

DEPARTMENT OF COMMERCE  
BUREAU OF STANDARDS  
George K. Burgess, Director

**SUPPLEMENTARY LIST OF  
PUBLICATIONS OF THE  
BUREAU OF STANDARDS**

**JULY 1, 1925, TO JUNE 30, 1926**

*Reference book not to be  
taken from the Library*



DEPARTMENT OF COMMERCE  
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# SUPPLEMENTARY LIST OF PUBLICATIONS OF THE BUREAU OF STANDARDS

(JULY 1, 1925, TO JUNE 30, 1926)

For all previous papers see Circular No. 24 7th ed., June 30, 1925

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Issued October 5, 1926



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DEPARTMENT OF CHEMISTRY  
CHICAGO, ILLINOIS

ANALYTICAL CHEMISTRY  
OF THE BUREAU OF STANDARDS

1950

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# SUPPLEMENTARY LIST OF PUBLICATIONS OF THE BUREAU OF STANDARDS

July 1, 1925, to June 30, 1926

For all previous papers see Circular No. 24 7th ed., June 30, 1925

This supplementary list is issued annually to supplement the information given in Circular of the Bureau of Standards, No. 24 (7th ed., June 30, 1925): Publications of the Bureau of Standards. This supplement will bring up to date the information listed below under "Contents."

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## I. DESIGNATIONS OF PUBLICATION SERIES

Eight series are issued: S, Scientific Papers; T, Technologic Papers; C, Circulars; H, Handbooks; R, Simplified Practice Recommendations; L, Limitation of Variety Recommendations; BH, Building and Housing; and M, Miscellaneous Publications. The separate papers in each series are numbered consecutively. An initial letter preceding each number shows the particular series; S for Scientific Papers, T for Technologic Papers, etc.—thus T203 is "Technologic Paper No. 203." In referring to publications the series *initial* and the *number* are both needed to give complete identification. For information regarding the Technical News Bulletin see page 4.

## II. ANNOUNCEMENT OF NEW PUBLICATIONS

A mailing list is maintained to which is sent at regular intervals a card giving titles and prices of new publications issued. Names will be added to this announcement list on request. Notice should be given promptly by those on this list of any change of address, giving the exact form of the old as well as the new address.

One of the objects of this supplement is to list new publications issued after the latest edition of Circular No. 24, Publications of the Bureau of Standards. Such new publications will be listed in the succeeding editions of this supplementary list.

## III. PUBLICATIONS NOT AVAILABLE

The publications listed below are not available for distribution by the Bureau of Standards nor for sale by the Superintendent of Documents. They may be consulted at some of the designated depository libraries listed on pages 7 to 12.

*Scientific Papers.*—S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S17, S19, S20, S21, S22, S24, S25, S27, S28, S29, S30, S32, S33, S34, S35, S36, S37, S38, S39, S40, S41, S42, S43, S44, S45, S46, S47, S49, S51, S52, S53, S54, S55, S56, S57, S58, S59, S60, S61, S62, S67, S68, S69, S70, S71, S72, S74, S75, S77, S79, S81, S82, S87, S89, S90, S92, S93, S94, S95, S96, S97, S100, S101, S102, S103, S104, S105, S108, S112, S113, S114, S115, S117, S118, S120, S121, S122, S123, S125, S126, S128, S129, S130, S133, S138, S139, S140, S142, S143, S146, S147, S148, S149, S150, S151, S154, S155, S157, S159, S162, S165, S166, S167, S168, S170, S172, S173, S174, S175, S178, S180, S181, S182, S186, S187, S188, S189, S190, S193, S194, S200, S202, S203, S210, S212, S213, S215, S216, S219, S223, S224, S226, S230, S231, S232, S233, S239, S241, S242, S243, S244, S249, S250, S255, S256, S258, S260, S263, S264, S265, S269, S272, S274, S275, S277, S279, S284, S285, S288, S290, S291, S297, S300, S301, S304, S306, S307, S308, S317, S321, S326, S241, S358, S375, S420.

*Technologic Papers.*—T1, T2, T3, T4, T5, T7, T8, T10, T11, T12, T13, T14, T17, T19, T21, T23, T24, T26, T27, T28, T29, T30, T31, T32, T33, T34, T35, T37, T39, T40, T41, T43, T44, T45, T46, T48, T50, T51, T52, T54, T57, T58, T60, T61, T64, T65, T66, T67, T68, T69, T71, T72, T73, T74, T78, T82, T87, T88, T89, T90, T94, T100, T101, T103, T105, T113, T122, T123, T153, T164, T177, T186, T198.

*Circulars.*—C2, C4, C5, C7, C8, C9, C11, C12, C14, C15, C21, C22, C23, C28, C29, C34, C36, C37, C39, C41, C45, C49, C50, C54, C57, C59, C72.

*Handbooks.*—1, 4.

*Miscellaneous Publications.*—M1, M4, M6, M7, M9, M11, M13, M16, M18, M20, M54.

## IV. ORDERING

Any of the publications in Circular No. 24 and this supplementary list, with the exception of those listed under "Publications not available," may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the price indicated. Purchase orders with remittance should be sent to the Su-

**perintendent of Documents.** (Do not send any such orders or remittances to the Bureau of Standards.)

Order by serial initial, letter and number combined (for example, "Bureau of Standards publication T281"). If initial and number are correctly given, the title is not needed.

All publications are sent out by the Superintendent of Documents, as provided by law, and usually reach destination within a week or two.

For the convenience of the general public coupons (good until used in exchange for Government publications sold by the Superintendent of Documents) may be purchased from his office in sets of 20 for \$1.

**TERMS AND MAILING.**—(a) *Domestic.*—Remittance should be made by coupons, postal money order, express order, or New York draft payable to the "Superintendent of Documents, Government Printing Office, Washington, D. C." Currency may be sent at sender's risk. Postage stamps, defaced or smooth coins, or foreign money positively will not be accepted. Publications are forwarded under Government frank to addresses in the United States and its possessions; also to Mexico and Canada.

(b) *Foreign.*—With the exception of Mexico and Canada, include in your remittance, in addition to the price of the publication, about one-third of the price quoted to cover postage. Publications intended for Mexico and Canada will be sent under Government frank. If the amount remitted is in excess of the postage required, the balance will be refunded to you, and if additional postage is required you will be notified.

Kindly make remittance by international money order or New York draft, payable to the "Superintendent of Documents, Government Printing Office, Washington, D. C., U. S. A."

## V. BOUND VOLUMES

In addition to the separate papers, both the Scientific and Technologic series are also issued in volumes of about 750 pages each, bound in cloth, consecutively paged, including title page and index. Subscription for either series may be placed in advance with the Superintendent of Documents to receive the bound volume as issued at \$2 per volume. See price list on page 4.

The Scientific Papers may be obtained in bound form from volume 1 to 20. (Previous to volume 15 they were called "Reprints" and in the bound form were known as the "Bulletin.")

The Technologic Papers in the bound form begin with volume 16, Technologic Paper No. 203, and in bound form may be obtained up to volume 19. Previous to this they had only been issued as separates.

## Price list and subscription basis

	Per volume
(a) Bulletins of the Bureau of Standards, vols. 1-14, inclusive; 1904-1914 (cloth)-----	\$2. 00
(b) Series (a) continued—Scientific Papers of the Bureau of Standards, vols. 15-20 (cloth)-----	2. 00
(c) Unbound separates, reprints of (b), sent as issued-----	1. 25
(d) Technologic Papers of the Bureau of Standards, vols. 16-19 (cloth)---	2. 00
(e) Unbound separates of Technologic Papers sent as issued-----	1. 25

## VI. TECHNICAL NEWS BULLETIN

The "Technical News Bulletin" is a monthly publication designed to keep the public informed of the progress of work in the Bureau of Standards. New publications of the bureau issued during the month are listed in this bulletin.

The subscription price is 25 cents per year (United States, Mexico, and Canada); 40 cents per year (Foreign). Mail your subscription with remittance to the Superintendent of Documents, Government Printing Office, Washington, D. C.

## VII. DATA CONCERNING LATEST EDITIONS OF CIRCULARS

[Those Marked (\*) Are Out of Print and No Longer Available]

Cir. No.	Edition	Date	No. of pages	Price	Cir. No.	Edition	Date	No. of pages	Price
1-----	2	Oct. 29, 1925	113	50	*29-----	1	Dec. 31, 1910	13	-----
*2-----	5	Apr. 30, 1915	21	-----	30-----	2	July 6, 1920	25	5
3-----	3	Dec. 23, 1918	89	15	31-----	3	Oct. 1, 1914	76	20
*4-----	2	Jan. 3, 1905	2	-----	32-----	4	Dec. 7, 1920	140	20
*5-----	3	July 16, 1917	19	5	33-----	3	Jan. 18, 1917	43	10
6-----	7	Dec. 30, 1916	30	5	*34-----	3	May 15, 1915	16	-----
*7-----	5	Oct. 1, 1913	19	-----	35-----	4	Dec. 1, 1919	2	5
*8-----	3	Aug. 11, 1921	18	-----	*36-----	1	June 30, 1912	26	-----
*9-----	8	Mar. 31, 1916	32	-----	37-----	2	Jan. 1, 1915	13	5
10-----	4	Jan. 22, 1924	18	5	38-----	4	Sept. 28, 1921	127	20
*11-----	3	June 23, 1917	18	-----	*39-----	1	Dec. 16, 1912	14	-----
*12 <sup>1</sup> -----	1	July 16, 1906	7	-----	40-----	3	Sept. 10, 1920	13	5
13-----	10	Feb. 7, 1923	16	5	*41-----	3	Sept. 30, 1918	15	5
*14-----	5	Mar. 20, 1916	17	-----	42-----	2	Aug. 29, 1921	11	5
*15-----	3	July 1, 1911	7	-----	43-----	2	Jan. 24, 1921	46	10
16-----	5	July 13, 1922	16	5	44-----	2	Jan. 30, 1918	196	25
17-----	3	Mar. 18, 1916	50	15	*45-----	1	Nov. 1, 1913	89	-----
18-----	2	July 1, 1911	4	5	46-----	3	Dec. 26, 1922	22	10
19-----	6	Oct. 31, 1924	72	15	47-----	1	July 1, 1914	68	15
20-----	2	May 28, 1915	57	15	47 (supt.) <sup>3</sup> -----	1	Oct. 27, 1917	10	5
*21-----	1	Mar. 1, 1910	30	-----	48-----	2	June 10, 1916	202	40
*22-----	2	May 15, 1911	12	-----	*49-----	2	May 4, 1915	50	-----
*23-----	1	July 15, 1910	93	-----	*50-----	2	June 8, 1917	34	-----
24-----	7	June 30, 1925	271	25	51-----	1	Dec. 1, 1914	39	15
24 (supt.)-----	1	July 1, 1926	-----	-----	52-----	2	June 28, 1916	44	10
25-----	8	June 26, 1923	14	5	53-----	1	Mar. 29, 1915	35	10
25 (supt.) <sup>2</sup> -----	-----	July 1, 1926	-----	-----	*54 <sup>4</sup> -----	2	Nov. 15, 1916	323	-----
26-----	4	Apr. 5, 1921	20	5	55-----	1	Aug. 28, 1915	149	45
27-----	2	Aug. 9, 1918	41	10	56-----	2	Sept. 26, 1923	344	60
*28-----	1	Mar. 1, 1911	19	-----	*57 <sup>5</sup> -----	2	May 11, 1916	64	-----

<sup>1</sup> Superseded by C44.

<sup>2</sup> Available free on application to Bureau of Standards.

<sup>3</sup> This is a supplement to circular 47, giving additional information.

<sup>4</sup> Superseded by H3 and H4.

<sup>5</sup> Superseded by C154 and supplement thereto.



## VII. DATA CONCERNING LATEST EDITIONS OF CIRCULARS—Continued

Cir. No.	Edition	Date	No. of pages	Price	Cir. No.	Edition	Date	No. of pages	Price
58	2	June 22, 1923	93	30	120	1	Apr. 24, 1922	16	5
*59	1	Apr. 5, 1916	13	---	121	1	July 17, 1922	14	5
60	2	Mar. 12, 1920	68	15	122	2	Sept. 12, 1923	16	5
61	2	Aug. 31, 1920	44	10	123	2	Feb. 1, 1924	5	5
62	3	Jan. 24, 1923	24	5	124	1	July 27, 1922	4	5
63	1	May 17, 1917	8	5	125	1	do	3	5
64	1	Apr. 20, 1917	6	5	126	1	do	5	5
65	1	July 23, 1917	19	5	127	1	do	4	5
66	1	July 25, 1917	13	5	128	2	Feb. 1, 1924	5	5
67	1	Jan. 17, 1918	5	5	129	1	July 27, 1922	4	5
68	1	Oct. 6, 1917	8	5	130	1	do	5	5
69	1	Nov. 17, 1917	85	15	131	1	do	5	5
70	1	Dec. 5, 1917	259	25	132	2	Feb. 1, 1924	4	5
71	1	Sept. 18, 1917	8	5	133	1	Nov. 10, 1923	21	10
*72	1	June 17, 1918	84	20	134	2	June 30, 1924	6	5
73	2	Nov. 14, 1922	103	20	135	1	Oct. 16, 1922	14	5
74	2	Mar. 10, 1924	345	60	136	2	Jan. 12, 1924	4	5
75	1	Jan. 10, 1918	127	15	137	1	Feb. 23, 1923	19	10
76	1	Apr. 21, 1919	120	20	138	1	Mar. 21, 1923	33	10
77	1	Mar. 10, 1919	67	10	139	1	June 15, 1923	9	5
78	2	Mar. 20, 1923	14	5	140	1	Mar. 26, 1923	6	5
79	2	Jan. 19, 1923	62	15	141	1	Mar. 24, 1923	18	10
80	2	Sept. 2, 1923	34	20	142	1	Apr. 16, 1923	48	15
81	2	Dec. 21, 1922	32	10	143	1	June 25, 1923	5	5
82	2	June 8, 1922	9	5	144	1	July 6, 1923	7	5
83	1	Jan. 31, 1920	35	5	145	1	Jan. 28, 1924	72	15
84	2	July 3, 1922	8	5	146	1	Sept. 25, 1923	6	5
85	2	do	9	5	147	1	Sept. 19, 1923	8	5
86	2	Oct. 6, 1922	11	5	148	1	Oct. 10, 1923	9	5
87	2	July 3, 1922	8	5	149	1	Feb. 1, 1924	5	5
88	2	do	8	5	150	1	Dec. 28, 1923	6	5
89	2	do	10	5	151	1	Jan. 9, 1924	66	15
90	2	May 23, 1922	8	5	152	1	Dec. 8, 1923	7	5
91	2	June 21, 1922	8	5	153	1	Dec. 27, 1923	7	5
92	1	June 7, 1920	94	30	154	1	May 29, 1924	175	30
93	2	June 21, 1922	9	5	154 (supt.) <sup>1</sup>	1	Oct. 8, 1925	4	5
94	2	July 7, 1922	8	5	155	1	Apr. 8, 1924	11	5
95	2	Mar. 5, 1925	32	10	156	1	Mar. 1, 1924	4	5
96	1	June 15, 1920	5	5	157	1	Apr. 8, 1924	10	5
97	3	July 3, 1922	10	5	158	1	Mar. 25, 1924	3	5
98	2	Feb. 28, 1923	10	5	159	1	Apr. 8, 1924	10	5
99	1	Nov. 12, 1920	44	10	160	1	do	9	5
100	2	May 9, 1924	162	40	161	1	Mar. 1, 1924	5	5
101	2	Apr. 23, 1924	204	40	162	1	Apr. 8, 1924	7	5
102	2	Sept. 22, 1922	5	5	163	1	Feb. 20, 1924	11	5
103	3	July 22, 1922	6	5	164	1	June 4, 1924	12	5
104	2	Jan. 30, 1923	7	5	165	1	June 21, 1924	11	5
105	2	Sept. 18, 1922	4	5	166	1	Sept. 18, 1924	5	5
106	1	Nov. 24, 1920	15	5	167	1	July 12, 1924	5	5
107	1	Feb. 12, 1921	37	10	168	1	July 7, 1924	10	5
108	1	Jan. 3, 1921	21	5	169	1	Aug. 12, 1924	37	10
109	1	do	9	5	170	1	July 8, 1924	3	5
110	1	Feb. 26, 1921	8	5	171	1	do	3	5
111	2	June 24, 1922	8	5	172	1	do	3	5
112	1	June 24, 1921	214	65	173	1	do	3	5
113	2	July 7, 1922	104	25	174	1	do	4	5
114	2	Apr. 17, 1925	10	5	175	1	do	3	5
115	2	Mar. 30, 1925	13	5	176	1	do	3	5
116	1	Aug. 17, 1921	5	5	177	1	do	3	5
117	2	July 3, 1922	6	5	178	1	do	3	5
118	1	Dec. 8, 1921	7	5	179	1	do	3	5
119	1	Feb. 6, 1922	3	5	180	1	do	3	5
					181	1	do	3	5
					182	1	July 23, 1924	4	5
					183	1	Aug. 2, 1924	4	5

<sup>1</sup> Abridged volume correction table for petroleum oils.

## VII. DATA CONCERNING LATEST EDITIONS OF CIRCULARS—Continued

Cir. No.	Edition	Date	No. of pages	Price	Cir. No.	Edition	Date	No. of pages	Price
184	1	Aug. 2, 1924	2	5	247	1	June 13, 1925	3	5
185	1	do	3	5	248	1	do	3	5
186	1	July 25, 1924	4	5					
187	1	Aug. 2, 1924	3	5	249	1	do	3	5
188	1	do	4	5					
189	1	Aug. 19, 1924	5	5	250	1	June 11, 1925	3	5
190	1	Sept. 4, 1924	4	5	251	1	June 13, 1925	3	5
191	1	do	6	5	252	1	do	2	5
192	1	Oct. 9, 1924	5	5	253	1	June 11, 1925	3	5
193	1	Jan. 9, 1925	5	5	254	1	June 13, 1925	3	5
					255	1	June 20, 1925	2	5
194	1	do	6	5	256	1	June 18, 1925	4	5
195	1	do	5	5	257	1	June 26, 1925	3	5
196	1	do	3	5	258	1	June 20, 1925	3	5
197	1	do	4	5	259	1	June 26, 1925	5	5
198	1	Feb. 3, 1925	8	5					
					260	1	do	3	5
199	1	Mar. 7, 1925	19	10	261	1	do	3	5
200	1	Feb. 7, 1925	4	5	262	1	do	3	5
201	1	Feb. 17, 1925	5	5	263	1	do	3	5
202	1	Mar. 25, 1925	16	5	264	1	June 20, 1925	3	5
203	1	Mar. 6, 1925	4	5					
					265	1	June 26, 1925	5	5
204	1	Mar. 23, 1925	7	5	266	1	do	5	5
205	1	Mar. 7, 1925	5	5	267	1	June 20, 1925	3	5
206	1	Apr. 16, 1925	6	5	268	1	July 7, 1925	3	5
207	1	Apr. 1, 1925	6	5	269	1	do	4	5
208	1	May —, 1925	37	15					
					270	1	June 26, 1925	5	5
209	1	Apr. 30, 1925	4	5	271	1	July 18, 1925	7	5
210	1	May 2, 1925	3	5	272	1	July 7, 1925	4	5
211	1	Apr. 30, 1925	3	5	273	1	do	4	5
212	1	May 9, 1925	5	5	274	1	do	4	5
213	1	May 8, 1925	5	5					
					275	1	Aug. 29, 1925	47	15
214	1	May 21, 1925	4	5	276	1	Aug. 5, 1925	28	20
215	1	May 9, 1925	12	5	277	1	July 7, 1925	4	5
216	1	do	9	5	278	1	do	4	5
217	1	May 22, 1925	2	5	279	1	Dec. 3, 1925	85	25
218	1	do	2	5					
					280	1	Oct. 29, 1925	9	5
219	1	do	2	5	281	1	Jan. 22, 1926	81	30
220	1	do	2	5	282	1	Feb. 20, 1926	50	25
221	1	do	2	5	283	1	Mar. 2, 1926	52	20
222	1	do	2	5	284	1	Nov. 18, 1925	3	5
223	1	do	2	5					
					285	1	Nov. 7, 1925	6	5
224	1	do	2	5	286	1	Nov. 17, 1925	4	5
225	1	do	2	5	287	1	do	5	5
226	1	do	2	5	288	1	Nov. 18, 1925	3	5
227	1	do	3	5	289	1	do	3	5
228	1	do	3	5					
					290	1	do	3	5
229	1	May 26, 1925	4	5	291	1	do	4	5
230	1	do	3	5	292	1	do	4	5
231	1	June 11, 1925	4	5	293	1	Dec. 1, 1925	8	5
232	1	July 6, 1925	42	10	294	1	Nov. 17, 1925	5	5
233	1	June 15, 1925	3	5					
					295	1	Jan. 16, 1926	3	5
234	1	do	3	5	296	1	Nov. 18, 1925	20	10
235	1	do	4	5	297	1	Dec. 1, 1925	5	5
236	1	do	3	5	298	1	do	6	5
237	1	do	3	5	299	1	Jan. 14, 1926	8	5
238	1	do	3	5					
					300	1	Feb. 25, 1926	9	5
239	1	do	2	5	301	1	Feb. 5, 1926	4	5
240	1	do	3	5	302	1	Feb. 9, 1926	6	5
241	1	do	4	5	303	1	do	7	5
242	1	do	3	5	304	1	June 11, 1926	49	20
243	1	do	3	5					
					305	1	Mar. 1, 1926	3	5
244	1	do	3	5	306	1	Apr. 1, 1926	3	5
245	1	June 13, 1925	3	5	307	1	Apr. 19, 1926	3	5
246	1	June 11, 1925	3	5	308	1	do	3	5

## VIII. GOVERNMENT DEPOSITORY REFERENCE LIBRARIES

Congress designates in the several congressional districts certain libraries as "Government depository libraries." These are entitled to receive any or all groups of Government publications on the understanding that they are kept available for consultation by the general public.

In case the Superintendent of Documents or the Bureau of Standards receives a request for a publication which can no longer be supplied, the correspondent is referred to the nearest depository reference library at which this publication can be consulted.

The following libraries (arranged by States) maintain reference files of bureau publications. Except where marked "Complete," initial letters indicate the series which are available:

- S, Scientific Papers.
- T, Technologic Papers.
- C, Circulars.
- H, Handbooks.
- A, Annual reports.
- W, Reports of Weights and Measures Conferences.
- M, Miscellaneous publications.

Location	Library	Publications received	Location	Library	Publications received
ALABAMA			DELAWARE		
Auburn.....	Alabama Polytechnic Institute.	STCAWM.	Dover.....	Delaware State University of Delaware.	SA. STCA.
Birmingham.....	Howard College.....	STHWM. Complete.	Newark.....	University of Delaware.	
Montgomery.....	Public.....	Do.	Wilmington.....	Wilmington Institute Free.	Complete.
Tuskegee Institute.	State Capitol.....	STCH.	DISTRICT OF COLUMBIA		
University.....	Tuskegee Institute.	Complete.	Washington.....	Department of Agriculture.	Do.
ALASKA				Department of Interior.	Do.
Fairbanks.....	Alaska Agricultural College and School of Mines.	Complete.		Department of Justice.	HA.
Juneau.....	Alaska Historical and Museum	SW.		Navy Department Treasury Department.	STCHW. A.
ARIZONA			FLORIDA		
Phoenix.....	Arizona State Phoenix Public.....	A. STC. Complete.	De Land.....	John B. Stetson University.	STA.
Tucson.....	University of Arizona.	Complete.	Gainesville.....	University of Florida.	Complete.
ARKANSAS			Jacksonville.....	Jacksonville Public.	STCHWM.
Conway.....	Hendrix College.....	STCHWM.	Winter Park.....	Rollins College.....	S.
Payetteville.....	University of Arkansas.	STCAWM.	GEORGIA		
Jonesboro.....	State Agricultural School.	ST.	Athens.....	University of Georgia.	Complete.
CALIFORNIA			Atlanta.....	Carnegie.....	Do.
Berkeley.....	University of California.	Complete.	Savannah.....	Georgia State University.	W. STC.
Claremont.....	Pomona College.....	Do.	HAWAII		
Eureka.....	Eureka Free.....	Do.	Honolulu.....	University of Hawaii.	Complete.
Fresno.....	Fresno County Free.	Do.	IDAHO		
Los Angeles.....	Los Angeles Public.	Do.	Boise.....	Idaho State University.	STAM. Complete.
Oakland.....	Oakland Free.....	Do.	Moscow.....	Idaho University of Idaho.	Do.
Riverside.....	Riverside Public.....	Do.	Pocatello.....	Idaho Technical Institute.	
Sacramento.....	California State City Free.....	Do.	ILLINOIS		
San Diego.....	San Diego Public.....	Do.	Belleville.....	Belleville Public.....	STC.
San Francisco.....	Mechanics Mercantile.	STCHM.	Bloomington.....	Illinois Wesleyan University.	Complete.
	San Francisco Public.	Complete.	Chicago.....	Chicago Public.....	Do.
Stanford University.	Leland Stanford, jr., University.	Do.		John Crerar.....	Do.
Stockton.....	Stockton Free Public.	STCHM.		Newberry.....	H.
COLORADO				St. Ignatius High School.	STAM.
Boulder.....	University of Colorado.	Complete.		University of Chicago.	Complete.
Colorado Springs	Colorado College.....	Do.	Danville.....	Danville Public.....	S.
Denver.....	Colorado State Public.....	Do.	Evanston.....	Northwestern University.	STCAWM.
	Regis College.....	SA.	Freeport.....	Freeport Public.....	STCHAW.
	University of Denver.	Complete.	Galesburg.....	Free Public.....	Complete.
Fort Collins.....	State Agricultural College.	Do.	Jacksonville.....	Jacksonville Public.	Do.
Pueblo.....	McClelland Public.	TC.	Lisle.....	St. Procopius College.	ST.
CONNECTICUT			McLeansboro.....	Mary E. C. McCoy Memorial.	Complete.
Bridgeport.....	Bridgeport Public.	Complete.	Monmouth.....	Monmouth College.	STA.
Hartford.....	Connecticut State College.	Do.	Normal.....	Illinois State Normal University.	Complete.
Middletown.....	Trinity College.....	STCAW.	Peoria.....	Peoria Public.....	Do.
	Wesleyan University.	Complete.	Rockford.....	Public.....	STCHWM.
New Haven.....	Yale University.....	Do.	Springfield.....	Illinois State.....	Complete.
Storrs.....	Connecticut Agricultural College.	STCHWM.	Urbana.....	University of Illinois.	Do.
Waterbury.....	Silas Bronson.....	STCH.			

Location	Library	Publications received	Location	Library	Publications received
INDIANA			MAINE		
Bloomington...	Indiana University.	Complete.	Augusta.....	Maine State.....	STCHWM.
Crawfordsville..	Wabash College..	Do.	Brunswick.....	Bowdoin College..	Complete.
Fort Wayne.....	Public.....	Do.	Lewiston.....	Bates College.....	STCAM.
Greencastle.....	Depauw University.	Do.	Orono.....	University of Maine.	Complete.
Hanover.....	Hanover College..	STC.	Portland.....	Portland Public..	Do.
Indianapolis....	Indiana State....	Complete.	Saco.....	Dyer.....	STCH.
	Indianapolis Public.	Do.	Waterville....	Colby College....	STC.
La Fayette.....	Purdue University.	Do.	MARYLAND		
Merom.....	Union Christian College.	STA.	Annapolis.....	Maryland State..	A.
Muncie.....	Public.....	STCHWM.		United States Naval Academy.	ST.
Notre Dame....	University.....	Complete.	Baltimore.....	Baltimore City....	Complete.
Richmond.....	Morrison Reeves..	STC.		Enoch Pratt Free	Do.
Terre Haute....	Indiana State Normal.	Complete.		Johns Hopkins University.	Do.
IOWA				Peabody Institute	Do.
Ames.....	Iowa State College.	Complete.		Washington College.	STCW.
Council Bluffs..	Free Public.....	STH.	Chestertown...	Washington College.	
Des Moines.....	Iowa State Public.	STCHAW.	Westminster...	Western Maryland College.	ST.
	Public.....	STCHAM.	MASSACHUSETTS		
Dubuque.....	Carnegie-Stout Free Public.	T.	Amherst.....	Amherst College..	Complete.
Fairfield.....	Fairfield Free Public.	Complete.		Massachusetts Agricultural College.	Do.
Fayette.....	Upper Iowa University.	STH.	Boston.....	Boston Public....	Do.
Grinnell.....	Grinnell College..	Complete.		State Library of Massachusetts.	Do.
Iowa City.....	State University of Iowa.	Do.	Cambridge.....	Harvard College..	Do.
Mount Pleasant	Iowa Wesleyan College.	SCW.	Lynn.....	Lynn Public.....	STCAWM
Mount Vernon..	Cornell College..	STM.	New Bedford...	Public.....	TCHA.
Sioux City.....	Sioux City Public.	Complete.	Salem.....	Essex Institute..	STA.
KANSAS			Tufts College...	Tufts College....	STCA.
Baldwin.....	Baker University.	Complete.	Williamstown...	Williams College..	Complete.
Emporia.....	Kansas State Teachers College.	STC.	Worcester.....	American Antiquarian Society.	Do.
Lawrence.....	University of Kansas.	Complete.	MICHIGAN		
Manhattan.....	Kansas State Agricultural College.	Do.	Ann Arbor.....	University of Michigan.	Complete.
Pittsburg.....	Pittsburg Public..	Do.	Battle Creek...	Public.....	W.
Topeka.....	Kansas State....	STCWM.	Detroit.....	Detroit College..	T.
KENTUCKY				Public.....	Complete.
Danville.....	Center College....	Complete.	East Lansing...	Michigan State Agricultural College.	Do.
Glasgow.....	Glasgow Library Association.	SH.	Grand Rapids..	Grand Rapids Public.	Do.
Henderson.....	Henderson Public.	Complete.	Houghton.....	Michigan College of Mines.	Do.
Lexington.....	University of Kentucky.	Do.	Kalamazoo.....	Public.....	Do.
Louisville.....	Louisville Free Public.	Do.	Lansing.....	Michigan State..	Do.
Murray.....	Murray State Normal School.	CAW.	Muskegon.....	Hackley Public..	STCAW.
Somerset.....	Carnegie Public..	ST.	Orchard Lake..	Polish Seminary..	STCHAM.
Winchester....	Kentucky Wesleyan College.	STCHAM.	Port Huron....	Public.....	Complete.
LOUISIANA			Saginaw.....	Hoyt Public.....	Do.
Baton Rouge...	Louisiana State University.	Complete.	MINNESOTA		
Natchitoches...	State Normal School.	STA.	Duluth.....	Duluth Public....	STC.
New Orleans...	Howard Memorial.	STWM.	Fergus Falls...	Carnegie Public..	H.
	Louisiana State Museum.	Complete.	Minneapolis...	Public.....	Complete.
	New Orleans Public.	Do.		University of Minnesota.	Do.
Shreveport....	Tulane University.	Do.	St. Paul.....	Minnesota Historical Society.	A.
	Shreveport Memorial.	Do.		Minnesota State..	Complete.
		Do.	MISSISSIPPI		
			Agricultural College.	Mississippi Agricultural and Mechanical College.	Complete.
			Greenville....	Greenville Public.	Do.

Location	Library	Publications received	Location	Library	Publications received
MISSOURI			NEW MEXICO		
Cape Girardeau	State Teachers' College.	Complete.	Albuquerque	University of New Mexico.	Completa.
Columbia	University of Missouri.	Do.	East Las Vegas.	New Mexico Normal University.	Do.
Fulton	Westminster College.	Do.	State College	New Mexico College of Agriculture and Mechanical Arts.	Do.
Jefferson City	Missouri State	ST.			
Kansas City	Kansas City Public.	Complete.	NEW YORK		
Liberty	Rockhurst College	STCHWM.	Albany	New York State	Do.
Rolla	William Jewell College.	Complete.	Brooklyn	Brooklyn Public Pratt Institute	Do.
St. Joseph	Missouri School of Mines.	STCWM.		Free.	Do.
St. Louis	St. Joseph Public.	STCHW.	Buffalo	Buffalo Public	Do.
	St. Louis Public.	Complete.		Grosvenor	Do.
	St. Louis University.	Do.	Canton	St. Lawrence University.	STCAWM.
Springfield	Washington University.	Do.	Glen Falls	Crandall Free	ST.
Warrensburg	Drury College Library.	STCHWM.	Hamilton	Colgate University.	Complete.
	Central Missouri State Teachers College.	SCHAW.	Ithaca	Cornell University.	Do.
MONTANA			Keuka Park	Keuka College	S.
Bozeman	Montana State College.	Complete.	Newburgh	Newburgh Free	ST.
Butte	Montana State School of Mines.	Do.	New York	College of the City of New York.	Complete.
Helena	Helena Public.	Do.		Columbia University.	Do.
	Historical Society of Montana.	Do.		New York Public, Astor Branch.	Do.
Lewistown	Fergus County High School.	STCAM.		New York Public, Lenox Branch.	Do.
Missoula	State University.	Complete.		New York University.	Do.
NEBRASKA				The New York World.	A.
Blair	Dana College	T.	Poughkeepsie	Adriance Memorial.	ST.
Freomont	Midland College	STCWM.	Rochester	Rochester University.	Complete.
Lincoln	Nebraska State University of Nebraska.	Complete.	Schenectady	Union College	Do.
	Omaha Public	Do.	Syracuse	Syracuse University.	Do.
NEVADA			Troy	Troy Public	Do.
Carson City	Nevada State	STAM.	Utica	Utica Public	STC.
Reno	University of Nevada.	Complete.	NORTH CAROLINA		
NEW HAMPSHIRE			Chapel Hill	University of North Carolina.	Complete.
Concord	New Hampshire State.	STA.	Durham	Trinity College	Do.
Durham	New Hampshire State College.	STCHAW.	Newton	Catawba College	STC.
Hanover	Dartmouth College.	Complete.	Raleigh	North Carolina State College of Agriculture and Engineering.	Complete.
Laconia	Laconia Public	STC.		North Carolina State.	Do.
Manchester	City	Complete.	Wake Forest	Wake Forest College.	S.
NEW JERSEY			Washington	Public Schools	Do.
Atlantic City	Free Public	STCHWM.	NORTH DAKOTA		
Bayonne	do.	Do.	Agricultural College.	North Dakota Agricultural College.	STCAW.
Camden	Camden Free Public.	STC.		North Dakota State.	TC.
Elizabeth	Public	Complete.	Bismarck	North Dakota State University.	Complete.
Jersey City	Free Public	Do.		State University of North Dakota.	
Newark	do.	Do.	Valley City	State Teachers College.	STCW.
New Brunswick	do.	Do.			
Princeton	Rutgers College.	Do.			
	Princeton University.	Do.			
Trenton	Free Public	STCHAM.			
	New Jersey State.	Complete.			

Location	Library	Publications received	Location	Library	Publications received	
OHIO			PENNSYLVANIA—continued			
Alliance.....	Mount Union College.	Complete.	Philadelphia....	Free.....	Complete. Do.	
Athens.....	Ohio University..	STA.	Philadelphia....	Library Company of Philadelphia, R i d g w a y Branch.	Do.	
Chillicothe.....	Public.....	STH.		Mercantile.....	S.	
Cincinnati.....	do.....	Complete.		Philadelphia Museum.	STCHWM	
Cleveland.....	Western Reserve University.	Do.		University of Pennsylvania.	Complete.	
Columbus.....	Case.....	Do.		Pittsburgh....	Carnegie Free of Allegheny.	STCH.
	Cleveland Public.	Do.		Carnegie.....	Complete. Do.	
	Columbus Public.	Do.		Scranton.....	University of Pittsburgh.	STHAM.
Ohio State.....	Do.	State College....			Pennsylvania State College.	Complete.
Dayton.....	Ohio State University.	Do.		Swarthmore....	Swarthmore College.	Do.
Dayton.....	Dayton Public....	Do.		Warren.....	Warren Library Association.	STH.
Delaware.....	Ohio Wesleyan University.	STCHAW.	Washington....	Washington and Jefferson College.	Complete.	
Gambier.....	Kenyon College..	Complete.	Wilkes-Barre..	Wyoming Historical and Geological Society.	STCWM.	
	Granville.....	Denison University.	Williamsport..	James V. Brown..	ST.	
Hiram.....	Hiram College....	STCAWM.	PHILIPPINE ISLANDS			
	Marietta College.	Complete.	Manila.....	Philippine Library and Museum.	Complete.	
Oberlin.....	Oberlin College..	Do.	RHODE ISLAND			
Oxford.....	Miami University.	Do.	Kingston.....	Rhode Island State College.	Complete.	
Sidney.....	Sidney Public....	STCM.	Providence....	Brown University. Providence Public. Rhode Island State.	Do. Do. Do.	
Springfield....	Werder Public....	Complete.	Westerly.....	Westerly Public... H.		
Toledo.....	Toledo Public....	Do.	SOUTH CAROLINA			
Van Wert.....	Brumbach.....	STCHM.	Charleston....	Charleston College.	STH.	
Youngstown....	Reuben McMillan Free.	Do.	Clemson College.	Charleston Library Society.	ST.	
OKLAHOMA			Clinton.....	Clemson Agricultural College.	Complete.	
Ada.....	East Central State Normal School.	ST.	Columbia.....	Presbyterian College of South Carolina.	Do.	
Alva.....	Northwestern State Teachers College.	STHA.	Rockhill.....	University of South Carolina. Winthrop College.	STCAWM. A.	
	Enid.....	Enid Carnegie....	SOUTH DAKOTA			
Miami.....	Miami Public....	STCHM. T.	Brookings....	South Dakota State College.	Complete.	
Norman.....	University of Oklahoma.	Complete.	Huron.....	Huron College.	S.	
Oklahoma City.	Oklahoma State..	STCAW.	Mitchell.....	Dakota Wesleyan University.	ST.	
Stillwater.....	Oklahoma Agricultural and Mechanical College.	Complete.	Pierre.....	South Dakota State.	ST.	
Tablequah....	Northeastern State Teachers College.	STCA.	Sioux Falls....	Carnegie Free Public.	STCHA.	
	OREGON			Vermilion....	University of South Dakota.	Complete.
Corvallis.....	Oregon Agricultural College.	TCHAWM.	Yankton.....	Yankton College..	SAM.	
Eugene.....	University of Oregon.	Complete.	PENNSYLVANIA			
Forest Grove..	Pacific University.	STCH.	Bethlehem....	Lehigh University	STCHAW.	
Portland.....	Library Association of Portland.	Complete.	Bradford.....	Carnegie Public..	STCA.	
Salem.....	Reed College....	Do.	Erie.....	Erie Public.....	STCW.	
	Oregon State....	Do.	Gettysburg....	Gettysburg College.	STC.	
PENNSYLVANIA			Harrisburg....	Pennsylvania State.	Complete.	
Bethlehem....	Lehigh University	STCHAW.	Haverford....	Haverford College.	STCAWM.	
Bradford.....	Carnegie Public..	STCA.	Huntingdon....	Junia College....	S.	
Erie.....	Erie Public.....	STCW.	Lancaster.....	Franklin and Marshall College.	S.	
Gettysburg....	Gettysburg College.	STC.	Meadville....	Allegheny College.	ST.	
Harrisburg....	Pennsylvania State.	Complete.				
Haverford....	Haverford College.	STCAWM.				
Huntingdon....	Junia College....	S.				
Lancaster.....	Franklin and Marshall College.	S.				
Meadville....	Allegheny College.	ST.				

Location	Library	Publications received	Location	Library	Publications received
TENNESSEE			VIRGINIA—con.		
Chattanooga.....	Chattanooga Public.	Complete.	Lexington.....	Virginia Military Institute.	Complete.
Johnson City.....	Wayne Williams Public.	Do.		Washington and Lee University.	Do.
Knoxville.....	University of Tennessee.	Do.	Richmond.....	Virginia State.....	Do.
McKenzie.....	Bethel College.....	O.	Salem.....	Roanoke College.....	Do.
Memphis.....	Cossitt.....	Complete.	University.....	University of Virginia.	Do.
Murfreesboro.....	Middle Tennessee State Normal.	STCAW.	University of Richmond.	University of Richmond.	ST.
Nashville.....	Carnegie Library. Vanderbilt University.	Complete. Do.	WASHINGTON		
TEXAS			Everett.....	Everett Public.....	SCHAM.
Austin.....	Texas State.....	Complete.	Olympia.....	Washington State.	STCH.
	University of Texas.	Do.	Pullman.....	State College of Washington.	Complete.
Clarendon College Station.	Clarendon College. Agricultural and Mechanical College.	S. Complete.	Seattle.....	Seattle Public.....	Do.
Dallas.....	Dallas Public.....	STCAW.		University of Washington.	Do.
El Paso.....	Public.....	Complete.	Spokane.....	Spokane Public.....	Do.
Fort Worth.....	Carnegie Public.....	Do.	Tacoma.....	Tacoma Public.....	STCHWM.
	Texas Christian University.	Do.	Walla Walla.....	Whitman College.	Complete.
Galveston.....	Rosenberg.....	Do.	WEST VIRGINIA		
Georgetown.....	Southwestern University.	Do.	Athens.....	Concord State Normal School.	SCWM.
Houston.....	Houston Public.....	Do.	Charleston.....	State.....	Complete.
San Antonio.....	Carnegie.....	ST.	Fairmont.....	Fairmont State Normal.	ST.
Waco.....	Baylor.....	Complete.	Institute.....	West Virginia College State Institute.	Complete.
UTAH			Montgomery.....	New River State School.	SA.
Ephraim.....	Snow College.....	Complete.	Morgantown.....	West Virginia University.	Complete.
Logan.....	Utah Agricultural College.	Do.	WISCONSIN		
Ogden.....	Carnegie Free.....	STCHAM.	Appleton.....	Lawrence College.	ST.
Provo.....	Brigham Young University.	Complete.	Beloit.....	Beloit College.....	Complete.
Salt Lake City..	University of Utah.	Do.	Eau Claire.....	Eau Claire Public.	STCAWM.
VERMONT			Fond du Lac.....	Fond du Lac Public.	SW.
Burlington.....	University of Vermont.	Complete.	La Crosse.....	La Crosse Public..	A.
Middlebury.....	Middlebury College.	Do.	Madison.....	State Historical Society.	Complete.
Montpelier.....	Vermont State.....	Do.	Milwaukee.....	State.....	CHAW.
Northfield.....	Norwich University.	Do.		Milwaukee Public.	Complete.
VIRGINIA			Racine.....	Racine Public.....	Do.
Blacksburg.....	Virginia Polytechnic Institute.	Complete.	Superior.....	Superior Public.....	ST.
Bridgewater.....	Bridgewater College.	STA.	WYOMING		
Emory.....	Emory and Henry College.	S.	Cheyenne.....	Wyoming State... University of Wyoming.	STCHWM.
			Laramie.....		Complete.



## IX. SCIENTIFIC PAPERS

### S509. Alternating Current Distribution in Cylindrical Conductors-- Chester Snow

General theory of propagation of periodic waves along parallel cylindrical conductors and dielectrics. The existence and uniqueness of scalar and vector potentials is proven and their properties examined by the construction of a generalized Green's function and an analogous magnetic flux function. From the formal solutions, the physical concepts, coefficients of leakage, capacity, resistance, and inductance, and the propagation constant are given as functions of the frequency which reduce to the ordinary constants in case the frequency is so low or the cross section of the conductors so small that the current distribution is practically uniform in each section. High-frequency formulas are obtained for these quantities in the case of two unequal circular cylinders having different electrical constants. (July 24, 1925.) pp. 62. Price, 10 cents.

### S510. Effect of Wear on the Magnetic Properties and Tensile Strength of Steel Wire---- Raymond L. Sanford, Walter L. Cheney, and James M. Barry

In order to design intelligently apparatus for the magnetic testing of wire hoisting rope, it is necessary to have a knowledge of the fundamental principles involved. This paper describes experiments to determine the effect of wear on the magnetic properties and tensile strength of steel wire of the kind used in the manufacture of wire rope. It was found that the magnetic properties of the wire were altered by wear and that this change was accompanied by an increase in tensile strength. (July 24, 1925.) pp. 6. Price, 5 cents.

### S511. A Nonintermittent Sensitometer (Time-Scale Exposure Machine) with Clock Controlled Motor Drive----- Raymond Davis

The sensitometer described contains a gear driven sector wheel with which the time-scale exposures are made, during a single revolution. The sector wheel may be run at a wide range of speeds by power-of-two steps. A new arrangement of the sector apertures is shown and the method of construction and calibration is discussed. The speed of the motor which runs the apparatus is controlled by a clock so the precision is obtained in the exposure time. The method used and the electrical circuits are given in this paper. (Aug. 20, 1925.) pp. 26. Price, 15 cents.

### S512. Temperature Estimates of the Planet Mars----- W. W. Coblentz

This paper gives the results of an investigation of four methods of estimating planetary temperatures, especially of Mars, from radiometric measurements using transmission screen of water, quartz, glass and fluorite (see B. S. Sci. Papers Nos. 438 and 460).

The results obtained are concordant in showing that the bright areas on Mars are cooler than the dark areas, and that the sunset side of the planet is hotter than the sunrise side. The following temperatures were deduced at opposition (August 21, 1924); equatorial bright areas  $-10$  to  $+5^{\circ}$  C., dark areas  $10$  to  $20^{\circ}$  C., north polar region  $-70^{\circ}$  C., south polar region  $0$  to  $10^{\circ}$  C., east limb  $45^{\circ}$  C., west limb  $0^{\circ}$  C., whole disk  $30^{\circ}$  C., night side below  $-70^{\circ}$  C. (Sept. 22, 1925.) pp. 27. Price, 10 cents.

**S513. Origin of Quenching Cracks.....Howard Scott**

The causes of quenching cracks incident to the hardening of tool steels are examined both analytically and experimentally. The results indicate practical expedients for the avoidance of quenching cracks. (Sept. 25, 1925.) pp. 46  
Price, 20 cents.

**S514. Gases in Metals: II. The Determination of Oxygen and Hydrogen in Metals by Fusion in Vacuum.....Louis Jordan and James R. Eckman**

A study was made of three types of vacuum fusion methods for determining gases in ferrous metals, viz, fusion of the metal (a) in a refractory oxide crucible, (b) with an alloy of antimony and tin, and (c) in a graphite crucible. The method finally selected as the most satisfactory procedure for determining oxygen and hydrogen in pure iron steels and cast irons was that of fusion in graphite. Metal samples contained in an evacuated fused silica tube were melted by high-frequency induction heating. A train of solid absorbents for the determination of H<sub>2</sub>O, CO<sub>2</sub>, CO, and H<sub>2</sub> was developed, tested, and used for the gravimetric determination of total oxygen and hydrogen evolved from the fused sample. (Oct. 9, 1925.) pp. 38. Price, 10 cents.

**S515. Thermal Expansion of Tungsten.....Peter Hidnert and W. T. Sweeney**

This paper gives the results of an investigation on the thermal expansion of tungsten (99.98 per cent) over various temperature ranges between -100 and +500° C. A summary of available data by previous observers on the thermal expansion of tungsten is included. The expansion of tungsten is given by the following empirical equation:

$$L_t = L_0 [1 + (4.28 t + 0.00058 t^2) 10^{-6}]$$

where  $L_t$  represents the length of the metal at any temperature  $t$  between -105 and +502° C., and  $L_0$  the length at 0° C. Average coefficients of expansion for various temperature ranges are given in a table. (Dec. 1, 1925.) pp. 5. Price 5 cents.

**S516. A Shielded Resistor for Voltage Transformer Testing..Francis B. Silsbee**

The equipment and method used at the Bureau of Standards for the precise testing of voltage transformers up to 30,000 volts is described in detail. A general discussion of the various errors which may arise in apparatus of this type as a result of capacitance between the various parts is included, together with suggestions as to other applications and limitations of shielded resistors. (Dec. 2, 1925.) pp. 26. Price, 15 cents.

**S517. A Special Camera for Photographing Cylindrical Surfaces..Raymond Davis**

This paper describes a camera designed for photographing the entire outside surface of short lengths of pipe which had been subjected to soil corrosion tests.

The pipe is rotated by means of a belt which is driven by a pulley of the camera. The film moves at speed equal to that of the image of the pipe. An automatic switch stops the camera after the complete surface of the pipe has been photographed. In this way a picture of the entire surface is obtained in one piece. The design is applicable to the photographing of other cylindrical objects. (Dec. 5, 1925.) pp. 12. Price, 10 cents.

**S518. Metallographic Etching Reagents, III; For Alloy Steels**

Edward C. Groesbeck

There has been lacking in the literature a rationale, which would guide one in making an intelligent selection of a suitable etching solution for identifying, by means of metallographic etching methods, the constituents present in various alloy steels, ferroalloys, and special alloys. This investigation was undertaken, with the object of furnishing such a rationale for alloy steels containing chromium, tungsten, and vanadium. Experimental data on the etching behavior of typical

constituents, found present in these steels and ferroalloys, and in high-speed steels, toward various alkaline solutions were obtained. The principles governing this behavior were determined from these data, and results of tests made with certain solutions. A differentiation of the various constituents is thus made possible. (Dec. 11, 1925.) pp. 60. Price, 25 cents.

**S519. The Preparation of Levulose**

Richard F. Jackson, Clara Gillis Silsbee, and Max J. Proffitt

It is demonstrated that levulose, the sweetest member of the sugar group, can be prepared at moderate cost from the Jerusalem artichoke or the dahlia. Artichoke juices are, immediately upon extraction, acidified with sulphuric or hydrochloric acid and converted by heating to 70 or 80 °C. for 30 to 45 minutes. Lime is then added to very slight alkalinity, neutralizing the acid and defecating the juice. From juices of sufficiently high purity levulose may be crystallized directly. From impure juices levulose may be isolated in the form of its insoluble compound with lime. By the latter process sirups of 94 per cent purity may be obtained. Crystallization, which has hitherto necessitated the use of expensive organic reagents, is accomplished directly from aqueous sirups. (Jan. 12, 1926.) pp. 31. Price, 10 cents.

**S520. Nonflammable Liquids for Cryostats**----- C. W. Kanolt

Several very serious accidents have occurred in laboratories as the result of the use of flammable liquids in cryostats, in which a liquid of low-freezing point is required. In some instances burning liquid has been thrown upon the operator. The purpose of this work is to find liquids that will not burn, and are suitable for use in cryostats. By mixing several ingredients in suitable proportions liquids have been produced having lower freezing points than any of the ingredients. Their viscosities and corrosiveness have been investigated. Liquids that will not burn and can be used to -150° C. are described. (Mar. 17, 1926.) pp. 15. Price, 10 cents.

**S521. Measurements of the Index of Refraction of Glass at High Temperatures**----- C. G. Peters

The index of refraction of a substance is equal to the ratio of the number of waves of light in a given distance in the material to the number of waves in an equal distance in vacuum. With the interference method described in this paper the number of waves under these two conditions can be determined and the change in the index with varying conditions can be measured. The indexes of nine different glasses, including flints, crowns, and pyrex, were measured for the temperature interval, 20 to 700° C. It was found that the glasses passed through a critical expansion region near 500° C. in which the expansion rate increased by 2 to 7 times. The index of refraction increased from 20° to the critical region, then decreased in the rapid expansion region, and increased again above the softening temperature. (Mar. 17, 1926.) pp. 25. Price, 10 cents.

**S522. Pure Zinc at Normal and Elevated Temperatures**

John R. Freeman, jr., Frederick Sillers, jr., Paul F. Brandt

A study was made of the physical properties and crystal structure of pure zinc. Data are given on the following properties: Coefficient of expansion, density, scleroscope and Brinell hardness, tensile properties and crystal structure at normal and elevated temperatures. Proof is given that zinc has but one allotropic form between normal temperatures and the melting point. (Apr. 3, 1926.) pp. 35. Price, 15 cents.

**S523. Wind Pressure on Structures-----Hugh L. Dryden, George C. Hill**

Available data on wind pressure are based on experiments made many years ago on models which do not resemble the forms commonly used for structures. The authors discuss the various features of the general problem and give a brief summary of pertinent results of modern wind tunnel investigations in the first section of the paper. A second section contains the results of measurements of pressure distribution over a model of a tall building with the wind blowing in various directions. (Apr. 3, 1926.) pp. 36. Price, 20 cents.

**S524. Measurements on the Thermal Expansion of Fused Silica**

**Wilmer Souder and Peter Hidnert**

This paper gives the results of an investigation on the thermal expansion of transparent and nontransparent fused silica for various temperature ranges between  $-125$  and  $1,000^{\circ}$  C. A total of 48 expansion tests were made on 17 samples of fused silica. A critical temperature or minimum length was found at about  $-80^{\circ}$  C. Expansion occurred on heating fused silica above the critical temperature or cooling below this temperature. The coefficients of expansion of the transparent samples differ slightly from the coefficients of the nontransparent samples. Typical expansion curves are shown and discussed. The authors' average expansion curve is compared with the results of previous investigators. The average coefficient of expansion between 20 and  $1,000^{\circ}$  C. was found to be  $0.48 \times 10^{-6}$  per  $^{\circ}$ C. A description of the expansivity equipment used in making these tests is included in the paper. (Apr. 13, 1926.) pp. 23. Price, 10 cents.

**S525. A Unicontrol High-Frequency Radio Direction Finder----F. W. Dunmore**

This paper deals with the development of a special type of radio direction finder for use in taking bearings on a frequency of 2,100 kc (143 m). An installation on a 75-foot Coast Guard patrol boat is described. This direction finder is used in conjunction with a superheterodyne receiving set without alteration in the circuit. This receiving set is part of the radio equipment on these boats. The coil consists of 4 turns, 20 inches square, of heavy ignition cable. A special coupling transformer is used between the coil and the receiving set. A bearing is taken simply by rotating the direction finder coil; the balancing condenser is operated automatically by means of a cam on the direction-finder shaft. (Apr. 16, 1926.) pp. 11. Price, 5 cents.

**S526. Transmission and Absorption of Sound by Some Building Materials**

**E. A. Eckhardt and V. L. Chrisler**

This paper contains a report of the work on sound transmission through partition walls, and on the sound-absorbing properties of these walls and of various other materials commonly used in building construction. A description is given of the new sound chamber erected for the purpose of this work; details of the experimental methods are described and relative results of both transmission and absorption measurements tabulated. These results are given for frequencies covering the range from 250 to 3,470 cycles per second. Specifications for the construction of the various panels used in transmission tests are appended. It is found that as far as transmissivity goes certain panels are sufficiently opaque to sound to reduce a sound of painful intensity to complete inaudibility. The poorest panels tested were capable of reducing such a sound to about the intensity of the ordinary speaking voice. (Apr. 28, 1926.) pp. 29. Price, 15 cents.

**S527. Short Tests for Sets of Laboratory Weights-----A. T. Pienkowsky**

This paper outlines rough checks for gross errors and two very short calibration systems for determining the actual error or correction for each weight of a set from 100 grams to one milligram, or of similar arrangements of other denominations.

Ordinary "direct" weighings may be used. Numerical examples are given, also notes on the balance, the buoyant effect of the air, the determination of relative instead of actual values for weights, and other details. (May 17, 1926.) pp. 29. Price, 10 cents.

**S528. A Study of the Relation Between Intermittent and Nonintermittent Sector Wheel Photographic Exposures-----Raymond Davis**

A comparison of sector wheel intermittent and equal nonintermittent exposures shows that the photographic density difference varies with the emulsion used, the illumination, the number of interruptions, and the rest periods between. When the illumination is above a certain level a greater effect results from the intermittent exposure; and conversely, for lower illuminations a loss is obtained. The magnitude of the loss or gain is affected by the number of exposures and the rest period after each exposure. The gain or loss, as the case may be, is accentuated by each interruption. (May 18, 1926.) pp. 45. Price, 20 cents.

**S529. A Review of the Literature Relating to the Normal Densities of Gasses  
Marion Smith Blanchard and S. F. Pickering**

In this review of the literature relating to the normal densities of gasses an attempt is made to choose the most reliable value for each gas. The number of sources of the gas in question, the methods used for its purification, the precautions observed in making the experimental measurements, the number of observations made, the agreement between observations of a set and the concordance between the results of the different observers have all been carefully considered in the selection of a final value. (May 28, 1926.) pp. 37. Price, 15 cents.

## X. TECHNOLOGIC PAPERS

**T290. Relation Between the Heating Value of Gas and Its Usefulness to the customer.....E. R. Weaver**

This paper contains a critical review of the data which have been made public regarding the relation between the heating value of gas and its usefulness to the customer. The data are divided into two classes—those relating to direct observations of the useful effects from the utilization of gases of different qualities in the appliances in common use and statistical data showing changes in quantity of gas used which accompanied changes in heating value. It is found that there is general agreement both between the two classes of data and within each class. Some of the consequences of the relation found are pointed out. (July 19, 1925.) pp. 117. Price, 30 cents.

**T291. Tests of Hollow Tile and Concrete Slabs Reinforced in One Direction  
Douglas E. Parsons, Ambrose H. Stang**

This paper describes the results of tests made for the purpose of obtaining information on the value of hollow tiles in resisting bending and shearing stresses when combined in hollow tile and concrete slabs reinforced in one direction. The test pieces consisted of 42 beams from 8 feet 10 inches to 15 feet 3 inches long, all 8 inches deep and having a maximum width of 30 inches. Observations were made of the deformation in the concrete tiles and reinforcement, deflection of the center of the beam, and development of cracks as the loads were supplied. The results indicate that the tiles assisted the concrete in resisting bending and shearing stresses. Tables and curves give a summary of the test data, and comparisons are made between these and the usual design computations for reinforced concrete beams. (Aug. 12, 1925.) pp. 50. Price, 25 cents.

**T292. Relative Merits of Cotton and Jute Cement Sacks....Robert J. Morris**

This paper contains information concerning the tests made and the apparatus used to determine the relative merits of cotton Osnaburg and jute burlap sacks used as containers for Portland cement. A brief description is given of the physical tests for breaking strength, thread count, length, width, stretch, and resistance to drop; also of the practical tests made, such as the service test, where the sacks were filled with hot, freshly ground cement; the humidity test, where samples were exposed to various atmospheric conditions; and the moisture test, where the sacks of cement were subjected to excessively damp conditions. (Aug. 7, 1925.) pp. 22. Price, 10 cents.

**T293. Condensation of Water from Engine Exhaust for Airship Ballasting  
Robert F. Kohr**

An airship in flight becomes lighter as fuel is consumed by the engines. In order to correct this effect without releasing lifting gas, apparatus has been developed to condense, from the engine exhaust gas, enough of the water of combustion, formed by combination of the oxygen of the air with the hydrogen of the fuel, to compensate for the weight of fuel burned. The exhaust gas is cooled in a bank of thin aluminum tubes exposed to the air stream, and such of the condensed water as can not be directly drained from the tubes is collected in a baffle-type separator at the outlet end. The ballast normally carried may be reduced so that the addition of the condensing apparatus need not increase the load carried. (Aug. 13, 1925.) pp. 41. Price, 25 cents.

**T294. Wearing Qualities of Tire Treads as Influenced by Reclaimed Rubber**  
W. L. Holt and P. L. Wormeley

Service tests were made on 80 "sectional tread" tires in order to determine the comparative resistance to wear of tread compounds containing reclaimed rubber and those compounded using new rubber only. The tread of each tire was made in four sections, each section representing a compound under test. The results of tread wear as obtained from each individual tire are shown and for comparison data on laboratory wear tests of the same rubber compounds are also given. These results show that the substitution of reclaimed rubber for new rubber in these compounds reduces the resistance of reclaimed rubber used. (Aug. 13, 1925.) pp. 10. Price, 5 cents.

**T295. Initial Temperature and Mass Effects in Quenching**

H. J. French and O. Z. Klopsch

In this report are given results of quenching experiments with high-carbon steels in which the speed of cooling was determined at the center of spheres, rounds, and plates of various dimensions quenched from various temperatures into different coolants, such as water, 5 per cent NaOH; oils; and air. The cooling velocity at 720° C. is taken as the best measure of hardening produced, and relations are developed between this and the size and shape of steel quenched. Knowing the described cooling rate at the center of any one size of the simple shapes quenched in any of the customary quenching media, such as oils and aqueous solutions, the velocity in any other size in such shapes can be closely approximated from the included data when the steel is quenched from any temperature between 720 and 1,050° C. Typical examples are given. (Aug. 25, 1925.) pp. 30. Price, 10 cents.

**T296. Flow in a Low-Carbon Steel at Various Temperatures**

H. J. French and W. A. Tucker

This report relates to flow (elongation) in 0.25 per cent carbon steel subjected to a fixed total load in tension at constant temperature within the range 70 to 1,100° F. (20 to 595° C.). The character of flow is described, and the factors governing selection of maximum allowable stresses are discussed for service in which very long life is required and the case in which both long life and freedom from appreciable deformation must be considered. Comparisons are also given between maximum allowable stresses and the stress-strain relations determined in the customary short-time tension tests at various temperatures. (Aug. 25, 1925.) pp. 22. Price, 10 cents.

**T297. A Statistical Study of Conditions Affecting the Distance Range of Radio Telephone Broadcasting Stations**.....C. M. Jansky, jr.

The conditions affecting radio transmission are too complex to permit a simple analysis, and the most satisfactory method of studying such conditions and their variations is the analysis of a large number of similar observations taken by a large number of observers. This paper describes the organization of such a group of observers by the bureau, the methods used for making observations, and the forms used for recording 8,500 observations made over a period of a year (1922-23) on transmitting station KDKA, of the Westinghouse Electric & Manufacturing Co., located at East Pittsburgh, Pa. The data obtained were analyzed on automatic machines and charts given showing (a) variation of strength of atmospherics (b) variation of fading, (c) relative magnitude of obstacles to reception, (d) variation of interference from receiving sets, (e) relative magnitude of obstacles to reception grouped in bimonthly periods, (f) mean reliability as a function of distance. (Oct 8, 1925.) pp. 10. Price, 5 cents.

**T298. Radio-Frequency Resistance and Inductance of Coils Used in Broadcast Reception**.....August Hund and H. B. De Groot

This paper gives data on the radio-frequency resistance and inductance of coils of different shapes and kinds of wire within the range of frequencies used in radiotelephone broadcasting. The experimental results are presented by means of curves in order to give the reader a means for designing a suitable coil. This requires that the particular coil be constructed in accordance with the data given in a table. A statement of the important properties of coils is given. (Oct. 22, 1925.) pp. 18. Price, 10 cents.

**T299. Dielectric Constant, Power Factor, and Resistivity of Rubber and Gutta-Percha**.....H. L. Curtis and A. T. McPherson

This paper describes an investigation of the electrical properties of rubber and gutta-percha to determine their suitability for submarine cable insulation. The adaptation of the form of specimen to electrical measurement is discussed. The properties of gutta-percha and rubber are affected by their composition and methods of preparation. Measurements are given on crude rubber of different varieties and gutta-percha of known composition. The properties of rubber are shown to be affected by vulcanization and by the compounding ingredients incorporated in it. The influence of moisture on electrical properties receives consideration. (Oct. 23, 1925.) pp. 54. Price, 20 cents.

**T300. Development of a Standard Bending Test for Rope Yarns**

Charles W. Schoffstall and Robert C. Boyden

The need for physical tests other than for breaking strength of cordage has made necessary a study of other methods of tests which would more nearly simulate service conditions. Apparatus to test the effect of bending a rope yarn was designed and built. The yarn under tension is bent over a cross arm at the rate of a certain number of oscillations per minute. An auxiliary instrument was designed which would enable the transfer of the specimen from the rope or coil to the clamps of the apparatus without losing any of the original twist. The variables of the apparatus were studied, and a method of test formulated. (Dec. 1, 1925.) pp. 10. Price, 10 cents.

**T301. A Comparative Study of Paper Fillers**

Merle B. Shaw and George W. Bicking

Commercial paper fillers consisting of asbestine, talc, clay, crown filler, and gypsum, were studied to determine their comparative paper-making value. Paper-making tests were made in the semicommercial paper mill of the bureau, amounts of filler added being 10 and 20 per cent of the beater furnish. The paper produced was tested for weight, strength, color, opacity, finish, degree sized, and filler retention. Asbestine, talc, and clay were found to have similar paper-making properties. Crown filler and gypsum being soluble in water yielded somewhat different results from the other insoluble fillers. Retention was considerably less for the soluble materials and, in general, the differences noted in the characteristics of the papers were due chiefly to the difference in the amount of filler retained. The sizing process and the other paper-making operations were not adversely affected by any of the fillers employed. (Dec. 5, 1925.) pp. 16. Price, 10 cents.

**T302. Investigation of Synthetic Tanning Materials**.....Edward Wolesensky

A preliminary study, chiefly qualitative, has been made of the methods of preparation and of the tanning properties of a number of synthetic materials, chiefly sulfonated condensation products of benzene, toluene, naphthalene, phenol, cresylic acid, and alpha and beta naphthol with formaldehyde, and in a few cases also with acetaldehyde and furfural. Most of the products



studied possess tanning properties, and some of them are capable of producing a leather of good color, flexibility, and strength, but lacking weight and fullness. Some of these materials are suitable for the tanning of light leathers without the aid of other tanning agents, and, when used with other tanning of filling materials, may be used also in the tanning of heavy leathers. (Dec. 8, 1925.) pp. 45. Price, 15 cents.

**T303. Causes of Some Accidents from Gas Appliances. An Investigation Conducted in Baltimore in Cooperation With the Baltimore Health Department, United States Public Health Service, and the Consolidated Gas Electric Light & Power Co.-----I. Vernon Brumbaugh**

Several fatal asphyxiations from carbon monoxide produced by unvented gas appliances during the beginning of the winter of 1922-23 prompted the mayor of Baltimore to order an investigation by the health department in which this bureau cooperated. Studies were made of causes of asphyxiation in 18 cases, which involved the death of 5 persons and the temporary disablement of 48 persons, 13 of whom were unconscious when found.

Eight water heaters, six room heaters, and five cooking stoves were found to produce carbon monoxide. The causes were attributed to faults in design, improper installation or adjustment, deterioration or clogging of the burners. (Jan. 11, 1926.) pp. 76. Price, 30 cents.

**T304. A Method for Testing Gas Appliances to Determine Their Safety from Producing Carbon Monoxide. \_E. R. Weaver, J. H. Eiseman, and G. B. Shawn**

The requirements which must be met by a successful method for testing gas appliances to determine their safety for household use are discussed. Recently developed methods for determining and clearly representing those characteristics of an appliance which determine the relative hazard of producing carbon monoxide are described. The results of tests upon numerous appliances of varied character are given in graphic form to illustrate the application and value of the testing methods, to show the range of hazard in existing appliances, and to indicate what may reasonably be expected of good appliances in service. (Jan. 11, 1926.) pp. 30. Price, 10 cents.

**T305. Permeability of Stone.-----D. W. Kessler**

The paper describes an apparatus recently developed at the Bureau of Standards for determining the permeability of stone at various pressures. The results of tests on six types of stone are given. Some attention is given to determining the variation with the thickness of specimen. (Jan. 14, 1926.) pp. 17. Price, 10 cents.

**T306. A Photometric Method for Measuring the Hiding Power of Paints**

**H. D. Bruce**

In this paper is described a method for measuring the hiding power of paints. Measurements are made upon the dry paint film. A black and white plate is mechanically coated with paint. The contrast between the black and white portions of the plate is then measured with a Martens photometer. The thickness of the paint film is measured by a direct reading gauge. Formulas are developed and presented for the calculation of the hiding power. The method is applicable to all but very opaque paints. Laboratory data are tabulated showing the accuracy of the method to be quite satisfactory. (Jan. 16, 1926.) pp. 18. Price, 10 cents.

**T307. Durability of Cement Drain Tile and Concrete in Alkali Soils; Fourth Progress Report, 1923.-----G. M. Williams and Irving Furlong**

This paper reports the results of the inspection in 1923 of experimental drain tile and concrete block installations at eight alkali-bearing projects in the West. The investigation has been carried on since 1913 and the conclusions to date are

that the best quality of concrete will disintegrate when exposed to severe alkali attack, and that installations of concrete in soils containing more than 0.1 per cent of salts of the sulphate type should be preceded by an examination of surrounding conditions. (Jan. 20, 1926.) pp. 49. Price, 20 cents.

**T308. Cement-Lime Mortars**-----H. V. Johnson

This paper contains results of original research on the effects which changes in the composition of cement-lime mortars have upon the water requirement, plasticity, density, time of set, shrinkage, and strength—all of which are found to vary greatly with different percentages of cement, lime, and sand. There is given also a chapter on recommended practice and a bibliography on cement-lime mortars. (Jan. 29, 1926.) pp. 34. Price, 15 cents.

**T309. Behavior of Synthetic Tanning Materials Toward Hide Substance**

Edward Wolessensky

The solvent action of syntans on hide during tanning varies greatly with the individual syntan, and no relation has been found between this and other characteristics of the syntan. In one group of syntans combination with the hide takes place rapidly but to a limited extent and is apparently little influenced by the concentration of the solution. Another group possesses much greater filling power, requires longer time to reach a maximum, and the rate of combination is strongly influenced by the concentration of the solution. The combination with the hide seems to be mainly of a chemical nature, but in the second group there is also some evidence that the phenomenon may be partly colloidal. (Feb. 12, 1926.) pp. 13. Price, 5 cents.

**T310. Properties of Potters' Flints and Their Effects in White-Ware Bodies**

E. E. Pressler and W. L. Shearer

A report is given on an investigation of the commercial flints and of their effects in typical white-ware bodies. The flints were relatively pure silica with a small percentage of iron oxide and lime, varying from 0 to 0.45 per cent. Over 95 per cent of most of the flints would pass a No. 325 sieve and over 50 per cent a theoretical No. 1000 sieve. Heat absorption and thermal expansion effects were indicated at the quartz inversion temperature and appeared to be roughly proportional to the percentage of the quartz in the samples. The firing behavior of bodies was affected less by the type of flint used than by the fineness of the flint and the presence of impurities. (Feb. 12, 1926.) pp. 27. Price, 15 cents.

**T311. Compressive and Transverse Strength of Hollow Tile-Walls**

A. H. Stang, D. E. Parsons, and H. D. Foster

Seventy tile walls, 6 feet long and 9 feet high, built of various designs and grades of tiles and from different sources, were tested in compression. These walls were built with ordinary commercial workmanship and under average indoor conditions. Fifty-three were tested with central loading and the others with an eccentric loading. Twenty-seven of the centrally loaded walls were also subjected to transverse tests. The walls fall into groups, depending upon the kind of clay used in making the tiles, the design of the tiles, the construction, and the mortars used. The mortar affected the strength of the walls more than any other one factor. Side construction and end construction walls were about equally strong. (Feb. 25, 1926.) pp. 37. Price, 15 cents.

**T312. A Study of Case-lining Papers for the Purpose of Developing Standard Specifications**-----B. W. Scribner and F. T. Carson

Investigation of waterproofed case-lining papers was made at the request of the Bureau of Foreign and Domestic Commerce in order to develop information to aid overseas shippers in their selection of such papers. The type found most suitable was duplex asphalted kraft paper. As existing methods of testing the water resistance of such paper were found inadequate, research was made to

find a suitable method of test. This resulted in the development of the "ground-glass" method, which is considered satisfactory for this purpose. Specifications of water resistance, strength, and weight were formulated, which are believed to define paper of suitable quality. (Mar. 12, 1926.) pp. 10. Price, 5 cents.

**T313. Some Characteristics of Quenching Curves.** H. J. French and O. Z. Klopsch

In this report is given a discussion of time-temperature cooling curves at the center of steel samples of various sizes and shapes quenched in ordinary coolants, such as water, a commercial quenching oil, and air. Based on the described experiments a method is outlined by which cooling curves for various sizes and shapes quenched from various temperatures can be derived, provided the curve for one size from one quenching temperature is available and one constant is known for the coolant. Typical examples are given. (Mar. 25, 1926.) pp. 21. Price, 10 cents.

**T314. Shear Tests of Reinforced Concrete Beams.**----- Willis A. Slater

Large reinforced concrete beams, generally of I-shaped section, were tested to determine their resistance to shearing stresses. Shearing strengths as great as one-half the compressive strength of the concrete were developed. Generally, however, the shearing strength of the beam was dependent upon the amount of web reinforcement rather than upon the compressive strength of the concrete. Yield-point stresses in the web reinforcement were developed even when large quantities of web reinforcement were used. As a result of the tests, shearing stresses as great as 500 lbs./in.<sup>2</sup> were used in the design of the concrete ships during the war. The results should be of value in fixing standards of design in general practice in reinforced concrete. (Apr. 13, 1926.) pp. 108. Price, 50 cents.

**T315. Nondestructive Testing of Wire Hoisting Rope by Magnetic Analysis**

R. L. Sanford

This paper describes an investigation of the magnetic properties of steel wire and the influence on them of stress, wear, and fatigue. The object of the investigation was to determine the possibilities of magnetic analysis as a nondestructive method for the routine inspection of wire hoisting rope. The connection between the magnetic and mechanical properties of steel is very close, but the relationships are so complex that more study will be required before application on a practical basis can be expected. (Apr. 16, 1926.) pp. 22. Price, 10 cents.

**T316. Analysis of Synthetic Tanning Materials.**----- Edward Wolesensky

Methods are described for the determination of acidity, total sulphur, total inorganic matter, free sulphuric acid and sulphates, nonvolatile matter, total organic matter, and the tanning material in synthetic tanning materials which are sulphonated condensation products. These methods are mostly adaptations of principles or modifications of methods already known and are based on experience gained in the analysis of such synthetic tanning materials in the course of an investigation of these products. (May 19, 1926.) pp. 9. Price, 5 cents.

**T317. Action of Sodium Sulphate in Synthetic Tanning Materials**

Edward Wolesensky

Hide substance has such a marked affinity for sulphuric acid that it can remove the latter even from dilute solutions of sulphates in presence of other acids. Sulphuric acid thus combined with the hide can not be completely washed out by water nor displaced by syntans; the latter can even be displaced to a certain extent from combination with hide by the sulphuric acid. Hence neutralization of excess sulphuric acid in syntans by sodium hydroxide does not entirely prevent the acid from reacting with hide during tanning. Whether this combined sulphuric acid is harmful to the leather has yet to be determined. This behavior of sodium sulphate in syntans also interferes in certain analyses of these products by the usual methods. (May 20, 1926.) pp. 16. Price, 10 cents.

## XI. CIRCULARS

[For price and latest edition see table on page 4]

### C1. National Bureau of Standards.

Gives general information concerning the organization, functions, and work of the bureau. Cites accomplishments and includes illustrations typical of work in laboratories and facilities for same.

### C268. United States Government Master Specification for Steam Hose.

This specification was officially adopted by the Federal Specifications Board on October 6, 1922, for the use of the departments and independent establishments of the Government in the purchase of steam hose. The specification was prepared in cooperation with the Rubber Association of America. The hose is of wrapped construction, consisting of a rubber tube, cotton duck reinforcements, and a rubber cover.

### C269. United States Government Master Specification for Rubber-Metal Gasoline Hose.

This specification was officially adopted by the Federal Specifications Board on May 1, 1924, for the use of the departments and independent establishments of the Government in the purchase of rubber-metal gasoline hose. The specification was prepared in cooperation with the Rubber Association of America. The hose is made with a flexible metal tube, a rubber tube, and a cotton jacket, in lengths of 10, 12, or 25 feet as ordered, and is adapted for use in conducting gasoline.

### C270. United States Government Master Specification for Mercerized Cotton Airplane Cloth, Grade A.

This specification is intended to cover the Government's requirements for mercerized cotton airplane cloth, grade A. This specification was prepared by the technical committee on textiles of the Federal Specifications Board and officially promulgated December 6, 1924. In its preparation the committee had the cooperation of the National Association of Cotton Manufacturers and the American Cotton Manufacturers Association, so that the requirements specified are essentially in agreement with commercial practice.

### C271. United States Government Master Specification for Rubber Gloves for Electrical Workers (For Use in Connection with Apparatus or Circuits not Exceeding 3,000 Volts to Ground).

This specification was officially approved by the Federal Specifications Board on July 6, 1925, for the use of the departments and independent establishments of the Government in the purchase of rubber gloves for electrical workers. The technical requirements of this specification are the same as those of Standard Specification D-120-23, adopted by the American Society for Testing Materials. Two classes of gloves are provided for. Class A gloves are intended for use with external protection of leather or other materials.

**C272. United States Government Master Specification for Brown Cotton Sheeting.**

This specification is intended to cover the Government's requirements for brown cotton sheeting. This specification was prepared by the technical committee on textiles of the Federal Specifications Board and officially promulgated July 6, 1925. In its preparation the committee had the cooperation of the National Association of Cotton Manufacturers and the American Cotton Manufacturers Association, so that the requirements specified are essentially in agreement with commercial practice.

**C273. United States Government Master Specification for Bleached Wide Cotton Sheeting.**

This specification is intended to cover the Government's requirements for bleached wide cotton sheeting. This specification was prepared by the technical committee on textiles of the Federal Specifications Board. In its preparation the committee had the cooperation of the National Association of Cotton Manufacturers and the American Cotton Manufacturers Association, so that the requirements specified are essentially in agreement with commercial practice.

**C274. United States Government Master Specification for Bleached Cotton Sheets (Medium and High Count Sheeting).**

This specification is intended to cover the Government's requirements for bleached cotton sheets of medium and high counts. This specification was prepared by the technical committee on textiles of the Federal Specifications Board. In its preparation the committee had the cooperation of the National Association of Cotton Manufacturers and the American Cotton Manufacturers Association, so that the requirements specified are essentially in agreement with commercial practice.

**C275. United States Government Master Specification for Builders Hardware.**

This specification was prepared by the technical committee for builders hardware of the Federal Specifications Board for the use of all Government departments and independent establishments in the purchase of builders hardware, and covers such items as door locks, hinges, latches, catches, turns, bolts, brackets, pivots, door closers, transom lifters and operators, and cabinet locks. Standard finishes, rules for hands of locks, and correct sizes of butts are described. Methods for testing nickel plating, zinc coatings, and japan coating are specified.

**C276. Motor-Vehicle Headlighting.**

Requirements for good road lighting are discussed and the construction and operation of present-day types of electric headlights explained. Few so-called antiglare devices have been found to be really effective, and the most practical solution to the headlighting problem under present conditions is the proper adjustment of lighting devices by manufacturers and sales agencies on new cars and careful maintenance of such adjustments by owners and drivers. The methods used at the Bureau of Standards for making laboratory tests on electric headlight devices are briefly described. State law is presented. The Appendix contains the specifications under which tests for approval of devices by State officials are made.

**C277. United States Government Master Specification for Bleached Cotton Pillowcases.**

This specification is intended to cover the Government's requirements for bleached cotton pillowcases. This specification was prepared by the technical committee on textiles of the Federal Specifications Board and officially promulgated. In its preparation the committee had the cooperation of the National Association of Cotton Manufacturers and the American Cotton Manufacturers Association, so that the requirements specified are essentially in accord with commercial practice.

**C278. United States Government Master Specification for Brown Wide Cotton Sheeting.**

This specification is intended to cover the requirements of the Government for brown wide cotton sheeting. This specification was prepared by the technical committee on textiles of the Federal Specifications Board and officially promulgated. In its preparation the committee had the cooperation of the National Association of Cotton Manufacturers and the American Cotton Manufacturers Association, so that the requirements specified are essentially in agreement with commercial practice.

**C279. Relations Between the Temperatures, Pressures, and Densities of Gases.**

This paper gives a simple but thorough discussion of the relations between the temperatures, pressures, volumes, and weights of gases. The experimental data involving high pressures, such as are encountered in the commercial handling of compressed gases, are presented in a form which permits of ready application. The compressibilities of gases as calculated from the equations of state of van der Waals, of Dieterici, and of Berthelot are compared with existing data for the purpose of estimating their accuracy in predicting the compressibilities of gases for which no experimental data are available. There is also included an extensive bibliography of the literature covering the subjects of the circular.

**C280. Time Throughout the World.**

This paper gives a brief historical sketch of the development of the standard time system, a map showing the time zone boundaries in the United States, and a list of the official stations sending out radio time signals. Time in nearly every foreign country and in many foreign cities is also given, compared with both Greenwich mean time and with noon, eastern standard time.

**C281. The Technology of the Manufacture of Gypsum Products.**

A number of gypsum mills were visited in the spring of 1924. An account of the methods of manufacture, including a description of each of the mills visited, together with a discussion as to the relative merits of processes found in use, is given.

**C282. Fire-Clay Brick: Their Manufacture, Properties, Uses, and Specifications.**

The paper embodies (1) a brief history of fire-clay brick manufacture, (2) a discussion of the geology and classification of the raw materials used, (3) a non-technical description of the methods of manufacture and the properties and uses of the finished product, (4) F. S. B. Specification No. 268 for the purchase of fire-clay brick, and (5) a short bibliography.

**C283. United States Master Specification for Stitches, Seams, and Stitching.**

Specifications for stitches, seams, and stitching for use by Government departments, as prepared by the committee on standardized stitches and seams, of the Federal Specifications Board.

**C284. United States Government Master Specification for Rubber Bands.**

This specification was officially adopted by the Federal Specifications Board on September 1, 1923, for the use of the departments and independent establishments of the Government in the purchase of rubber bands. The specification was prepared in cooperation with the Rubber Association of America.

**C285. United States Government Master Specification for Slate-Surfaced Asphalt Prepared Roofing and Shingles.**

This specification was prepared by the technical committee on bituminous roofing and waterproofing compounds, Federal Specifications Board, after careful consideration of suggestions from manufacturers. The specification covers both slate-surfaced roll roofing and shingles. These shingles and this type of roll roofing are in a form ready for application to a roof. Complete methods for sampling and testing are included.

**C286. United States Government Master Specification for Asphalt-Saturated Rag Felt for Flashings.**

This specification was prepared by the technical committee on bituminous roofing and waterproofing compounds, Federal Specifications Board, after careful consideration of suggestions from manufacturers. The specification covers a type of material suitable for use in the construction of flashings in connection with built-up roofing and when it is desired to use a sheet heavier than 14 pounds for unsurfaced built-up roofing. Complete methods for sampling and testing are included.

**C287. United States Government Master Specification for Asphalt-Saturated Woven Cotton Fabric for Waterproofing.**

This specification was prepared by the technical committee on bituminous roofing and waterproofing compounds, Federal Specifications Board, after careful consideration of suggestions from manufacturers. This specification covers a type of cotton fabric which has been saturated with asphalt and is suitable for use with asphalt for waterproofing and damp proofing, by the so-called membrane system. Complete methods for sampling and testing are included.

**C288. United States Government Master Specification for Tender Hose (Corrugated).**

This specification was officially adopted by the Federal Specifications Board on October 6, 1922, for the use of the departments and independent establishments of the Government in the purchase of tender hose. The specification was prepared in cooperation with the Rubber Association of America. The hose consists of (1) an inner rubber tube, (2) two plies of cotton duck, (3) a helix of wire, (4) a layer of rubber, (5) two plies of cotton duck, (6) an outer cover of rubber.

**C289. United States Government Master Specification for Divers' Hose.**

This specification was officially adopted by the Federal Specifications Board on October 6, 1922, for the use of the departments and independent establishments of the Government in the purchase of divers' hose. The specification was prepared in cooperation with the Rubber Association of America. The hose is of braided construction, one-half inch diameter, and consists of a rubber tube, three plies of braided cotton reinforcement, and a rubber cover.

**C290. United States Government Master Specification for Gas Hose.**

This specification was officially adopted by the Federal Specifications Board on October 6, 1922, for the use of the departments and independent establishments of the Government in the purchase of gas hose. The specification was prepared in cooperation with the Rubber Association of America. The hose is of wrapped construction, five-sixteenth inch diameter, and consists of a rubber tube, cotton duck reinforcements, and a rubber cover. It is branded "ACETHYD" for acetylene-hydrogen and "OXY" for oxygen.

**C291. United States Government Master Specification for Water and Wash Deck Hose.**

This specification was officially adopted by the Federal Specifications Board on October 6, 1922, for the use of the departments and independent establishments of the Government in the purchase of water hose. The specification was prepared in cooperation with the Rubber Association of America. The hose is of wrapped construction, consisting of a rubber tube, cotton-duck reinforcements, and a rubber cover.

**C292. United States Government Master Specification for Water-Suction Hose (Smooth Bore).**

This specification was officially adopted by the Federal Specifications Board on October 6, 1922, for the use of the departments and independent establishments of the Government in the purchase of water-suction hose. The specification was prepared in cooperation with the Rubber Association of America. The hose consists of (1) an inner rubber tube, (2) a layer of cotton duck, (3) a helix of wire with rubber filling between the coils, (4) a second layer of rubber, (5) layers of cotton duck, (6) an outer rubber cover.

**C293. United States Government General Specification for Textile Materials (Methods of Physical and Chemical Tests).**

General methods of testing textiles have been drawn up for use in making determinations in textile specifications promulgated by the Federal Specifications Board so that variations introduced by different test methods may be eliminated. They are not intended to include all the textile test methods in use in the textile industry. It is probable that they will be revised and added to from time to time as the necessity arises.

**C294. Standards for Paper Towels.**

Results of an investigation made for the purpose of developing specifications for purchase of paper towels are given. Wide variation was found in this paper product as regards both quality and methods of marketing.

The composition of the different kinds of paper toweling is described and considerations involved in valuation discussed. Recommendations are made in respect to methods of testing, simplification of sizes, basis for expression of weight, unit of payment, and unit of packaging. Specifications are suggested for towels suitable for general use.

**C295. Temperature Corrections to Readings of Baumé Hydrometers, Bureau of Standards Baumé Scale for Sugar Solutions (Standard at 20° C.).**

In trade transactions involving the sale of molasses it is the general practice to make the Baumé determinations at various temperatures between 38° C. and 60° C. To facilitate the correction of the hydrometer readings to the standard temperature of 20° C. a table of temperature corrections has been calculated. This table is submitted as supplementary to the Baumé table of Bates and Bearce (B. S. Tech. Paper No. 115) and the table of temperature corrections for Brix hydrometers (Table 11, B. S. Circular No. 44).

**C296. Research Associates at the National Bureau of Standards.**

Recites history of research associate plan at the bureau, and discusses cooperation with the industries and advantages offered for research work at bureau. Gives list of organizations accorded research associate privileges, general fields of research, specific problems, and names of research associates. Specific illustrations of problems undertaken and value of results are given.



**C297. United States Government Master Specification for Plastic Fire-Clay Refractories.**

This specification, prepared for the Federal Specifications Board by its technical committee, provides for one class of material and specifies that this material shall contain not more than 65 per cent total  $\text{SiO}_2$ ; that the softening point shall not be less than that of standard pyrometric cone No. 31; that when delivered it shall contain not more than 15 per cent water; that the total linear dry-and-burned shrinkage shall not exceed 4 per cent; and, when specified, that the material shall pass the simulated service test. The specification also contains detailed instructions for sampling and testing.

**C298. United States Government Master Specification for Fire Clay.**

This specification, prepared for the Federal Specifications Board by its technical committee, provides for two classes of material. Class F shall be ground to such fineness that not less than 96 per cent shall pass a 20-mesh sieve; it shall show satisfactory bonding power; the softening point shall be not more than 3 cones (approximately  $60^\circ \text{C.}$ ) lower than that of the brick with which it is to be used; and, when required, it shall pass the Navy simulative service test. Material of class C shall have the same softening point and bonding power as that of class F, but only 90 per cent need pass a 20-mesh sieve, and the simulative service test shall not be required.

**C299. United States Government Master Specification for Fire-Clay Brick.**

This specification, prepared for the Federal Specifications Board by its technical committee, provides for six classes of material. The general requirements for fire-clay brick are given and, in addition, requirements for each class and methods of testing are detailed. The specification also contains definitions of each class based on the service for which the brick of each class is intended.

**C300. Architectural Acoustics.**

The fundamental principles governing the construction of an acoustically successful auditorium are no longer new, but are not yet generally understood by those engaged in such work. In this circular these principles are stated, and an example is worked out showing their practical application to the planning of a new auditorium or to the curative treatment of one that has proved to be unsatisfactory.

**C301. United States Government Master Specification for Ink, Drawing, Colored Waterproof.**

The specification calls for two types of ink—solution of dye and suspension of insoluble pigment. Each of these is in the colors, red, orange, yellow, green, blue, violet, and brown. Formulas are given for standard inks of the first type. Tests for determining the quality of samples submitted are described.

**C302. United States Government Master Specification for Flake Orange Shellac.**

This specification was prepared by the technical committee on paints and oils of the Federal Specifications Board after carefully considering suggestions from shellac importers and varnish manufacturers. The specification covers requirements for orange-flake shellac for use in ship-bottom paints and in the preparation of orange-shellac varnish. Four types of shellac are covered and detailed directions for sampling and testing are included.

**C303. United States Government Master Specification for Shellac Varnish.**

This specification was prepared by the technical committee on paints and oils of the Federal Specifications Board after carefully considering suggestions from shellac importers and varnish manufacturers. The specification covers light,

medium, and heavy body varnishes made from two types of orange shellac and two types of bleached shellac. Detail directions for sampling and testing are included.

**C304. Properties and Manufacture of Concrete Building Units.**

Numerous inquiries have been received at the Bureau of Standards from prospective makers or users of concrete units, who were interested in learning more of their properties or the details of the manufacturing methods. This circular endeavors to bring out the essential features concerning concrete brick, block, and building tile, and to give some information on their manufacture.

**C305. United States Government Master Specification for Rubber Tubing.**

This specification was officially adopted by the Federal Specifications Board on September 15, 1922, for the use of the departments and independent establishments of the Government in the purchase of rubber tubing. The specification was prepared in cooperation with the Rubber Association of America. Two grades of tubing are provided for as follows: Grade A, known as "pure gum" tubing contains not less than 90 per cent by volume of rubber. Grade B, known as "compounded" tubing contains not less than 60 per cent by volume of rubber.

**C306. United States Government Master Specification for Rubber Matting.**

This specification was officially adopted by the Federal Specifications Board on March 1, 1926, for the use of the departments and independent establishments of the Government in the purchase of rubber matting. The specification which was prepared in cooperation with the Rubber Association of America, gives dimensions and general requirements for the construction of roll matting suitable for floor covering. It also includes detailed test requirements for the rubber compound and fabric used.

**C307. United States Government Master Specification for Pneumatic Hose.**

This specification was officially adopted by the Federal Specifications Board on October 6, 1922, for the use of the departments and independent establishments of the Government in the purchase of pneumatic hose. The specification was prepared in cooperation with the Rubber Association of America. The hose is of wrapped construction, consisting of a rubber tube, cotton duck reinforcements, and a rubber cover. It is branded "Rock-drill" or "Pneumatic-tool" as specified.

**C308. United States Government Master Specification for Rubber Stoppers.**

This specification was officially adopted by the Federal Specifications Board on March 1, 1926, for the use of the departments and independent establishments of the Government in the purchase of rubber stoppers. The specification was prepared in cooperation with the Rubber Association of America. The stoppers are suitable for general laboratory use. The specification provides detail requirements regarding composition of the rubber, sizes, dimensions, and methods of test.

## XII. HANDBOOKS

### **H6. Safety Rules for the Installation and Maintenance of Electrical Supply Stations.**

This handbook contains that portion of the National Electrical Safety Code dealing with the installation and maintenance of electrical equipment in generating stations and substations. Regulations deal with the general protective arrangements of equipment and include special sections dealing, respectively, with rotating equipment, storage batteries, transformers, conductors, fuses, switches, switchboards, lightning arresters and grounding. The rules have recently been revised according to the procedure of the American Engineering Standards Committee, and this publication represents the fourth edition. (Feb. 5, 1926.) pp. 56. Price, 10 cents.

### **HB7. Safety Rules for the Installation and Maintenance of Electric Utilization Equipment.**

This consists of section 9 and part 3 of the fourth edition of Handbook No. 3. (Mar. 12, 1926.) pp. 71. Price, 15 cents.

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### XIII. SIMPLIFIED PRACTICE RECOMMENDATIONS

#### R34. Warehouse Forms.

Simplified Practice Recommendation No. 34 is one of a series of publications on the elimination of waste in industry. It contains a history of the development, report of the general conference, and the result obtained in an effort to eliminate excess variety of warehouse forms. It shows facsimiles of the approved forms. The specific recommendations of the general conference covered in this publication, which have been accepted by representative users, are to become effective forthwith. Price, 10 cents.

#### R37. Commercial Forms (Invoice, Inquiry, and Purchase Order).

Simplified Practice Recommendation No. 37 is one of a series of publications on the elimination of waste in industry. It contains a history of the development, report of the general conference, and the result obtained in an effort to eliminate excess variety of invoice, purchase order, and inquiry forms. It shows facsimiles of the approved forms. The specific recommendations of the general conference covered in this publication, which have been accepted by representative users, are to become effective at once. Price, 5 cents.

#### R38. Sand-Lime Brick.

Simplified Practice Recommendation No. 38 is one of a series of publications on the elimination of waste in industry through simplified practice. It contains a history of the development, report of the general conference, and the result obtained in an effort to eliminate excess variety in sizes of sand-lime brick. This project is to become effective from July 1, 1925. Price, 5 cents.

#### R40. Hospital Chinaware.

Simplified Practice Recommendation No. 40 is one of a series of publications on the elimination of waste in industry through simplified practice. It contains a history of the development, report of the general conference, and the result obtained in an effort to eliminate excess variety in sizes of hospital chinaware. This project is to become effective from July 1, 1925. Price, 5 cents.

#### R42. Paper Grocers' Bags.

Simplified Practice Recommendation No. 42 is one of a series of publications on the elimination of waste in industry through simplified practice. It contains a history of the development, report of the general conference, and the result obtained in an effort to eliminate excess variety in capacities, colors, qualities, and strengths of paper grocers' bags. This project is to become effective from October 15, 1925. Price, 5 cents.

#### R44. Boxboard Thicknesses.

Simplified Practice Recommendation No. 44 is one of a series of publications on the elimination of waste in industry. It contains a history of the development, report of the general conference, and the result obtained in an effort to eliminate excess variety of thicknesses and colors of stock for containers and set-up folding boxes. It carries tables of thicknesses adopted by the industry for all kinds, grades, and qualities of box board considered by the conference. This program is to become effective from October 1, 1925. Price, 5 cents.

**R45. Grinding Wheels.**

Simplified Practice Recommendation No. 45 is one of a series of publications on the elimination of waste in industry through simplified practice. It contains a history of the development, report of the general conference, and the result obtained in an effort to eliminate excess variety of grinding wheels. This project is to become effective, as applying to new production, January 1, 1926, and for existing stocks before July 1, 1926. Price, 10 cents.

**R47. Cut Tacks and Small Cut Nails.**

Simplified Practice Recommendation No. 47 is one of a series of publications on the elimination of waste in industry through simplified practice. It contains a simplified schedule of styles, sizes and methods of packing, report of the general conference, and the result obtained in an effort to eliminate excess variety in this commodity. This program is to be effective from January 1, 1926. Price, 5 cents.

**R49. Sidewalk, Floor, and Roof Lights.**

Simplified Practice Recommendation No. 49 is one of a series of publications on the elimination of waste in industry through simplified practice. It contains a history of the development, report of the general conference, and the result obtained in an effort to eliminate excess variety in sizes, styles, and shapes of sidewalk, floor, and roof lights. This project is to become effective from March 1, 1926, subject to annual revision. Price, 5 cents.

**R51. Die Head Chasers (for self-opening and adjustable die heads).**

Simplified Practice Recommendation No. 51 is one of a series of publications on the elimination of waste in industry through simplified practice. It contains a history of the project, survey of conditions in the industry, report of the general conference, and the result obtained in an effort to eliminate excess variety in sizes and types of chasers for self-opening and adjustable die heads. This program is to become effective from April 1, 1926, subject to annual revision. Price, 5 cents.

## XIV. BUILDING AND HOUSING

### **BH8. Recommended Practice for Arrangement of Building Codes.**

A description of existing diversity of building-code arrangement with administrative advantages of uniform and logical sequence of requirements. Presents a recommended outline for chapters, sections, and principal subdivisions of building codes. The main divisions are arranged as nearly as possible in the sequence in which reference is necessary to code requirements when a building is planned, designed, and constructed. The content of each heading is plainly indicated by descriptive material explanatory of its meaning. The report provides for all types of municipal requirements having to do with safety of buildings or equipment, though it is expected not all sections or subdivisions will necessarily be utilized in any one code. (July 5, 1925.) 29 pp. Price, 10 cents.

## XV. MISCELLANEOUS PUBLICATIONS

### **M65. National Directory of Commodity Specifications: Classified and Alphabetical Lists and Brief Descriptions of Existing Commodity Specifications.**

This contains an alphabetical list of such commodities as are paid for out of taxes and also a thoroughly classified list of the specifications for these commodities formulated not only by the public purchasing agencies, but also by other organizations having national recognition. In collecting the specifications correspondence was carried on with over 500 public purchasing organizations and more than 500 technical societies and trade associations vitally interested in specifications. The work has been carried on cooperatively by the Bureau of Foreign and Domestic Commerce and the Bureau of Standards in accordance with detailed plans formulated or approved by an advisory board composed of representatives of 14 national organizations interested in the preparation and unification of specifications, as follows: American Electric Railway Association, American Engineering Standards Committee, American Hospital Association, American Hotel Association, American Society for Testing Materials, Associated Business Papers (Inc.), Associates for Government Service (Inc.), Chamber of Commerce of the United States, National Association of Manufacturers, National Association of Purchasing Agents, National Conference of Business Paper Editors, National Conference of Governmental Purchasing Agents, National Electric Light Association, and the Society of Automotive Engineers. (Aug. 28, 1925.) 385 pp. Price, \$1.25.

### **M66. Second Technical Conference of State Utility Commission Engineers.**

Contains an address by the Director of the Bureau of Standards, and papers with extended discussions on problems involved in making public utility valuations and rates; rural extensions and rural electric service; a proposed classification of quantity units for telephone service; and informal discussion on engineering problems of interest to public service commission engineers, such as voltage classification of circuits, gas service conditions and production of carbon monoxide, and voltage variations on electric circuits. 98 pp. Price, 15 cents.

### **M67. Kilocycle-Meter Conversion Table.**

A card 6 by 11 inches giving a table to be used in converting meters to kilocycles or kilocycles to meters. Both units are extensively used in radio, and this publication fills the need of a rapid means of obtaining one in terms of the other. Pairs of values are given for every tenth number from 10 to 10,000. Price, 5 cents.

### **M68. Adjust your Headlights.**

A chart (folder) 9 by 23 inches describing and illustrating manner of properly adjusting automobile headlights. Price, 5 cents.

### **M69. Annual Report of the Director of the Bureau of Standards to the Secretary of Commerce for the Fiscal Year Ended June 30, 1925.**

Beginning with the annual report for the fiscal year ended June 30, 1925, the annual report has been amplified to include more complete reference to and description of the completed and pending research and testing for the year. In addition, there has been introduced a general section at the beginning outlining

the functions, organization, and location of the bureau. The functions relate to standards of measurements, standard physical constants, standards of quality, standards of performance, and the relation of the bureau's work to the public. A chart gives an analytical synopsis of the functions of the bureau with the scope, purpose, and effect of each function. At the end are given brief summaries of the work of publications, library, correspondence, stores, personnel, appropriations, and accounts, as well as mechanical plant, construction facilities, and the care of buildings and grounds. There is a concluding section relating to recommendations.

**M70. Report of Eighteenth National Conference on Weights and Measures of the United States. (1925.)**

Contains: Addresses by the Secretary of Commerce and the president of the conference; papers and discussions on methods of sale of ice cream, methods and equipment for field and factory tests of heavy-capacity platform scales, practicability of sale of commodities on basis of moisture-free ingredients, methods of test of taximeters, test-car accuracy, Post Office Department program for maintaining accuracy of scales, necessity for tolerances in excess weighing in the Customs Service, progress of weights and measures in the far West, railroad supervision of baggage and freight scales, meeting problem of pedlars and transient vendors, supervision of weighmasters, and activity of Bureau of Standards in increasing accuracy of freight weighing; and reports on specifications and tolerances for vehicle tanks (adopted) and for taximeters (adopted tentatively), on tolerances for bread (adopted) and on amendment to model law with reference to sales of service (adopted). 187 pp. Price, 50 cents.

**M71. Compressibilities of Gases.**

This paper contains 13 graphs (8 x 9½ inches) for computing the compressibilities of air, argon, helium, hydrogen, methane, neon, nitrogen, and oxygen, and for computing the volumes delivered from cylinders containing argon, helium, hydrogen, nitrogen, and oxygen at high pressures. Price, 10 cents.

**M72. Strain Lines Developed by Compressive Tests on Structural Members of the Delaware River Bridge at the United States Bureau of Standards for the Delaware River Bridge Joint Commission.**

Although the Luder or Hartman lines on the surface of a steel specimen which has been stressed to the yield point have been known for many years they could not be readily photographed because of the lack of contrast. It was found in testing portions of the Delaware River Bridge under compressive loads that the surface of the specimen could be coated with a thin mixture of white Portland cement and water, which dried to a clear white. The portions of the specimen which reached the yield point of the steel were clearly shown and readily photographed. The method is described, and two typical photographs illustrate the results which were obtained. A poster 14¾ by 18 inches. Price, 5 cents.

**M73. Subject Index of United States Government Master Specifications.**

Alphabetical list of specifications which have been officially adopted and promulgated by the Federal Specifications Board as United States Government master specifications, for the mandatory use of all departments and independent establishments of the Government. 6 pp. Price, 5 cents.



## **XVI. PUBLISHED PAPERS BY THE BUREAU STAFF PRINTED IN OUTSIDE JOURNALS ON SUBJECTS WITHIN THE BUREAU'S FIELD OF WORK**

[June 1, 1923, to June 30, 1926. For papers prior to this see Annual Reports  
of 1922 and 1923]

These articles are not available either from the Superintendent of Documents or the Bureau of Standards. The proper issue of the periodical should be consulted at a library maintaining files of scientific and technical papers.

### **1. WEIGHTS AND MEASURES**

A study of sieve specifications (Lewis V. Judson), Proc. of Am. Soc. for Test. Mats., **24**, pt. II, p. 1084; 1924.

Some recent results obtained in standardization of geodetic base-line tapes (L. V. Judson and B. L. Page), J. Wash. Acad. of Sci., **14**, p. 340; Aug. 19, 1924.

Notes on the graduation of invar base-line tapes (L. V. Judson and B. L. Page), J. Wash. Acad. of Sci., **14**, p. 342; Aug. 19, 1924.

Are your sieves standardized? (Lewis V. Judson), Chem. Metl. Eng., **13**, p. 823; Nov. 24, 1924.

New ruling for haemacytometer chambers (Lewis V. Judson), J. Am. Med. Assn., **84**, p. 947; Mar. 28, 1925; J. Opt. Soc.; May, 1925.

Thermal expansion of aluminum and various important aluminum alloys (Peter Hidnert), Chem. and Met. Eng.; 1925.

Thermal expansion of molybdenum (Peter Hidnert and W. B. Gero) (abstract), Sci. Abstracts (Abst. 589); March, 1925.

Observations on the "hydrogen point" in iron (Henry S. Rawdon and Peter Hidnert) (abstract in press), Phys. Rev.

Physical properties of dental material (progress report) (Wilmer Souder), J. Am. Dental Assn.; 1925.

Physical properties of dental materials II (wrought gold) (R. L. Coleman), J. Am. Dental Assn.; May, 1925.

Continuous motion to the dividing engine carriage (abstract) (Wilmer Souder), Proc. of Opt. Soc. of Am.; October, 1923.

Analysis of track scale tolerances (H. M. Roeser), Scale Jour.; Aug. 10, 1923.

Weighing cars and trucks one end at a time (H. M. Roeser), Scale J.; May 10, 1924.

Determining the constants of oil decline curves (H. M. Roeser), Min. and Met.; June, 1924.

Note on the nature of the correlation coefficient (H. M. Roeser), Am. Math. Monthly, **31**; September, 1924.

The relation between inches and millimeters (H. W. Bearce), Am. Mach., **59**, No. 21, p. 764; Nov. 22, 1923.

Precision measuring instruments used in gauge inspection (George K. Burgess), Army Ordnance, **4**, No. 12, pp. 375-380; May-June, 1924.

- The work of the International Bureau of Weights and Measures (abstract) (Lewis V. Judson), *J. Wash. Acad. of Sci.*; Mar. 4, 1924.
- A plotting instrument (A. H. Sellman), *J. Opt. Soc. of Am. and Rev. of Sci. Inst.*, **8**, p. 693; May, 1924.
- Gages, a key problem (G. K. Burgess), *Proc. Soc. Aut. Engrs.*, **16**, p. 456; April, 1925.
- Unilateral and bilateral tolerances as applied to interchangeable manufacture (H. W. Bearce), *Mech. Engr.*, **47**, No. 6, p. 485; June, 1925.
- Fire-hose coupling screw thread standard has been completed (H. W. Bearce), *A. S. M. E. News*, June 7, 1925.
- How the United States Bureau of Standards cooperates with the Horological Institute of America (R. E. Gould), *Jewelers' Circular*, p. 131; June 10, 1925.
- Geodetic instruments from the viewpoint of the physicist (L. V. Judson), *Bulletin, National Research Council*, **10**, pt. 3, p. 36; July, 1925.
- The possibility of a specification for dental amalgams (Wilmer Souder), *Official Bulletin, Chicago Dental Soc.*, **V**, No. 48; July 24, 1925.
- Chronometer test (R. E. Gould), *Jewelers' Circular*, p. 111; Aug. 12, 1925.
- The stop watch test (R. E. Gould), *Jewelers' Circular*, p. 153; Aug. 19, 1925.

## 2. ELECTRICITY

- Use of an oscillograph in mechanical measurements (H. L. Curtis), *J. Am. Inst. Elect. Engrs.*, **44**, p. 45; January, 1925.
- The standardization of electrical measuring instruments (H. B. Brooks), *J. Am. Inst. Elect. Engrs.*, **42**, p. 713; July, 1923.
- Accuracy tests of meggers (H. B. Brooks), *Elect. World*, **85**; 1925.
- Nondestructive testing of wire rope (R. L. Sanford), *Min. and Met.*, **4**, p. 333; July, 1923; *Power*, **58**, p. 1031; December, 1923.
- The present status of magnetic analysis (R. L. Sanford), *Trans. Am. Soc. Steel Treat.*, **5**, p. 577; June, 1924.
- New developments in electric telemeters (O. S. Peters and R. S. Johnston), *Proc. Am. Soc. Test. Mat.*, **23**, p. 592; 1923. Abstract in *Engrs. News-Record*, **91**, p. 27; 1923.
- Batteries for airplane service (G. W. Vinal), *Aeronaut. Digest*, **3**, p. 162; September, 1923.
- EMF of cells at low temperatures (G. W. Vinal and F. W. Altrup), *Railway Signalling*, **16**, p. 449; November, 1923.
- The tarnishing and detarnishing of silver (G. W. Vinal and G. N. Schramm), *Metal Industry*, **22**, p. 15; January; p. 110, March; p. 151, April; p. 231, June, 1924.
- Effect of certain impurities in storage battery electrolytes (G. W. Vinal and F. W. Altrup), *J. Am. Inst. Elect. Engrs.*, **43**, p. 313; April, 1924.
- Report of radio battery committee on the standardization of tests for dry cells used in radio receiving sets (G. W. Vinal, C. F. Burgess, and C. A. Gillingham), *Trans. Am. Electrochem. Soc.*, **45**, p. 15; April, 1924.
- Storage battery electrolytes (G. W. Vinal and G. N. Schramm), *J. Am. Inst. Elect. Engrs.*, **44**, p. 128; February, 1925; *Power*, **61**, p. 509; March, 1925.
- Storage batteries—a general treatise on the physics and chemistry of secondary batteries and their engineering applications (G. W. Vinal), 402 pp., published by John Wiley & Sons (Inc.), New York; 1924.
- Storage batteries (G. W. Vinal), *J. Opt. Soc. Am. and Rev. of Sci. Instruments*, **11**, p. 263; September, 1925.
- Methods of varying the sensitivity of galvanometers (F. Wenner), *J. Opt. Soc. Am. and Rev. of Sci. Instruments*, **11**, No. 5, p. 495; November, 1925.

### 3. PHOTOMETRY AND ILLUMINATION

- Legislation and approved headlights are not sufficient to eliminate glare (E. C. Crittenden), *Am. Motorist*, **15**, p. 10; September, 1923.
- The menace of the dimmed headlight (R. E. Carlson), *Motor Life*, **19**, p. 23; January, 1924.
- The automobile head lamp situation (R. E. Carlson), *J. Soc. Automotive Engrs.*, **13**, p. 526; December, 1923.
- Adjust your headlights (R. E. Carlson), folder issued by the National Automobile Chamber of Commerce; 1924.
- The lights of the White House (Ben S. Willis), *Light*, **2**, p. 5, No. 5; May, 1924; and **2**, p. 5, No. 7; July, 1924.
- The solution of the glare problem (M. C. Malamphy), *The Battery Man*, **4**, p. 21; May, 1924.
- Report of sixth session International Commission on Illumination (E. C. Crittenden), *Trans. Ill. Engr. Soc.*, **19**, p. 607; September, 1924.
- Better lighting as a public service (E. C. Crittenden), *Trans. Ill. Engr. Soc.*, **19**, p. 827; November, 1924.
- Lamp efficiency and life tests (J. F. Skogland and J. Franklin Meyer), *Elect. World*, **84**, p. 1302; Dec. 20, 1924.
- A survey of street lighting practice in the United States (J. Franklin Meyer), *Trans. Ill. Engr. Soc.*, **20**, p. 21; January, 1925; also in *Amer. City*, **32**, p. 21; January, 1925, and *Munic. and County Engr.*, **67**, p. 252; November, 1924 (abst.).

### 4. SAFETY AND UTILITY STANDARDS

- Résumé of rules used in electric light and power regulation (J. Franklin Meyer), *Elect. Light and Power*, **1**, p. 41 (No. 7); July, 1923.
- Safety legislation (M. G. Lloyd), *Safety Engr.*, **46**, p. 14; July, 1923.
- Uniform safety legislation (editorial) (M. G. Lloyd), *Mechan. Engr.*, **45**, p. 444; July, 1923.
- American aeronautical safety code (A. Halsted), *Natl. Safety News*, **10**, p. 27; September, 1924.
- Grounding of secondary circuits (M. G. Lloyd), *Proc. Internat. Assn. Municipal Electricians*, p. 77; 1924.
- Practical uses of the logging and sawmill safety code (J. A. Dickinson), *Nat. Safety News*, **10**, p. 35; December, 1924.
- Aeronautical safety code (sectional committee), published by Soc. Automotive Engr. (Inc.), Oct., 1925.
- Safety in logging and lumbering industry (J. A. Dickinson), *Proc. of Nat. Safety Congress*; 1924.
- Some safety considerations in logging operations (J. A. Dickinson), *Proc. of Appalachian Logging Congress*; 1924.
- How the National Elevator Code safeguards vertical travel (John A. Dickinson), *Nat. Safety News*, **12**, No. 1, p. 9; July, 1925.
- Traffic signals (M. G. Lloyd), Paper before Internat. Assoc. of Municipal Electricians, thirtieth annual convention; Aug. 19, 1925.

### 5. RADIO

- Recent developments in radio in the United States (J. H. Dellinger), *Boletín de la Uniao Pan-Americana* (Portuguese), **25**, p. 31; July, 1923. *Boletín de la Union Panamericana* (Spanish), **57**, p. 117; August, 1923.
- Bureau of Standards explores short wave regions (F. W. Dunmore), *QST*, **6**, p. 75; July, 1923.

- Reducing the guesswork in tuning (J. H. Dellinger), *Radio Broadcast*, **3**, p. 241; July, 1923.
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## XVII. SUBJECT INDEX TO NEW PUBLICATIONS

The consolidated index in Circular 24 is designed to include citations to titles, cross references, and subsidiary topics of all printed publications of the bureau listed in that circular. The following index supplements the index in Circular 24 by giving the additional index references to cover new publications announced in this supplementary list. The circular, supplementary list, and the two indexes contained therein cover all bureau publications except those published in outside journals up to the date the supplement goes to print.

### A

Absorbency\*of paper towels, C294.  
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