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U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
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GUIDE TO THE LITERATURE ON RUBBER

Introduction

This Letter Circular contains a brief review of current books, periodicals, handbooks, pamphlets, Government documents, and other publications relating to rubber; it also indicates some of the Government departments, societies, institutions, and firms which conduct investigations on rubber and issue publications describing their work. Emphasis is placed on publications which are considered the most useful for reference; consequently the current American literature is stressed while relatively little attention is paid to the older literature or to books in foreign languages.

The aim of this Letter Circular is to indicate sources from which information can be obtained, rather than to give detailed bibliographies on specific topics or to list the publications issued by particular institutions or organizations. Especial attention, however, is directed to literature in which bibliographies and lists of references are given; lists of publications can, of course, be obtained from the individual institutions. Publications on rubber by the National Bureau of Standards, for example, are listed in Letter Circular LC532, which is sent free on request.

The logical method of approach to the literature on rubber is to consult first the general reference works and to proceed, if need be, from them to the larger comprehensive reference works, and then to books, monographs, or reviews on the subject under consideration. The final step is to consult the results of original investigations, which are published for the most part in periodicals.

A great deal of general information regarding rubber and the rubber industry is given in concise form in encyclopedias, which are available in practically all libraries.

Other brief publications of a general nature include pamphlets issued by the educational or the public relations divisions of the larger rubber manufacturing firms, survey articles published in widely available periodicals such as the National Geographic Magazine (see p. 18), and Government circulars or bulletins such as "Rubber: History, Production, and Manufacture" cited on p. 8 .

For detailed or technical information one should turn first to general books, such as the Chemistry and Technology of Rubber edited by Davis and Blake, or to the English translation of Memmler's "Science of Rubber", or even to the older but still useful, "Plantation Rubber and Testing of Rubber" by Whitby.

As a next step books, monographs, and reviews on special topics should be consulted, as for example the comprehensive work of Dawson and Porritt on the constants and properties of rubber, or the recent books by Marchionna, by Flint, and by others on the chemistry and technology of latex.

Scientific and technical works, such as the foregoing, contain numerous references to the original literature which should be consulted by the reader seeking detailed information. To cover the subject still more thoroughly and to bring the information up to date the reader should search for additional references to the original literature in abstract journals and indexes. The important literature on the science and technology of rubber is covered by Chemical Abstracts, which has a wide circulation among libraries and scientific workers generally. Literature on rubber products, manufacturing processes, and the applications of rubber is covered in the Engineering Index. By far the most comprehensive abstract service on rubber, however, is that which is afforded by the Summary of Current Literature (see p.25), which, unfortunately, is available in only a few libraries in the United States.

Even though the literature on rubber is very extensive it is by no means as complete as might be wished. Many important products and processes have not been fully or adequately described in publications. There is, for example, no recent comprehensive textbook on tires, although tires are the most important single product made by the industry.

Certain apparent gaps in the literature on rubber, however, are not without reason. No publications have been prepared, for example, to tell the amateur craftsman how to make rubber articles on a small scale in the home workshop, because the manufacture of rubber products requires a considerable amount of special equipment, and furthermore because the necessary skill and technique cannot be readily gained by reading.

Many of the books, periodicals, and other publications cited in this letter circular are available at the larger public, university, and technical libraries throughout the United States. Readers located at a distance from these central reference libraries can usually arrange at a reasonable charge to obtain photostat or photofilm copies of articles in which they are interested. The Engineering Societies Library in New York maintains a file of all publications cited in the Engineering Index (see p. 26) and can furnish not only copies but also translations. Government publications can be consulted at Government depository reference libraries located in the different congressional districts. These libraries are entitled to receive any or all Government publications on the understanding that they are kept available for consultation by the general public. The location of the nearest depository library can be ascertained by consulting one's congressman or a local librarian.

The prices of publications have been included in order to make this publication as helpful as possible; they are, of course, subject to change and no responsibility can be assumed as to their correctness.

C O N T E N T S

I. BOOKS ON RUBBER

Books on rubber are here arranged in groups according to their general purpose or scope. The classification is not always sharp, and some of the books might be listed in more than one group. Reverse chronological order has been followed for the most part in order to emphasize the more recent books, which are usually the more valuable for reference.

1. History of the Rubber Industry

CHARLES GOODYEAR: CONNECTICUT YANKEE AND RUBBER PIONEER. A BIOGRAPHY. P. W. Barker. 1940. (Privately printed by Godfrey L. Cabot, Inc., Boston, Mass.). 98 p. Distributed in connection with sales promotion; not for sale. This biography is based on extensive research among original records. It was originally published serially in the Rubber Age in 16 installments from vol. 43, No. 1, April, 1938, to vol. 45, No. 4, July, 1939.

INDIA RUBBER MAN. Ralph Wolf. 1939. (The Caxton Printers, Ltd., Caldwell, Idaho). 291 p. $3.00. A comprehensive biography of Charles Goodyear written from the standpoint of human interest.

RUBBER. A STORY OF GLORY AND GREED. Howard and Ralph Wolf. 1936. (Covici Friede, New York, N. Y.). 533 p. $4.50. This story of the rubber industry is written in journalistic style for the general reader. The teacher will find this book useful as a source of human-interest material; it is not recommended for juvenile reading, however, because of the lurid treatment of atrocities practiced in the collection of wild rubber, and other abuses in the industry.

GUM ELASTIC. Charles Goodyear. 1855. Facsimile reproduction. 1937. (India Rubber Journal, 37 & 38 Shoe Lane, E.C. 4, London, England). 600 p. 20 illus. 15 shillings, 9 pence. This book is an important source of information about the early development of the rubber industry. The present reproduction was published serially in the India Rubber Journal from vol. 91, No. 15, April 11, 1936 to vol. 92, No. 24, Dec. 12, 1936.

PERSONAL NARRATIVE OF THE ORIGIN AND PROGRESS OF THE CAOUTCHOUC OR INDIA-RUBBER MANUFACTURE IN ENGLAND. Thomas Hancock. 1857. (Longman, Brown, Green, Longmans, and Roberts, London, England). 72 p. Reprinted in 1920 by order of James Lyne Hancock, Ltd., London. This valuable historical document parallels Goodyear's "Gum Elastic".

WHEELS OF FORTUNE. A SALUTE TO PIONEERS. Sir Arthur du Cros. 1939. (Chapman & Hall, Ltd., 11 Henrietta St., London, W.C. 2, England.) 316 p. Price 10 shillings 6 pence.

This book is a story of the invention and development of the pneumatic tire. It pays tribute to Robert William Thompson, who invented the pneumatic tire in 1845; to John Boyd Dunlop, who successfully applied pneumatic tires to bicycles in 1895; to Charles Kingston Welch and William Erskine Bartlett, who by inventions in 1890 made pneumatic tires detachable and practical for all forms of transport; to William Harvey de Cros who founded the original Dunlop Tire Co; and to many other less well-known figures connected with the beginning of the tire industry.

History of the Goodyear Tire and Rubber Company:

THE HOUSE OF GOODYEAR. Hugh Allen. 1936. (Goodyear Tire and Rubber Co.). 413 p. Out of print. This history of the Company is written in popular style and deals with developments in rubber technology, merchandising, labor relations, and financing.

THE STORY OF THE AIRSHIP. Hugh Allen. 8th ed. 1932. (Goodyear Tire and Rubber Co., Akron, Ohio). 96 p. 25 cents. An interesting description of lighter-than-air aviation.

MEN WORKING. Norman Beasley. 1931. (Harper Brothers, New York, N. Y.). 294 p. Out of print. A history of the Goodyear Tire and Rubber Co.

History of the Firestone Tire and Rubber Company:

LIBERIA REDISCOVERED. James C. Young. 1934. (Doubleday, Doran and Co., New York, N. Y.). 212 p. illus. Out of print. An account of the establishment of Firestone plantations in Liberia.

THE ROMANCE AND DRAMA OF THE RUBBER INDUSTRY. Harvey S. Firestone, Jr. 1933. (Firestone Tire and Rubber Co., Akron, Ohio). 127 p. Distributed without charge at the discretion of the Firestone Tire and Rubber Co. This collection of 50 radio talks deals with the history of rubber, its collection, manufacture, and applications. This book has been placed in a great many libraries, including high school libraries, throughout the United States.

MEN AND RUBBER. Harvey S. Firestone. 1926. (Doubleday, Page and Co.). 279 p. Out of print.

RUBBER - ITS HISTORY AND DEVELOPMENT. Harvey S. Firestone. 1922. (Firestone Tire and Rubber Co.). 110 p. Out of print. Pictures of the industry from the rubber tree to the finished tire.

2. General, Nontechnical Books

RUBBER: HISTORY, PRODUCTION, AND MANUFACTURE. U. S. Department of Commerce, Trade Promotion Series No. 209. P. W. Barker. 1940. (Superintendent of Documents, Government Printing Office, Washington, D. C.). 47 p. 10 cents. A pamphlet designed to answer inquiries about the rubber industry received by the Bureau of Foreign and Domestic Commerce from manufacturers, dealers, business houses, schools, and the public.

THE RUBBER INDUSTRY IN OHIO. Occupational Study No. 1, National Youth Administration in Ohio. Mary J. Drucker. 1937. (N.Y.A. in Ohio, One South Fourth St., Columbus, Ohio). 76 p. mimeographed. Distributed without charge at the discretion of the N. Y. A. in Ohio. This study is written for young people who are considering employment in the rubber industry. The contents include a concise treatment, in simple language, of the following topics: History and General Scope of the Rubber Industry; How Tires and Tubes are Made; How Other Rubber Products are Made; Working in a Rubber Factory; Working Conditions in Rubber Factories; the Rubber Worker and his Job; Job Analyses in Rubber Factories; and a Bibliography of Reference Material. The chapters telling how rubber products are made are well adapted to use in schools. This book has been widely distributed and is available at many public, high school, and college libraries.

THE RUBBER BOOK. William Clayton Pryor and Helen Sloman Pryor. 1936. (Harcourt Brace and Co., New York, N. Y.). 100 p. 50 illus. $1.00. This childrens' book on rubber has been prepared by experienced authors who have taken pains to obtain authentic information. Interest centers around 50 full-page illustrations, accompanied by concise supporting text. It is intended for ages 6 to 12.

THE REIGN OF RUBBER. W. C. Geer. 1922. (The Century Co., New York, N. Y.). 344 p. $3.00. The contents include a brief history of the rubber industry, and a description of the production of crude rubber, the manufacture of rubber goods, and the reclaiming of scrap rubber.

3. Science and Technology of Rubber

The field of science and technology of rubber has grown so large that it is impractical for any one author to cover it adequately; the three recent works of comprehensive scope have been the joint effort of selected groups of authorities.

ENCYCLOPÉDIE TECHNOLOGIQUE DU CAOUTCHOUC. (In French) Edited by André Bloc and Georges Génin. 1939. (La Revue Générale du Caoutchouc, 19, Boulevard Malesherbes, Paris, France.). Two volumes, 1671 p. 350 francs. The encyclopedia consists of 5 books:

I. Preparation and Properties of Raw Rubber (8 chapters);
II. Modern Developments in the Rubber Industry (7 chapters);
III. Chemical and Physical Tests of Rubber (2 chapters);
IV. Preparation of Compounds (7 chapters);
V. The Principal Rubber Products (28 chapters).

CHEMISTRY AND TECHNOLOGY OF RUBBER. Edited by C. C. Davis and J. T. Blake. 1937. American Chemical Society Monograph Series No. 74. (Reinhold Publishing Corporation, New York, N. Y.). 896 p. $15.00. This comprehensive treatise was prepared by 38 different authors, each a recognized authority in his own field. The chapters are: (I) Composition of Crude Rubber, (II) Physical Properties of Raw Rubber, (III) Chemistry and Structure of Rubber Hydrocarbon, (IV) Mastication and Plasticity, (V) Structure and Behavior of Rubber in Solvents, (VI) Theories and Phenomena of Vulcanization, (VII) Vulcanization without Sulphur, (VIII) Accelerators. Their History and Use, (IX) Theories of Acceleration, (X) Physics of Vulcanized Rubber. (XI) Fillers and Reinforcing Agents, (XII) History and Use of Materials which Improve Aging, (XIII) Autooxidation and Deterioration by Oxygen, (XIV) Deterioration of Rubber by Heat, Light, and Ozone, (XV) Electrical Behavior of Rubber, (XVI) Properties of Latex, (XVII) Industrial Uses of Latex, (XVIII) Hard Rubber, (XIX) Rubber Derivatives of Commercial Utility, (XX) Synthetic and Substitute Rubbers, (XXI) Gutta-Percha and Balata, (XXII) Reclaimed Rubber, (XXIII) Practical Compounding, (XXIV) Physical Testing and Specifications, (XXV) Chemical Analysis of Rubber and Rubber Products, (XXVI) Literature on the Chemistry of Rubber.

SCIENCE OF RUBBER. Translation by R. F. Dunbrook and V. H. Morris of "Handbuch der Kautchukwissenschaft" edited by K. Memmler. 1934. (Reinhold Publishing Corporation, New York, N. Y.). 770 p. $12.50. This book is made up of the

following 8 divisions, written by well-known authorities: (A) Botany, Collection, Culture and Preparation, (B) Chemistry, (C) Vulcanization, (D) Chemical-Analytical Testing Methods, (E) Physics, (F) Physical Testing Methods, (G) Microscopy, and (H) Bibliography. The translators have added references and notes which materially increase the usefulness of the book.

THE CHEMISTRY OF RUBBER. H. Freundlich. 1935. (Methuen & Co., Ltd., London, England). 72 p. 2 shillings, 6 pence. A brief text with emphasis on latex.

THE CHEMISTRY OF RUBBER MANUFACTURE. Lothar E. Weber. 1926. (Charles Griffin and Co., Ltd., London, England). 372 p. 21 shillings. This book is a revision of the classical "Chemistry of India Rubber" by C. O. Weber, which was published in 1902.

THE CHEMISTRY OF RUBBER. B. D. W. Luff. 1923. (Ernest Benn, Ltd., London, England). 232 p. 25 shillings. In addition to the chemistry of rubber proper, this book deals with the history and source of crude rubber, and with the vulcanization, properties, and testing of rubber.

SYSTEMATIC SURVEY OF RUBBER CHEMISTRY. Clayton W. Bedford and Herbert A. Winkelman. 1923. (Chemical Catalog Co., now Reinhold Publishing Corporation, New York, N. Y.) 385 p. $8.00. This comprehensive and carefully prepared bibliography is invaluable for searches of the literature prior to 1923.

GOTTLOB'S TECHNOLOGY OF RUBBER. AUTHORIZED ENGLISH EDITION. J. H. Rosenbaum. 1926. (Maclaren & Sons, 37 & 38 Shoe Lane, London, E.C.4, England. 350 p. 117 illus. Available in the United States from India Rubber World, 420 Lexington Ave., New York, N. Y. $10.50. The contents include chapters on the chemistry of rubber, the preparation and properties of crude rubber, the analysis and testing of rubber, the production of rubber goods, and the special technology of tires, mechanical goods, footwear, toys, rubberized fabric, and dipped goods. The methods of manufacture described are those used on the Continent in 1925; many changes and improvements have been made since that time.

INDIA RUBBER AND GUTTA-PERCHA. T. Seeligmann, G. Lamy Torrilhon, and H. Falconnet. Second edition, 1910. (Scott, Greenwood, & Son, London, England). 408 p. This classical work is of interest for the comprehensive list of rubber-producing plants which it gives, and its detailed treatment of gutta-percha.

MANUAL DE LA INDUSTRIA DE LA GOMA. Luis Pascual Majias Lopez. 1936. (La Goma, Calle de moncada, 4, Tda., Barcelona, Spain). 362 p. 50 pesetas. This manual of the rubber industry is the only current work on the technology of rubber in the Spanish language. It covers briefly all phases of the industry from the growing of rubber to the manufacture and testing of finished rubber products and the reclamation of scrap. Brief instructions are given for the manufacture of a wide variety of rubber articles, together with numerous formulas. The industrial applications of latex are also treated.

CRUDE RUBBER AND COMPOUNDING INGREDIENTS. A TEXT-BOOK OF RUBBER MANUFACTURE. Henry C. Pearson. Third edition, 1920. (India Rubber Publishing Co., New York, N. Y.). 422 p.

RUBBER GOODS MANUFACTURE. "Factory Manager". 1920. (Maclaren & Sons, Ltd., London, England.).

Developments in manufacturing methods and changes in the materials used in rubber compounding since 1920 have rendered these books out-of-date. Although they are no longer of use in connection with production they constitute a valuable supplement to the literature of the period 1900 to 1920; anyone making a search of the literature will find them of use as a source of background information, definitions, and current practices of that period.

PLANTATION RUBBER AND TESTING OF RUBBER. G. Stafford Whitby. 1921. (Longmans, Green & Co., London and New York). 559 p. $7.50. This book, though old, is still of value because of the thorough and critical manner in which it treats the properties of rubber as they were known in 1921.

4. Rubber Latex

CHEMISTRY AND TECHNOLOGY OF RUBBER LATEX. C. Falconer Flint. 1938. (D. Van Nostrand Co., Inc., New York, N. Y.). 715 + xx p. $14.00. The author is qualified by experience both in the production of latex and in its industrial use. The contents deal with the following topics as related to latex: history, source, composition and properties; coagulation, preservation, shipping, concentration, compounding, and vulcanization; manufacture of dipped goods; electrodeposition; impregnation of fibres and fabrics; various other applications; and physical testing. Latices of synthetic rubber and redispersions of natural rubber are also treated briefly.

RUBBER LATEX. Henry P. Stevens and W. H. Stevens. 4th Ed. 1936. (The Rubber Growers' Association, Inc., 19,

Fenchurch St., London, E.C. 3, England.). 224 p. (Reprinted by the Chemical Publishing Co., New York, N. Y. $2.00). This text was prepared primarily for the guidance of persons undertaking to use latex in manufacture. More than half of the space is devoted to abstracts of patents.

LATEX AND ITS INDUSTRIAL APPLICATIONS. (Vol. I). 1037 p. 1933. LATEX AND RUBBER DERIVATIVES AND THEIR INDUSTRIAL APPLICATIONS. (Vol. II and III) paged consecutively, 1670 p. 1937. Frederick Marchionna. (The Rubber Age, 250 West 57th St., New York, N. Y.). Vol. I, $15.00; Vol. II and III together, $20.00; Vol. I, II, and III, as a set $30.00. This monumental work is an exhaustive compilation of abstracts of technical articles and patents on latex and rubber derivatives; it is well indexed and is invaluable for searches on latex.

LATEX IN INDUSTRY. Royce J. Noble. 1936. (The Rubber Age, 250 West 57th St., New York, N. Y.). 384 p. $7.50. Part I deals with the source, properties, concentration, vulcanization, compounding, and coagulation of latex. Part II treats of process applications such as impregnation, spreading, dipping, molding, and electrodeposition, and also deals with uses of latex in products such as artificial leather, thread, sponge, and adhesives.

THE ELECTROMETRIC DETERMINATION OF THE HYDROGEN ION CONCENTRATION IN THE LATEX OF HEVEA BRASILIENSIS AND ITS APPLICABILITY TO TECHNICAL PROBLEMS. N. H. van Harpen. 1931. (Varekamp & Co., Medan, Sumatra, Netherlands East Indies). 485 p.

5. Crude Rubber

GUIDE TO THE PREPARATION OF PLANTATION RUBBER. Planting Manual No. 1. B. J. Eaton. 1928. (Rubber Research Institute of Malaya, Kuala Lumpur, Federated Malay States). 54 p. A description of the production, packing, and inspection of the different types of plantation rubber. This booklet is the first of a series of manuals prepared for rubber planters.

PLANTATION SHEET RUBBER MANUFACTURE. Planting Manual No. 3 Rubber Research Institute of Malaya. R. O. Bishop. 1932. 61 p. illus. (Rubber Research Institute. Kuala Lumpur, Federated Malay States). $2.00 Straits Settlement currency. A manual describing improvements in the practice of collecting latex and converting it into smoked sheet rubber.

THE PREPARATION OF PLANTATION RUBBER. Sidney Morgan and Henry P. Stevens. 2nd Ed. 1927. (Constable & Co., Ltd., London, England). 357 p. illus. 21 shillings. This comprehensive text deals with the planting, maintenance, and thinning of trees; the tapping, collection and coagulation of latex; and the preparation, drying, sorting, grading, and packing of sheets and crepe. Sections are also devoted to machinery and buildings, defects in finished rubber, and vulcanization and testing procedures.

SOME MODERN ASPECTS OF RUBBER CULTIVATION. Charles H. Wright. 1928. (Maclaren and Sons, London, England.). 162 p. illus.

CRUDE RUBBER SURVEY BULLETINS. An extensive survey of crude rubber production was conducted by the United States Departments of Commerce and Agriculture from about 1924 to 1927. The findings are given in the following 9 publications for sale by the Superintendent of Documents, Government Printing Office, Washington, D. C. at the prices indicated.

PLANTATION RUBBER INDUSTRY IN THE MIDDLE EAST. David M. Figart. 1925. (Trade Promotion Series No. 2) 327 p. 50 cents.

MARKETING OF CRUDE RUBBER. E. G. Holt. 1927. Trade Promotion Series No. 55). 273 p. 45 cents.

POSSIBILITIES OF PARA RUBBER PRODUCTION IN THE Philippine Islands. C. F. Vance, A. H. Muzzall, J. P. Bushnell, and Mark Baldwin. 1925. (Trade Promotion Series No. 17). 111 p. 20 cents.

RUBBER PRODUCTION IN THE AMAZON VALLEY. William L. Schurz, O. D. Hargis, C. F. Marbut, and C. B. Manifold. 1925. (Trade Promotion Series No. 23). 377 p. 65 cents.

RUBBER PRODUCTION IN AFRICA. H. N. Whitford and Alfred Anthony. 1926. (Trade Promotion Series No. 34). 142 p. 25 cents.

POSSIBILITIES FOR RUBBER PRODUCTION IN NORTHERN TROPICAL AMERICA. John C. Treadwell, C. Reed Hill, and H. H. Bennett. 1926. Trade Promotion Series No. 40). 387 p. 65 cents.

PRODUCTION OF GUTTA-PERCHA, BALATA, CHICLE, AND ALLIED GUMS. Joseph W. Vander Laan. 1927. (Trade Promotion Series No. 41). 80 p. 15 cents.

HEVEA TREE IN THE AMAZON VALLEY. Carl D. LaRue. 1926. (Department of Agriculture Bulletin No. 1422). 69 p. 15 cents.

A PATHOLOGICAL SURVEY OF THE PARA RUBBER TREE IN THE AMAZON VALLEY. James R. Weir. 1926. (Department of Agriculture Bulletin No. 1380). 129 p. 50 cents.

ESTATE RUBBER, ITS PREPARATION, PROPERTIES, AND TESTING. O. de Vries. 1920. (Drukkerijen, Ruygrok & Co., Batavia, Java, Netherlands East Indies). 649 p. 20 florins. A classic work to which reference is still made.

6. Gutta-Percha and Related Gums

GUTTA-PERCHA AND BALATA. (In German). Emil J. Fischer. 1933. (Allgemeiner Industrie-Verlag G.M.b.H., Berlin-Lichterfelde, Germany.). 184 p. 10 Reichsmarks. This book is a compilation of information on the production, properties, and uses of gutta-percha and balata. Numerous references are given to the technical and patent literature.

PRODUCTION OF GUTTA-PERCHA, BALATA, CHICLE, AND ALLIED GUMS. Joseph W. Vander Laan. 1927. (Dept. of Commerce Trade Promotion Series No. 41). 80 p. 15 cents. This is one of the Crude Rubber Survey Bulletins referred to on p. 13.

DIE GUTTAPERCHA. (In German). Eugen Obach. 1899. (Steinkopf and Springer; now available from Union Deutsche Verlagsgesellschaft, Berlin, Germany.). 114 p. 5 Reichsmarks. This classic work is still of value for reference.

7. Synthetic Rubber

SYNTHETIC RUBBERS: A REVIEW OF THEIR COMPOSITIONS, PROPERTIES, AND USES. Lawrence A. Wood. 1940. Circular of the National Bureau of Standards, C427. (Superintendent of Documents, Government Printing Office, Washington, D. C.). 30 p. 10 cents. This circular treats 29 commercial varieties of synthetic rubber, classified as, (1) chloroprene polymers, (2) butadiene polymers, (3) organic polysulphides, (4) isobutene polymers, (5) plasticized vinyl chloride polymers, and (6) dimethylbutadiene polymers. A bibliography of 228 references covers the literature of the decade 1930-1940.

SYNTHETIC RUBBER. W.J.S. Naunton. 1937. (Macmillan & Co. Ltd., London, England.) 162 p. 7 shillings, 6 pence.

This book is intended for both the laymen and the technical reader. It deals briefly with the history, economics, chemistry, physics, technology, and applications of synthetic rubbers, with particular emphasis on neoprene.

A RUBBER PLANTATION IN NEW JERSEY. Not dated, about 1935. (The Thiokol Corporation, Trenton, N. J.). Distributed free at the discretion of the Thiokol Corporation. 35 p. A brief, popular description of the production, properties, and uses of Thiokol.

Note - So many developments are being made in synthetic rubber at this time that anyone seeking detailed information on the subject should refer to the current periodical literature. See also the Hearing before the Committee on Military Affairs, of the United States Senate, p. 30.

8. Physical Constants and Properties

The literature on the physical constants and properties of rubber consists of one outstanding, comprehensive book, two small engineering handbooks, and several articles of broad scope and interest in recent periodicals. In addition, considerable attention is, of course, devoted to the constants and properties in books on the science and technology of rubber.

RUBBER. PHYSICAL AND CHEMICAL PROPERTIES. T. R. Dawson and B. D. Porritt. 1935. (Research Association of British Rubber Manufacturers, Croyden, England; available in the U. S. from India Rubber World, 420 Lexington Ave., New York, N. Y.). 700 p. About $12.50. This book presents "a set of tables of detailed quantitative data of the properties of rubber, so far as available information allows". All significant measurements of constants and properties of rubber from the beginning of the industry to 1934 are included. This large amount of material is well organized, concisely presented, and fully indexed. The book also includes a directory of trade associations, a list of rubber specifications, a bibliography, and a chapter on methods of analysis and testing.

The engineering handbooks on rubber have been issued for promoting sales. The different compounds, regarding which properties are given, are designated only by code, but the well-informed rubber technologist will have no difficulty in recognizing the types of compounds and their approximate compositions.

RUBBER AS AN ENGINEERING MATERIAL. 1940. (B. F. Goodrich Co., Akron, Ohio). 25 p. 50 cents. This handbook deals with forms of manufactured rubber; properties; resistance to corrosion; resistance to abrasion, cutting, tearing, and impact; elasticity; vibration, shock, and noise isolation; heat resistance and insulation; resistance to oils and solvents; properties of synthetic elastics; and testing of rubber products.

SOME PHYSICAL PROPERTIES OF RUBBER. 1936. (New Products Development Division, United States Rubber Co., Detroit, Michigan). 19 p. Distributed free at the discretion of the U. S. Rubber Co. "The object of this handbook is to present information concerning (1) the stress-strain relations of rubber in static compression and in static shear, and (2) various physical constants of rubber." The section on rubber in Kent's Mechanical Engineers' Handbook, 11th edition, 1938, (John Wiley and Sons, New York, N. Y.) is an abstract of this handbook.

9. Proceedings of International Conferences

Large international conferences which have been held from time to time have served to summarize the current knowledge and give a cross section of the work being done in the science and technology of rubber throughout the world. The conference in London in 1938 was outstanding.

PROCEEDINGS OF THE RUBBER TECHNOLOGY CONFERENCE, Held under the Auspices of the Institution of the Rubber Industry on May 23-25, 1938. Edited by T. R. Dawson and J. R. Scott. (Institution of the Rubber Industry, 12, Whitehall, London, S. W. 1, England; available in the U. S. from the Rubber Age, 250 West 57th St., New York, N. Y.). 1137 p. $12.00. The 103 papers included in these proceedings were presented at sessions dealing with plantation subjects, latex, chemistry, general technology, synthetic rubber-like materials, compounding materials, durability, physics, and applications. The collected papers constitute in many respects the equivalent of a comprehensive text-book on rubber.

10. Economics and statistics

THE PRODUCTIVITY OF LABOR IN THE RUBBER TIRE MANUFACTURING INDUSTRY. John Dean Gaffey. No. 472 in Studies in History, Economics, and Public Law edited by the Faculty of Political Science of Columbia University. 1940. (Columbia University Press, New York, N. Y.). 204 p. Price, $2.50. This study traces the changes in the productivity of labor in the tire industry since 1914, and analyzes

the conditions attending these changes. It describes the principal effect of the changes upon our economic society and attempts the prediction of the probable future course of labor productivity in the tire industry.

THE STATISTICS OF THE RUBBER INDUSTRY. George Rae. Journal of the Royal Statistical Society, April, 1938. (Reprints available from Assistant Secretary, Royal Statistical Society, 4, Portugal St., London, W. C. 2, England.). 58 p. Price, 2 shillings. This brief publication contains a comprehensive summary of the statistics of the rubber industry. It deals with subjects such as areas planted in rubber, cost of developing estate rubber, output of estate and native rubber, yield per acre, cost of production, absorption of rubber in various products, manufacture of tires, use of motor transport, tire mileage, stocks of rubber in producing countries, afloat, and in manufacturing countries, regulation schemes, and reclaimed rubber.

RUBBER INDUSTRY OF THE UNITED STATES 1839 - 1939. P. W. Barker and E. G. Holt. Dept. of Commerce Trade Promotion Series - No. 197. 1939. (Superintendent of Documents, Government Printing Office, Washington, D. C.) 42 p. 10 cents. This booklet provides a concise and comprehensive sketch of the development of the American rubber industry. It is especially valuable as a source of statistical information on such subjects as world rubber production, world position of the American rubber industry, consumption of rubber and compounding materials, production of various rubber products, prices of rubber products, geographical distribution of the industry, and employment and income in the industry. A section is devoted to the uses of rubber and includes a list of about 2,000 different rubber products.

II. REVIEWS AND SURVEYS

Articles in encyclopedias and comprehensive reviews in periodicals fill an important place in the literature on rubber because they have, in general, a wide circulation, and also because a considerable proportion of them are addressed to the general reader rather than to the specialist.

Recent articles and annual surveys serve as a convenient means of bringing the knowledge of rubber up to date. The progress of science and technology is so rapid that it is very often necessary to supplement by current reading the information given in even relatively new books.

1. Articles in Encyclopedias

RUBBER, ITS HISTORY AND USES. Robert E. Powers. Encyclopedia Americana, 1939 Ed. vol. 23, pp. 739-745.

RUBBER: BOTANY, CULTIVATION, AND CHEMISTRY. G. Martin. Encyclopedia Britannica, 14th Ed., vol. 19, pp. 602-605.

RUBBER PRODUCTION AND MANUFACTURE. James W. Schade. Encyclopedia Britannica, 14th Ed. vol. 19, pp. 605-611.

2. Reviews

OUR MOST VERSATILE VEGETABLE PRODUCT. J. R. Hildebrand. National Geographic Magazine, (Washington, D. C.), vol. 77, No. 2, pp. 143-200, February, 1940. This review contains numerous illustrations and will be found helpful in teaching about rubber in schools.

THE CHEMISTRY OF RUBBER. Harry L. Fisher. Chemical Reviews, vol. 7, pp. 51-138, March, 1930. This review is practically a textbook on the chemistry of rubber.

3. Annual Surveys

ANNUAL REPORT ON THE PROGRESS OF RUBBER TECHNOLOGY. Institution of the Rubber Industry (12, Whitehall, London, S.W.1, England.). 10 shillings, 6 pence. Volume III for 1939, edited by T. J. Drakeley, contained 161 pages and was made up of 24 sections, each prepared by a well-known authority. About 1200 references were included. The organization of material follows the well-known system of classification employed in the Summary of Current Literature. (p. 25.)

ANNUAL SURVEY OF AMERICAN RUBBER CHEMISTRY. Webster Newton Jones. The Survey for 1937 was published as an Engineering Bulletin by the Carnegie Institute of Technology, Pittsburgh, Pa. 63 p. 75 cents. The survey for 1936 was also published by the Institute, with the assistance of the Works Progress Administration. The surveys for 1925 to 1935, prepared by different authors, constituted a part of the Annual Survey of American Chemistry, published under the sponsorship of the National Research Council. It is understood that plans have been made to bring the surveys up to date and to publish them regularly in the future.

III. PERIODICALS

Publications on rubber in periodicals serve two main functions, (1) to give the news of the industry, production and import statistics, market quotations, notices of meetings, descriptions of new processes and equipment and the like; and (2) to report the results of original research. The rubber journals emphasize the news function. Some of them also serve as mediums for the publication of original papers, and all of them carry abstracts and summaries of important technical papers published elsewhere. Occasionally the rubber journals reprint outstanding papers, or even books in serial form. The bulk of the original scientific literature on rubber, however, is published rather widely in general scientific journals and not in the rubber journals.

Rubber Chemistry and Technology is a unique periodical which aims to reprint all the technical literature of importance and of permanent value. The sources of the papers reprinted within the past 5 years were as follows: 15 percent from Industrial and Engineering Chemistry, Industrial Edition, 9 percent from Transactions of the Institution of the Rubber Industry, 7 1/2 percent from Kautschuk, 6 percent from the Analytical Edition of Industrial and Engineering Chemistry, and 4 percent from the Journal of Research of the National Bureau of Standards. The remaining 58 1/2 percent of the papers were published in 65 different periodicals, 33 of which carried only one article on rubber in the 5-year period.

1. American Periodicals

RUBBER CHEMISTRY AND TECHNOLOGY. Published quarterly under the auspices of the Division of Rubber Chemistry of the American Chemical Society, 1500 Greenmount Ave., Baltimore, Maryland. Subscription price, members of the American Chemical Society, $2.50; non-members, $5.00. In this periodical are reprinted original papers on rubber which are judged to be of importance or of value for reference. Publications in foreign languages are translated into English. The contents also include reviews of new books, records of the meetings of the Rubber Division, and occasional original articles.

INDIA RUBBER WORLD. Published monthly by Bill Brothers Publishing Corporation, 420 Lexington Ave., New York, N. Y. Annual subscription, $3.00.

RUBBER AGE (NEW YORK). Published monthly by Palmerton Publishing Co., Inc., 250 West 57th St., New York, N. Y. Annual subscription, $2.00.

The contents of the India Rubber World and the Rubber Age include original papers on rubber, editorials, summaries

and abstracts of work published elsewhere, book reviews, reviews of patents, reports of scientific meetings, market quotations, financial news regarding rubber companies, personal items, biographical sketches, and statistics on the imports, production, consumption, and stocks of rubber and rubber products.

TIRE REVIEW. Published monthly by Edward S. Babcox, Akron, Ohio. Annual subscription, $2.00. As the name implies this trade journal is primarily of interest to dealers in tires.

TIRE REBUILDERS' NEWS (formerly Rebuilt Tire Journal). Published monthly by the Clephane Association, Inc., 381 Fourth Ave., New York, N. Y. Annual subscription, $2.00. This journal of the tire rebuilding industry is almost the sole source of information about methods, materials, and equipment used for retreading and recapping tires.

VANDERBILT NEWS. Published bimonthly by the R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. Distributed free at the discretion of the Vanderbilt Co. This periodical is designed to promote the use of compounding ingredients marketed by the Vanderbilt Co. Formulas and processing instructions are given for all kinds and types of rubber compounds. The results of comprehensive laboratory tests are given with each formula. The contents also include articles on test methods and other subjects of practical interest.

INDUSTRIAL AND ENGINEERING CHEMISTRY. Published by the American Chemical Society, Mills Bldg., Washington, D. C. Published in two editions, Industrial Edition issued on the 1st of each month, and Analytical Edition, on the 15th. The two editions are sold only as a unit, annual subscription, $4.00. This journal is outstanding in the number of its original papers on rubber. The scope of these papers is not strictly limited to chemistry. Comprehensive reviews on rubber are also occasionally included.

AMERICAN SOCIETY FOR TESTING MATERIALS, PROCEEDINGS. Published annually by the American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa. The Proceedings consist of Committee Reports, (Committee D-11 deals with Rubber Products), Tentative and Revised Standards, and Technical Papers. AMERICAN SOCIETY FOR TESTING MATERIALS STANDARDS are published triennially. Standards on rubber are included in Part II, NON-METALS. At intervals of about two years Committee D-11 on Rubber Products

prepares a booklet, A.S.T.M. STANDARDS ON RUBBER PRODUCTS, in which standards, tentative standards, and test methods for rubber are reprinted in convenient form. The 1939 edition of this booklet contained 210 pages and included, in addition to the above-mentioned items, an excellent bibliography on the testing of rubber; the price was $1.25 to members and $1.75 to nonmembers of the A.S.T.M.

OTHER AMERICAN PERIODICALS which publish papers on rubber include the Journal of the American Chemical Society, the Journal of Applied Physics, Journal of Research of the National Bureau of Standards, News Edition of the American Chemical Society. S.A.E. (Society of Automotive Engineers) Journal, and A.S.M.E. (American Society of Mechanical Engineers) Transactions. The two periodicals last mentioned have published several important general articles on the use of rubber as an engineering material.

2. British Periodicals

TRANSACTIONS OF THE INSTITUTION OF THE RUBBER INDUSTRY. Published bimonthly by the Institution of the Rubber Industry, 12, Whitehall, London, S.W. 1, England. Foreign subscription, 2 pounds, 2 shillings. This periodical is the most important medium for the publication of research on rubber in Great Britain. In addition to original papers, it contains editorials, announcements and questions of diploma examinations, and other institution news.

INDIA RUBBER JOURNAL. Published weekly at 37 and 38 Shoe Lane, London, E.C. 4, England. Annual subscription, 20 shillings. This journal covers much the same scope as the India Rubber World and the Rubber Age (New York). A regular feature of each issue is a critical review of one or more recent papers on rubber by Philip Schidrowitz, a well-known authority on rubber.

RUBBER AGE (LONDON). Published at 143 Grosvenor Rd., London, S.W.1, England. This monthly journal is devoted largely to the news of the trade. Annual subscription, post free, 10 shillings.

JOURNAL OF RUBBER RESEARCH. Published monthly by the Research Association of British Rubber Manufacturers, 105 Lansdowne Road, Croydon, England. Price furnished on application to the Association. This journal is devoted to the publication of work done by the staff of the Association. It is issued under the same cover as the Summary of Current Literature (p. 25).

BULLETIN OF THE RUBBER GROWERS' ASSOCIATION. Published by Rubber Growers' Association, 19 Fenchurch St., London, E. C. 3, England. Not for sale. Distributed at the discretion of the Association. This journal deals with scientific and technical matters pertaining to the planting and cultivation of Hevea trees and the production of crude rubber. It also contains news of the trade and information about legislation affecting rubber plantations.

STATISTICAL BULLETIN OF THE INTERNATIONAL RUBBER REGULATION COMMITTEE. This monthly publication is issued by the International Rubber Regulation Committee, which was set up by an agreement between Great Britain, France, and the Netherlands for the purpose of controlling the output of crude rubber. It is published at Brettenham House, 5-6 Lancaster Place, Strand, London, W.C. 2, England. Annual subscription, 10 shillings. Distributed in the United States by the India Rubber World, (p. 20), annual subscription, $2.50. The contents include the following sections, (A) Crude Rubber Supplies, (B) Absorption, (C) Stocks, (D) Comparison of Supplies, Absorption, and Stocks, (E) Statistics of Interest to the Rubber Industry (Absorption by products, automobile statistics, etc.), (F) Prices, and (G) Indices of Business Activity.

RESEARCH ASSOCIATION OF BRITISH RUBBER MANUFACTURERS. SUMMARY OF CURRENT LITERATURE. (See p. 25)

JOURNAL OF THE RUBBER RESEARCH INSTITUTE OF MALAYA. Published by the Institute at P.O. Box 150, Kuala Lumpur, Federated Malay States. Subscription price not announced. This journal reports the results of research on a variety of problems relating to the growing of rubber.

3. Periodicals of Other Countries

REVUE GENERALE DU CAOUTCHOUC. Published monthly at 18, Rue Duphot, Paris, France. This journal contains articles of general interest, occasional original papers, news, and statistics.

KAUTSCHUK. Published monthly by Union Deutsche Verlagsgesellschaft, Roth & Co., Alexandrinenstrasse 108, Berlin S.W. 68, Germany. This official organ of the German Rubber Society is the chief medium for the publication of German scientific and technological work on rubber.

GUMMI-ZEITUNG. Published weekly by Union Deutsche Verlagsgesellschaft, Roth & Co., Alexandrinenstrasse 108, Berlin S.W. 68, Germany. This is primarily a trade journal.

LA GOMA. Published monthly by Juan Blanche Guerrero, Calle de Moncada, 4, Barcelona, Spain. This is the only periodical on rubber in the Spanish language.

JOURNAL OF RUBBER INDUSTRY (U.S.S.R.). Published at 12 Maroseyka St., Moscow, U.S.S.R.

GOMMA. Published bimonthly at Via Spontini, No. 5, Milan, Italy. This Italian periodical contains a few original papers as well as trade news.

JOURNAL OF THE SOCIETY OF THE RUBBER INDUSTRY (JAPAN). Published by Nippon Gomu Kyokai, Room 404 Mitsubishi Naka No 2 Bldg., No 6, Marunouchi-3-Chome, Kojimachiku, Tokio, Japan.

JOURNAL OF THE SOCIETY OF CHEMICAL INDUSTRY (JAPAN). Published by the Society of Chemical Industry at Yuraku Bldg., Marunouti, Tokio, Japan.

BULLETIN OF THE CHEMICAL SOCIETY OF JAPAN. Published by the Chemical Society of Japan, c/o Faculty of Science, Imperial University, Tokio, Japan.

The three journals, above-mentioned, are the principal mediums for the publication of Japanese papers on rubber.

ARCHIEF VOOR DE RUBBERCULTUUR IN NEDERLANDSCH-INDIE. Published at Experiment Station, Buitenzorg, West Java, Netherlands East Indies. This journal issued 3 or 4 times a year contains a number of original papers on the growing of rubber, the properties of rubber and latex, and related subjects. Some of the papers are in Dutch with English abstracts, others are entirely in English.

IV. ABSTRACTS AND BIBLIOGRAPHIES

The outstanding abstract service on rubber is that afforded by the Research Association of British Manufacturers through the Summary of Current Literature. This periodical covers the world-wide literature very thoroughly and includes many more references than any other abstract journal. Unfortunately it has only a very limited circulation in the United States. Chemical Abstracts, however, which ranks next in coverage has a very wide circulation in the United States and is available not only in technical and university libraries, but also in most public libraries as well.

RESEARCH ASSOCIATION OF BRITISH RUBBER MANUFACTURERS. SUMMARY OF CURRENT LITERATURE. Published monthly by the Association, 105 Lansdowne Road, Croyden, England. Price furnished on application to the Association. This periodical covers thoroughly the scientific, technical, trade, and patent literature on rubber. Abstracts of difficultly accessible publications, such as those in Russian and Japanese, are given in such detail as to render it unnecessary to refer to the original for most purposes. Some articles of potential importance or application to rubber are abstracted even though rubber is not directly mentioned. The abstracts are classified into the following main sections: 1. Planting; 2. Latex; 3. Raw rubber (including synthetic rubbers, balata, gutta-percha, etc.); 4. Compounding ingredients; 5. Fibres and textiles; 6. Vulcanized rubber (including sections on applications to: A-tires; B-belting; C-cables and electrical insulation; F-footwear; G-games, toys, and sports accessories; H-hose and tubing; M-mechanical goods; R-roads, flooring, and mats; S-surgical and dental goods; T-textile-and-rubber goods; X-miscellaneous, and Z-hard rubber); 7. Works processes; 8. Machinery and Appliances; and 9. General and Miscellaneous (including statistics and financial items). Two auxiliary tables are employed for subclassification, one based on properties and the other on products. The classification and the simple numbering system which has been developed in connection with it are described fully in Journal of Rubber Research, vol. 6, pp. 67-132, July, August, and September, 1937. Abstracts are classified and numbered according to this system in each issue; since the numbers indicate the subject it is not necessary to employ a subject index. An author index, however, is provided.

CHEMICAL ABSTRACTS is published twice monthly by the American Chemical Society, Mills Bldg., Washington, D. C. Annual subscription, $12.00. This periodical is

divided into 30 sections, one of which is devoted to Rubber and Allied Substances. All important original contributions to the science and technology of rubber are abstracted; especially full abstracts are given of publications not readily available to American readers. Important publications not of an original character are listed by title. All United States patents on rubber and the more important foreign patents are covered. Cross-references are given to abstracts on other subjects which might have some bearing on rubber.

INDUSTRIAL ARTS INDEX. Published monthly by the H. W. Wilson Co., 950-972 University Ave., New York, N. Y. This periodical appears in monthly and cumulative issues and in annual volumes. Articles, books, and other publications relating to the science and technology of rubber and the business side of the rubber industry are listed by title. The references on rubber are segregated and are conveniently classified by appropriate subheadings. Only a few foreign rubber periodicals are included in the list of periodicals abstracted.

ENGINEERING INDEX. Published by Engineering Index, Inc., 29 West 39th St., New York, N. Y. This publication appears currently in card index form, and as annual volumes. Very concise reviews are given of all important publications on rubber related directly or indirectly to engineering. The author index includes not only the authors of all publications cited but also all names mentioned in the publications themselves. All material covered in the Index is permanently housed in the Engineering Societies Library in New York from which photostat copies and translations can be obtained.

BIBLIOGRAPHY OF RUBBER LITERATURE. Donald E. Cable. (Rubber Age, 250 West 57th St., New York, N. Y.). Volumes I, II, and III of this bibliography covered the years 1935, 1936, and 1937 respectively. Volume IV for 1938-1939 was published in 1940 and contained about 250 pages. Price, $4.00. The publisher plans to bring out biennial volumes in the future.

V. PUBLICATIONS BY THE UNITED STATES GOVERNMENT

Several departments of the Federal Government regularly engage in work on rubber and issue bulletins, circulars, research papers, and various other publications on the subject. A few of these publications of general interest have been mentioned in previous sections of this letter circular. In the following section the different bureaus and offices are enumerated and brief information is given about the scope of their work and the type of publications which they issue. For detailed information and lists of individual publications application should be made to the particular bureau or office concerned. Most of the publications are for sale, and, unless otherwise noted, orders should be sent to the Superintendent of Documents, Government Printing Office, Washington, D. C.

1. The Growing of Rubber; Rubber-Producing Plants

The Division of Plant Exploration and Introduction, Bureau of Plant Industry, Department of Agriculture, is concerned with all matters pertaining to the production of raw or crude rubber. Publications of this Division relate to the botany, plant physiology, cultivation, and utilization of rubber-producing plants. The development of rubber from goldenrod which was initiated by the Edison Botanic Research Corporation is one of a number of projects conducted by the Division. At present surveys are being made looking toward the growing of rubber in Latin America.

2. Commerce and Trade in Rubber

The Leather and Rubber Division, Bureau of Foreign and Domestic Commerce, Department of Commerce, has to do with commercial and economic aspects of the rubber industry throughout the world. The Division collects, correlates, interprets, and publishes a variety of statistical and other information regarding the world production, marketing, and consumption of rubber and rubber products. Most of the work of this Division relating to rubber was formerly published in a widely-circulated semimonthly periodical, the "RUBBER NEWS LETTER", but is now included in the following periodicals:

DOMESTIC COMMERCE WEEKLY. Superintendent of Documents, annual subscription, $2.00.

FOREIGN COMMERCE WEEKLY. Superintendent of Documents, annual subscription, $4.50.

INDUSTRIAL REFERENCE SERVICE. Superintendent of Documents, annual subscription, $15.00. A loose-leaf

reference service containing commodity and industry data.

From time to time special studies are published as bulletins of the Trade Promotion Series such as those cited on pages 13 and 17. Articles on special subjects are also contributed to the rubber trade journals.

3. Census of Rubber Manufactures

The biennial Census of Manufactures is taken by the Bureau of the Census, Department of Commerce, on the odd-numbered years. The results of the census are first issued in the form of preliminary reports which, in the case of rubber, deal with the main classes of products such as tires and tubes, boots and shoes, reclaimed rubber, etc. These preliminary reports are mimeographed and distributed by the Bureau of the Census without charge. When the final figures are compiled they are published in the form of individual bulletins on the same subjects as the preliminary reports. A certain number of these bulletins are distributed by the Bureau of the Census; they are also for sale by the Superintendent of Documents, the usual price being 5 cents. At a later date the bulletins on all industries are compiled in one large volume. The Census of Manufactures for 1937 is the latest available at the time this is written, and is for sale by the Superintendent of Documents at $2.25.

4. Patents on Rubber

Copies of United States Patents may be purchased from the United States Patent Office, Washington, D. C. at the uniform price of 10 cents each. In ordering a patent it is only necessary to give the number, if the number is known. If the number is not known or is in doubt, the subject, the inventor's name, the date of issue, and other relevant information which might aid in identifying the patent should be given. Patents are classified on the basis of subject matter as described in the "Manual of Classification of Patents", which is for sale by the Superintendent of Documents, Government Printing Office, Washington, D. C., price $1.50.

5. Tariff on Rubber and Rubber Products

The United States Tariff Commission conducts various studies, surveys, and fact-finding investigations in regard to the rubber industry, and other industries. Much of the information gathered by the Commission is published in the form of surveys and reports of investigations. The remainder of it is accumulated in the files of the Commission for the use of the President and the Congress when questions

concerning rubber are under consideration. Recently the Commission has released a timely report on CRUDE RUBBER, which gives "a brief summary of the present situation respecting crude rubber with special reference to the effect of war conditions on United States imports". Mimeographed copies of this report are obtainable from the Tariff Commission without charge.

6. Science and Technology of Rubber

The National Bureau of Standards, Department of Commerce, conducts a variety of scientific and technical researches on rubber and rubber products, the results of which are published, along with other work of the Bureau, in the JOURNAL OF RESEARCH OF THE NATIONAL BUREAU OF STANDARDS, a monthly periodical for sale by the Superintendent of Documents, annual subscription $3.50. Individual research papers are also for sale by the Superintendent of Documents, the prices usually being 5 cents or 10 cents per copy. A small monthly magazine, the Technical News Bulletin, describes progress of work in the laboratories and lists all publications by members of the Bureau's staff. Through the Bulletin it is possible to learn of each new paper in any given field soon after it is issued. The subscription price is 50 cents a year, payable in advance to the Superintendent of Documents. Information of general interest is published in the form of Circulars such as the circular on Synthetic Rubber referred to on page 14 . Information which is frequently used in answering letters is made available in Letter Circulars, such as this, which are distributed in mimeographed form without charge. Prior to 1923 the results of original investigations conducted at the Bureau were usually published as Scientific or as Technologic Papers. A classified list of publications of the Bureau relating to rubber is given in Letter Circular LC532.

7. Specifications for Rubber Products

Federal specifications, including those for rubber products, are prepared by technical committees on which all interested departments and independent establishments of the Government are represented, and are promulgated by the Director of Procurement, Treasury Department. An alphabetical index of Federal specifications is for sale by the Superintendent of Documents, price 15 cents. Copies of individual specifications are obtainable from the same source, the usual price being 5 cents. The methods of testing which are used in connection with all Government specifications for rubber products are described in Federal Specification ZZ-R-601a, "Rubber Goods; General Specifications", price, 15 cents.

Federal specifications are prepared only for products in which two or more departments of the Government are interested. Products used by a single department are covered by specifications issued by that department. The War and Navy Departments have a considerable number of specifications for rubber products. An index of War Department Specifications is for sale by the Superintendent of Documents, price, 25 cents. The index indicates the different branches of the service from which the respective specifications can be obtained. No charge is made for the individual specifications. An index of Navy Department Specifications and individual specifications can be obtained without charge from the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., and from Navy Yards.

8. Legislation relating to rubber

Information about legislation relating to rubber can be obtained from the Congressional Record. Bills of importance or general interest are, of course, fully reported in the rubber trade journals. The technical aspects of proposed legislation are most likely to be brought out in hearings before committees. For example, a great deal of information about the synthetic rubber situation is given in DEFENSE OF THE UNITED STATES AND OTHER NATIONS IN THE WESTERN HEMISPHERE (RUBBER). HEARING BEFORE THE COMMITTEE ON MILITARY AFFAIRS, UNITED STATES SENATE, SEVENTY-SIXTH CONGRESS, THIRD SESSION ON S. 4082. June 14, 1940. 33 p. (Printed for the use of the Committee on Military Affairs, Government Printing Office, Washington, D. C.) Requests for copies of this document should be directed to the Committee on Military Affairs.

VI. PUBLICATIONS BY INTERNATIONAL AND FOREIGN INSTITUTIONS

Some of the institutions cited in this section maintain their own periodicals, which have been listed in another section. The status of the institutions in Europe is uncertain at the time this is written.

1. Pan American Union

The series of publications on Commodities of Commerce, issued by the Pan American Union, Washington, D. C., contains two pamphlets of general interest which may be useful in schools:

No. 14. THE CHICLE INDUSTRY. 1936. 7 pages, 1 illustration. A brief description of the collection of chicle gum. Price, 5 cents.

No. 16 RUBBER. 1938. 22 pages, 9 illustrations. Price, 5 cents. The contents include a history of rubber-growing in Latin America, a description of the collection of wild rubber, and a brief account of the Ford, Goodyear and other plantation experiments.

2. The Rubber Growers' Association, Inc.

This Association which is located at 19 Fenchurch St., London, E.C. 3, England, issues the BULLETIN mentioned on page 23 and a wide variety of pamphlets designed to promote the use of rubber. They deal with topics such as latex, rubber roadways, rubber and footwear, rubber flooring, rubber and the home, rubber and engineering, rubber and railways, rubber and automobiles, rubber in aircraft design, etc. These publications are usually distributed without charge to interested firms and individuals.

3. Research Association of British Rubber Manufacturers

Three well-known publications issued by the Association have already been mentioned, - the JOURNAL OF RUBBER RESEARCH, page 22 , the SUMMARY OF CURRENT LITERATURE, pages 22 and 25, and RUBBER, PHYSICAL AND CHEMICAL PROPERTIES, page 15 . The Association maintains an exhaustive card index of the world-wide literature on rubber, and hence is able to give its members a very thorough bibliographic service. Many investigations are conducted in the interest of the members. The results are published when there is no longer reason for holding them confidential.

4. Netherlands Government Rubber Institute

This Institute, which is located at Delft, Holland, performs a variety of services for the Dutch rubber industry. The results of its investigations and researches in recent years have been published in various periodicals in the Netherlands, Germany, France, and England.

5. Rubber Research Institute of Malaya

This institute which is located at Kuala Lumpur, Federated Malay States, conducts a wide variety of research on problems related to the growing of rubber and the composition and properties of latex and rubber. The JOURNAL of the institute was mentioned on page 23 . It also issues a comprehensive ANNUAL REPORT, PLANTERS' BULLETINS, AND PLANTING MANUALS.

6. Institutions Set Up Under the International Rubber Restriction Agreement

In the three countries (Great Britain, France, and the Netherlands)participating in the International Rubber Restriction Agreement, three institutes have been established. The Dutch Institute, The Rubber Foundation, (Rubber-Stichting) maintains a Research Department at Delft and a Technico-Commercial Department at Amsterdam, and supports work at the West-Java Experiment Station at Buitenzorg. The Rubber Foundation publishes a bimonthly journal, RUBBER, which is devoted primarily to new and special uses of rubber and contains little or no original work. Scientific papers by members of the Foundation are published in various periodicals and are reprinted, usually in several languages, as "Communications of the Rubber Foundation", (Mededeelingen van de Rubber-Stichting).

The French institute of Rubber at Paris, (L'Institut Francais du Caoutchouc), like the Dutch Foundation, reprints scientific and technical papers by its members, and occasionally makes the original publication.

The corresponding British organization is the British Rubber Producers' Association (formerly British Rubber Research Institute). Thus far, several reprints appear to have been issued by the Association,

VII. PUBLICATIONS FOR SALES PROMOTION

The rapid technological development in the rubber industry in recent years has been greatly aided by the publication of detailed factual information about new compounding ingredients, new types of rubber and rubber compounds, and new rubber products. Much of this information has appeared in house organs, bulletins, pamphlets, handbooks, and other literature issued by firms interested in the sale of the materials or products concerned. Articles relating to new products have not infrequently been reprinted from technical or scientific periodicals and distributed to large mailing lists of present or prospective customers to provide background information.

Some of this literature intended for the indirect promotion of sales is designed for the public, much of it, however, is addressed to technologists, research workers, and purchasing agents. Hence in requesting publications from firms it is desirable to indicate the purpose for which the information is wanted. A publication

prepared for the research worker would be of little use in the school room, while the detailed information that a rubber compounder might want would be superfluous to an executive.

1. Production of crude rubber; manufacture of rubber products

The educational or the public relations departments of some of the large rubber companies have prepared attractive illustr ated publications showing all the steps from the tapping of the rubber tree to the production of tires and other rubber products. Exhibits can be purchased from some of the firms at a nominal price, and some motion picture films are available.

Among the firms which have prepared general and educational publications on rubber are,

Firestone Tire and Rubber Co., Akron, Ohio.
B. F. Goodrich Co., Akron, Ohio.
Goodyear Tire and Rubber Co., Akron, Ohio.
United States Rubber Co., Rockefeller Center, New York, N. Y.

2. Compounding ingredients

Following are firms which have issued published information about compounding ingredients:

American Zinc Sales Co., Columbus, Ohio. (Zinc Pigments only)
Binney and Smith Co., 41 East 42nd St., New York, N.Y. (Carbon black; fatty acids)
E. I. duPont de Nemours and Co., Inc., Rubber chemicals Division, Wilmington, Delaware. (Accelerators, antioxidants, colors, latex chemicals, mold lubricant, peptizing agents, copper and sun-checking inhibitors).

J. M. Huber, Inc., 460 West 34th St., New York, N. Y. (Carbon black).

Naugatuck Chemical Division of U. S. Rubber Co., Rockefeller Center, New York, N. Y. (Accelerators, antioxidants, latex chemicals, fatty acids, and specialties.)

Rubber Service Department, Monsanto Chemical Co., Akron, Ohio. (Accelerators, antioxidants, latex chemicals, colors, and miscellaneous materials).

New Jersey Zinc Co., Palmerton, Pa. (Zinc oxide and other zinc pigments).

R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. (Accelerators, antioxidants, latex chemicals, softeners, pigments, fillers, and miscellaneous materials).

3. Synthetic rubbers

The following firms have published information about synthetic rubbers and related materials:

E. I. duPont de Nemours and Co., Inc., Wilmington, Delaware.
B. F. Goodrich Co., Akron, Ohio.
Goodyear Tire and Rubber Co., Akron, Ohio.
Hydrocarbon Chemical and Rubber Co., Akron, Ohio.
Firestone Tire and Rubber Co., Akron, Ohio.
Thiokol Corporation, Trenton, New Jersey.

4. Trade Directory

RUBBER RED BOOK, Directory of the Rubber Industry. Published biennially by the Rubber Age, 250 West 57th St., New York, N. Y. The 1939 issue contained 420 pages and included comprehensive classified lists not only of rubber manufacturers, but also of firms dealing in machinery, equipment, chemicals, compounding ingredients, fabrics, textiles, crude and reclaimed rubber, latex, and other materials and supplies used by the industry. It also included lists of technical journals, trade organizations, and a "Who's Who" of the rubber industry in the United States and Canada.