1901** page Note: Advertisement with illustration of half round solid rubber tire and two wires running through it.

Stone Patent. *Carriage Monthly* July **1901** page Note: 1/3 page advertisement by Worstall & Carl Spoke and Wheel Co., Doylestown, PA. Illustration of cross section of hub.

Burr Patent Wheel. *Carriage Monthly* July **1901** page Note: Half page advertisement for the Burr Wheel Co., Chicago, Illinois. Illustrated is a heavy wheel with metal hub.

AMERICAN BLACKSMITH.

Dube, Isadore H. To Find Circumference of Bands. *American Blacksmith* February **1906** page Note: Mathematical formula for finding the correct circumference.

Barnard, E. A. Repairing Sarven Patent Wheels. *American Blacksmith* February **1906** page Note: Directions for replacing one or more spokes.

Gaza, J. M. Welding Iron Tires. *American Blacksmith* May **1907** page Note: Gives illustration and description of welding wide tires.

Short, W. A. How To Fit Spokes for Sarven Hubs. *American Blacksmith* May **1907** page Note: Diagram and directions for fitting spokes in Sarven hub.

Breckon, W. G. Some Practical Hints On Wagon Repair Work. *American Blacksmith* June **1909** page Note: Illustrated and described are the different ways of repairing the bent felloe. Gives advice on how to make a good wheel, replacing spokes, and bands on the hubs, etc.

Albright, M. A Practical Coal-burning Tire Furnace. *American Blacksmith* April **1911** page Note: Illustration and description.

Jeffries, J. W. In Favor of Cold Setting. *American Blacksmith* July **1911** page Note: Setting tires cold with a hydraulic cold tire setter and not kinking the tire.

Machine For Filling Wagon Wheels. *American Blacksmith* May **1912** page Note: Illustration and description of what looks like a work bench for holding wheel while it is worked on.

Tool For Pulling Tenons. *American Blacksmith* May **1912** page Note: Illustration and short description of tool.

Hayden, J. H. Several Practical Helps for the Wagon Shop=96Labor and Time Saving Tools and Devices Easily Made In the Shop. *American Blacksmith* February **1916** page Note: Detailed description and illustration of Modern Wheel Holding Machine. Made by hand.

BLACKSMITH AND WHEELWRIGHT

Carriage and Wagon Repairs (Wheels). Blacksmith and Wheelwright February 1903 page Note: Illustrated with: Spoke and mortise shoulders forced up by iron wedges, shoulders and mortise repaired by insertion of solid blocks, puller for removing old tenons from hub mortises, shows the puller with hook end buried in the tenon, repair of face of spoke, side view showing block and new lines for tenon front and back.

CARRIAGE JOURNAL

Vineyard, Ron. Straking: An Experiment to Recapture the Technology of Straking a Wheel. *Carriage Journal* Vol. 28, No. 1, Summer **1990**. Ron Vineyard was the master wheelwright at Colonial Williamsburg. Straking was a very old method of tiring wheels with sections of iron rather than a continuous hoop. Illustrated with photographs. List of references at the end of the article.

Wheeling, Ken. Rubber Tires and the Carriage Industry Part I=96Solid Rubber Tires. *Carriage Journal* Vol. 28, No. 1, Summer **1990** pages Note: Researched by Susan Green. Gives a good overview of the history of rubber tires. Some references are mentioned in the text, but failed to give footnotes or a list of references.

Wheeling, Ken. Rubber Tires and the Carriage Industry Part II-Pneumatic Tires. *Carriage Journal* Vol. 28, No. 3, Winter 1990 pages Note: Researched by Susan Green. Gives a good overview of the history of the pneumatic tire for carriages. Some references are mentioned in the text, but failed to give footnotes or a list of references.

Wheeling, Ken. Rubber Tires and the Carriage Industry Part III-The Contemporary Scene. *Carriage Journal* Vol. 28, No. 4, Spring 1991 pages Note: Overview of the use of pneumatic tires for sulkies and solid rubber tires in 1991.

CARRIAGE DEALERS' JOURNAL.

Special Pneumatic Runabout. *Carriage Dealers' Journal* April **1899** page Note: Advertisement with illustration of piano box runabout with stick seat and pneumatic tires sold by Cortland Cart & Carriage Co., Sidney, NY.