

U.S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS  
WASHINGTON

Letter  
Circular  
LC - 566  
Supersedes  
LC 121.

ELECTRODEPOSITION

PUBLICATIONS BY THE STAFF OF THE NATIONAL BUREAU OF STANDARDS.

(Revised to September 15, 1939).

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 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 ¢  |
| 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 ¢   |
| 6        | Reflecting power of beryllium, chromium, and several other metals, Coblenz, W.W. and Stair, R. BSJ Research <u>2</u> , 343 (1929).       | 1929 | RP 39    | 5 ¢   |
| 7        | The spotting of plated or finished metals, Barrows, W.P. BSJ Research <u>2</u> , 1085 (1929).  |      | RP 72    | 10 ¢  |
| 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 ¢  |
| 11       | Addition agents in copper electrotyping solutions, Hull, R.C. and Blum, W. BS J. Research <u>5</u> 767 (1930).                           |      | RP 228   | 5 ¢   |
| 12       | The making of mirrors by the deposition of metal on glass, Cir. BS 389 (1931).   | 1931 | C 389    | 10 ¢  |
| 13       | The resistance of chromium-plated gages to wear, Herschmann, H. K. BS J. Research <u>6</u> , 295 (1931).                                 |      | RP 276   | 10 ¢  |
| 14       | Dimensional changes in the manufacture of electrotypes, Bekkedahl, N. and Blum, W. BS J. Research <u>6</u> , 829 (1931).                 |      | RP 308   | 10 ¢  |
| 15       | Purification and analysis of alkali cyanides, Thompson, M.R. BS J. Research <u>6</u> , 1051 (1931).                                      |      | RP 323   | 5 ¢   |

| 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> , 697 (1931).  | 1931 | RP 368 | 10 ¢  |
| 17       | The analysis of cyanide silver-plating 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 ¢   |
| 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 ¢   |
| 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 ¢  |
| 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 ¢   |
| 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 ¢   |
| 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 | 5 ¢   |
| 26       | Rapid electrodeposition of iron from ferrous chloride baths, Kasper, C. J. Research NBS <u>18</u> , 536 (1937).  | 1937 | RP 991 | 5 ¢   |

| 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 ¢  |
| 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 ¢   |
| 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 ¢  |

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 ¢   |
| 202      | Hardware; builders' (nontemplate)        | Nickel, chromium on nonferrous metals. Nickel, chromium, zinc, on steel.         | FF-H-101 (superseded by FF-H-106 111 116a, 121a) | 8/19/30 | OP    |
| 203      | Hardware, builders'; Locks and lock-trim | Nickel, chromium on nonferrous metals. Nickel, chromium, zinc, cadmium on steel. | FF-H-106   | 8/19/30 | 5 ¢   |
| 203a     | Hardware, builders'; Door-closers        | As above   | FF-H-121a  | 4/12/37 | 5 ¢   |

| Ref. No. | Title   | Plating Reference  | Series    | Date     | Price |
|----------|---|--|-----------|----------|-------|
| 204      | Hardware, builders'; shelf, and miscellaneous                             | Nickel, chromium on nonferrous metals. Nickel, chromium, zinc, cadmium on steel. | FF-H-111  | 8/19/30  | 10¢   |
| 205      | Hardware, builders'; hinges   | Nickel, chromium on nonferrous metals. Nickel, chromium, zinc cadmium on steel.  | FF-H-116a | 2/10/37  | 10¢   |
| 206      | Hardware and fittings, (for) lavatory partitions and inclosures           | Nickel, chromium on brass and bronze   | FF-H-136  | 10/29/36 | 5¢    |
| 207      | Turnbuckles   | Zinc, cadmium on steel.  | FF-T-791  | 1/28/36  | 5¢    |
| 208      | Salts; nickel (for) electroplating and electrotyping                      | Nickel sulfate Nickel ammonium sulfate. Nickel chloride.                         | O-S-61    | 5/27/30  | 5¢    |
| 220      | Tableware; silver-plated  | Silver plating   | RR-T-51a  | 6/5/34   | 5¢    |
| 231      | Outlet boxes; steel, cadmium or zinc coated, with covers and accessories. | Cadmium, zinc on steel.  | W-C-821a  | 6/10/37  | 5¢    |
| 232      | Conduit; steel, rigid, zinc-coated.                                       | Zinc on steel.   | WW-C-581a | 5/7/35   | 5¢    |
| 233      | Plumbing fixtures; (for) shore purposes                                   | Nickel, chromium on brass and bronze. Zinc on steel                              | WW-P-541  | 8/1/33   | 10¢   |
| 234      | Tubing; electrical, metallic.   | Zinc on steel.   | WW-T-806a | 1/8/35   | 5¢    |
| 235      | Unions; brass or bronze, 250 lbs.   | Nickel, chromium on brass.   | WW-U-516  | 12/5/33  | 5¢    |
| 236      | Valves, radiator; air, thermostatic (gravity steam heating systems)       | Nickel, chromium, on brass.  | WW-V-151  | 4/23/37  | 5¢    |

## 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 fluoroborate solutions, Blum, W., Liscomb, F. J., Jencks, Z., 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 electrodeposited 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).  |      |
| 308      | The electrolytic reproduction of engraved printing plates, Blum, W. and Slattery, T. F. Chem & Met. Eng. <u>25</u> , 320 (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, M.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).                                       |      |



| Ref.<br>No. | Title  | Year |
|-------------|--|------|
| 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 Sveshnikoff, 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> , 692 (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).                              |      |
| 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. Electrochemical Soc. <u>52</u> , 301 (1927).                        |      |

| Ref. No. | Title  | Year |
|----------|--|------|
| 335      | Nickel electrotyping solutions, Blum, W. and Winkler, J.H. <i>Trans. Am. Electrochem. Soc.</i> <u>53</u> , 419 (1928).                                       | 1928 |
| 336      | The properties of graphite used in electrotyping, Winkler, J.H. and Blum, W. <i>Trans. Am. Electrochem. Soc.</i> <u>53</u> , 435 (1928).                     |      |
| 337      | Colloids in the electrodeposition of metals, Blum, W. <i>Colloid Symposium</i> , p. 301.   |      |
| 338      | Mechanical applications of chromium plating, Blum, W. <i>Mech. Eng.</i> <u>50</u> , 927 (1928).  |      |
| 339      | The measurement of pH in nickel plating solutions, Blum, W. and Bekkedahl, N. <i>Trans. Am. Electrochem. Soc.</i> <u>56</u> , 291 (1929).                    | 1929 |
| 340      | The production of electrolytic iron printing plates, Thomas, C.T. and Blum, W. <i>Trans. Am. Electrochem. Soc.</i> <u>57</u> , 59 (1930).                    | 1930 |
| 341      | Applications of chromium plating in the graphic arts, Blum, W. <i>Typothetae Bul.</i> (November 10, 1930).   |      |
| 342      | Adhesion of electroplated coatings, Blum, W. <i>Metals &amp; Alloys</i> <u>2</u> , 57 (1931).  | 1931 |
| 342a     | The titration of free cyanide in copper baths, Thompson, M.R. <i>Month. Rev. Am. Electroplaters' Soc.</i> <u>18</u> , (May, 1931).                           |      |
| 343      | Cyanides in Metallurgy, Thompson, M.R. <i>Trans. Electrochem. Soc.</i> <u>60</u> , 35 (1931).  |      |
| 344      | The definition and determination of free cyanide in electroplating solutions, Blum, W. <i>Trans. Electrochem. Soc.</i> <u>60</u> , 143 (1931).               |      |
| 345      | The status of chromium plating, Blum, W. <i>J. Franklin Inst.</i> <u>213</u> , 17 (1932).  | 1932 |
| 346      | The decomposition of cyanide solutions, <i>Month. Rev. Am. Electroplaters' Soc.</i> <u>19</u> , (April, 1933). Wick, R.M.                                    | 1933 |
| 347      | Methods of stripping plated coatings, <i>Month. Rev. Am. Electroplaters' Soc.</i> <u>20</u> (November, 1933). Brenner, A.                                    |      |
| 348      | Notes on cyanide solutions, Wick, R.M. <i>Month. Rev. Am. Electroplaters' Soc.</i> <u>20</u> (June, 1934).   | 1934 |
| 349      | Notes on the analysis of alkaline tin plating solutions, Thompson, M.R. <i>Month. Rev. Am. Electroplaters' Soc.</i> <u>20</u> (June, 1934).                  |      |
| 350      | Testing of plated metals for compliance with Federal Specifications, Thompson, M.R. <i>Month. Rev. Am. Electroplaters' Soc.</i> <u>21</u> (September, 1934). |      |

| Ref.<br>No. | Title  | Year |
|-------------|--|------|
| 351         | The definition of polarization, overvoltage, and decomposition potential, Blum, W. and Vinal, G.W. Trans. Electrochem. Soc. <u>66</u> , 359 (1934).                              | 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).                 |      |
| 358         | 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).   |      |

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 Industry (New York)  
 Metal Industry (London)  
 Brass World  
 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.B., 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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