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A GUIDE TO THE LITERATURE ON RUBBER

Introduction

This letter circular has been prepared in response to inquiries about sources of information on rubber. It is intended to assist the reader, who may be unfamiliar with rubber technology, in obtaining recent and authentic information relating to the production, manufacture, and properties of rubber and rubber products. There has been no attempt to make a complete or exhaustive survey of the field of rubber literature, but rather the aim has been to point out those books, periodicals and other publications which are likely to be accessible and useful to American readers. Only casual reference is made to the patent literature since patents are seldom useful as sources of general information.

The term rubber is here used in a wide sense to include both natural and synthetic rubber, and also gutta-percha, balata, and other gums related to rubber.

The main classes of publications on rubber are, (1) books, (2) reviews in encyclopedias, annual surveys and elsewhere, (3) technical articles in rubber journals and other scientific periodicals, and (4) circulars, pamphlets, and other special publications issued by governmental agencies, institutions, and manufacturers. Information on specific topics can be located by means of abstract journals and bibliographies. There is one comprehensive abstract journal devoted exclusively to rubber, and recently a series of annual bibliographies on rubber has been initiated.

Books on rubber are frequently inadequate as sources of information. The books available are relatively few in number and do not cover all topics pertaining to rubber fully or in detail; and furthermore, because of rapid changes in the industry much of the information contained in a book may be out of date in a very few years. For this reason the reader who seeks detailed or recent information will usually find it necessary to search through periodicals and special publications as well as books.

Publications of the National Bureau of Standards on rubber are listed in Letter Circular LC178, which will be sent free on request. Most of these publications are written to present the results of researches to the scientist and technologist. A few of them, however, are of general interest.

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## I. BOOKS ON RUBBER

Below is a list of books on rubber with brief notations of the contents, and other pertinent information. Most of these books may be consulted in the larger public libraries and in many technical libraries throughout the United States. So far as is known all the books cited are in print and available from the publishers. Where prices are given these are only approximate and are subject to change.

Only a few of the books were written expressly for popular reading. The others are addressed primarily to the rubber technologist, but the well informed individual not versed in rubber technology will experience little difficulty in consulting them, and will find many chapters readable and interesting.

There are no books designed for the guidance of the individual who wishes to undertake the manufacture of rubber products on a home-workshop scale. This does not indicate a deficiency in the rubber literature. The manufacture of rubber is highly specialized and does not lend itself readily to amateur craftsmanship.

None of the books on the list was written as a text book or reference work for use in schools. In the main, the teacher directing studies on rubber in connection with commercial geography, economics, or general science will find it necessary to select and organize material from a variety of sources, rather than to confine attention to a single book.

### 1. General Books on Rubber

#### (1) Non-technical treatises

RUBBER. A STORY OF GLORY AND GREED. 1936. Howard and Ralph Wolf. (Covici Friede, New York). 533 p. \$4.50. This is a comprehensive history of the rubber industry written for the general reader.

THE RUBBER BOOK. William Clayton Pryor and Helen Sloman Pryor. 1936. (Harcourt, Brace and Company, 383 Madison Ave., New York). 100 p. 50 illus. \$1.00. This childrens' book on rubber has been prepared by experienced authors who have taken the pains to obtain authentic, up-to-date information. Interest centers around 50 full page illustrations, accompanied by concise supporting text. It is probably best adapted to ages between 6 and 12.

THE HOUSE OF GOODYEAR. Hugh Allen. 1936. (Goodyear Tire and Rubber Co., Akron, Ohio). 413 p. \$1.00. This history of the Good-year Tire and Rubber Co. deals with developments in rubber technology, merchandising, financial matters, labor relations, and other affairs of the firm.

ANNALS OF RUBBER. Prepared and published by the India Rubber World, 420 Lexington Ave., New York. 1936. 20 p. \$0.50. A chronological record of the important events in the history of rubber from 1519 to 1936.

THE ROMANCE AND DRAMA OF THE RUBBER INDUSTRY. Harvey S. Firestone, Jr. 1933. (Firestone Tire and Rubber Co., Akron, Ohio). 127 p. A collection of fifty radio talks delivered between September, 1931 and September, 1932, dealing with the history of rubber, its production, manufacture, and applications.

THE STORY OF THE AIRSHIP. Hugh Allen. 8th Ed. 1932. (Goodyear Tire and Rubber Co., Akron, Ohio). 96 p. 141 illus. "Published..... as a convenient reference book for students, writers and others interested." This interesting picture of lighter-than-air aviation in 1932 is now largely of historical interest.

THE WORLD'S STRUGGLE WITH RUBBER, 1905-1931. James Cooper Lawrence. 1931. (Harper and Brothers, New York). 151 p. \$3.00. A discussion of the development of the plantation rubber industry and the restriction scheme (Stevenson plan) from the standpoint of the economist.

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

THE REIGN OF RUBBER. W.C. Geer. 1922. (The Century Co., New York). 344 p. \$3.00. This book was written for the non-technical reader. The contents include a short review of the history and production of rubber, and a description of manufacturing processes.

PAMPHLETS. The B. F. Goodrich Co., The Goodyear Tire and Rubber Co., and the Firestone Tire and Rubber Co., all of Akron, Ohio, and the United States Rubber Products Co., 1790 Broadway, New York, have published small, non-technical pamphlets dealing with rubber production and manufacture. Some of these firms also furnish exhibits for use in schools.

## (2) Technical treatises

CHEMISTRY AND TECHNOLOGY OF RUBBER. Edited by C. C. Davis and J. T. Blake. 1937. (Reinhold Publishing Corporation, 330 W. 42nd Street, New York). 896 p. \$15.00. A comprehensive treatise prepared by 38 different authors.

THE CHEMISTRY OF RUBBER. H. Freundlich. 1935. (Methuen & Co., Ltd., 36 Essex St., London, W.C., England). 72 p. 2 shillings, 6 pence. A brief text with particular emphasis on latex.

SCIENCE OF RUBBER. Translation by R. F. Dunbrook and V. H. Morris of "Handbuch der Kautschukwissenschaft" by K. Memmler. 1934. (Reinhold Publishing Corporation, 330 West Forty-Second St., New York). 770 p. \$12.50. The contents of this comprehensive text on rubber are as follows: (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 scope and usefulness of this book.

THE CHEMISTRY OF RUBBER MANUFACTURE. Lothar E. Weber. 1926. (Charles Griffin and Co., Ltd., 42 Drury Lane, W.C. 2, London). 372 p. This is a revision of the classical treatise, "The Chemistry of India Rubber", by C. O. Weber, which was published in 1902. The contents include the preparation, composition, and properties of crude rubber, a discussion of vulcanization and of compounding ingredients, methods for chemical and physical testing of both crude and vulcanized rubber. There is a brief discussion of synthetic rubber and reclaimed rubber. Numerous references to the literature are given.

PLANTATION RUBBER AND TESTING OF RUBBER. G. Stafford Whitby. 1921. (Longmans, Green & Co., London and New York). The preparation and examination of rubber are considered from a fundamental standpoint. The author devotes considerable attention to coagulation phenomena in Hevea latex. This book, though now somewhat out of date, is still of value for reference because of the thorough and comprehensive manner in which it treats the physical properties of rubber.

THE CHEMISTRY OF RUBBER. B.D.W. Luff. 1923. (Ernest Benn, Ltd., 8 Bouverie Street, E.C. 4, London). 232 p. 16 pl. 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. Winkelmann. 1923. (Chemical Catalog Co., now Reinhold Publishing Corporation, 330 West 42nd St., New York). 385 p. \$8.00. A comprehensive and carefully prepared bibliography of rubber chemistry up to 1923.

RUBBER MANUFACTURE: THE CULTIVATION, CHEMISTRY, TESTING, AND MANUFACTURE OF RUBBER, WITH SECTIONS ON THE RECLAMATION OF RUBBER AND THE MANUFACTURE OF RUBBER SUBSTITUTES. H. E. Simmons. 1921. (D. Van Nostrand Co., New York). 149 p.

GUM ELASTIC. Charles Goodyear. A photostat edition of the original work published in 1853 and reprinted in 1855. 1937. (Book Department, India Rubber Journal, 37 & 38 Shoe Lane, E.C. 4 London). 600 p. 20 illus. 15 shillings, 9 pence. This is a source book of great importance for information on the early development of the rubber industry.

2. Books on the Production of Crude Rubber

THE PREPARATION OF PLANTATION RUBBER. Sidney Morgan and Henry P. Stevens. 2nd Ed. 1927. (Constable & Co., Ltd., 10-12 Orange Street, W. C. 2, London). 357 p. This is a general and comprehensive treatise on the production of Hevea rubber on plantations. It discusses the planting, maintenance and thinning of trees, tapping, collecting and coagulation of latex, preparation and 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.

ESTATE RUBBER, ITS PREPARATION, PROPERTIES, AND TESTING. O. DeVries 1920. (Drukkerijen, Ruygrok & Co., Batavia, Java). 649 p. This book contains a review of the plantation methods for the preparation of rubber in the Dutch East Indies, with many experimental data and bibliographical references on the properties and testing of rubber.

CRUDE RUBBER SURVEY BULLETINS. The following publications were prepared in a survey of crude rubber production which was conducted by the Departments of Commerce and Agriculture, from about 1924 to 1927. They may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., for the prices indicated.

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

POSSIBILITIES OF PARA RUBBER PRODUCTION IN 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 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 PARA 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.

MARKETING OF CRUDE RUBBER. E. G. Holt. 1927. (Trade Promotion Series No. 55). 273 p. 45 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 RUBBER TREE IN AMAZON VALLEY. Carl D. La Rue. 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.

### 3. Books on the Technology of Rubber

THE VANDERBILT RUBBER HANDBOOK. Edited by W. F. Russell. 7th Ed. 1936. (R. T. Vanderbilt Co., 230 Park Ave., New York). 280 p. Free to customers. This book is unique as a source of information on current compounding practice, and methods of testing. The contents include a section on building rubber compounds, a description of products of the Vanderbilt Co., a collection of articles on history, specifications, and methods of testing, and finally a compilation of tables and useful data.

THE RUBBER INDUSTRY. Edited by H. B. Cronshaw. 1936. (Leonard Hill, Ltd., 17 Stratford Place, W. 1, London). 191 p. 10 shillings. This book will be of interest to American readers principally on account of the comprehensive rubber dictionary, and the description of compounding ingredients. It also includes chapters on Latex, Trade Statistics, Plantation Companies, and an advertising section.

HANDBUCH DER GESAMTEN KAUTSCHUKTECHNOLOGIE (Handbook of Rubber Technology). Edited by E. A. Hauser. 1935. (Union Deutsche Verlagsgesellschaft, Berlin). 2 vol. 1640 p. 280 Reichsmarks. (It is understood that a discount is given to purchasers outside of Germany). This comprehensive review of the technology and manufacture of rubber is intended to serve both the layman and the technologist. It deals with all the common types of rubber products, chemical and physical testing, compounding technique, and machinery. On account of the price this book has a limited circulation in the United States and is not generally available at libraries.

COMPOUNDING INGREDIENTS FOR RUBBER. Edited and published by the India Rubber World, 420 Lexington Ave., New York. 1936. 200 p. \$2.50. A classified list of rubber compounding ingredients, giving the chemical composition, source, and properties.

GOTTLOB'S TECHNOLOGY OF RUBBER. AUTHORIZED ENGLISH EDITION. J. H. Rosenbaum. 1926. (Maclaren & Sons, 37 & 38 Shoe Lane, E.C. 4, London). 350 p. 117 illus. Available in the United States from India Rubber World, 420 Lexington Avenue, New York. \$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.

#### 4. Monographs on Rubber

SYNTHETIC RUBBER. W.J.S. Naunton. 1937. (Macmillan & Co., Ltd., St. Martins St., London). 162 p. This book gives a concise history of synthetic rubber, and describes the properties, production, and uses of the more successful synthetic rubbers. Considerable attention is paid to Neoprene (formerly called DuPrene), but Thiokol is not considered. The subject is treated so as to interest both the layman and the technical reader.

RUBBER LATEX. Henry P. Stevens. 4th Ed. 1936. (Rubber Growers' Association, 2, 3, & 4 Idol Lane, Eastcheap, E.C. 3, London). 224 p. This text was prepared for the guidance of persons undertaking experimental work on latex. The contents include a bibliography and abstracts of the more important patents on latex.

LATEX IN INDUSTRY. Royce J. Noble. 1936. (The Rubber Age, 250 West 57th St., New York). 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, adhesives, and the like. Comprehensive bibliographies at the end of each chapter add to the usefulness of the book.

BRAKE LININGS. T. R. Sternberg. 1935. (India Rubber World, 420 Lexington Ave., New York). 91 p. \$2.00.

A RUBBER PLANTATION IN NEW JERSEY. Prepared and published by the Thiokol Corporation, Yardville, New Jersey. 35 p. Thiokol is a synthetic material which resembles rubber in physical characteristics, and finds its principal application by reason of its resistance to oil and organic solvents. This booklet gives a brief description of its production, properties, and uses.

LATEX, ITS OCCURRENCE, COLLECTION, PROPERTIES, AND TECHNICAL APPLICATIONS. Ernst Hauser. English translation by W. J. Kelly. 1930. (Chemical Catalog Co., now Reinhold Publishing Corporation, 330 West 42nd St., New York). 200 p. \$4.00. This book presents a critical study of latex from both a scientific and a technical standpoint.

LATEX AND ITS INDUSTRIAL APPLICATIONS. Frederick Marchionna. 1933. (The Rubber Age, 250 West 57th St., New York). 1037 p. \$15.00. A compilation of abstracts of technical articles and patents on latex.

THE ELECTROMETRIC DETERMINATION OF THE HYDROGEN ION CONCENTRATION IN THE LATEX OF HEVEA BRASILIENSIS AND ITS APPLICABILITY TO TECHNICAL PROBLEMS. N. H. van Harpen. 1932. (Varekamp & Co., Medan, Sumatra, Netherlands, East Indies). 458 p.



THE COLLOID CHEMISTRY OF RUBBER. Paul Stamberger. 1929. (Oxford University Press, London, and 114 Fifth Ave., New York). 88 p. \$2.00. The contents include a brief consideration of colloids in general, a discussion of the colloidal properties and industrial applications of solutions of rubber, and recent views on the structure of rubber and vulcanization.

THE ANALYSIS OF RUBBER. John B. Tuttle. 1922. (Chemical Catalog Co., now Reinhold Publishing Corporation, 330 West 42nd St., New York). 155 p. American Chemical Society Monograph No. 10.

#### 5. Books on Gutta-Percha and Related Gums

GUTTA-PERCHA UND BALATA. (In German). Emil J. Fischer. 1933. (Allgemeiner Industrie-Verlag G.M.B.H., Berlin-Lichterfelde). 184 p. 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 the patent literature.

LA GOMME DE BALATA. (In French). A. D. Luttringer. 1929. (A.D. Cillard, 49, Rue des Vinaigriers, Paris). 49 p. The contents include the following topics with reference to balata: origin, collection, properties, washing and purification, applications, use in rubber articles, reclaiming, analysis, price, and world production.

DIE GUTTA-PERCHA. (In German). Eugen Obach. 1899. (Steinkopf and Springer, Dresden-Balschwitz; now available from Union Deutsche Verlagsgesellschaft, Berlin, S.W. 19). 114 p. 5 Reichsmarks. This book contains a discussion of the sources, preparation, properties, analysis, testing, and technology of gutta-percha. Although out of date in some respects, it is still valuable for reference.

See also the Crude Rubber Survey Bulletin on PRODUCTION OF GUTTA-PERCHA, BALATA, CHICLE, AND ALLIED GUMS mentioned in section 2, above.

#### 6. Books on Physical Constants of Rubber

RUBBER. PHYSICAL AND CHEMICAL PROPERTIES. T. R. Dawson and B.D. Porritt. 1935. (Research Association of British Rubber Manufacturers, 105 Lansdowne Road, Groyden, England). 700 p. Available in the United States from India Rubber World, 420 Lexington Ave., New York. \$12.50. This comprehensive technical handbook was designed "to present a set of tables of detailed quantitative data of the properties of rubber, so far as available information allows." The material is well organized, concisely presented, and adequately indexed. Also included are comprehensive directories of trade associations, and rubber specifications, a selected bibliography, and a chapter on methods of analysis and testing.

## II. REVIEWS ON RUBBER

Recent information on general or special topics pertaining to rubber is in many instances effectively summarized in reviews or in papers delivered at symposiums.

Two reviews on rubber of general scope and interest have been prepared by Harry L. Fisher. One, *THE CHEMISTRY OF RUBBER*, was published in *Chemical Reviews*, Vol. 7, p. 51-138, March, 1930, and the other, *RUBBER: NEWER THEORETICAL AND PRACTICAL DEVELOPMENTS*, appeared in the *Journal of Chemical Education*, Vol. 8, p. 7-29, January, 1931. A concise review by J. W. Schade is published in *Encyclopaedia Britannica*, 14th Ed., under the title RUBBER.

A SYMPOSIUM ON RUBBER was held at the Cleveland, Ohio, meeting of the American Society for Testing Materials, March 9, 1932. Twelve papers were delivered, dealing with the manufacture of rubber products and the properties of rubber as an engineering material. These papers may be purchased from the American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa.

Another type of review is that which is given in annual surveys or reports. The *ANNUAL SURVEY OF AMERICAN CHEMISTRY* published for the National Research Council by the Reinhold Publishing Corporation, 330 West 42nd St., New York, regularly contains a brief review of the important contributions made to rubber chemistry during the year. This review is prepared by a recognized American authority on rubber. A British review somewhat similar in character but with more emphasis on the growing of rubber is given in *ANNUAL REPORTS OF THE SOCIETY OF CHEMICAL INDUSTRY ON THE PROGRESS OF APPLIED CHEMISTRY*, published by the Society of Chemical Industry, 46 Finsbury Square, E.C. 2, London.

A comprehensive review on *SYNTHETIC RUBBER* by Whitby and Katz was published in *Industrial and Engineering Chemistry*, vol. 25, p. 1204-1211, November, and 1339-1348, December, 1933.

Reviews of patents pertaining to rubber products appear from time to time in trade journals. The *India Rubber World* publishes one or more patent reviews in practically every issue. These cover a wide variety of subjects, such as latex technology, synthetic rubber, inner tubes, reclaimed rubber, rubber window channels, water dispersions of rubber, and the like.

### III. PERIODICALS DEVOTED PRIMARILY TO RUBBER

Periodicals are published in the interest of rubber industry in many countries. Some of these are primarily trade newspapers, and are concerned chiefly with current business news, market quotations, advertisements, and the like. Other of the periodicals emphasize scientific and technical work on rubber by the publication of accounts of original research, reviews, and summaries or abstracts of papers appearing elsewhere; publicity is also given to meetings and activities of the various rubber societies.

Following is a list of the better known technical journals, classified according to the country in which they are published.

#### 1. American Rubber Journals

INDIA RUBBER WORLD. Published monthly by Federated Business Publications, Inc., 420 Lexington Avenue, New York. Annual subscription, \$3.00.

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

The contents of the above journals include original papers on rubber, summaries and abstracts of work published elsewhere, book reviews, reviews of patents on products or processes of current interest, editorials, reports of scientific meetings, market quotations, financial news regarding rubber companies, personal items and biographical sketches, and statistics on the production and consumption of rubber and rubber products.

RUBBER CHEMISTRY AND TECHNOLOGY. Published quarterly by the Rubber Division of the American Chemical Society, 20th and Northampton Streets, Easton, Pa. Annual subscription, \$4.00. In this journal are reprinted all publications on rubber which appear in the Journal of the American Chemical Society and in Industrial and Engineering Chemistry. The more important scientific papers published abroad are reprinted; those in languages other than English are translated. Detailed reviews are given of new books and other publications on rubber.

TIRE REVIEW. Published monthly by India Rubber Review Co., Edward S. Babcox, Publisher, Akron, Ohio. Annual subscription, \$2.00. A trade journal primarily of interest to dealers in tires.

VANDERBILT NEWS. Published bimonthly by the R. T. Vanderbilt Co. 230 Park Avenue, New York. This periodical gives formulas and detailed information as to the properties of practical rubber compounds. It also gives information regarding methods of testing, compounding ingredients and current manufacturing practices.

REBUILT TIRE JOURNAL. Published monthly by Atlas Publishing Co., 150 Lafayette St., New York, Annual subscription, \$2.00.

## 2. British Rubber Journals

INDIA RUBBER JOURNAL. Published weekly at 37 & 38 Shoe Lane, E. C. 4, London. This journal covers much the same scope as the India Rubber World and the Rubber Age, though it is somewhat different in form and emphasis. A regular feature of each issue is a critical review of one or more recent papers on rubber by Philip Schidrowitz, a recognized authority on rubber.

RUBBER AGE (London). Published monthly at 43 Essex Street, Strand, W.C. 2, London. This is primarily a trade journal.

TRANSACTIONS OF THE INSTITUTION OF THE RUBBER INDUSTRY. Published bimonthly by the Institution of the Rubber Industry, Faraday House, 10, Charing Cross Road, London, W.C. 2, England. This journal contains papers presented before the institution of the Rubber Industry, and is the most important medium for the publication of research on rubber in Great Britain.

BULLETIN OF THE RUBBER GROWERS' ASSOCIATION. Published by the Rubber Growers' Association, 2, 3 & 4 Idol Lane, Eastcheap, E. C. 3, London. This journal deals with scientific and technical matters pertaining to the planting and cultivation of Hevea trees, and the production of crude rubber therefrom. It also deals with uses of rubber and carries propaganda designed to increase rubber consumption.

RESEARCH ASSOCIATION OF BRITISH RUBBER MANUFACTURERS, INFORMATION BUREAU, SUMMARY OF CURRENT LITERATURE. Detailed information regarding this periodical is given in Section V, below.

STATISTICAL BULLETIN OF THE INTERNATIONAL RUBBER REGULATION COMMITTEE. Published monthly by the International Rubber Regulation Committee, Brettenham House, 5-6 Lancaster Place, Strand, W.C. 2, London. Annual subscription, 10 shillings. The contents include the following sections, (A) Crude Rubber Supplies, (B) Absorption, (C) Stocks, (D) Comparison of Supplies, Absorption, and Stocks, (E) Manufactured Articles in which Rubber is Used, (F) Prices, and (G) Indices of Business Activity.

## 3. German Rubber Journals

GUMMI-ZEITUNG. Published weekly at Krausenstrasse, 35/36, Berlin, S.W. 19. This is a trade journal in which a few original papers are published.

KAUTSCHUK. Published monthly at Krausenstrasse, 35/36, Berlin, S.W. 19. This is the official organ of the German Rubber Society, and is the chief medium for the publication of German scientific and technological work on rubber.

4. French Rubber Journals

LE CAOUTCHOUC ET LA GUTTA-PERCHA. Published weekly at 49 Rue des Vinaigriers, Paris. This is a trade journal which contains some original technical and scientific papers on rubber; considerable space is devoted to reviews, some of which are published serially.

REVUE GÉNÉRALE DU CAOUTCHOUC. Published monthly at 18, Rue Duphot, Paris. This journal publishes a number of original papers, chiefly on the technologic aspects of the rubber industry.

5. Dutch Rubber Journal

ARCHIEF VOOR RUBBERCULTUUR IN NEDERLANDSH INDIE, Published by Algemeen Landbouw Syndicaat, Batavia, Java.

6. SPANISH RUBBER JOURNAL

LA GOMA. Published monthly by Juan Blanch Guerrero, Calle de Moncada, 4, Barcelona, Spain.

7. Japanese Rubber Journal

JOURNAL OF THE SOCIETY OF RUBBER INDUSTRY OF JAPAN, Published at Room No. 404, Naka-Nigokan Sancho, 3rd St., Kojimachiko, Tokio, Japan.

8. Russian Rubber Journals

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

Sintet Kautschuk, Published at 12 Marosseyka St., Moscow, U.S.S.R.

IV. ABSTRACTS AND BIBLIOGRAPHIES OF PUBLICATIONS ON RUBBER

While the rubber trade journals usually devote space to summaries or abstracts of work published elsewhere, none of them attempts to cover the whole field of rubber literature. There are only two abstract journals on rubber in English: (1) Chemical Abstracts, and (2) the Summary of Current Literature. Research Association of British Rubber Manufacturers.

CHEMICAL ABSTRACTS is published twice monthly by the American Chemical Society, Mills Building, Washington, D. C. This journal is divided into 30 sections of which one is devoted to rubber and allied substances. Reference is made to scientific and technical papers on rubber, to reviews, and to a few of the more important United States patents, and occasional foreign patents. The publications related to the chemistry of rubber are abstracted fully; other publications are given by title or are abstracted very briefly.

RESEARCH ASSOCIATION OF BRITISH RUBBER MANUFACTURERS, INFORMATION BUREAU. SUMMARY OF CURRENT LITERATURE. Published monthly by the Association of British Rubber Manufacturers, 105 Lansdowne Road, Croyden, England. This journal makes an exhaustive survey of the literature on rubber. The abstracts are classified into the following sections: I. Planting; II. Latex; III. Raw Rubber; III. A. Gutta-Percha, Balata, Chiclc, and Jelutong; IV. Compounding Ingredients; V. Fibres and Textiles; VI. Vulcanized Rubber; VII. General Works Processes; VIII. Machinery and Appliances; IX. General and Miscellaneous. Some of the sections, particularly section VI, are classified into appropriate subdivisions. The classification follows a simple logical system.

ANNUAL BIBLIOGRAPHY OF RUBBER LITERATURE. Donald E. Cable. (Rubber Age, 250 W. 57th St., New York). The 1935 Bibliography included 1403 references classified in 74 separate sections. The coverage was world-wide and as nearly complete as possible.

RUBBER: ITS ANTIOXIDANTS AND PRESERVATIVES. A bibliography compiled by the Science Library and the Research Association of British Rubber Manufacturers. 1934. (Science Museum, South Kensington, London). Mimeographed. 82 p. 5 shillings, net.

#### V. GENERAL PERIODICALS IN WHICH SOME PAPERS ON RUBBER ARE PUBLISHED

In the United States the chief medium for the publication of research papers on rubber is Industrial and Engineering Chemistry. This journal is published monthly by the American Chemical Society, Mills Building, Washington, D. C. While the title might indicate limitation to chemical subjects, such is not the case. Since 1929 papers relating to methods of analysis and test have been published in the Analytical Edition of this journal.

American papers on rubber, of a theoretical nature, are sometimes published in Physics, Journal of Physical Chemistry, Journal of the American Chemical Society, Journal of the Franklin Institute, and the proceedings of various learned societies. Occasional papers designed for the nontechnical reader are published in the Journal of Chemical Education. Some publications on the testing of rubber are to be found in Proceedings of the American Society for Testing Materials, to which fuller reference will be made subsequently.

The foreign journals in which occasional papers on rubber are published are too numerous to mention here. A list would include practically all the leading scientific and technical periodicals.

#### VI. SPECIAL PUBLICATIONS ON RUBBER

In this classification are included publications by government bureaus, research institutes, specification writing bodies, firms and commercial organizations.

## 1. Publications by the United States Government

Most of the investigational work of the government on rubber is conducted by (1) the Bureau of Plant Industry of the Department of Agriculture; (2) the Bureau of Foreign and Domestic Commerce; and (3) the National Bureau of Standards of the Department of Commerce.

The Bureau of Plant Industry, through its Division of Plant Exploration and Introduction, is concerned with all matters pertaining to the production of raw or crude rubber. Publications of this Bureau relate to the botany, plant physiology, pathology, cultivation, and commercial utilization of rubber-producing plants.

The Bureau of Foreign and Domestic Commerce has to do with the commercial aspects of the rubber industry, and issues publications dealing with the production, marketing, and consumption of crude rubber and rubber products in all parts of the world. A publication of general interest to the industry is the RUBBER NEWS LETTER, issued semimonthly in mimeographed form. The subscription price is \$1.00 per year, remittance being made payable to the Bureau of Foreign and Domestic Commerce.

The National Bureau of Standards conducts a variety of scientific and technical researches on rubber and rubber products, the results of which are usually published in the Journal of Research of the National Bureau of Standards. A few circulars and letter circulars have been prepared for general information. Prior to 1928 the results of investigations were published in Scientific and Technologic Papers of the Bureau of Standards.

Federal Specifications for rubber products are prepared by technical committees on which all interested departments of the Government are represented. They are promulgated by the Director of Procurement. An alphabetical index of Federal Specifications can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. for ten cents. Copies of individual specifications are obtainable from the same source, the usual price being five cents.

The United States Army and Navy have their own specifications for many of the rubber products which they purchase. Copies of Army specifications can be obtained from the Quartermaster's Corps, Washington, D. C., and copies of Navy Specifications, from the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.

Lists of publications on rubber can be obtained from the bureau, office, or board issuing them, but orders should be sent to the Superintendent of Documents, Government Printing Office, Washington, D. C., unless otherwise indicated.

## 2. Publications by British Institutions and Associations

THE RUBBER RESEARCH INSTITUTE OF MALAYA, at Kuala Lumpur, Federated Malay States, began in 1929 the publication of a BULLETIN containing scientific and technical papers dealing with problems related to the production of rubber. The activities of the Institute are described in ANNUAL REPORTS. PLANTERS BULLETINS are also issued.

THE RUBBER GROWERS' ASSOCIATION, INC., 2, 3, & 4 Idol Lane, Eastcheap, E.C. 3, London, issues annual reports in addition to the BULLETIN mentioned in the section on periodicals. The Association also issues publications designed to promote the use of rubber in industry. They deal with such topics 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 booklets are usually distributed without charge to interested firms and individuals.

## 3. Publications by Institutions in the Netherlands and Possessions

The General Experimental Station of the General Association of Rubber Planters of the East Coast of Sumatra at Medan, Sumatra, issues publications in Dutch with summaries and occasional articles in English under the title, MEDEDEELINGEN VAN HET ALGEMEEN PROEFSTATION DER A.V.R.O.S. (Algemeene vereeniging van rubber-planters ter Oostkust van Sumatra). Similarly, the Experiment Station for Rubber at Buitenzorg, Java, issues its publications as MEDEDEELINGEN PROEFSTATION VOOR RUBBER. These papers are also published in ARCHIEF VOOR RUBBER-CULTUUR, mentioned above.

The International Association for Rubber and other Cultivations in the Netherlands Indies, at The Hague, Holland, issues publications on rubber through its Propaganda Department. One publication of general interest is ADHESION PROBLEMS IN CONNECTION WITH RUBBER FLOORING, 1930, 150 p.

## 4. Specifications for Rubber Products

Mention has been made above of specifications promulgated by the Federal Government. In addition to government agencies there are a number of societies and organizations which prepare and issue specifications for rubber products and descriptions of test methods and procedures. Chief of these bodies so far as rubber is concerned is the American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa. Publications of this society consist of A.S.T.M. STANDARDS published triennially, and PROCEEDINGS OF THE A.S.T.M., which appears annually and consists of two parts, Part I, Committee Reports and Tentative Standards, and Part II, Technical Papers.



The A.S.T.M. methods of testing and specifications for rubber products have been collected and reprinted in a book entitled, A.S.T.M. STANDARDS ON RUBBER PRODUCTS. October, 1935. 204 p. An appendix to this book includes a classified bibliography on the testing of rubber and a list of the membership of Committee D-11 on Rubber Products.

#### 5. Publications for Trade-Promotion

Some rubber manufacturers and also several firms, which deal in materials used by the rubber industry, publish research bulletins, house organs, handbooks, and occasional separate papers dealing with the properties, characteristics, or uses of their products. These publications constitute a valuable source of information regarding current manufacturing practice.

A partial list of firms in the United States which issue publications relating to rubber is the following:

American Hard Rubber Company, 11 Mercer Street, New York City.

American Zinc Sales Company, Columbus, Ohio.

Binney and Smith Company, 41 East 42nd Street, New York City.

E. I. Du Pont de Nemours & Company, Wilmington, Delaware.

J. M. Huber, Inc., 460 West Thirty-Fourth Street, New York City.

Naugatuck Chemical Company, 1790 Broadway, New York City.

New Jersey Zinc Company, 160 Front Street, New York City.

Simplex Wire and Cable Company, 83 Sidney Street, Cambridge,  
Massachusetts.

R. T. Vanderbilt Company, 230 Park Avenue, New York City.

