

SECTION II.

ABSTRACTS OF PAPERS

RELATING TO

THE NON-FERROUS METALS AND THE

INDUSTRIES CONNECTED

THEREWITH.

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Where no initials appear abstracts have been prepared by the staff of the Institute from the source mentioned in the abstract.

The title of each abstract on the following pages is the same as—or is a close translation of—that appearing in the corresponding original article.

PERIODICALS ABSTRACTED.

ABBREVIATIONS.

THE following is a list of periodicals from which abstracts are prepared (directly or indirectly) by the Institute of Metals. The letters which constitute the official abbreviations used in the abstracts are printed in clarendon (black-face) type. Thus the abbreviation *Met. Ind. (Lond.)*, found in the text of the abstracts, appears in the list of periodicals, combined with the full title of the periodical, as **Metal Industry (London)**.

To facilitate reference, the names of the periodicals are arranged in the alphabetical order of *their abbreviations*.

With the exception of those marked *, all the undermentioned publications are regularly abstracted.

Abrasive Industry.

Abstract Bulletin of the Nela Research Laboratory.

Acetylene and Welding Journal. (Name changed, Oct. 1924, to "Welding Journal.")

Acetylen in Wissenschaft und Industrie.

Acetylene Journal.*

Advisory Committee for Aeronautics. Publications.

A.E.G. Mitteilungen.

Aerial Age.*

Aero.*

Aeronautical Journal. (Now "Journal of the Royal Aeronautical Society.")

Aeronautical Research Committee. Reports and Memoranda. Internal Combustion Engine Sub-Committee Reports.

Aéronautique.*

Aeroplane.*

Aérotechnique.* (Suppt. to "L'Aéronautique.")

Allgemeine Automobil-Zeitung.*

Allgemeine Oesterreichische Chemiker- und Techniker-Zeitung.

Allgemeine Tonindustrie Zeitung.*

Aluminium.

American Drop Forger. (Now "Forging, Stamping and Heat-Treating.")

American Electrochemical Society. Advance Copy of Paper.

American Foundrymen's Association. Advance Copy of Paper.

American Gas Association. Bulletin of Abstracts.

American Gas Engineering Journal. (Name changed, March 1921, to "American Gas Journal.")

American Gas Journal.

American Institute of Mining and Metallurgical Engineers. Advance Copy of Paper.

American Journal of Pharmacy.*

American Journal of Roentgenology and Radium Therapy.

American Journal of Science.

American Machinist (European and Colonial Edn.).

American Machinist (New York Edition).*

American Mineralogist.

American Quarterly of Roentgenology. (Now "American Journal of Roentgenology and Radium Therapy.")

American Railway Engineering Association Bulletin.

American Railway Engineering Association Proceedings.

American Society for Testing Materials. Standards.

American Society for Testing Materials. Tentative Standards.

Anales de la Asociación Química Argentina.

Anales de Instituto de Ingenieros de Chile.*

Anales de la Sociedad española de Física y Química.

Anales de la Sociedad Química Argentina. (Name changed 1921 to "Anales de la Asociación química Argentina.")

Analyst, The.

Annales de l'Association des Ingénieurs de l'École spéciale de Gand.*

Annales de Chimie.

Annales de Chimie analytique et Chimie appliquée.

Annali di Chimica applicata.

Annales de Chimie et de Physique. (Now two separate journals:—"Annales de Chimie" and "Annales de Physique.")

Annales de l'Energie.*

Annales des Falsifications et des Fraudes.

Annales de l'Institut analytique de Physico-Chimie.*

Annales des Mines.

Annales des Mines de Belgique.

Annales des Mines de Roumaine.*

Annals of the New York Academy of Sciences.*

Annalen der Physik.

Annales de Physique.

Annales des Ponts et Chaussées.

Annales des Postes, Télégraphes et Téléphones.

Annual Reports of the National Advisory Committee for Aeronautics (U.S.A.).*

* Not regularly abstracted.

- Annual Reports on the Progress of Chemistry.**
Annual Report of the Water Commissioner, St. Louis, Mo.*
Annales scientifiques de l'Université de Jassy.
Annales des Travaux publics de Belgique.*
Annalen der Chemie (Justus Liebig's).
Annuario di Chimica scientifica e industriale. (Monthly Suppt. to "Encyclopedie di Chimica.") (Discontinued, Dec. 1921.)
Annuario scientifico ed industriale.
Anode.*
Anzeiger der Akademie der Wissenschaften in Wien.*
Anzeiger für Berg-, Hütten- und Maschinenwesen.*
Apparatebau, Der.
Arbeiten der Kaiser-Wilhelm Institut für Kohlenforschung.*
Archiv für Elektrotechnik.
Archiv für Hygiene.
Archives Néerlandaises des Sciences exactes et naturelles.
Archiv der Pharmazie. (Amalgamated, Jan. 1924, with "Berichte der deutschen pharmazeutischen Gesellschaft" as "Archiv der Pharmazie und Berichte der deutschen pharmazeutischen Gesellschaft.")
Archiv der Pharmazie und Berichte der deutschen pharmazeutischen Gesellschaft.
Arch. Pharmsper.*
Archiv für Post und Telegraphie.
Archives des Sciences physiques et naturelles.
Archiv für Wärmewirtschaft.*
Arkiv för Kemi, Mineralogi och Geologi. Utgivet av K. Svenska Vetenskapsakademiens.
Arkiv för Matematik, Astronomi och Fysik. Utgivet av K. Svenska Vetenskapsakademiens.
Army Ordnance.
Arts et Métiers.
Asociación de Ingenieros del Instituto Católico de Artes e Industrias. Anales.*
Association of Engineering and Shipbuilding Draughtsmen. Publications.
Association des Ingénieurs électriciens sortis de l'Institut électrotechnique Montefiore. Bulletin.
Astrophysical Journal.
Atti dell' Accademia di Scienze e Lettere, Palermo.
Atti del Congresso nazionale di Chimica industriale.
Atti e Memorie dell' Accademia di Scienze, Lettere ed Arti di Padova.
Atti e Memorie della Reale Accademia di Scienze, Padua.
Atti della Reale Accademia nazionale dei Lincei, Roma.
Atti della Reale Accademia della Scienze, Torino.
Atti del Reale Istituto d'Incoraggiamento alle Scienze naturali di Napoli.
Atti della Reale Istituto Veneto di Scienze, Lettere ed Arti, Venezia.
- Atti della Società italiana per il progresso delle Scienze, Roma.**
Australasian Engineer.
Australia. Advisory Council of Science and Industry. Bulletins.
Australia. Institute of Science and Industry. Publications.
Autocar.
Autogene Metallbearbeitung.
Automobile Engineer.
Automotive Industries.
Automotive Manufacturer, The.
Aviation (New York).
- Bauingenieur, Der.***
Bayerisches Industrie- und Gewerbeblatt.*
Beama. (Name changed, Jan. 1924, to "World Power.")
Beiblatt zur Zeitschrift für Instrumentenkunde.
Bell System Technical Journal.
Bell Telephone Quarterly.
Berichte der deutschen chemischen Gesellschaft.
Ber. Akad. Wiss. Wien.*
Berichte der deutschen keramischen Gesellschaft.*
Berichte der deutschen pharmazeutischen Gesellschaft. (Amalgamated, Jan. 1924, with "Archiv der Pharmazie" as "Archiv der Pharmazie und Berichte der deutschen pharmazeutischen Gesellschaft.")
Berichte der Gesellschaft für Kohlentechnik.*
Ber. preuss. Akad. Wiss.*
Berichte über die Verhandlungen der Sächsischen Akademie der Wissenschaften zu Leipzig.*
Berichte der Fachausschuss des Vereins deutscher Eisenhüttenleute: Ausschuss für Betriebswirtschaft. Werkstoffausschuss. Erfassungsausschuss. Chemikerausschuss. Hochofenausschuss. Maschinenausschuss. Wärmestelle.
Berg- und Hüttenmännisches Jahrbuch der Montanistischen Hochschule in Leoben.
Berg- und Hüttenwesen.
Bergswerksnyt, Tidskrift för Norsk Grubedrift. (Ceased publication at end of 1923.)
Berl Ber.*
Beton und Eisen.*
Betrieb, Der.*
Bibliografica Chemica.
Blast-Furnace and Steel Plant.
Board of Trade Journal.
Boiler Maker.
Boletín de la Academia nacional de Ciencias en Córdoba (Republic Argentina).
Boletín de la Asociación argentina de Electrotécnicos.*
Boletín de Minas, Industrias y Construcciones.*
Bollettino della Società di Scienze naturalizzate economiche di Palermo.
Brass World and Plater's Guide.
Braunkohle.*
Braunkohlen Archiv.*

* Not regularly abstracted.

Brennstoff-Chemie.
Brick and Clay Record.*
Brick and Pottery Trades Journal.*
British Clayworker.
British Engineers' Home and Export Journal.
British Journal of Dental Science.*
British Journal of Radiology.
British Machine Tool Engineering.
British Standard Specifications and Reports.
Brown-Boveri Review.
Building Maintenance.*
Bul. Chim. pura applicata Soc. Romana Stiinte.*
Buletinul Societății de Chimie din București-România. (Now "Buletinul Societății Române de Științe.")
Buletinul Societății Române de Științe.*
Buletinul Societății de Științe din Cluj.*
Bulletin de la Section scientifique de l'Académie Roumanie.*
Bulletin de l'Académie (Imperiale) des Sciences de St. Petersbourg.*
Bulletin of the American Foundrymen's Association.
Bulletin of the American Zinc Institute.
Bulletin de l'Association des Ingénieurs de Liège.*
Bulletin de l'Association Suisse des Électriciens.*
Bulletin of the British Cast Iron Research Association.
Bulletin of the British Non-Ferrous Metals Research Association.
Bulletin of the Calcutta Mathematical Society.*
Bulletin of the Cleveland Scientific and Technical Institution.
Bulletin of the Copper and Brass Research Association.
Bulletin of the Dept. of Scientific and Industrial Research.
Bulletin de la Fédération des Industries chimiques de Belgique. (Suppt. to "Bulletin de la Société chimique de Belgique.")
Bulletin of the Imperial Institute.
Bulletin of Indian Industries and Labour.
Bulletin of the Institution of Engineers, Australia.
Bulletin of the Institution of Mining and Metallurgy.
Bulletin of the Japanese Chemical Society.
Bulletin mensuel de l'Office international d'Hygiène publique.*
Bulletin of the National Research Council.
Bulletin of the Nela Research Laboratory.
Bulletin des Postes, Télégraphes et Téléphones.*
Bulletin of the School of Mines and Metallurgy, University of Missouri.
Bulletin des Schweizerischen Elektrotechnischen Vereines.*
Bulletin de la Classe des Sciences de l'Académie royale de Belgique.
Bulletin mensuel de la Société Belge des Électriciens.*
Bulletin de la Société chimique de Belgique.

Bulletin de la Société chimique de France.
Bulletin de la Société d'Encouragement pour l'Industrie nationale.
Bulletin de la Société française des Électriciens.
Bulletin de la Société française de minéralogie.
Bulletin de la Société française de Photographie.*
Bulletin de la Société de l'Industrie minérale. (Name changed, Jan. 1921, to "Revue de la Société de l'Industrie minérale.")
Bulletin de la Société industrielle de Mulhouse.
Bulletin de la Société industrielle du Nord de la France.
Bulletin de la Société industrielle de Rouen.
Bulletin of the Taylor Society.*
Bulletin technique du Bureau Veritas.
Bulletin technique de la Suisse Romande.*
Bulletin de l'Union des Charbonnages, Mines et Usines Métallurgiques de la Province de Liège.*
Bulletin. University of Washington Engineering Experiment Station.
Bureau Bulletin of the Cast Iron Research Association. (Title changed 1924, 1, No. 4, to "Bulletin of the Cast Iron Research Association.")
Bureau of Chemical Abstracts.
Burns Engineering Magazine.

Canadian Chemistry and Metallurgy.
Canadian Engineer.
Canadian Foundryman and Metal Industry News.
Canadian Machinery and Manufacturing News.
Canadian Magazine of Science and the Industrial Arts.
Canadian Manufacturer.*
Canadian Mining Journal.
Canadian Shipping and Marine Engineering News.*
Canada. Air Board. Bulletin.*
Canada. Air Board. Report.*
Canada. Department of Mines. Mines Branch. Bulletins.
Canada. Honorary Advisory Council for Scientific and Industrial Research. Bulletin.
Carnegie Institute of Technology. Coal Mining Investigations. Bulletin.
Carnegie Institution of Washington. Publications.
Carnegie Scholarship Memoirs, Iron and Steel Institute.
Catalyst.*
Centralblatt für Mineralogie, Geologie und Paläontologie.
Central-Zeitung für Optik und Mechanik.*
Ceramic Abstracts.
Ceramic Industry.
Ceramica ed il Vetro. Il.*
Céramique, La.
Ceramist.*
Chaleur et Industrie.
Chemical Abstracts.

* Not regularly abstracted.

- Chemical Age (London).**
Chemical Age (New York). (Consolidated, March 23, 1925, with "Chemical Colour and Oil Record" as "Chemical Age Record.")
Chemistry and Industry (Journal of the Society of Chemical Industry).
Chemische Apparatur.
Chemical, Colour and Oil Record. (Consolidated, March 23, 1925, with "Chemical Age (N.Y.)" as "Chemical Record-Age.")
Chemical Engineering and the Works Chemist.
Chemical Engineering and Mining Review (Melbourne).
Chemické Listy pro Vědu a Průmysl.
Chemical and Metallurgical Engineering.
Chemical News.
Chemical Record-Age. (Consolidated, 1925, with "Colour Trade Journal and Textile Chemist" as "Chemicals.")
Chemical Reviews.*
Chemische-technische Wochenschrift.*
Chemical Trade Journal.
Chemisch Weekblad.
Chemiker-Zeitung.
Chemisches Zentralblatt.
Chemicals.
Chemist-Analyst.
Chicago Chemical Bulletin. (Name changed to "Chemical Bulletin (Chicago).") *
Chimie et Industrie.
China Journal of Sciences and Arts.
Civil Engineering.*
Coal Age.
Coal and Iron.
Coal Industry.*
Colliery Engineering.
Colliery Guardian and Journal of the Coal and Iron Trades.
Combustion.
Communication from the Physical Laboratory at the University of Leiden.*
Commonwealth Engineer.
Compressed Air Magazine.
Comptes rendus hebdomadaires des Séances de l'Académie des Sciences.
Comptes rendus de l'Association française pour l'avancement des Sciences.
Comptes rendus des Séances de la Société Polonaise de Physique Fasc.*
Conquest.
Contribución al estudio de las Ciencias físicas y matemáticas (La Plata).*
Correire dei Ceramisti.*

Decorator, The.*
Denki Gakkwai Zasshi (Institute of Electrical Engineers, Japan).*
Dental Cosmos.
Dental Record.*
Deutsche Bauzeitung.*
Deutsche Goldschmiede Jahrbuch.*
Deutsche Töpfer- und Ziegler-Zeitung.*
Deutsche Zahnärztliche Wochenschrift.*
Diamant. Glas-Industrie-Zeitung.*

Dinglers polytechnisches Journal.
Discovery.
Domestic Engineering.*
Drop Forger.

Echo des Mines et de la Métallurgie.*
Economic Proceedings of the Royal Dublin Society.
Edel-Erden und Erze.
Edgar Allen News.
Edison Monthly.*
Eisen Zeitung (Zeitschrift für die gesamte Giesserei-Praxis).
Eisenbau.*
Electrical Industries.*
Electric Journal.
Electric Railway Journal.*
Electric Railway and Tramway Journal.*
Electrical Record.*
Electrical Review.
Electrical Times.
Electrical World.
Electrician, The.
Électricien, L'.
Electricity.*
Electritchestvo.*
Elektrische Betrieb.
Elektrische Kraftbetriebe und Bahnen. (Now "Elektrische-Betrieb.")
Elektrische Nachrichten.*
Elektrochemische Zeitschrift. (Discontinued, 1922.)
Elektro-Journal.*
Elektrotechnischer Anzeiger.
Elektrotechnik und Maschinenbau.
Elektrotechnische Zeitschrift.
Elektroteknikeren (København).*
Elettrotecnica.*
Empire Mining and Metallurgical Congress. Proceedings.
Engineering Abstracts.
Engineer and Iron Trades Advertiser.
Engineering and Contracting.
Engineering Index.
Engineering Journal. The Journal of the Engineering Institute of Canada.
Engineering and Mining Journal-Press.
Engineering News-Record.
Engineering Production. (Ceased publication, May 1925. Incorporated in "The Automobile Engineer.")
Engineering Progress.
Engineering and Boiler-House Review.
Engineering World. (Suspended, Sept. 1922.)
Engineer, The.
Engineering.
Engineers and Engineering.*
English Electric Journal.
English Mechanics and World of Science.
Experimental Wireless.

Factory.
Feuerfest.
Feuerungstechnik.
Fiziko-Khimicheskoe Obschestwo.

* Not regularly abstracted.

Flight.*
Fonderie moderne, La.
Forging—Stamping—Heat-Treating.
Forno elettrico. (Discontinued, 1921.)
Forschungsarbeiten aus dem Gebiete des Ingenieurwesens.
Fortschritte der Chemie, Physik und physikalischen Chemie.*
Fortschritte der Krystallographie und Mineralogie.*
Fortschritte der Mineralogie, Kristallographie und Petrographie.*
Fortschritte auf dem Gebiet der Röntgenstrahlen.*
Foundry Trade Journal.
Foundry, The.
France-Belgique.*
Fuel in Science and Practice.
Fuel Economy Review.
Fuel Oil Journal.
Fuel Research Board Publications.
Fuels and Furnaces.
Fysisk Tidskrift.*

Galvanoplastik und Metallbearbeitung. (Ceased publication in 1922.)
Gas Age. (Combined in Aug. 1921 with "Gas Record" as "Gas Age-Record.")
Gas Age-Record.
Gas Journal.
Gas Record. (Combined in Aug. 1921 with "Gas Age" as "Gas Age-Record.")
Gasteknikeren.*
Gas und Wasserfach, Das.*
Gas World.
Gazzetta chimica italiana.
General Electric Review.
General Science Quarterly.*
Génie civil, Le.
Gesammelte Abhandlungen zur Kenntniss der Kohle.
Gesundheitsingenieur.*
Gewerbefleiß.*
Giesserei, Die. Zeitschrift für die Wirtschaft und Technik des Giessereiwesens.
Giesserei-Zeitung. Zeitschrift für das gesamte Giessereiwesen.
Giornale di Chimica industriale ed applicata.
Glaser's Annalen.*
Glashütte, Die. (Zeitschrift für die gesamte Glasindustrie, Emailleindustrie und verwandte Zweige.)*
Glasindustrie, Die.*
Glass.
Glass Industry.
Glückauf, Berg- und Hüttenmännische Zeitschrift.
Goldschmiedekunst, Die.*
Gorni Journal.

Helios.
Helvetica Chimica Acta.
Het Gas.*
Houille Blanche.
Ice Cream Trade Journal.*

Illuminating Engineer.
Imperial Mineral Resources Bureau Publications.
Inco.
Indian and Eastern Engineer, The.
Indian Engineering.
Indian Industries and Power. (Ceased publication, April 1923.)
Indian Railway Gazette.
Industrial and Engineering Chemistry.
Industrial Australian and Mining Standard.
Industrial Chemist.
Industrial Engineer.
Industrial Management and Mechanical Handling (London).*
Industrial Management, The Engineering Magazine (New York).*
Industria, L': Rivista tecnico-scientifica ed economica.
Industrie chimique, L'.
Industrie des Tramways, Chemins de Fer, et Transports publics automobiles.*
Industrie électrique, L'.
Ingegneria.*
Ingenieria y Construcción.*
Ingenieur, De (Hague).*
Ingenieur Zeitschrift.*
Ingeniøren, udgivet af Dansk Ingeniørforening.
Ingeniörs Vetenskapsakademien. Handlingar.
Ingeniörs Vetenskapsakademien. Meddelande.
Institution of Aeronautical Engineers. Minutes of Proceedings.
Institute of Chemistry Publications.
Institution of Engineers, Australia. Papers.
Institution of Post Office Electrical Engineers. Professional Papers.
Institution of Structural Engineers' Journal.*
International Labour Review.*
International Marine Engineering. (Name changed Sept. 1921, to "Marine Engineering and Shipping Age.")
Irish Engineering. (Ceased publication, March 1925.)
Iron Age, The.
Iron and Coal Trades Review.
Iron and Steel of Canada.
Iron and Steel Engineer. (American Association of Iron and Steel Electrical Engineers.)
Iron and Steel Institute. Advance Copy of Paper.
Iron Trade Review.

Journal of the American Ceramic Society.
Journal of the American Chemical Society.
Journal of the American Dental Association.
Journal of the American Institute of Electrical Engineers.
Journal of the American Medical Association.*
Journal of the American Society of Heating and Ventilating Engineers.*
Journal of the American Society of Naval Engineers.
Journal of the American Water Works Association.

* Not regularly abstracted.

- Journal of the **American Welding Society**.
 Journal of the **Association of Chinese and American Engineers**.
 Journal of the **Birmingham Metallurgical Society**.
 Journal of **Biological Chemistry**.
 Journal of **Chemical Education**.
 Journal of the **Chemical, Metallurgical and Mining Society of South Africa**.
 Journal of the **Chemical Society**.
 Journal de **Chimie physique**.
 Journal of the **College of Science, Tokyo Imperial University**.
 Journal of **Dairy Science**.
 Journal of **Electricity**.
 Journal of **Electricity and Western Industry**. (Now "Journal of Electricity.")
 Journal of the **Elisha Mitchell Scientific Society**.
 Journal of **Engineering Education**.
 Journal of the **Faculty of Engineering, Tokyo Imperial University**.
 Journal du **Four électrique**.
 Journal of the **Franklin Institute**.
 Journal für **Gasbeleuchtung und verwandte Beleuchtungsarten sowie für Wasserversorgung**. (Name changed in Jan. 1922, to "Gas und Wasserfach.")
 Journal of **Indian Industries and Labour**.
 Journal of **Industrial Hygiene**.
 Journal of the **Institution of Electrical Engineers**.
 Journal of the **Institution of Electrical Engineers, Japan**.
 Journal of the **Institution of Engineers (India)**.
 Journal of the **Institution of Locomotive Engineers**.
 Journal of the **Institute of Metals**.
 Journal of the **Institution of Petroleum Technologists**.
 Journal of the **Institution of Post Office Electrical Engineers**.
 Journal of the **Iron and Steel Institute**.
 Journal of the **Japanese Ceramic Association**.
 Journal of **Mathematics and Physics, Massachusetts Institute of Technology**.
 Journal of the **National Institute of Industrial Psychology**.
 Journal of **Neurology and Pathology**.
 Journal of the **New England Water Works Association**.
 Journal of the **Oil and Colour Chemists' Association**.
 Journal of the **Optical Society of America and Review of Scientific Instruments**.
 Journal de **Pharmacie et de Chimie**.
 Journal de **Physique et le Radium**.
 Journal of **Physical Chemistry**.
 Journal für **praktische Chemie**.
 Journal and **Proceedings of the Royal Society of New South Wales**.
 Journal and **Record of Transactions of the Junior Institution of Engineers**.
 Journal de **Radiologie**.
 Journal of the **Röntgen Society**. (Now "British Journal of Radiology.")
 Journal of the **Royal Aeronautical Society**.
 Journal of the **Royal Institute of British Architects**.
 Journal of the **Royal Microscopical Society**.
 Journal of the **Royal Society of Antiquaries**.
 Journal of the **Royal Society of Arts**.
 Journal of the **Royal Society of Western Australia**.
 Journal of the **Royal Technical College (Glasgow)**.
 Journal of the **Russian Metallurgical Society**.
 Journal of the **Russian Physical-Chemical Society**.
 Journal of the **South African Association of Analytical Chemists**.
 Journal of the **South African Institution of Engineers**.
 Journal of the **Scientific Association, Maharajah's College, Vizianagaram**.
 Journal of **Scientific Instruments**.
 Journal de la **Société des Américanistes de Paris**.
 Journal of the **Society of Automotive Engineers**.
 Journal of the **Society of Chemical Industry**.
 Journal of the **Society of Glass Technology**.
 Journal of the **Society of Mechanical Engineers, Tokyo**.
 Journal **télégraphique**.
 Journal of the **West of Scotland Iron and Steel Institute**.
 Journal of the **Washington Academy of Sciences**.
 Journal of the **Western Society of Engineers**.
Jahrbuch der Chemie.
Jahrbuch der Elektrochemie und angewandten physikalischen Chemie.
Jahrbuch der Elektrotechnik.
Jahrbuch der preussischen geologischen Landesanstalt zu Berlin.
Jahrb. Math.-naturw. Fakultät, Göttingen.
Jahrbuch der Radioaktivität und Elektronik.
Jahrbuch für drahtlosen Telegraphie und Telephonie. (Zeitschrift für Hochfrequenztechnik.)
Japanese Journal of Chemistry.
Japanese Journal of Engineering. Abstracts.
Japanese Journal of Physics.
Jernindustri.
Jernkontorets Annaler. Tidskrift för Svenska Bergshandteringen.
Keramische Rundschau.
Keramos.
Kleine Mitteilungen der preussischen Landesanstalt für Wasser-, Boden- und Lufthygiene in Berlin-Dahlem.
Kogyo-Kwagaku-Zasshi (Journal of Chemical Industry, Japan).
Kolloid Zeitschrift.
Kolloidchemische Beihefte.

* Not regularly abstracted.

Kongelige Danske Videnskabernes Selskab,
Skrifter naturvidenskabelij og matematisk
Afdeling.

Korrosion und Metallschutz.

Krupp'sche Monatshefte.

Kwaga-ku-Kogei (Chemical Technology).*

Lancet.

Locomotive, Railway Carriage and Waggon
Review.

Minutes of Proceedings of the Institution of
Civil Engineers.

Machinery Market.

Machine Tool Review.

Machine moderne, La.

Machinery (London).

Machinery (New York).

Management and Administration. (Name
changed in Jan. 1926 to "Manufacturing
Industries.")

Management Engineering. (Name changed
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Manufacturing Industries.

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Marine Engineer and Motorship Builder.

Marine Engineer Officer's Magazine.

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Marine Review.

Marine Rundschau.*

Maschinenbau.*

Massachusetts Institute of Technology.
Publications.*

Mechanical Engineering.

Mechanical World.

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akademiens Nobel-Institut.

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tri-Kontor.

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Lettere, Modena.

Memoirs of the American Academy of Arts
and Sciences.

Memoirs of the College of Engineering,
Kyōtō Imperial University.

Memoirs of the College of Engineering,
Kyushu Imperial University.

Memoirs of the College of Science, Kyōtō
Imperial University.

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Imperial University.

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la Société des Ingénieurs civils de France.

Memoirs of the National Academy of Sciences.
Memorial des Poudres.*

Memoirs and Proceedings of the Manchester
Philosophical Society.

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dei Lincei, Roma.

Memorie della Reale Accademia delle Scienze
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Memorie della Reale Accademia delle
Scienze di Torino.

Memorie della Reale Istituto Lombardo di
Scienze e Lettere, Milano.

Memorie della Società italiana dei XL, Roma.

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Messenger technico-économique russe.*

Metal Industry (London).

Metal Industry (New York).

Metallurgia italiana, La.

Metall, Das. (Zeitschrift für die gesamte
Giesserei-Praxis.)

Metall-Technik.*

Metall und Erz.

Metallbörse, Die.

Metallurgist (Suppt. to Engineer).

Metropolitan-Vickers Gazette.*

Mikrochemie.

Mining and Metallurgy.

Mineral Industry.

Mineralogical Magazine.

Mining Journal.

Mining Magazine.

Mitteilungen des chemisch-technischen Insti-
tuts der Technischen Hochschule Karls-
ruhe i. B.*

Mitteilungen aus der Versuchsanstalt der
Deutsch-Luxemburgischen Bergwerks- und
Hütten A.G. Dortmunder Union. Dortmund.

Mitteilungen der Eidgenössischen Material-
prüfungsanstalt am Schweiz.-Polytechnik-
um in Zürich.

Mitteilungen des Instituts für Kraftfahrwesen
an der Technischen Hochschule, Auto-
technik.*

Mitteilungen aus dem Kaiser-Wilhelm Insti-
tut für Eisenforschung.

Mitteilungen aus dem Materialprüfungsamt
und dem Kaiser-Wilhelm Institut für
Metallforschung zu Berlin-Dahlem.

Mitteilungen der physikalisch-technischen
Reichsanstalt—Abteilung I. für Mass und
Gewicht.*

Mitteilungen des Staatl. technischen Versuchs-
amts, Wien.

Modern Transport.

Modern Wireless.

Moniteur scientifique.

Monatshefte für Chemie und verwandte
Teile anderer Wissenschaften.

Montanistische Rundschau. Zeitschrift für
Berg- und Hüttenwesen.

Monthly Abstract Bulletin. Research Labor-
atory, Eastman Kodak Company.

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Society.

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Motor Boat (New York).

Motor Ship (London).

Motor Ship (New York).

Motor Transport.*

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Münchener Ber.*

Münchener medizinische Wochenschrift.*

Municipal and County Engineering.*

Nagaoka Anniversary Volume.

National Petroleum News.*

* Not regularly abstracted.

National Physical Laboratory. Collected Researches.

Nature.

Nature, La.

Naturforscher, Der.

Naturprodukte.*

Naturwissenschaften, Die.

Neues Jahrbuch für Mineralogie, Geologie und Paläontologie.*

New Zealand Journal of Science and Technology.

Nippon Kwagaku Kwai Shi (Journal of the Chemical Society, Japan).*

Norske Videnskaps-Akademi i Oslo, Forhandlinger.

Nuovo cemento, Il, Pisa.

Oesterreichische Chemiker-Zeitung.

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Oil and Gas Journal.*

Oil and Gas News.*

Oil Engineering and Finance.*

Oil Engine Power.

Oil Trade Journal.*

Optical Journal (N.Y.).*

Optician and Scientific Instrument Maker.*

Outillage.*

Paint Manufacturers Association of the United States. Circular.*

Paint, Oil and Chemical Review.*

Paper Trade Journal.*

Petroleum. Zeitschrift für die gesamten Interessen der Mineralöl-Industrie und des Mineralöl-Handels.*

Petroleum Times.*

Pharmaceutisch Weekblad.*

Philosophical Magazine and Journal of Science.

Philosophical Transactions of the Royal Society.

Philippine Journal of Science.

Phizicheski Institut, Moscow.

Photographic Abstracts.

Photographic Journal.

Photographische Rundschau.*

Physical Review.

Physica.

Physikalische Berichte.

Physikalische Zeitschrift.

Post Office Electrical Engineers Journal.

Power.

Power Engineer.

Power House.

Power Plant Engineering.

Power User, Engineer-in-Charge and Works Manager. (Name changed to "Power Engineer.")

Practical Engineer. (Discontinued, Dec. 27, 1923.)

Praktischer Maschinen-Konstrukteur.*

Proceedings of the Academy of Natural Sciences of Philadelphia.

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Proceedings of the American Association for the Advancement of Science.

Proceedings of the American Philosophical Society.

Proceedings of the American Physical Society.

Proceedings of the American Society of Civil Engineers.

Proceedings of the American Society for Testing Materials.

Proceedings of the Australasian Institute of Mining and Metallurgy.

Proceedings of the Cambridge Philosophical Society.

Proceedings of the Cleveland Institution of Engineers.

Proceedings of the Colorado Scientific Society.

Proceedings of the Engineers Society of Western Pennsylvania.

Proceedings of the Indian Association for Cultivation of Science.*

Proceedings of the Indiana Academy of Science.

Proceedings of the Institution of Automobile Engineers.

Proceedings of the Institute of British Foundrymen.

Proceedings of the Institution of Mechanical Engineers.

Proceedings of the Institute of Radio Engineers.

Proceedings of the International Congress for Applied Mechanics.

Proceedings of the Iowa Academy of Science.*

Proceedings of the Iowa Engineering Society.

Proceedings of the Koninklijke Akademie van Wetenschappen te Amsterdam (in English).

Proceedings of the Leeds Philosophical and Literary Society.*

Proceedings of the Literary and Philosophical Society of Liverpool.

Proceedings of the National Academy of Sciences.

Proceedings of the Physico-Mathematical Society of Japan.*

Proceedings of the Physical Society of London.

Proceedings of the Royal Institution of Great Britain.

Proceedings of the Royal Irish Academy.

Proceedings of the Royal Philosophical Society of Glasgow.

Proceedings of the Royal Physical Society of Edinburgh.

Proceedings of the Royal Society (of London) (Series A).

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Proceedings of the Royal Society of Queensland.*

Proceedings of the Royal Society of Tasmania.

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Proceedings of the South Wales Institute of Engineers.

* Not regularly abstracted.

Proceedings of the Society of Chemical Industry, Victoria.*
Proceedings of the Southern and South-Western Railway Club.*
Proceedings of the Staffordshire Iron and Steel Institute.
Proceedings and Transactions of the Nova Scotian Institute of Science.
Proceedings and Transactions of the Royal Society of Canada.
Proceedings of the United States Naval Institute.
Proceedings of the University of Durham
Philosophical Society.
Przegląd.*

Quarterly Bulletin. The Institution of Engineers, Australia.
Quarterly of the Colorado School of Mines.
Quarterly Journal of the Indian Chemical Society.
Quarterly Journal of Microscopical Science.
Queen's Engineering Works Magazine.*
Quim. e Ind.*

Research Department Reports, Woolwich.
Radioélectricité.
Radium.*
Railway Age.
Railway Engineer.
Railway Gazette (Calcutta).
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Railway Journal.*
Railway and Locomotive Engineering.
Railway Maintenance Engineer.
Railway Mechanical Engineer.
Railway Review.
Rassegna mineraria, metallurgia e chimica.
Raw Material.(Ceased publication, April 1923.)
Recueil des travaux chimiques des Pays-Bas et de la Belgique.
Recherches et Inventions.
Rendiconti dell' Istituto Lombardo di Scienze e Lettere, Milano.
Rendiconti della Reale Accademia nazionale dei Lincei, Roma.
Rendiconti della Reale Accademia di Scienze fisiche e matematiche (Class della Società reale di Napoli).
Rendiconti tecnici della Direzione superiore del Genio e delle Costruzioni aeronautiche.
Report of the Australian Association for the Advancement of Science.
Report of the British Association for the Advancement of Science.
Report of the Research Laboratory, Imperial Iron Works (Yawata, Japan).*
Répertoire de pharmacie.*
Revue de l'Aluminium.
Revue de Chimie industrielle.
Revue des deux Mondes.*
Revue d'Optique.
Revue de l'Électrochimie et de l'Électrometallurgie.
Revue générale des Chemins de Fer.*

Revue générale des Colloïdes.*
Revue générale de l'Électricité.
Revue générale des Sciences pures et appliquées.
Revue industrielle.*
Revue de l'Industrie minérale.*
Revue de l'Ingénieur et Index technique.*
 (In January 1922, merged in "France-Belgique."*)
Revue de l'Ingénieur.
Revue des Matériaux de Construction et de travaux publics.*
Revue de Métallurgie.
Revue de Pathologie comparée et d'Hygiène générale.*
Revue des Produits chimiques.
Revue scientifique.
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Revista Minera, Metallurgica y de Ingenieria.*
Roczniki Chemji.
Royal Artillery Journal.*
Royal Technical College [Glasgow] Metallurgical Club Journal.
Royal Mint. Annual Report of the Deputy Master and Comptroller.

South Africa.*
South African Engineering.
South African Journal of Science.
South African Mining and Engineering Journal.
South African Mining Journal.
Schiffbau.*
Schleifen und Polieren.*
Schweizerische Bauzeitung.*
Schweizerische Chemiker-Zeitung.
Schweizerische Techniker-Zeitung.*
Science Abstracts (Section A, Physics; Section B, Electrical Engineering).
Scientific American.
Scientific Australian. (Ceased publication, Nov. 15, 1924.)
Science et Industries photographiques, Informations Cinématographiques et Photographiques.*
Revue de la Presse photographique.*
Scientific Monthly.
Scientific Papers of the Institute of Physical and Chemical Research, Tokyo.
Scientific Proceedings of the Royal Dublin Society.
Science Reports of the Tôhoku Imperial University.
Science.
Science (China).*
Science and Invention.*
Science et Industrie.*
Science et la Vie.
Science Progress.
Scientia. Revista di Scienze.
Seifensiederzeitung.*
Sheet Metal Worker.
Shipbuilding and Shipping Record.
Shipbuilder, The.
Shipping World.
Siemens Zeitschrift.*

* Not regularly abstracted.

Sitzungsberichte der mathematisch-naturwissenschaftlichen Klasse der Akademie der Wissenschaften in Wien.

Sitzungsberichte der mathematisch-physikalischen Klasse der Bayerischen Akademie der Wissenschaften zu München.*

Sitzungsberichte der Preussischen Akademie der Wissenschaften zu Berlin.

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Smithsonian Institution Publications. Miscellaneous Collection. Reports. Special Publications.

Société des Ingénieurs civils de France. Procès-Verbal.*

Soudeur-Coupeur, Le.

Sprechsaal. Zeitschrift für die Keramischen, Glas- und verwandten Industrien.

Stahl und Eisen.

Statens Provningsanstalt. Meddelande.

Steam.*

Steamship, The.

Süddeutsche Apotheker-Zeitung.*

Svensk Kemisk Tidskrift. Organ för Kemist-samfundet, Kemiska Sektionen i Upsala, Kemiska Föreningen i Lund, Kemiska Sällskapet i Stockholm samt Sveriges Kemiska Industrikontor.

Syren and Shipping Illustrated.

Technische Blätter.*

Tech-Engineering News.*

Technique moderne, La..

Technical Reports, Commonwealth of Australia Munitions Supply Board.*

Technology Reports of the Tôhoku Imperial University.

Technische Zeitschriftenschau.*

Teknisk Tidskrift. Utgiven av Svenska Teknologföreningen.

Teknisk Tidsskrift. (Teknisk Forenings.) *

Teknisk Ukeblad. Utgit av den Norske Ingeniørforening och den Polytekniske forening, Oslo.

Telegraphen und Fernsprechtechnik.*

Telephone Engineer.

Testing. (Ceased publication.)

Tetsu-to-Hagane (Japan).*

Textile Colourist.*

Tidsskrift for Kemi og Bergvæsen.*

Times Trade and Engineering Supplement.

Tôhoku University Aeronautical Research Institute.*

Tokyo Imperial University. Aeronautical Research Institute. Report.*

Tonindustrie-Zeitung.*

Tramway & Railway World.*

Transactions of the American Electrochemical Society.

Transactions of the American Foundrymen's Association.

Transactions of the American Institute of Chemical Engineers.

Transactions of the American Institute of Electrical Engineers.*

Transactions of the American Institute of Mining and Metallurgical Engineers.

Transactions of the American Philosophical Society.

Transactions of the American Society of Civil Engineers.

Transactions of the American Society of Mechanical Engineers.*

Transactions of the American Society for Steel Treating.

Transactions of the Cambridge Philosophical Society.

Transactions of the Canadian Institute of Mining and Metallurgy.*

Transactions of the Ceramic Society.

Transactions of the Faraday Society.

Transactions of the Illuminating Engineering Society.

Transactions of the Institution of Engineers, Australia.*

Transactions of the Institution of Engineers and Shipbuilders in Scotland.

Transactions of the Institute of Marine Engineers.

Transactions of the Institution of Mining Engineers.

Transactions of the Institution of Mining and Metallurgy.

Transactions of the Institution of Naval Architects.

Transactions of the International Congress of Applied Chemistry.

Transactions of the Liverpool Engineering Society.

Transactions of the Manchester Association of Engineers.

Transactions of the North of England Institute of Mining and Mechanical Engineers.

Transactions of the North-East Coast Institution of Engineers and Shipbuilders.

Transactions of the Optical Society.

Transactions of the Royal Aeronautical Society.

Transactions of the Royal Society of Edinburgh.

Transactions of the Royal Society of South Africa.

Transactions of the Society of Engineers.

Transactions of the Society of Naval Architects and Marine Engineers.

Transactions of the — World Power Conference.

U.G.I. Circle.*

United States Advisory Committee for Aeronautics. Technical Notes.*

United States Air Service Information Circular.

United States Bureau of Labour Statistics. Bulletin.*

United States. Bureau of Mines Publications. Bulletins. Circulars. Reports of Investigations. Technical Papers.

* Not regularly abstracted.

United States. Bureau of Standards Publications. Bulletins. Circulars. Miscellaneous Publications. Scientific Papers. Technical Papers.

United States Geological Survey. Publications. Circulars. Mineral Resources. Professional Papers.

United States Mint. Annual Report.*

United States Public Health Service. Reports.*

United States War Department. Annual Report of the Chief of Engineers.*

United States War Department. Reports of Tests of Metals and Other Materials made in the Ordnance Laboratory at Watertown Arsenal, Mass.

Ukrainskii Khemichnii Zhurnal.*

Umschau, Die.

University of Illinois Bulletin.

University of Wisconsin Studies in Science.*

Usine.*

Verf. u. Kleur.*

Verhandlungen der deutschen physikalischen Gesellschaft.

Verkehrstechnik.*

Videnskapsselskapets. Forhandlinger Oslo. (Name changed to "Norske Videnskaps-Akademi i Oslo, Forhandlinger.")

Wärme, Die. (Zeitschrift für Dampfkessel- und Maschinenbetrieb.)*

Wasser und Gas.*

Waste Trade World.*

Welding Engineer, The.

Welding Journal.

Werkstattstechnik.*

Western Engineer, The.

Western Machinery World.*

Westinghouse International.*

Wireless World.*

Wirtschaftsmotor.*

Wissenschaftliche Abhandlungen der Physikalisch-Technischen Reichsanstalt.*

Wissenschaftliche Veröffentlichungen aus dem Siemens-Konzern.

Wochenschrift für Brauerei.*

Woman Engineer.

World Power.

Yakugakuzasshi (Journal of the Pharmaceutical Society of Japan).*

Year-Book of the American Iron and Steel Institute.

Zeitschrift für analytische Chemie.

Zeitschrift für angewandte Chemie.

Zeitschrift für angewandte Mathematik und Mechanik.

Zeitschrift für anorganische und allgemeine Chemie.

Zeitschrift für Dampfkessel- und Maschinenbetrieb. (Name changed, Jan. 1922, to "Die Wärme.")

Zeitschrift der deutschen Gesellschaft für Mechanik und Optik.

Zeitschrift für Elektrochemie und angewandte physikalische Chemie.

Zeitschrift für Feinmechanik und Präzision.*

Zeitschrift für Flugtechnik und Motorluftschiffahrt.*

Zeitschrift für die gesamte Giesserei-Praxis : Eisen-Zeitung. Das Metall.

Zeitschrift für Hygiene und Infektionskrankheiten.

Zeitschrift für Instrumentenkunde.

Zeitschrift für Kristallographie.

Zeitschrift für Kristallographie und Mineralogie. (Name changed, Jan. 1921, to "Zeitschrift für Kristallographie.")

Zeitschrift für Metallkunde.

Zeitschrift des Oesterreichischen Ingenieur- und Architekten-Vereines.

Zeitschrift für öffentliche Chemie.*

Zeitschrift für Physik.

Zeitschrift für physikalische Chemie, Stöchiometrie und Verwandtschaftslehre.

Zeitschrift für technische Physik.

Zeitschrift des Vereines deutscher Ingenieure.

Zeitschrift für wissenschaftliche Mikroskopie und für mikroskopische Technik.

Zeitschrift für wissenschaftliche Photographie, Photophysik und Photochemie.

Zentralblatt der Bauverwaltung.*

Zentralblatt für Hütten und Walzwerke.*

* Not regularly abstracted.

ABBREVIATIONS USED IN TEXT.

The following abbreviations are used in the text.

Å.	Ångström units.	hr.	hour.
abs.	absolute.	hrs.	hours.
a.c.	alternating current(s).	in.	inch ; inches.
amp.	ampère(s).	in. ²	square inch.
amp.-hr.	ampère-hour(s).	in. ³	cubic inch.
B.	Baumé.	kg.	kilogramme(s).
B. & S.	Brown & Sharpe (gauge).	km.	kilometre(s).
B.H.P.	brake horse-power.	km. ²	square kilometre.
B.O.T.	Board of Trade.	kva.	kilovolt-ampère(s).
B.th.u.	British thermal units.	kw.	kilowatt(s).
B.T.U.	Board of Trade unit.	kw.-hr.	kilowatt-hour(s).
B.W.G.	Birmingham wire-gauge.	l.	litre(s).
C.	centigrade.	lb.	pound(s).
c.c.	cubic centimetre(s).	L.-F.	low-frequency.
cg.	centigramme(s).	m.	metre(s).
c.p.	candle-power.	m.amp.	milliampère(s).
cm.	centimetre(s).	max.	maximum.
cm. ²	square centimetre.	mg.	milligramme(s).
cm. ³	cubic centimetre.	mm.	millimetre(s).
coeff.	coefficient.	m.m.f.	magnetomotive force(s).
coeffs.	coefficients.	m.v.	millivolt(s).
const.	constant(s).	N.	normal.
cu.	cubic.	oz.	ounce(s).
cwt.	hundredweight.	p.d.	potential difference.
d.c.	direct current(s).	p.p.m.	parts per million.
dg.	decigramme(s).	R.	Réaumur.
diam.	diameter(s).	r.p.m.	revolutions per minute.
dm.	decimetre(s).	sec.	second(s).
e.m.f.	electromotive force(s).	sp.	specific.
F.	Fahrenheit.	sp. gr.	specific gravity.
ft.	foot ; feet.	sq.	square.
ft. ²	square foot.	v.	volt(s).
ft. ³	cubic foot.	va.	volt-ampère(s).
ft.-lb.	foot-pound(s).	w.	watt(s).
grm.	gramme(s).	w.-hr.	watt-hour(s).
H.-F.	high-frequency.	w.p.c.	watts per candle.
H.-ion.	hydrogen-ion.	°	degree(s).
H.P.	horse-power.	%	per cent.

PREFACE.

CERTAIN of the following abstracts relate to papers published some years ago. These are included primarily in order to ensure completeness when the next ten-year Index Volume is published. It is regretted that they did not appear nearer to the date of issue of the periodicals to which they refer, but this was not possible owing to the small number of abstractors who were engaged upon this work at the time of the large expansion in the abstracting service which took place a few years ago. Since then the work of overtaking arrears has been strenuously pursued. As a result, the abstracting of the many hundreds of periodicals regularly searched is—in the majority of cases—now quite up to date.

By including abstracts of those which have been published some time ago, there will thus be rendered available a practically complete abstracting service as from 1921—the date of issue of the last Index Volume. From the point of view of the user of the ten-year Index it is a matter of no consequence in which particular volume of the Journal the abstract is published, so long as it can be found. It is hoped, however, that from now onward the abstracting will be kept thoroughly up to date.