

ELECTRODEPOSITION

PUBLICATIONS BY THE STAFF OF THE NATIONAL BUREAU OF STANDARDS.

(Revised to January 7, 1941).

I. SCOPE OF ACTIVITIES.

The principal activities of the Bureau in the field of electro-deposition are as follows:

1. Researches upon the fundamental principles of electro-deposition.
2. Studies upon the quality and value of electroplated coatings and the development of specifications for use by the Government and industry.
3. The development of special processes and equipment required by other branches of the Government, such as the War, Navy, and Treasury Departments.
4. Investigation of the methods of testing electroplated products and the solutions used in electrodeposition.
5. Testing of electroplated metals, such as hardware and plumbing fixtures, that are purchased by the Federal Government on specifications. (Tests are not made for the general public.)
6. Furnishing information to the Government and the public. Requests for information in this field that are not covered by the inclosed publications will receive careful attention.

In all the above activities the Bureau cooperates directly with other Government agencies and with appropriate technical organizations, such as the American Electroplaters' Society, the International Association of Electrotypers, and the American Society for Testing Materials.

II. SCOPE OF THIS LETTER CIRCULAR

The publications that are listed in this circular are divided into three parts.

A - Government publications on electroplating, principally from the National Bureau of Standards.

FS - Federal Specifications that include definite requirements for electroplated coatings. (In certain cases, individual agencies, especially the War and Navy Departments, have separate specifications to meet their particular needs. Information regarding such specifications may be obtained from the Office of the Quartermaster General, War Department, Washington, D. C.; or the Bureau of Supplies and Accounts, Navy Department, Washington, D.C.

B - Papers from the National Bureau of Standards that were published in outside journals, files of which are available in many libraries.

In the first column, each paper is assigned a "reference number", purely for use in the index of this circular. This number should not be included in requests addressed to the Superintendent of Documents, but only the "serial number" and title.

For convenience, a list "C" is added, of journals and books printed in the English language, that contain information on electrodeposition.

The index contains reference to the principal subjects covered in lists A, FS, and B.

III. PUBLICATIONS

Government Publications:

List "A" includes in chronological order those papers published by the Government. Where the price is stated in the extreme right-hand column, the publication can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. The prices quoted are for delivery to addresses in the United States and its territories and possessions and in certain foreign countries which extend the franking privilege. In the case of all other countries, one-third of the cost of the publication should be added to cover postage. Remittances should be made either by coupons (obtainable from the Superintendent of Documents in sets of 20 for \$1.00 and good until used, or by check or money order payable to the "Superintendent of Documents, Government Printing Office" and sent to him with order. Letter Circulars are obtainable, without charge, from the Bureau. Publications marked "OP" are out of print. Files of the Government publications will be found in the larger libraries.

The explanation for the serial letters used for designating the separate papers of the Bureau is as follows:

- RP = "Research Paper". These are reprints of articles appearing in the "Bureau of Standards Journal of Research" (BSJ.Research) and the "Journal of Research of the National Bureau of Standards" (J. Research NBS), the latter being the title of this periodical since July, 1934 (volume 13, number 1).
- S = "Scientific Paper" of the National Bureau of Standards. From Nos. 1 to 329, inclusive, the separate papers of this series were known as reprints from the "Bulletin of the Bureau of Standards" (Bul.BS). Subsequently, from Nos. 330 to 572, the separates were known as reprints from the "Scientific Papers of the Bureau of Standards" (Sci.Pap.BS). This series was superseded by the "Bureau of Standards Journal of Research" in 1928.
- T = "Technologic Paper" of the National Bureau of Standards. Nos. 1 to 202 were issued each independent of the other with individual pagination. Later they were assembled to make the first 15 volumes of this series, and subsequent separates were given volume pagination. (Tech. Pap.BS). This series was superseded by the "Bureau of Standards Journal of Research" in 1928.
- C = "Circular" of the National Bureau of Standards.
- LC = Mimeographed "Letter Circular of the National Bureau of Standards".
- PHR = Public Health Reports, issued by the U.S. Public Health Service, Federal Security Agency.

LIST "A"

Published by the Government

Ref. No.	Title	Year	Series	Price
1	Relation between composition and density of aqueous solutions of copper sulfate and sulfuric acid, Holler, H.D. and Peffer, F. L. Bul.BS <u>13</u> , 273 (1916-17)	1916	S 275	OP
2	Black nickel plating solutions, Hoga-boom, G. B., Slattery, T. F., and Ham, L.B. Tech. Pap.BS <u>15</u> (1921).	1921	T 190	OP
3	Zinc cyanide plating solutions, Blum W., Liscomb, F.J., and Carson, C.M. Tech.Pap.BS <u>15</u> (1921).		T 195	OP

Ref. No.	Title	Year	Series	Price
4	Electrodeposition of chromium from chromic acid baths, Haring, H.E. and Barrows, W.P. Tech.Pap.BS <u>21</u> , 413 (1926-27).	1927	T 346	15 c.
5	Health hazards in chromium plating, Bloomfield, J.J. (Public Health Service) and Blum, W. Public Health Reports <u>43</u> , 2330 (1928).	1928	PHR 1245	5 c.
6	Reflecting power of beryllium, chromium, and several other metals, Coblentz, W.W. and Stair, R. BSJ Research <u>2</u> , 343 (1929).	1929	RP 39	OP
7	The spotting of plated or finished metals, Barrows, W.P. BSJ Research <u>2</u> , 1085 (1929).		RP 72	10 c.
8	Throwing power in chromium plating, Farber, H.L. and Blum, W. BSJ. Research <u>4</u> , 27 (1930).	1930	RP 131	OP
9	Conductivity and density of chromic acid solutions, Moore, H.R. and Blum, W. BS J. Research <u>5</u> , 255 (1930).		RP 198	OP
10	Copper electrotyping, Cir. BS 387 (1930)		C 387	10 c.
11	Addition agents in copper electrotyping solutions, Hull, R.O. and Blum, W. BS J. Research <u>5</u> , 767 (1930).		RP 228	5 c.
12	The making of mirrors by the deposition of metal on glass, Cir. BS 389 (1931).	1931	C 389	10 c.
13	The resistance of chromium-plated gages to wear, Herschmann, H. K. BS J. Research <u>6</u> , 295 (1931).		RP 276	10 c.
14	Dimensional changes in the manufacture of electrotypes, Bekkedahl, K. and Blum, W. BS J. Research <u>6</u> 829 (1931)		RP 308	10 c.
15	Purification and analysis of alkali cyanides, Thompson, M.R. BS J. Research <u>6</u> , 1051 (1931).		RP 323	5 c.

Ref. No.	Title	Year	Series	Price
16	The porosity of electroplated chromium coatings, Blum, W., Barrows, W.P., and Brenner, A. BS J. Research <u>7</u> , 607 (1931)	1931	RP 368	10 c.
17	The analysis of cyanide silverplating solutions, Wick, R. M. BS J. Research <u>7</u> , 913 (1931).		RP 384	OP
18	The structure of the chromic acid plating bath. The theory of chromium deposition, Kasper, C. BS J. Research <u>9</u> , 353 (1932).	1932	RP 476	OP
19	A metal-connected glass electrode, (For pH measurements), Thompson, M.R. BS J. Research <u>9</u> , 833 (1932).		RP 611	5 c.
20	The deposition of chromium from solutions of chromic and chromous salts, Kasper, C. BS J. Research <u>11</u> , 515 (1933).	1933	RP 604	5 c.
21	Protective value of nickel and chromium plating on steel, Blum, W., Strausser, P.W.C., and Brenner, A. J. Research NBS <u>13</u> , 331 (1934).	1934	RP 712	10 c.
22	Accelerated tests of nickel and chromium plating on steel, Strausser, P.W.C., Brenner, A., and Blum, W. J. Research NBS <u>13</u> , 519 (1934).		RP 724	5 c.
23	Mechanism of chromium deposition from the chromic acid bath, Kasper, C. J. Research NBS <u>14</u> , 693 (1935).	1935	RP 797	OP
24	Mesle's chord method for measuring the thickness of metal coatings, Blum, W. and Brenner, A. J. Research NBS <u>16</u> , 171 (1936).	1936	RP 866	5 c.
25	Corrosion-protective value of electro-deposited zinc and cadmium coatings on steel, Blum, W., Strausser, P.W.C., and Brenner, A. J. Research NBS <u>16</u> , 185 (1936).		RP 867	OP
26	Rapid electrodeposition of iron from ferrous chloride baths, Kasper, C. J. Research NBS <u>18</u> , 536 (1937).	1937	RP 991	5 c.

Ref.

Ref. No.	Title	Year	Series	Price
27	Magnetic method for measuring the thickness of nickel coatings on non-magnetic base metals, Brenner, A. J. Research NBS <u>18</u> , 565 (1937).	1937	RP 994	10 c.
28	Magnetic method for measuring the thickness of non-magnetic coatings on iron and steel, Brenner, A. J. Research NBS <u>20</u> , 357 (1938).	1938	RP 1081	5 c.
29	Salt spray test, Mutschler, W.H., Buzzard, R.W., and Strausser, P.W.C. July 1, 1938.		LC 530	free
30	Dropping tests for measuring the thickness of zinc and cadmium coatings on steel, Brenner, A. J. Research NBS <u>23</u> , 387 (1939).	1939	RP 1240	10 c.
31	Methods of measuring pH in alkaline cyanide plating baths, Thompson, M.R. J. Research NBS <u>24</u> , 423 (1940).	1940	RP 1291	5 c.
32	Outdoor exposure tests of electroplated nickel and chromium coatings on steel and nonferrous metals, Blum, W. and Strausser, P.W.C. J. Research NBS <u>24</u> , 443 (1940).		RP 1293	5 c.

LIST "FS"

Federal Specifications Relating to Electroplating.

Federal Specifications may be obtained by sending the list price (not stamps) to the Superintendent of Documents, Government Printing Office, Washington, D. C. DO NOT send money to the National Bureau of Standards.

Ref. No.	Title	Plating Reference	Series	Date	Price
201	Bolts, lag; steel (lag-screws)	Zinc, cadmium	FF-B-561	8/27/37	5 c.
202	Hardware; builders' (nontemplate)	Nickel, chromium on non-ferrous metals . Nickel, chromium, zinc, on steel	FF-H-101 (super- seded by FF-H-106 111 116a 121a)	8/19/30	OP

Ref. No.	Title	Plating Reference	Series	Date	Price
203	Hardware, builders'; Locks and lock-trim	Nickel, chromium on non- ferrous metals. Nickel, chromium, zinc, cadmium on steel.	FF-H-106	8/19/30	5 c.
203a	Hardware, builders'; Door-closers.	as above	FF-H-121a	4/12/37	5 c.
204	Hardware, builders'; shelf, and miscell- aneous	Nickel, chromium on non- ferrous metals. Nickel, Chromium, zinc, cadmium on steel	FF-H-111	8/19/30	10 c.
205	Hardware, builders'; hinges	As above	FF-H-116a	2/10/37	10 c.
206	Hardware and fit- ings, (for) lava- tory partitions and inclosures	Nickel, chromium on brass and bronze	FF-H-136	10/29/36	5 c.
207	Turnbuckles	Zinc, cadmium on steel.	FF-T-791	1/28/36	5 c.
208	Salts; nickel (for) electroplating and electrotyping	Nickel sulfate Nickel ammonium sulfate. Nickel chloride.	O-S-61	5/27/30	5 c.
220	Tableware; silver- plated	Silver plating	RR-T-51a	6/5/34	5 c.
231	Outlet boxes; steel, cadmium or zinc coated, with covers and accessories.	Cadmium, zinc on steel	W-O-821a	6/10/37	5 c.

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Ref. No.	Title	Plating Reference	Series	Date	Price
232	Conduit; steel, rigid, zinc-coated	Zinc on steel.	WW-C-581a	5/7/35	5 c.
233	Plumbing fixtures; (for) land use.	Nickel;chromium on brass and bronze. Zinc on steel.	WW-P-541a	3/30/40	15 c.
234	Tubing, electrical metallic	Zinc on steel	WW-T-306a	1/8/35	5 c.
235	Unions; brass or bronze, 250 lbs.	Nickel, chromium on brass	WW-U-516	12/5/33	5 c.
236	Valves, radiator; air, thermostatic (gravity steam heating systems)	Nickel,chromium on brass	WW-V-151	4/23/37	5 c.

LIST "B"

Outside Publications (available only in libraries).

Ref. No.	Title	Year
301	Preliminary studies in the deposition of copper in electrotyping baths, Blum, W., Holler, H.D., and Rawdon, H.S. Trans. Am. Electrochem. Soc. <u>30</u> , 159 (1916).	1916
302	Factors governing the structure of electrodeposited metals, Blum, W. Trans. Am. Electrochem. Soc. <u>36</u> , 213 (1919).	1919
303	Lead plating from fluoborate solutions, Blum, W., Liscomb, F.J.; Jencks, E., Bailey, W.E. Trans. Am. Electrochem. Soc. <u>36</u> , 243 (1919).	
304	The embrittling effects of cleaning and pickling upon carbon steels, Langdon, S.C. and Grossman, M.A. Trans. Am. Electrochem. Soc. <u>37</u> , 543 (1920).	1920
305	The use of fluorides in solutions for nickel deposition, Blum, W. Trans. Am. Electrochem. Soc. <u>39</u> , 459 (1921).	1921
306	The structure and properties of alternately electro deposited metals, Blum, W. Trans. Am. Electrochem. Soc. <u>40</u> , 307 (1921).	
307	The electrodeposition of lead-tin alloys, Blum, W. and Haring, H.E. Trans. Am. Electrochem. Soc. <u>40</u> , 287 (1921).	

Ref. No.	Title	Year
308	The electrolytic reproduction of engraved printing plates, Blum, W. and Slattery, T. F. Chem. & Met. Eng. <u>25</u> , 320 (1921).	1921
309	The acidity of nickel depositing solutions, Thompson, M.R.. Trans. Am. Electrochem. Soc. <u>41</u> , 333 (1922).	1922
310	The effect of impurities in nickel salts used for electrodeposition, Thompson, M.R. and Thomas, C.T. Trans. Am. Electrochem. Soc. <u>42</u> , 79 (1922).	
311	The influence of the base metal on the structure of electrodeposits, Blum, W. and Rawdon, H.S. Trans. Am. Electrochem. Soc. <u>44</u> , 305 (1923).	1923
312	Current distribution and throwing power in electrodeposition, Haring, H.E. and Blum, W. Trans. Am. Electrochem. Soc. <u>44</u> , 313 (1923).	
313	The effect of iron on the electrodeposition of nickel, Thompson, R.R. Trans. Am. Electrochem. Soc. <u>44</u> , 359 (1923).	
314	The crystalline form of electrodeposited metals, Blum, W. and Rawdon, H.S. Trans. Am. Electrochem. Soc. <u>44</u> , 397 (1923).	
315	Recent progress in electroplating and electroforming, Blum, W. Trans. Am. Electrochem. Soc. <u>45</u> , 187 (1924).	1924
316	Nickel anodes, Thomas, C.T. and Blum, W. Trans. Am. Electrochem. Soc. <u>45</u> , 193 (1924).	
317	Electroplating worn machine gun barrels, de Svenshnikoff, W.W. and Haring, H.E. Army Ordnance <u>5</u> , 503 (1924).	
318	Conductivity of nickel depositing solutions, Hammond, L.D. Trans. Am. Electrochem. Soc. <u>45</u> , 219 (1924).	
319	Fluorine determination in nickel depositing solutions, Hammond, L.D. Ind. Eng. Chem. <u>16</u> , 938 (1924).	
320	Throwing power, cathode potentials and efficiencies in nickel deposition, Haring, H.E. Trans. Am. Electrochem. Soc. <u>46</u> , 107 (1924).	
321	Principles and operating conditions of chromium plating, Haring, H.E. Chem. & Met. Eng. <u>32</u> , 592 (1925).	1925
322	Electrolytes and ionogens, Blum, W. Trans. Am. Electrochem. Soc. <u>47</u> , 123 (1925).	
323	The nickel plating of zinc and zinc-base die-castings, Thompson, M.R. Trans. Am. Electrochem. Soc. <u>47</u> , 163 (1925).	
324	Teaching principles of electrodeposition, Blum, W. J. Chem. Educ. <u>2</u> , 556 (1925).	
325	The protective value of nickel plating, Thomas, C.T. and Blum, W. Trans. Am. Electrochem. Soc. <u>48</u> , 69 (1925).	

Ref. No.	Title	Year
326	Note on the protection of iron by cadmium, Rawdon, H.S. Trans. Am. Electrochem. Soc. <u>49</u> , 339 (1926).	1926
327	A simple method for measuring polarization and resistivity, Haring, H.E. Trans. Am. Electrochem. Soc. <u>49</u> , 417 (1926)	
328	Future trends in electrochemistry, Blum, W. Ind. & Eng. Chem. <u>18</u> , 1028 (1926).	
329	Acid zinc plating baths, Thompson, M.R. Trans. Am. Electrochem. Soc. <u>50</u> , 193 (1926).	
330	Protection against corrosion by means of metallic coatings, Blum, W. J. Chem. Educ. <u>4</u> , 1477 (1927).	1927
331	The protective value of nickel plating (supplemental observations), Thomas, C.T. and Blum, W. Trans. Am. Electrochem. Soc. <u>52</u> , 271 (1927).	
332	Principles of electrolytic studies on corrosion, Blum, W. and Rawdon, H.S. Trans. Am. Electrochem. Soc. <u>52</u> , 403 (1927).	
333	Electroplating (In the automobile industry), Blum, W. Ind. Eng. Chem. <u>19</u> , 1111 (1927)	
334	Note on the crystal structure of electrodeposited chromium, Sillers, F. Trans. Am. Electrochem. Soc. <u>52</u> , 301 (1927).	
335	Nickel electrotyping solutions, Blum, W. and Winkler, J.H. Trans. Am. Electrochem. Soc. <u>53</u> , 419 (1928).	1928
336	The properties of graphite used in electrotyping, Winkler, J. H. and Blum, W. Trans. Am. Electrochem. Soc. <u>53</u> , 435 (1928).	
337	Colloids in the electrodeposition of metals, Blum, W. Colloid Symposium, p. 301.	
338	Mechanical applications of chromium plating, Blum, W. Mech. Eng. <u>50</u> , 927 (1928).	
339	The measurement of pH in nickel plating solutions, Blum, W. and Bekkedahl, N. Trans. Am. Electrochem. Soc. <u>56</u> , 291 (1929).	1929
340	The production of electrolytic iron printing plates, Thomas, C.T. and Blum, W. Trans. Am. Electrochem. Soc. <u>57</u> , 59 (1930).	1930
341	Applications of chromium plating in the graphic arts, Blum, W. Typothetae Bul. (November 10, 1930).	
342	Adhesion of electroplated coatings, Blum, W. Metals & Alloys <u>2</u> , 57 (1931).	1931
342a	The titration of free cyanide in copper baths, Thompson, M.R. Month. Rev. Am. Electroplaters' Soc. <u>13</u> , (May, 1931).	
343	Cyanides in metallurgy, Thompson, M.R. Trans. Electrochem. Soc. <u>60</u> , 35 (1931).	

Ref. No.	Title	Year
344	The definition and determination of free cyanide in electroplating solutions, Blum, W. Trans Electrochem. Soc. <u>60</u> , 143 (1931).	1931
345	The status of chromium plating, Blum; W. J. Franklin Inst. <u>213</u> , 17 (1932).	1932
346	The decomposition of cyanide solutions, Month. Rev. Am. Electroplaters' Soc. 19, (April, 1933). Wick, R.M.	1933
347	Methods of stripping plated coatings, Month. Rev. Am. Electroplaters' Soc. <u>20</u> (November, 1933), A. Brenner.	
348	Notes on cyanide solutions, Wick, R.M. Month. Rev. Am. Electroplaters' Soc. <u>20</u> (June, 1934).	1934
349	Notes on the analysis of alkaline tin plating solutions, Thompson, M.R. Month. Rev. Am. Electroplaters' Soc. <u>20</u> (June, 1934).	
350	Testing of plated metals for compliance with Federal Specifications, Thompson, M.R. Month. Rev. Am. Electroplaters' Soc. <u>21</u> (September, 1934).	
351	The definition of polarization, overvoltage, and decomposition potential, Blum, W. and Vinal, G.W. Trans. Electrochem. Soc. <u>66</u> , 359 (1934).	
352	The structure and physical properties of nickel deposited at high current densities, Blum, W. and Kasper, C. Trans. Faraday Soc. <u>31</u> , 1203 (1935).	1935
353	Dropping tests for determining the local thickness of zinc and cadmium coatings, Hull, R.O. and Strausser, P.W.C. Month. Rev. Am. Electroplaters' Soc. <u>22</u> , (March 1935).	
354	The use of color photography for recording the results of exposure tests, Vincent-Daviss, C.A. and Blum, W. Month. Rev. Am. Electroplaters' Soc. <u>24</u> , 818 (1937).	1937
355	Laboratory tests of electroplated coatings on non-ferrous metals, Strausser, P.W.C. Month. Rev. Am. Electroplaters' Soc. <u>24</u> , 822 (1937).	
356	Magnetic method for measuring the thickness of nickel coatings on nonmagnetic base metals, Brenner, A. Month. Rev. Am. Electroplaters' Soc. <u>25</u> , 252 (1938).	1938
357	Magnetic method for measuring the thickness of non-magnetic coatings on iron and steel, Brenner, A. Month. Rev. Am. Electroplaters' Soc. <u>25</u> , 261 (1938).	

Ref. No.	Title	Year
353	Current distribution in electrodeposition. I. Linear, cylindrical and spherical conductors, Kasper, C. Month. Rev. Am. Electroplaters' Soc. <u>26</u> , 11 (1939).	1939
359	Current distribution in electrodeposition. II. Point-plane and line-plane systems, Kasper, C. Month. Rev. Am. Electroplaters' Soc. <u>26</u> , 91 (1939).	
360	Porosity tests for nickel coatings on steel, Strausser, P.W.C. Convention Proc. Am. Electroplaters Soc. p. 194 (1939).	
361	The measurement of pH in alkaline plating solutions, Thompson, M.R. Convention Proc. Am. Electroplaters' Soc. p. 200 (1939).	
362	Some effects of anode shape and position upon cathode current distribution, Kasper, C. Convention Proc. Am. Electroplaters' Soc. p. 209 (1939).	
363	A study of silver plating for industrial applications, Dornblatt, A. J., Lowe, C.S., and Simon, A.C. Convention Proc. Am. Electroplaters' Soc. p. 214 (1939).	
364	Dropping tests for zinc and cadmium on steel, Brenner, A. Convention Proc. Am. Electroplaters' Soc. p. 204 (1939).	
365	The theory of the potential and the technical practice of electrodeposition. I. The general problem and the cases of uniform flow, Kasper, C. Trans. Electrochem. Soc. <u>77</u> , 353 (1940).	1940
366	The theory of the potential and the technical practice of electrodeposition. II. Point-plane and line-plane systems, Kasper, C. Trans. Electrochem. Soc. <u>77</u> , 365 (1940).	
367	Notes on the spot test for thickness of chromium coatings, Blum, W. and Olson, W.A. Convention Proc. Am. Electroplaters' Soc. p. 25 (1940).	
368	Silver plating at very high current densities, Simon, A.C. and Lumley, J. T. Convention Proc. Am. Electroplaters' Soc. p. 91 (1940).	
369	A method for studying cathode films by freezing, Brenner, A. Convention Proc. Am. Electroplaters' Soc. p. 95 (1940).	
370	The theory of the potential and the technical practice of electrodeposition. III. Linear polarization on some line-plane systems, Kasper, C. Trans. Electrochem. Soc. <u>78</u> , preprint (1940).	
371	The theory of the potential and the technical practice of electrodeposition. IV. The flow between and to circular cylinders, Kasper, C. Trans. Electrochem. Soc. <u>78</u> , preprint (1940).	

Ref. No.	Title	Year
372	What metals can be deposited from aqueous solutions?, Blum, W. Month. Rev. Am. Electroplaters' Soc. <u>27</u> , 923 (1940).	1940
373	The constitution and properties of cyanide plating baths, Thompson, M.R. Trans. Electrochem. Soc. <u>79</u> , preprint (1941).	1941

LIST "C"

General Sources of Information in English.

Numerous articles on electrodeposition will be found in such journals as:

Transactions of the Electrochemical Society
 Transactions of the Faraday Society
 Monthly Review American Electroplaters' Society
 Journal Depositors' Technical Society (London)
 Metal Finishing (New York)
 Metal Industry (London)
 Products Finishing
 Electrotypers' Bulletin

Among the recent books in English on electrodeposition are:

Langbein, G. and Brannt, W. T., Electrodeposition of metals, (Henry Carey Baird and Co., 8th Ed., 1920).
 Bedell, W.L.D., Practical electroplating (5th Ed., 1923)
 Hughes, W.E., Modern electroplating (Oxford Technical Publications, 1923).
 Field, S. and Bonney, S.R., The chemical coloring of metals, (Chapman and Hall, Ltd., 1925).
 Freeman, B. and Hoppe, F.G., Electroplating with chromium, copper, and nickel (Prentice-Hall Co., 1929).
 Blum, W. and Hogaboom, G.E., Principles of electroplating and electroforming, (McGraw-Hill Book Co., 2d ed., 1930).
 Field, S. and Weill, A.E., Electroplating (I. Pitman and Sons, Ltd., 1930).
 Richards, E.S., Chromium plating (J.B. Lippincott Co., 1932)
 Bauer, O., Arndt, H., and Krause, W., Chromium plating. English translation by Parker, E.W. (Edward Arnold and Co., 1935).

IV. INDEX

In the following list, each publication is referred to by the reference number, by which it is listed in the first column in the preceding pages of this circular, in which are given explicit references, and directions for ordering Government publications.

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