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SEAMLESS TUBING

A BIBLIOGRAPHY

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Seamless Tubing

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Compares the various processes now in use and describes the McCool process of manufacture and appliances used.

Machine for Drawing Seamless Steel Tubes with Longitudinal Ribs. 1900. (In Engineering News, v. 43, p. 142-143.)

The same, abstract translation. 1900. (In Bulletin de la Société D'Encouragement pour L'Industrie Nationale, v. 99, ser. 5, v. 5, p. 468-469.)

Describes method of forming seamless tubes with exterior longitudinal ribs to add strength against flexure.

Machine for Making "Welded Seamless" Tubing. 1913. (In Machinery, N. Y., v. 20, p. 168-169.)

Description of method employed by the Lloyd Mfg. Co.

Machinery's Handbook for Machine Shop and Drafting-Room. Ed. 6, rev. and enl. 1924. Industrial Press.

Compares the average tensile strength of seamless steel tubes, butt-welded, lap-welded and wrought iron pipes, p. 403-404, and includes a table giving inside diameter of various Shelby standard cold drawn tubing, p. 1508.

McTear Method of Making Seamless Tubes. 1907. (In Brass World and Platers' Guide, v. 3, p. 313.)

Discussion of a method employed in England, the advantage being in the production of seamless tubes with walls of uniform thickness.

Make 50-ft. Tubes from Ingots. 1926. (In Iron Age, v. 118, p. 846-850.)

Describes Pilger mill of the Pittsburgh Steel Products Co., which produces seamless tubing in lengths up to 50 feet, the plant being unusually well equipped, particularly for finishing operations.

Making Cold-Drawn, Seamless Steel Unions. 1913. (In Iron Trade Review, v. 52, p. 1291-1293.)

Describes methods employed by the Mark Manufacturing Co.

Making Drawn Steel Tubes. 1920. (In Gas Age, v. 46, p. 131-135.)

Description of the process successfully employed in the manufacture of Shelby steel pipes and tubes.

Making Seamless Steel Tubes. 1907. (In Machinery, N. Y., v. 13, p. 441-442.)

Taken from the "Pittsburgh Dispatch." While not a technical article it is a good description of the process, without going into details at great length.

Making Seamless Tubes. 1919. (In Iron Trade Review, v. 64, p. 259-264.)

Description of plant of the Standard Seamless Tube Co.

Mannesmann Pilger Seamless Steel Tube Process Meets Oil Industry Needs. 1926. (In *Oil Age*, v. 23, no. 11, p. 69.)

Brief description of new seamless tube mill of the Pittsburgh Steel Products Co. at Allenport.

Mannesmannrohre oder Gussmuffenrohre? 1898. (In *Journal für Gasbeleuchtung und Wasserversorgung*, v. 41, p. 540.)

Brief note on the advantages of using seamless tubes for gas and water.

Mannesmann'sche Walzverfahren. 1889. (In *Zeitschrift des Vereines Deutscher Ingenieure*, v. 33, pt. 1, p. 462-465.)

Chiefly a review of German patents issued to Mannesmann on seamless tube manufacture.

Mansfield, Newton. Seamless Steel Boiler Tubes—Their Limited Endurance a Menace to Naval Efficiency. 1903. (In *Journal of the American Society of Naval Engineers*, v. 15, p. 417-432.)

The same, abstract. 1903. (In *Iron Trade Review*, v. 36, pt. 2, p. 61-62.)

The same, abstract. 1903. (In *Machinery*, N. Y., v. 9, p. 591-592.)

Treats of the kind of steel to be used, method of treatment and the manufacture of the tubes.

Manufacture of Large Steel Tubes. 1889. (In *Journal of Gas Lighting*, v. 53, p. 760.)

Brief note on improved method of making steel tubes by Mannesmann process.

Manufacture of Metal Tubes at High Speeds. 1908. (In *Mechanical Engineer*, v. 22, p. 767-768.)

Illustrated description of Pilger mill for high speed production of tubes, invention of Henry Reinhard and Tubes, Ltd.

Manufacture of Seamless Steel Tubes. 1892. (In Iron Age, v. 50, p. 563-565.)

Description of the plant of the Kellogg Seamless Tube and Mfg. Co.

Manufacture of Seamless Steel Tubes. 1922. (In Iron and Coal Trades Review, v. 104, p. 849, 898.)

Describes the Pilger mill process for rolling seamless tubes at the works of the Ebbw Vale Steel, Iron, and Coal Co.

Manufacture of Seamless Steel Tubing. 1908. (In Iron Trade Review, v. 43, p. 845-851.)

Complete description of process for drawing seamless tubes from solid billets and plates with special reference to the making of Shelby products by the National Tube Co.

Manufacture of Seamless Steel Tubing. 1925. (In Scientific American, n. s. v. 132, p. 246-247.)

One of a series of articles on the "Story of Steel," dealing briefly with history and manufacture.

Manufacture of Seamless Tubes. 1924. (In Ryerson Journal and Stock List, v. 32, no. 4, p. 19-24.)

The same. 1924. (In Sanitary and Heating Engineering, v. 102, p. 155-156, 173.)

No. 10 of a series of articles on "Making Steel," dealing with the manufacture by the cold-drawn and the cup methods.

Manufacture of Seamless Tubes from Plates. 1909. (In Iron Age, v. 83, pt. 1, p. 728-729.)

The same. 1909. (In Metal Worker, Plumber and Steam Fitter, v. 71, no. 21, p. 56-57.)

The same, abstract translation. 1909. (In Stahl und Eisen, v. 29, pt. 1, p. 723.)

Brief discussion of the method employed by the National Tube Co.

Manufacturing Seamless Steel Tubes. 1920. (In Blast Furnace and Steel Plant, v. 8, 487-493.)

Gives a general description of the manufacture of seamless tubes from solid round billets and from flat plates, including operations involved in the cold drawing of seamless tubes.

Manufacturing Seamless Steel Tubes. 1920. (In Machinery, N. Y., v. 26, p. 1013-1018.)

Describes practice of the National Tube Co., including the processes for hot-finished and cold-drawn tubes and the manufacture of large tubes and seamless cylinders.

Marks, Edward C. R. Manufacture of Iron and Steel Tubes. 1897. Marks and Clerk.

Treats of the development of seamless steel tube manufacture, appliances used, and a survey of the available patent literature, p. 25-33. The Mannesmann, Stiefel and Ehrhardt processes are discussed, with comments on the various seamless tube rolling mills, p. 33-61.

Marks, Lionel S., ed. Mechanical Engineers' Handbook. Ed. 2, 1924. McGraw.

Treats briefly of seamless steel tubing and tabulates physical properties of wrought iron and steel and seamless tubes, and approximate weight in pounds per foot of round seamless tubing, p. 856-857.

Mason, F. H. Metallic Tubing and Tube Furniture in Germany. 1903. (In Iron Age, v. 71, p. 23-24.)

A report on the tube industry and the development and application of seamless tubing manufactured by the Mannesmann and Ehrhardt processes.

Mason, William. Mild-Steel Tubes in Compression and Under Combined Stress. 1909. (In Proceedings of the Institution of Mechanical Engineers, v. 73, pt. 3-4, p. 1205-1236.)

Discussion, p. 1278-1316.

The same, abstract. 1909. (In Engineer, v. 108, p. 671-674.)

Treats chiefly of the comparative yield-point strengths in compression and shear, with numerous tables and diagrams. The tubes used in the experiments were solid drawn mild steel tubes furnished by the British Mannesmann Tube Co.

Metge. Festigkeit von Mannesmann-Rohren. 1892. (In Zeitschrift des Vereines Deutscher Ingenieure, v. 36, pt. 2, p. 1360.)

Briefly discusses and tabulates results of experiments on the physical properties of Mannesmann tubes.

Method of Manufacture of Shelby Seamless Tubing. 1909. (In *Industrial World*, v. 43, pt. 1, p. 130-135.)

Brief historical review leading up to seamless tube manufacture. Includes an illustrated description of the manufacture of Shelby seamless tubing.

Mill Produces Small Size Tubes. 1923. (In *Iron Trade Review*, v. 72, p. 1877-1882.)

Description of new plant of Weldless Tube Co., making seamless tubing of $3\frac{1}{2}$ inches diameter and smaller. Equipment was specially designed.

Mittheilungen über den Stand der Mannesmann-Röhren-Fabrikation. 1889. (In *Glaser's Annalen für Gewerbe und Bauwesen*, v. 24, p. 106.)

Brief note on the seamless tubes manufactured at the Mannesmann works in Remscheid.

Modern Seamless Tube Manufacturing Plant. 1911. (In *Iron Trade Review*, v. 48, p. 227-230.)

Illustrated description of the modern seamless tube plant erected by the Globe Seamless Tube Co.

Monteagle, Robert C. Notes on the Arrangement and Construction of Steam Pipes and Their Connections. 1903. (In *Transactions of the Society of Naval Architects and Marine Engineers*, v. 11, p. 15-24.)

Discussion, p. 24-31.

Includes specifications for seamless steel and lap-welded steel steam pipes, p. 22-24.

The same, abstract. 1904. (In *Iron and Coal Trades Review*, v. 68, p. 310-311.)

Specifications for seamless steel and lap-welded steam pipes the same as in original article.

Morgan, John David. Manufacture of Weldless Steel Tubes. 1905. (In *Minutes of Proceedings of the Institution of Civil Engineers*, v. 159, p. 324-340.)

Illustrated description of the method of manufacture employed at the present time.

Müller, F. C. Festigkeitsversuche mit autogen geschweissten, kalt nachgezogenem Stahlrohr. 1918. (In Technische Berichte, v. 2, p. 111-125.)

Discusses and tabulates results of physical tests of autogenously welded and cold drawn seamless steel tubes, and their application in aeronautical construction.

Müller, M. Zur Geschichte der nahtlosen Röhren. 1908. (In Stahl und Eisen, v. 28, pt. 2, p. 1839-1847.)

Deals with the history of weldless tubes, and gives an illustrated description of the modern methods of rolling these tubes. The Mannesmann, Briede, Kellogg continuous mills, and others are dealt with.

Müller, Wilhelm, and Dornauer, Max. Das Buch der Eisenkunde. 1925. Baedeker.

Treats briefly of seamless tubes, p. 271, and gives sizes of various tubes and their applications, p. 273.

Muspratt, James Sheridan, comp. Theoretische, praktische und analytische Chemie in anwendung auf Künste und Gewerbe. 12 v.

Gives physical properties of Mannesmann tubes of various sizes and treats of their advantages over other tubes for conducting water, v. 11, p. 773.

Nahtlose Stahlbehälter für Gase. 1893. (In Stahl und Eisen, v. 13, pt. 1, p. 43-44.)

Brief article discussing the use of seamless steel containers for gases.

Nahtlose Walzwerkfabrikate. 1904. (In Technische Rundschau, v. 18, p. 32.)

Brief treatment of the seamless products manufactured by the Press- und Walzwerk-Aktiengesellschaft.

National Tube Company. Mechanical Properties of Shelby Seamless Steel Tubing. By Reid T. Stewart. 1908. (Advanced Sheets of Book of Standards.)

Prepared for the purpose of providing useful data for the solution of the multitude of problems that arise in connection with the application of seamless steel tubing to the mechanical arts.

National Tube Company. Shelby Cold-Drawn Seamless Steel Tubes. 1908.

A well illustrated booklet dealing with the history, manufacture, properties and various applications of Shelby seamless tubes.

National Tube Company. "Shelby" Seamless Steel Tubes and Their Making. 1920.

The same, abstract. 1920. (In *Railway Mechanical Engineer*, v. 94, p. 601-602.)

An illustrated description of the processes employed.

New Method of Making Tube Shells. (In *Brass World and Platers' Guide*, v. 3, p. 131-132.)

An improvement in the production of seamless shells.

A New Method of Rolling Tubes. 1888. (In *Industries*, v. 4, p. 322.)

The same. 1888. (In *Scientific American Supplement*, v. 25, p. 10297-10298.)

Brief description of the Mannesmann process of seamless tube rolling.

New Processes of Manufacturing Seamless Tubes. 1888. (In *Scientific American Supplement*, v. 25, p. 10190-10191.)

Describes and illustrates the Mannesmann process, including a brief review of the Flotow Leidig and Roberston processes.

New Seamless Tube Plant near Pittsburgh. 1913. (In *Iron Age*, v. 92, pt. 1, p. 391.)

Brief note on the construction of a seamless tube plant by the Fownes interests.

New System of Rolling Seamless Steel Tubes. 1891. (In *Manufacturer and Builder*, v. 23, p. 245.)

Brief illustrated article on a new method invented by William Heckert, for the rolling of seamless steel tubes.

Nicholson, J. H., and Holinger, Emil. Manufacture and Use of Steel Tubing. 1912. (In *Journal of the American Society of Naval Engineers*, v. 42, p. 1290-1327.)

The same. 1914. (In "National" Bulletin, no. 17a.)

Discusses the manufacture and use of Shelby seamless steel tubing, including numerous illustrations.

Plant Making Small Weldless Tubes. 1923. (In Iron Age, v. 111, p. 1399-1402.)

Describes and illustrates the equipment of the plant of the Weldless Tube Co.

Platt, S. Heavy and Light Tube Drawing Benches. 1892. (In Engineer, v. 74, p. 500.)

The same. 1893. (In Iron, v. 41, p. 91, 98.)

The same. 1893. (In Scientific American Supplement, v. 35, p. 14199-14200.)

Illustrated article describing draw benches for the manufacture of cold drawn seamless tubes made by the author.

Poppleton, Clement F. Producing Seamless Steel Tubing. 1921. (In Iron Trade Review, v. 69, p. 1477-1483.)

Process consists of piercing the billet, rolling out embryo tube and finally rolling or cold drawing.

Possibilities of Steel Tubing. 1908. (In American Machinist, v. 31, pt. 2, p. 251-252.)

Brief note with illustrations of Shelby seamless steel table ware.

Prentis, F. L. Making Steel Tubes for Roller Bearings. 1924. (In Iron Age, v. 114, p. 1463-1469.)

Detailed description of the manufacture of alloy seamless tubes at the plant of the Timken Roller Bearing Co.

Resistance of Tubes to Collapse. 1907. (In Engineering, v. 83, p. 19-20.)

Gives results of experiments conducted by various authorities on cold drawn steel tubes and lap welded tubes.

Reuleaux, F. Ueber das Mannesmann'sche Rohrwalzverfahren. 1890. (In Zeitschrift des Vereines Deutscher Ingenieure, v. 34, pt. 1, p. 621-627.)

The same. 1890. (In Dingler's Polytechnisches Journal, v. 277, p. 22-33.)

The same. 1890. (In Glaser's *Annalen für Gewerbe und Bauwesen*, v. 26, p. 265-271.)

The same. 1890. (In *Oesterreichische Zeitschrift für Berg- und Hüttenwesen*, v. 38, p. 487-495.)

The same, abstract translation. 1890. (In *Engineering News*, v. 24, p. 92-93.)

The same, abstract translation. 1890. (In *Iron Age*, v. 46, p. 128-130.)

Describes at length the Mannesmann process for seamless pipe rolling, including illustrations of machinery used.

Richard, Gustave. Fabrication des tubes soudure par le procédé Mannesmann. 1891. (In *Bulletin de la Société D'Encouragement pour L'Industrie Nationale*, v. 90, ser. 4, v. 6, p. 121-141.)

Lengthy illustrated description of the Mannesmann process of seamless tube manufacture, including numerous foot-note references to British patents and periodical literature.

Richards, J. A. Manufacture of Solid-Drawn Steel Tubes. 1922. (In *Iron and Coal Trades Review*, v. 105, p. 880-881.)

Paper read before the "Institute of Marine Engineers." Gives an illustrated description of the operations involved in the production of solid-drawn steel tubes.

Riedler, A. Mannesmann'schen Walzverfahrens. 1888. (In *Zeitschrift des Vereines Deutscher Ingenieure*, v. 32, pt. 1, p. 206-207.)

Brief description of the method of rolling Mannesmann seamless tubes.

Röber, Ewald. Ueber die Herstellung von Eisen- und Stahlröhren. 1922. (In *Stahl und Eisen*, v. 42, pt. 1, p. 253-258.)

The same, translation. 1922. (In *Engineering Progress*, v. 3, p. 250-254.)

The same, translation. 1922. (In *Iron Trade Review*, v. 71, p. 1481-1484.)

The same, slightly condensed. 1922. (In *Revue Universelle des Mines*, ser. 6, v. 17, p. 189-193.)

The same, abstract. 1922. (In *Zeitschrift des Vereines Deutscher Ingenieure*, v. 66, pt. 1, p. 237.)

Short account, with diagrammatic illustrations of the various methods of manufacturing welded and seamless tubes of different diameters and wall thicknesses.

Robertson, James. *Manufacture of Tubes.* 1888. (In *Engineer*, v. 66, p. 263.)

See also Siemens.

Comments on Siemens' paper read before the "British Association for the Advancement of Science."

Robertson, W. H. A. *Plant Used in the Manufacture of Tubes.* 1909. (In *Journal of the Institute of Metals*, v. 1, p. 268-279.)

Discussion, p. 280-285.

The same, without discussion. 1909. (In *Mechanical Engineer*, v. 24, p. 12-14.)

The same, abstract. 1908. (In *Engineering*, v. 86, p. 832.)

Includes brief discussion of the Mannesmann process of tube manufacture.

Rohrleitung aus Mannesmannröhren. 1891. (In *Dingler's Polytechnisches Journal*, v. 282, p. 71-72.)

Comments on Siemens' article published in "Dinglers polytechnische journal," v. 280, p. 301.

Rolling Mills for Billets and Tubes. 1910. (In *Mechanical Engineer*, v. 25, p. 354.)

Illustrated description of rolling mills, comprising rolls having planetary movement with circular operative surfaces, the invention of Mannesmannröhren-Werke.

Rolling Seamless Pipe from Hollow Ingots. 1890. (In *Iron Age*, v. 46, p. 632-633, plate following p. 636.)

Describes the Kellogg machine which consists of a series of rolls, alternately horizontal and vertical, supported in housings which are secured to the bed plate of the machine. Positive motion is secured by properly proportioned gear wheels.

Rolling Seamless Tubes. 1907. (In *Iron Age*, v. 80, p. 553-555.)

Discusses the phenomenon of the central rupture in cross rolling.

Ross, E. F. Making Seamless Steel Tubes by Improved Processes. 1925. (In *Iron Trade Review*, v. 77, p. 1079-1083, 1091.)

Discusses most recent development of a process which features the use of square billets, also known as push-bench process.

Rössler. Rohrenfabrikation. 1903. (In *Zeitschrift des Vereines Deutscher Ingenieure*, v. 47, pt. 1, p. 288-289.)

Brief treatment of the manufacture of tubes of iron, steel, copper and of their alloys. Includes seamless tubes.

Sargent, Edward. Threading Seamless Tubes. 1904. (In *American Machinist*, v. 27, pt. 1, p. 325-326.)

Describes briefly method employed by author in threading open-hearth steel seamless tubes.

Schulz, E. H., and Fiedler, R. Untersuchung eines gebrochenen nahtlos gezogenen Rohres. 1920. (In *Stahl und Eisen*, v. 40, pt. 1, p. 21-24.)

Seamless tube which had split longitudinally in service was tested chemically and by tensile specimens, but the cause could not be found.

Seamless Steel Tube Plant Being Built. 1920. (In *Blast Furnace and Steel Plant*, v. 8, p. 88.)

Brief description of the plant being constructed by the Detroit Seamless Steel Tube Co., which will produce twenty-five tons of seamless steel tubing per month.

[Seamless Steel Tubing.] 1917. (In *Machinery's Encyclopedia*, v. 2, p. 301; v. 6, p. 333-339.)

Gives results of test on strength of seamless tubes, v. 2, p. 301, and discusses the development of the various processes, v. 6, p. 333-339.

Seamless Tubes Made from Solid Blanks. 1887. (In American Machinist, v. 10, no. 42, p. 1-2.)

The same, condensed. 1887. (In Engineer, v. 64, p. 396.)

The same, condensed. 1887. (In Railroad Gazette, v. 19, p. 664-665.)

Illustrated description of the Mannesmann process of making seamless tubes.

Seamless Tube Mill Employs Forging Rather than Rolling Principle. 1926. (In Iron and Coal Trades Review, v. 79, p. 773-776.)

Description of the new seamless tube mill of the Pittsburgh Steel Products Co. at Allenport.

Seamless Tubes by Mechanical Mill. 1926. (In Iron Age, v. 117, p. 681-685.)

Describes an automatic Pilger mill, claimed to be the first one in the United States, employed by the Delaware Seamless Tube Co.

Seel, Fritz. Mannesmann Seamless Steel Joint Tubes. 1912. (In Iron Age, v. 90, pt. 1, p. 126-127.)

Synopsis of a paper read before the Track Superintendents' Society of the Railroads in the Cossel district and published in "Wochenschrift fuer Deutsche Bahnmeister," dealing with the development and application of the Mannesmann process.

Shaner, E. L. Build New Tube Mill in Detroit. 1920. (In Iron Trade Review, v. 67, p. 1805-1809, 1820.)

Illustrated description of a new seamless tube mill erected for the Detroit Seamless Steel Tube Co.

Sharp, John. Some Considerations Regarding Cast Iron and Steel Pipes. 1914. Longmans.

Treats of relative corrosion of cast iron, mild steel and Mannesmann steel tubes, p. 100-106.

Shelby Steel Tube Company Wins Its Patent Suit. 1907. (In Iron Age, v. 79, p. 1042-1044.)

Gives result of suit between Shelby Steel Tube Co. and the Delaware Seamless Tube Co., and discusses the history of the art of Mannesmann and Stiefel processes of seamless tube rolling.

Siemens, Friedrich. Mannesmann'sche Verfahren, nahtlose Rohre aus dem vollem Stücke ohne Dorn zu walzen. 1888. (In *Journal für Gasbeleuchtung und Wasserversorgung*, v. 31, p. 663-668.)

The same. 1888. (In *Dingler's Polytechnisches Journal*, v. 269, p. 454-466, 503-511, incomplete.)

The same, abstract translation. 1891. (In *Minutes of Proceedings of the Institution of Civil Engineers*, v. 107, p. 528.)

Paper read before Saechsischen Ingenieur- und Architektenvereines," deals with the manufacture of seamless tubes from solid bars and appliances used.

Siemens, Friedrich. Rolling Seamless Tubes. 1888. (In *Engineering*, v. 46, p. 291-292.)

The same. 1888. (In *American Engineer*, v. 16, p. 128-129.)

The same. 1888. (In *Scientific American Supplement*, v. 26, p. 10720-10721.)

The same, abstract. 1888. (In *Journal of the Iron and Steel Institute*, v. 33, p. 286-288.)

The same, abstract. 1891. (In *Locomotive*, n. s. v. 12, p. 1-4.)

The same, abstract. 1888. (In *Report of the British Association for the Advancement of Science*, v. 58, p. 804-805.)

The same, abstract. 1890. (In *Scientific American*, v. 77, n. s. v. 63, p. 198.)

The same, abstract translation. 1889. (In *La Nature*, v. 32, p. 99-100.)

The same, abstract translation. 1888. (In *Oesterreichische Zeitschrift für Berg- und Hüttenwesen*, v. 36, p. 417.)

The same, abstract translation. 1888. (In *Stahl und Eisen*, v. 8, pt. 2, p. 441-442.)

The same, abstract translation. 1888. (In Technische Rundschau, v. 2, p. 219-220.)

Describes the Mannesmann process of rolling seamless tubes from solid bars or ingots.

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Includes also a reprint of an article from the "Civilingenieur," v. 34, no. 3, on "Das Mannesmann'sche Verfahren, nahtlose Röhren aus dem vollen Stücke ohne Dorn zu Walzen," by Friedrich Siemens.

The same, abstract. 1891. (In Journal für Gasbeleuchtung und Wasserversorgung, v. 34, p. 379.)

The same, abstract. 1891. (In Stahl und Eisen, v. 11, pt. 1, p. 516.)

Sisco, F. T., and Boulton, H. W. Welding Steel Tubing and Sheet with Chromium-Molybdenum Welding Wire. 1925. (In American Society for Steel Treating, v. 8, p. 589-619.)

Discussion, p. 619-620, 665-668.

In welding chromium-molybdenum steel seamless tubing, chromium-molybdenum welding wire produces weld which has more desirable and uniform structure than low carbon welding wire; in welding chromium-molybdenum steel tubing to plain carbon steel tubing chromium-molybdenum steel welding wire is not greatly superior and may even be inferior to low carbon wire.

Slocum, S. E. Collapse of Tubes under External Pressure. 1909. (In Engineering, v. 87, p. 35-37.)

Discussion of Carman's and Stewart's experiments. Suggests that discrepancy between theoretical formula and experimental results is probably due to imperfections in geometrical forms. Proposes a correction factor C in the formula:

$$p = C \frac{2E}{1 - m^2} \left[\frac{t}{D} \right]^3.$$

The value of C for solid drawn weldless steel tubes is 0.76.

Society of Automotive Engineers. S. A. E. Handbook. 2 v. 1918-1919.

Gives dimensions and torque capacities of seamless steel tubes, v. 1, p. 16-16b.

Specifications for Seamless Steel Tubing for Structural Purposes. 1910. (United States—Navy Dept. Specification, 44T1.)

Supersedes specification 44T1 issued May 12, 1909.

Speller, Frank N. Manufacture of Soft Steel Tubes in Relation to Corrosion. 1912. (In Journal of the Society of Chemical Industry, v. 31, pt. 1, p. 263-265.)

Includes a table giving comparisons of corrosion of boiler tube materials in aerated water and acid, and summary of corrosion tests on various materials in 25 per cent sulphuric acid. Includes cold and hot drawn open-hearth steels.

Speller, Frank N. Wrought Pipe—Threading and Relative Durability of Steel and Iron. 1905. (In Journal of the Canadian Mining Institute, v. 8, p. 46-55.)

Gives results of experiments on relative corrosion of wrought iron and steel pipes, and includes corrosion data on cold and hot drawn seamless tubes.

Spring, La Verne W. Non-Technical Chats on Iron and Steel and Their Application to Modern Industry. 1917. Stokes.

Devotes a chapter to the manufacture of seamless steel tubes, p. 302-309.

Springer, J. F. Seamless Steel Tube Manufacture. 1910. (In Iron Age, v. 86, pt. 1, p. 612-618.)

Describes and illustrates the manufacture of seamless steel tubes. Discusses various processes including the Mannesmann, Stiefel, Charnock, Diescher, and principally the process employed by the National Tube Co. in making Shelby tubing.

Standard Specifications for Lap-Welded and Seamless Steel and Lap-Welded Iron Boiler Tubes. 1924. (In American Society for Testing Materials, Standards 1924, p. 212-218.)

The same. 1926. (United States—Bureau of Foreign and Domestic Commerce. Industrial Standards, No. 63.)

In English and Spanish.

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Stang, A. H. Tests of Rotary Drill Pipes. 1921. (In *Iron Age*, v. 108, p. 804.)

Gives results of experiments and includes tests conducted on seamless iron pipes.

Steel Tube Process. 1898. (In *Iron Age*, v. 61, May 12, p. 10.)

Abstract of paper on a new process of making weldless tubes for cycles.

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Describes the method of seamless tube manufacture.

Stewart, J. G. Processes of Manufacture of Wrought Iron and Steel Tubes. 1915. (In *Transactions of the Institution of Engineers and Shipbuilders in Scotland*, v. 58, p. 212-249.)

Discussion, p. 249-256.

The same, without discussion. 1915. (In *Mechanical Engineer*, v. 35, p. 178-180, 203-207.)

The same, abstract. 1915. (In *Iron and Coal Trades Review*, v. 90, p. 608-610.)

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Stewart, Reid, T. Strength of Steel Tubes, Pipes and Cylinders under Internal Fluid Pressure. 1912. (In *Transactions of the American Society of Mechanical Engineers*, v. 34, p. 297-312.)

Discussion, p. 312-318.

The same, without discussion. 1912. (In *Mechanical Engineer*, v. 29, p. 514-518.)

Author investigated and compared various formulas and found that Barlow's formula was best suited for all ordinary calculations pertaining to bursting strength of commercial tubes. Tabulates results of tests on seamless steel tubes, p. 309.

Stoughton, Bradley. The Metallurgy of Iron and Steel. Ed. 3. 1923. McGraw.

Treats very briefly of seamless tube making, p. 252, 253.

Tool Steel in Seamless Cold Drawn Tubes. 1903. (In *Iron Age*, v. 72, Nov. 5, p. 34.)

The same, abstract. 1903. (In *Machinery*, N. Y., v. 10, p. 199.)

Brief note on the production of tool steel seamless tubing by the Ellwood Ivins Tube Works.

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Wolff, G. Verwendung von siliziertem und unsiliziertem Stahl zur Herstellung von nahtlosen Rohren nach dem Schrägwalz- und Pilgerschrittverfahren. 1925. (In *Stahl und Eisen*, v. 45, pt. 2, p. 1958-1961.)

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Brief treatment of weldless tubes, p. 119, gives tables of thickness of Mannesmann steel tubes in I.W.G., and lengths of solid drawn steel main with rigid joint, p. 128, 131.

Woodvine, G. R., and Roberts, A. L. Influence of Segregation on the Corrosion of Boiler Tubes and Super-

heaters. 1926. (In *Journal of the Iron and Steel Institute*, v. 113, p. 219-222.)

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Becker, Theodor. Process and Device for Producing Hollow Blocks for Manufacturing Seamless Tubes. (1,455,703.)

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