THE WOODSMAN'S HANDBOOK

PART I

HENRY SOLON GRAVES

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GIFFORD PINCHOT, FORESTER.

[E WOODSMAN'S HANDBOOK.

BY

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DIRECTOR OF THE YALE FOREST SCHOOL.

PART I.
(Revised Edition.)

WASHINGTON:
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1903.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF FORESTRY,
Washington, D. C. January 3, 1903.

SIR: I have the honor to transmit herewith Part I (Revised) of a collection of papers by Professor Henry S. Graves, Director of the Yale Forest School and a collaborator of this Bureau, entitled "The Woodsman's Handbook," and to recommend its publication as Bulletin No. 36 of the Bureau of Forestry.

By bringing together information so thoroughly valuable to the lumberman and the forester alike Professor Graves has made possible a long step toward the better understanding and appreciation of each by the other, and has added a most useful member to the forest literature of the United States.

Very respectfully,

GIFFORD PINCHOT,
Forester.

Hon. JAMES WILSON,
Secretary of Agriculture.

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THE WOODSMAN'S HANDBOOK.

INTRODUCTION.

The purpose of the Woodsman's Handbook is to give a collection of tables and rules of practical use to lumbermen, foresters, and others interested in the measurement of wood and timber. The Handbook is not intended as a treatise on forest mensuration, and many tables and facts of interest to students of advanced forest mathematics are omitted.

Only such information as is deemed of immediate practical value to American woodsmen is included. For this reason many rules for computing the cubic contents of logs and trees are not mentioned. The cubic foot is used commercially in this country to a very limited extent, and therefore only the simplest rules for its use are given. In the discussion of growth and yield in the second volume the author will confine himself also to the simplest methods of investigation. Those who wish to inform themselves in the more advanced portions of forest mensuration are referred to technical treatises on the subject.

The unit of measure most commonly used in this country for selling logs and lumber is the board foot. The amount of manufactured lumber which can be sawed from logs of different dimensions is shown in log rules. Satisfactory log rules are difficult to construct, because the sawed product of logs depends on the skill of the sawyer and on the kind of machinery used, which necessarily vary. There are now in use in the United States and Canada over forty different log rules for board feet. Many of them are admitted to be inaccurate and unfair by their users, who continue

to employ them because a satisfactory rule is not known or is not readily available.

The author has endeavored to collect all the rules in use in the United States and Canada. Many of them are defective, and some are almost absurd. The log rules are compared in tables which give the contents of logs 12, 16, and 20 feet in length, and of all diameters from 6 to 60 inches. The Scribner, Doyle, and New Hampshire rules have been given in full, the first two being the ones in most common use throughout the country and the last being the best caliper log rule. To give them all in full would make the Handbook too voluminous for practical use.

The rules are presented without discussion of their respective merits. However, their origin and mode of use have been explained as far as possible. As yet no sufficiently extensive study of the merchantable contents of logs in board feet has been made to justify a positive statement that any single one of the log rules included in the Handbook is the best for general use. It is expected that lumbermen will compare the rules and select those best meeting their particular needs.

A critical consideration of the various log rules now in use will be given in a later bulletin of the Bureau of Forestry.

On account of the inaccuracies of the rules and the lack of uniformity in their use, the equivalents employed to convert one unit of measurement into another, as, for example, board feet into standards, or board feet into cords, vary to such an extent that only the figures in most common use are given.

As yet comparatively little information has been gathered concerning the volume of standing trees, the rate of their growth, and the future yield of forests. But the best available figures have been given with the intention of adding in future editions such material as may then be at hand.

The author is indebted to Mr. George Dudley Seymour for describing the construction and use of the instruments illustrated and for reviewing the manuscript, and to Mr. Roy L. Marston for his assistance in compiling the log rules. He desires also to acknowledge the courteous cooperation of Mr. John Humphrey and of many others who have placed at the disposal of the Bureau of Forestry data regarding the measurement of timber.

The first volume comprises rules for finding the contents of logs and standing trees, methods of estimating timber, a brief outline of forest working plans, and a description of instruments useful in the woods.

It is the intention of the author to include in the second volume directions for studying the growth of trees, tables of growth, as far as the growth of American trees has been studied, directions for the study of the future production of forests, tables showing the future yield of forests, and miscellaneous tables of value to woodsmen.

If any of the users of the Handbook know of American rules or tables for measuring timber which have not been included or mentioned in this volume, the author would regard it as a favor to have his attention called to them.

UNITS OF LOG MEASURE.

In the United States and Canada logs are most commonly measured in board feet. Firewood and wood cut into short bolts, such as small pulpwood, excelsior wood, etc., are usually measured in cords. In the Adirondack Mountains the 19-inch standard, or, as it is often called, "the market," is a common unit of log measure. In some localities a log 22 inches in diameter at the small end and 13 feet long is used as a standard log and is the unit for buying and selling timber. In other sections standards are used which are based on logs 12 feet long and respectively 21, 22, and 24 inches in diameter at the small end inside the bark, as explained in a later chapter.

In some cases logs are measured in cubic feet. This is common with long spar timber and with long logs to be cut or hewn square. In many localities timber is sold by the log or tree, and in some sections standing timber is sold for a specified amount per acre or other unit of land measure. Piles and mine props are usually sold by the piece or by the lineal foot. Logs are occasionally sold by the ton.

BOARD MEASURE.

The unit of board measure is the board foot, which is the contents of a board 1 foot square and 1 inch thick. The number of board feet which can be sawed from logs of different diameters and lengths is shown in log rules.

Logs are usually measured at the small end inside the bark, because the removal of the slabs reduces the logs to the dimensions of the small end. This is the custom in measuring short logs by all the rules which follow, except in certain cases noted in the descriptions of the several rules. Some of the rules, for example the Doyle and the Partridge rules, were intended by their originators to be used for an average diameter, but most persons who use them take the diameter at the small end, except in case of long timber. In measuring long logs which are to be cut into short logs before being sawed into boards, the diameter is usually not taken at the small end alone. Thus in using the Maine Rule, long logs are scaled as two logs. The diameter at the small end inside the bark is measured and is taken as the diameter of the uppermost log. The diameter at the small end of the lower log is estimated by the log scaler. Another method of measuring long logs, often used with the Doyle Rule, is to take the diameters at both ends inside the bark, average them, and use this average as the diameter of the log. Still another method in use is to take the diameter inside the bark, one-third the distance from the small end of the log.

Logs are usually cut from 2 to 6 inches longer than the standard lengths of boards, to allow for bruising in handling. This additional length is disregarded in scaling.

Log rules give the number of board feet in logs which are straight and sound. If logs are unsound or otherwise defective, a certain allowance must be made by the scaler. The determination of the amount in board feet which should be deducted for unsoundness or defects in a given log requires great skill on the part of the scaler, and, as it is a matter of judgment in each case, no definite directions can be given here.

The rules which follow are constructed from diagrams, by mathematical formulæ, by measurements of logs sawed at the mill, or by a combination of these methods.

Comparison of Log Rules for Board Measure.

The tables which follow show the contents of 12, 16, and 20 foot logs of different diameters as derived from the rules used in the United States and Canada. A brief description of the rules follows the comparison tables.

Comparison of Log Rules for Board Measure.

TWELVE-FOOT LOGS.

	NAME OF RULE.	DIAMETER IN INCHES.						
		6	8	10	12	14	16	18
		BOARD FEET.						
1	Scribner[a]	14	23	38	59	86	119	160
2	Doyle	3	12	27	48	75	108	147
3	Doyle and Scribner	3	12	27	48	75	108	147
4	Holland or Maine	15	33	51	78	107	134	174
5	New Hampshire	14	26	41	58	80	104	132
6	Humphrey or Vermont	18	32	50	72	98	128	162
7	Bangor	14	30	51	75	103	136	178
8	Cumberland River	....	....	36	51	70	91	115
9	Hanna	....	24	38	60	88	120	160
10	Spaulding	....	....	38	58	86	121	162
11	Favorite	....	....	....	49	74	107	148
12	Baxter	....	26	42	63	88	117	150
13	Doyle and Baxter	....	....	27	48	75	108	147
14	Square of three-fourths	20	36	56	81	110	144	182
15	Square of two-thirds	....	....	44	64	86	113	144
16	Drew	No values given below 20 feet.						
17	Herring	....	19	37	58	80	106	137
18	Dusenberry	....	....	32	50	75	102	134
19	Orange River	....	....	....	58	79	103	130
20	Chapin	....	....	48	63	84	108	139
21	Northwestern	....	27	46	58	88	128	155
22	Derby	20	36	56	81	110	145	185
23	Partridge	20	34	52	78	104	136	176
24	Parsons[b]	12	32	52	75	105	136	177
25	Ropp	....	....	....	52	82	118	158
26	Stillwell	No values given for 12-foot logs.						
27	Baughman's rotary saw	13	31	53	79	109	145	183
28	Baughman's band saw	15	31	55	84	117	157	203
29	Saco River[b]	14	36	58	82	112	150	185
30	Ballon	17	30	46	59	88	128	155
31	Wilson	19	34	50	75	106	142	183
32	Wilcox	....	....	....	50	76	108	135
33	Warner	....	....	34	52	74	96	122
34	Boynton	....	24	45	66	93	128	162
35	Carey[b]	18	33	51	78	110	143	183

[a] Values for 6, 8, and 10 inches are those used by the Santa Clara Lumber Company, New York.

[b] Values read off from a scaler's stick.

Comparison of Log Rules for Board Measure.

Twelve-foot Logs.

DIAMETER IN INCHES.										
20	22	24	26	28	30	32	34	36	38	
BOARD FEET.										
210	251	303	375	436	493	552	600	692	801	1
192	243	300	363	432	507	588	675	768	867	2
192	243	300	363	436	493	552	600	692	801	3
227	272	327	380	460	530	594	675	770	851	4
163	197	235	276	319	367	417	471	528	589	5
200	240	288	.....	.....	.....	.....	.....	.....	.....	6
225	276	333	393	456	523	594	669	.....	.....	7
142	172	201	240	279	320	364	411	461	514	8
204	252	312	376	432	492	556	624	700	800	9
207	256	309	366	427	492	561	634	713	798	10
186	243	294	358	422	474	544	634	690	778	11
192	229	275	324	378	437	499	566	636	.....	12
188	229	275	324	378	437	499	566	636	.....	13
225	272	324	380	441	506	576	650	729	.....	14
177	214	256	300	348	400	454	513	576	641	15
No values given below 20 feet.										16
173	213	258	308	364	425	492	564	643	722	17
172	214	259	310	365	425	489	558	631	709	18
160	194	231	271	314	360	410	463	519	578	19
175	220	280	349	422	499	582	672	770	870	20
186	243	294	338	402	474	544	634	690	778	21
232	277	328	285	446	511	581	655	734	.....	22
216	262	312	366	424	488	554	626	702	.....	23
228	278	325	385	451	535	.....	.....	.....	.....	24
204	254	310	370	434	504	578	658	742	830	25
No values given for 12-foot logs.										26
233	287	343	405	475	542	617	701	791	857	27
255	313	375	443	515	593	675	767	887	965	28
227	275	326	386	444	512	580	.....	.....	.....	29
210	.....	.....	.....	.....	.....	.....	.....	.....	.....	30
224	280	336	397	462	534	611	691	.....	.....	31
180	235	280	335	385	444	505	566	640	730	32
156	191	237	279	316	368	420	470	518	.....	33
200	242	288	338	392	.....	.....	.....	.....	.....	34
227	280	331	395	464	536	611	688	778	.....	35

Comparison of Log Rules for Board Measure—Continued.

TWELVE-FOOT LOGS—Continued.

	NAME OF RULE.	DIAMETER IN INCHES.						
		6	8	10	12	14	16	18
		BOARD FEET.						
36	Forty-five	....	28	46	67	94	126	163
37	White	....	24	40	59	88	121	162
38	Finch and Apgar	....	....	....	56	84	118	152
39	Constantine	....	50	79	113	154	201	255
40	Ake	....	31	49	70	96	125	159
41	Quebec	12	24	44	60	90	120	160
42	British Columbia	....	....	41	63	89	120	155
43	New Brunswick	....	....	....	72	98	128	172

	NAME OF RULE.	DIAMETER IN INCHES.			
		40	42	44	46
		BOARD FEET.			
1	Scribner	903	1,007	1,110	.....
2	Doyle	972	1,083	1,200	1,323
3	Doyle and Scribner	903	1,007	1,110	.....
4	Holland or Maine	946	1,051	1,142	1,276
5	New Hampshire	652	719	790	863
6	Humphrey or Vermont	.....	.....	.....	.....
7	Bangor	.....	.....	.....	.....
8	Cumberland River	569	627	688	752
9	Hanna	900	1,000	1,108	1,212
10	Spaulding	889	984	1,086	1,186
11	Favorite	870	950	1,052	1,160
12	Baxter	.....	.....	.....	.....
13	Doyle and Baxter	.....	.....	.....	.....
14	Square of three-fourths	.....	.....	.....	.....

Comparison of Log Rules for Board Measure—Continued.

TWELVE-FOOT LOGS—Continued.

DIAMETER IN INCHES.										
20	22	24	26	28	30	32	34	36	38	
BOARD FEET.										
206	256	311	373	442	518	602	694	793	.....	36
212	254	302	371	430	490	546	600	.....	.....	37
193	239	300	355	414	468	550	630	696	791	38
314	380	452	531	616	706	804	908	1,017	1,133	39
196	237	283	331	384	441	502	.....	.....	.....	40
210	260	315	380	435	505	570	650	710	780	41
195	240	289	343	401	464	531	603	680	761	42
225	272	324	.....	.....	.....	.....	.....	.....	.....	43

DIAMETER IN INCHES.							
48	50	52	54	56	58	60	
BOARD FEET.							
180							
.....	.....	.....	.....	.....	.....	.....	1
1,452	1,587	1,723	1,875	2,028	2,187	2,352	2
.....	.....	.....	.....	.....	.....	.....	3
1,386	.....	.....	.....	.....	.....	.....	4
939	.....	.....	.....	.....	.....	.....	5
.....	.....	.....	.....	.....	.....	.....	6
.....	.....	.....	.....	.....	.....	.....	7
819	879	961	1,037	1,115	1,196	1,280	8
1,324	1,448	.....	.....	.....	.....	.....	9
1,293	1,404	1,519	1,638	1,763	1,893	2,028	10
1 272	.....	.....	.....	.....	.....	.....	11
.....	.....	.....	.....	.....	.....	.....	12
.....	.....	.....	.....	.....	.....	.....	13
.....	.....	.....	.....	.....	.....	.....	14

Comparison of Log Rules for Board Measure—Continued.

TWELVE-FOOT LOGS—Continued.

	NAME OF RULE.	DIAMETER IN INCHES.			
		40	42	44	46
		BOARD FEET.			
15	Square of two-thirds	710	784	860	940
16	Drew	No values given below 20 feet.			
17	Herring	800	882	.....	.....
18	Dusenberry	790	877	.....	.....
19	Orange River	640	.....	.....	.....
20	Chapin	972	1,078	1,182	1,290
21	Northwestern	870	950	1,052	1,160
22	Derby	.....	.....	.....	.....
23	Partridge	.....	.....	.....	.....
24	Parsons	.....	.....	.....	.....
25	Ropp	924	1,022	1,126	1,234
26	Stillwell	No values given for 12-foot logs.			
27	Baughman's rotary saw	971	1,073	1,183	1,299
28	Baughman's band saw	1,069	1,187	1,309	1,425
29	Saco River	.....	.....	.....	.....
30	Ballon	.....	.....	.....	.....
31	Wilson	.....	.....	.....	.....
32	Wilcox	840	.....	.....	.....
33	Warner	.....	.....	.....	.....
34	Boynton	.....	.....	.....	.....
35	Carey	.....	.....	.....	.....
36	Forty-five	.....	.....	.....	.....
37	White	.....	.....	.....	.....
38	Finch and Apgar	886	960	1,057	1,188
39	Constantine	1,257	1,384	1,520	1,661
40	Ake	.....	.....	.....	.....
41	Quebec	880	950	.....	.....
42	British Columbia	847	937	1,032	1,131
43	New Brunswick	.....	.....	.....	.....

Comparison of Log Rules for Board Measure—Continued.

TWELVE-FOOT LOGS—Continued.

DIAMETER IN INCHES.							
48	50	52	54	56	58	60	
BOARD FEET.							
1,024	1,111						15
No values given below 20 feet.							16
							17
							18
							19
1,398	1,512	1,620	1,736	1,850	1,970	2,093	20
1,272							21
							22
							23
							24
1,346	1,464	1,586	1,714	1,846	1,982	2,124	25
No values given for 12-foot logs.							26
1,413	1,531	1,655	1,797	1,943	2,073	2,174	27
1,567	1,703	1,837	1,977	2,131	2,305	2,449	28
							29
							30
							31
							32
							33
							34
							35
							36
							37
							38
1,819	1,963						39
							40
							41
1,235	1,343	1,457	1,574	1,696	1,823	1,955	42
							43

Comparison of Log Rules for Board Measure—Continued.

SIXTEEN-FOOT LOGS.

	NAME OF RULE.	DIAMETER IN INCHES.						
		6	8	10	12	14	16	18
		BOARD FEET.						
		4	8	12	20	28	36	44
1	Scribner[a]	18	32	54	79	114	159	213
2	Doyle	4	16	36	64	100	144	196
3	Doyle and Scribner	4	16	36	64	100	144	196
4	Holland or Maine	20	44	68	105	142	179	232
5	New Hampshire	19	35	54	78	106	139	176
6	Humphrey or Vermont	24	43	66	96	130	170	217
7	Bangor	23	41	69	100	137	182	238
8	Cumberland River			47	68	93	121	153
9	Hanna		32	51	80	117	160	213
10	Spaulding			50	77	114	161	216
11	Favorite				64	98	142	197
12	Baxter		34	56	84	117	156	200
13	Doyle and Baxter			36	64	100	144	196
14	Square of three-fourths	27	48	75	108	147	192	243
15	Square of two-thirds			58	85	114	150	192
16	Drew	No values given below 20 feet.						
17	Herring		25	49	77	107	142	183
18	Dusenberry			42	68	100	136	170
19	Orange River				76	104	136	173
20	Chapin			64	84	112	144	186
21	Northwestern		33	61	77	117	170	206
22	Derby	28	49	75	110	148	195	248
23	Partridge	26	46	68	102	140	180	236
24	Parsons[b]	21	41	64	100	140	179	231
25	Ropp				69	109	157	211
26	Stillwell			65	96	133	176	225
27	Baughman's rotary saw	17	41	70	105	145	193	244
28	Baughman's band saw	20	41	73	112	156	209	270
29	Saco River[b]	26	49	75	108	147	192	246
30	Bailon	22	40	61	79	117	170	206
31	Wilson	23	46	67	101	144	184	244
32	Wilcox				66	101	144	180
33	Warner		30	40	62	98	128	162
34	Boynton		32	60	90	124	170	216
35	Carey[b]	No values given over 15 feet long.						

[a] Values for 6, 8, and 10 inches are those used by the Santa Clara Lumber Company, New York.

[b] Values read off from a scaler's stick.

Comparison of Log Rules for Board Measure—Continued.

Sixteen-foot Logs.

DIAMETER IN INCHES.										
20	22	24	26	28	30	32	34	36	38	
BOARD FEET.										
280	334	404	500	582	657	736	800	923	1,068	1
256	324	400	484	576	676	784	900	1,024	1,156	2
256	324	400	484	582	657	736	800	923	1,068	3
202	363	439	507	614	706	795	900	1,026	1,135	4
217	262	313	367	426	489	557	628	704	785	5
267	320	384	.....	.....	.....	.....	.....	.....	.....	6
300	369	444	526	609	697	792	892	.....	.....	7
190	229	268	320	372	427	485	548	614	685	8
272	336	416	501	576	656	741	832	933	1,066	9
276	341	412	488	569	656	748	845	950	1,064	10
248	324	392	476	562	632	725	845	920	1,037	11
250	305	366	432	504	582	665	754	848	.....	12
256	305	366	432	504	582	665	754	848	.....	13
300	365	432	507	588	675	768	867	972	.....	14
236	285	341	400	464	533	605	684	768	854	15
No values given below 20 feet.										16
230	284	344	411	485	567	655	752	857	963	17
229	285	346	414	487	567	652	744	841	945	18
213	258	308	360	418	480	546	616	692	769	19
233	294	374	465	563	666	777	896	1,027	1,161	20
248	324	392	450	536	632	725	845	920	1,037	21
307	368	438	512	593	680	773	872	977	.....	22
288	350	416	486	564	650	738	834	998	.....	23
300	366	433	506	600	705	.....	.....	.....	.....	24
272	339	413	493	579	672	771	877	989	1,107	25
261	320	385	456	533	588	675	768	.....	.....	26
310	382	457	540	633	722	822	934	1,054	1,142	27
340	417	500	590	686	790	900	1,022	1,182	1,286	28
302	366	436	513	590	674	771	.....	.....	.....	29
280	.....	.....	.....	.....	.....	.....	.....	.....	.....	30
306	374	448	529	616	713	814	922	.....	.....	31
240	313	373	446	513	592	673	754	853	973	32
203	258	316	372	431	490	560	630	.....	.....	33
366	322	384	450	522	.....	.....	.....	.....	.....	34
No values given for logs over 15 feet long.										35

Comparison of Log Rules for Board Measure—Continued.

SIXTEEN-FOOT LOGS—Continued.

	NAME OF RULE.	DIAMETER IN INCHES. 6	8	10	12	14	16	18
		BOARD FEET.						
36	Forty-five	....	38	61	90	125	168	218
37	White	....	30	51	79	114	161	214
38	Finch and Apgar	....	....	....	74	112	157	203
39	Constantine	....	67	105	151	213	268	339
40	Ake	....	41	65	95	128	167	212
41	Quebec	16	32	59	80	120	160	213
42	British Columbia	....	....	55	84	119	160	207
43	New Brunswick	....	....	....	96	130	170	229

	NAME OF RULE.	DIAMETER IN INCHES. 40	42	44	46
		BOARD FEET.			
			132	148	159
1	Scribner	1,204	1,343	1,480	.....
2	Doyle	1,296	1,444	1,600	1,764
3	Doyle and Scribner	1,204	1,343	1,480	.....
4	Holland or Maine	1,261	1,401	1,523	1,701
5	New Hampshire	870	959	1,052	1,149
6	Humphrey or Vermont	.....	.....	.....	.....
7	Bangor	.....	.....	.....	.....
8	Cumberland River	759	835	918	1,003
9	Hanna	1,200	1,333	1,477	1,616
10	Spaulding	1,185	1,312	1,448	1,581
11	Favorite	1,160	1,266	1,402	1,546
12	Baxter	.....	.....	.....	.....
13	Doyle and Baxter	.....	.....	.....	.....
14	Square of three-fourths	.....	.....	.....	.....
15	Square of two-thirds	946	1,045	1,146	1,253
16	Drew	No values given below 20 feet.			
17	Herring	1,067	1,176	.....	.....
18	Dusenberry	1,054	1,170	.....	.....
19	Orange River	853	.....	.....	.....

Comparison of Log Rules for Board Measure—Continued.

SIXTEEN-FOOT LOGS—Continued.

DIAMETER IN INCHES.										
20	22	24	26	28	30	32	34	36	38	
BOARD FEET.										
275	341	415	498	590	691	803	925	1,058	.....	36
290	338	402	492	575	649	728	797	.....	.....	37
258	318	400	474	552	624	733	840	928	1,054	38
416	507	603	708	821	942	1,072	1,210	1,356	1,511	39
261	316	377	441	512	588	669	.....	.....	.....	40
280	347	420	507	580	673	760	867	947	1,040	41
261	320	386	457	535	619	708	804	906	1,015	42
300	362	432	.....	.....	.....	.....	.....	.....	.....	43

DIAMETER IN INCHES.							
48	50	52	54	56	58	60	
BOARD FEET.							
173							1
1,936	2,116	2,304	2,500	2,704	2,916	3,136	2
							3
1,848							4
1,252							5
							6
							7
1,092	1,172	1,281	1,382	1,486	1,594	1,707	8
1,765	1,930						9
1,724	1,872	2,025	2,184	2,350	2,524	2,704	10
1,696							11
							12
							13
							14
1,365	1,481						15
No values given below 20 feet.							16
							17
							18
							19

Comparison of Log Rules for Board Measure—Continued.

SIXTEEN-FOOT LOGS—Continued.

	NAME OF RULE.	DIAMETER IN INCHES.			
		40	42	44	46
		BOARD FEET.			
20	Chapin	1,296	1,437	1,577	1,721
21	Northwestern	1,160	1,266	1,402	1,546
22	Derby				
23	Partridge				
24	Parsons				
25	Ropp	1,232	1,363	1,501	1,645
26	Stillwell				
27	Baughman's rotary saw	1,294	1,430	1,577	1,732
28	Baughman's band saw	1,425	1,582	1,745	1,900
29	Saco River				
30	Ballon				
31	Wilson				
32	Wilcox	1,120			
33	Warner				
34	Boynton				
35	Carey	No values for logs over 15 feet long.			
36	Forty-five				
37	White				
38	Finch and Apgar	1,181	1,280	1,410	1,584
39	Constantine	1,671	1,846	2,026	2,215
40	Ake				
41	Quebec	1,173	1,267		
42	British Columbia	1,129	1,249	1,376	1,508
43	New Brunswick				

Comparison of Log Rules for Board Measure—Continued.

Sixteen-foot Logs—Continued.

DIAMETER IN INCHES.							
48	50	52	54	56	58	60	
BOARD FEET.							
1,865	2,016	2,160	2,313	2,467	2,627	2,791	20
1,696	.....	.....	.....	.....	.....	.....	21
.....	.....	.....	.....	.....	.....	.....	22
.....	.....	.....	.....	.....	.....	.....	23
.....	.....	.....	.....	.....	.....	.....	24
1,795	1,952	2,115	2,285	2,461	2,643	2,832	25
.....	.....	.....	.....	.....	.....	.....	26
1,884	2,041	2,206	2,396	2,590	2,764	2,898	27
2,089	2,270	2,449	2,636	2,841	3,073	3,265	28
.....	.....	.....	.....	.....	.....	.....	29
.....	.....	.....	.....	.....	.....	.....	30
.....	.....	.....	.....	.....	.....	.....	31
.....	.....	.....	.....	.....	.....	.....	32
.....	.....	.....	.....	.....	.....	.....	33
.....	.....	.....	.....	.....	.....	.....	34
No values for logs over 15 feet long.							35
.....	.....	.....	.....	.....	.....	.....	36
.....	.....	.....	.....	.....	.....	.....	37
.....	.....	.....	.....	.....	.....	.....	38
2,425	2,617	.....	.....	.....	.....	.....	39
.....	.....	.....	.....	.....	.....	.....	40
.....	.....	.....	.....	.....	.....	.....	41
1,647	1,791	1,942	2,099	2,262	2,431	2,606	42
.....	.....	.....	.....	.....	.....	.....	43

Comparison of Log Rules for Board Measure—Continued.

TWENTY-FOOT LOGS.

	NAME OF RULE.	DIAMETER IN INCHES. 6	8	10	12	14	16	18
		BOARD FEET.						
1	Scribner [a]	....	40	70	98	143	198	267
2	Doyle	5	20	46	80	125	180	245
3	Doyle and Scribner	5	20	46	80	125	180	245
4	Holland or Maine	25	55	85	131	178	223	290
5	New Hampshire	24	43	68	97	133	174	220
6	Humphrey or Vermont	30	53	84	120	164	212	272
7	Bangor	31	51	86	125	171	228	297
8	Cumberland River	....	....	59	85	116	151	191
9	Hanna	....	40	63	100	147	200	267
10	Spaulding	....	....	63	96	143	201	270
11	Favorite	....	....	....	81	122	177	246
12	Baxter	....	54	86	123	167	219	278
13	Doyle and Baxter	....	....	46	80	125	180	245
14	Square of three-fourths	34	60	94	135	182	240	304
15	Square of two-thirds	....	....	73	106	143	188	240
16	Drew	....	....	80	104	144	194	250
17	Herring	....	31	61	96	133	177	229
18	Dusenbury	....	....	59	86	125	170	225
19	Orange River	....	....	....	96	131	171	216
20	Chapin	....	....	80	105	140	180	232
21	Northwestern	....	42	78	98	150	214	260
22	Derby [?]	36	63	96	142	188	250	312
23	Partridge	32	58	84	126	178	224	296
24	Parsons [b]	27	53	83	123	178	237	291
25	Ropp	....	....	....	87	136	196	264
26	Stillwell	....	....	82	120	167	238	300
27	Baughman's rotary saw	21	51	88	131	181	241	305
28	Baughman's band saw	25	51	91	140	195	261	338
29	Saco River [b]	36	62	96	136	186	242	305
30	Ballon	No values for 20-foot logs.						
31	Wilson	30	58	83	125	178	235	306
32	Wilcox	....	....	....	83	126	180	225
33	Warner	No values for 20-foot logs.						
34	Boynton	No values for 20-foot logs.						
35	Carey [b]	No values given over 15 feet long.						

[a] Values for 8 and 10 inches are those used by the Santa Clara Lumber Company, New York.

Comparison of Log Rules for Board Measure—Continued.

TWENTY-FOOT LOGS.

DIAMETER IN INCHES.										
20	22	24	26	28	30	32	34	36	38	
BOARD FEET.										
350	418	505	625	728	821	920	1,000	1,152	1,335	1
320	404	500	605	720	845	980	1,125	1,280	1,446	2
320	404	500	605	728	821	920	1,000	1,152	1,335	3
378	454	549	634	767	883	990	1,125	1,283	1,419	4
271	329	391	459	533	611	696	785	880	981	5
333	400	480	.....	.....	.....	.....	.....	.....	.....	6
375	461	555	656	761	871	990	1,115	.....	.....	7
238	287	335	400	465	533	607	685	768	856	8
340	420	520	627	720	820	927	1,040	1,167	1,334	9
345	426	515	610	711	820	935	1,056	1,188	1,330	10
308	405	490	596	703	790	908	1,058	1,150	1,298	11
343	416	494	580	674	774	882	995	1,115	.....	12
320	416	494	580	674	774	882	995	1,115	.....	13
375	454	540	634	735	844	960	1,084	1,215	.....	14
295	356	426	500	580	666	756	855	960	1,068	15
316	386	466	555	653	759	876	999	1,126	1,263	16
288	355	430	514	606	708	819	940	1,071	1,203	17
286	356	433	517	609	709	815	930	1,051	1,180	18
267	323	384	451	523	600	683	771	864	963	19
292	368	468	582	704	834	972	1,120	1,284	1,452	20
308	405	490	564	670	790	908	1,058	1,150	1,298	21
385	464	548	640	740	851	970	1,094	1,226	.....	22
360	438	520	606	704	812	922	1,042	1,234	.....	23
379	455	546	645	750	890	.....	.....	.....	.....	24
340	424	516	616	724	840	964	1,096	1,236	1,384	25
327	401	482	571	667	735	844	960	.....	.....	26
388	478	571	675	791	903	1,028	1,168	1,318	1,428	27
425	521	625	738	858	988	1,125	1,278	1,478	1,608	28
377	458	544	640	740	850	968	.....	.....	.....	29
No values for 20-foot logs.										30
382	466	560	661	769	892	1,017	1,150	.....	.....	31
300	391	466	558	641	740	841	943	1,066	1,216	32
No values for 20-foot logs.										33
No values for 20-foot logs.										34
No values for logs over 15 feet long.										35

[b] Values read off from a scaler's stick.

Comparison of Log Rules for Board Measure—Continued.

TWENTY-FOOT LOGS—Continued.

	NAME OF RULE.	DIAMETER IN INCHES.						
		6	8	10	12	14	16	18
		BOARD FEET.						
36	Forty-five	....	47	76	112	157	210	272
37	White	....	41	65	99	145	190	272
38	Finch and Apgar	....	....	....	93	140	196	254
39	Constantine	....	84	131	188	256	335	424
40	Ake	....	52	82	118	160	208	265
41	Quebec	20	40	73	100	150	200	267
42	British Columbia	....	....	69	105	149	200	259
43	New Brunswick	....	....	....	120	163	213	286

	NAME OF RULE.	DIAMETER IN INCHES.			
		40	42	44	46
		BOARD FEET.			
1	Scribner	1,505	1,679	1,850	.....
2	Doyle	1,620	1,805	2,000	2,206
3	Doyle and Scribner	1,505	1,679	1,850	.....
4	Holland or Maine	1,576	1,752	1,904	2,127
5	New Hampshire	1,087	1,198	1,315	1,437
6	Humphrey or Vermont	.....	.....	.....	.....
7	Bangor	.....	.....	.....	.....
8	Cumberland River	948	1,043	1,147	1,254
9	Hanna	1,500	1,667	1,847	2,020
10	Spaulding	1,481	1,640	1,810	1,976
11	Favorite	1,450	1,584	1,754	1,934
12	Baxter	.....	.....	.....	.....
13	Doyle and Baxter	.....	.....	.....	.....
14	Square of three-fourths	.....	.....	.....	.....
15	Square of two-thirds	1,183	1,306	1,433	1,566
16	Drew	1,407	1,561	1,723	1,900
17	Herring	1,333	1,470	.....	.....
18	Dusenbury	1,318	1,462	.....	.....
19	Orange River	1,067	.....	.....	.....

Comparison of Log Rules for Board Measure—Continued.

Twenty-foot Logs—Continued.

DIAMETER IN INCHES.										
20	22	24	26	28	30	32	34	36	38	
BOARD FEET.										
344	426	518	622	737	864	1,004	1,156	1,317	.....	36
354	418	503	630	720	818	916	1,000	.....	.....	37
322	398	500	592	690	780	916	1,050	1,160	1,318	38
523	633	754	884	1,026	1,178	1,336	1,512	1,662	1,889	39
327	395	472	552	640	735	837	.....	.....	.....	40
350	433	525	633	725	842	950	1,083	1,183	1,360	41
326	400	482	571	668	773	886	1,005	1,133	1,268	42
375	453	540	.....	.....	.....	.....	.....	.....	.....	43

DIAMETER IN INCHES.							
48	50	52	54	56	58	60	
BOARD FEET.							
.....	.....	.....	.....	.....	.....	.....	1
2,420	2,645	2,880	3,125	3,380	3,645	3,920	2
.....	.....	.....	.....	.....	.....	.....	3
2,310	.....	.....	.....	.....	.....	.....	4
1,565	.....	.....	.....	.....	.....	.....	5
.....	.....	.....	.....	.....	.....	.....	6
.....	.....	.....	.....	.....	.....	.....	7
1,365	1,465	1,602	1,728	1,858	1,992	2,133	8
2,207	2,414	.....	.....	.....	.....	.....	9
2,155	2,340	2,531	2,730	2,938	3,155	3,380	10
2,124	.....	.....	.....	.....	.....	.....	11
.....	.....	.....	.....	.....	.....	.....	12
.....	.....	.....	.....	.....	.....	.....	13
.....	.....	.....	.....	.....	.....	.....	14
1,706	1,851	.....	.....	.....	.....	.....	15
2,087	2,285	2,492	2,710	2,939	3,179	3,431	16
.....	.....	.....	.....	.....	.....	.....	17
.....	.....	.....	.....	.....	.....	.....	18
.....	.....	.....	.....	.....	.....	.....	19

Comparison of Log Rules for Board Measure—Continued.

TWENTY-FOOT LOGS—Continued.

	NAME OF RULE.	DIAMETER IN INCHES.			
		40	42	44	46
		BOARD FEET.			
20	Chapin	1,620	1,796	1,972	2,152
21	Northwestern	1,450	1,584	1,754	1,934
22	Derby				
23	Partridge				
24	Parsons				
25	Ropp	1,540	1,704	1,876	2,056
26	Stillwell				
27	Baughman's rotary saw	1,618	1,788	1,971	2,165
28	Baughman's band saw	1,781	1,978	2,181	2,375
29	Saco River				
30	Ballon	No values for 20-foot logs.			
31	Wilson				
32	Wilcox	1,400			
33	Warner	No values for 20-foot logs.			
34	Boynton	No values for 20-foot logs.			
35	Carey	No values for logs over 15 feet long.			
36	Forty-five				
37	White				
38	Finch and Apgar	1,476	1,600	1,762	1,980
39	Constantine	2,088	2,308	2,533	2,768
40	Ake				
41	Quebec	1,467	1,583		
42	British Columbia	1,411	1,561	1,719	1,885
43	New Brunswick				

Comparison of Log Rules for Board Measure—Continued.

TWENTY-FOOT LOGS—Continued.

DIAMETER IN INCHES.							
48	50	52	54	56	58	60	
BOARD FEET.							
2,332	2,520	2,700	2,892	3,084	3,284	3,490	20
							21
							22
							23
							24
2,244	2,440	2,644	2,856	3,076	3,304	3,540	25
							26
2,355	2,551	2,758	2,995	3,238	3,455	3,623	27
2,611	2,838	3,061	3,295	3,551	3,841	4,081	28
							29
No values for 20-foot logs.							30
							31
No values for 20-foot logs.							32
No values for 20-foot logs.							33
No values for logs over 15 feet long.							34
							35
							36
							37
							38
3,031	3,238						39
							40
							41
2,058	2,239	2,428	2,624	2,827	3,039	3,258	42
							43

ORIGIN AND USE OF THE LOG RULES.

The Scribner Rule.

This is the oldest log scale now in general use. It was originally published in Scribner's Lumber and Log Book, in later editions of which it was replaced by the Doyle Rule. It is now usually called the "Old Scribner Rule," and is used to some extent in nearly every State. The rule was based on computations derived from diagrams drawn to show the number of inch boards that can be sawed from logs of different sizes after allowing for waste. The contents of these boards was then calculated and the table built up in this way. Sometimes the Scribner Rule is converted into what is known as the Scribner Decimal Rule by dropping the units and rounding the values to the nearest tens. Thus 107 board feet would be written 11 in the Decimal Rule; 104 would be written 10. The Hyslop Rule is practically the same as the Scribner Decimal Rule. The Scribner Rule is known in Minnesota as the Minnesota Standard Rule. In the original table no values were given below 12 inches.

Scribner Rule.[a]

Length in feet.	DIAMETER IN INCHES.									
	6	7	8	9	10	11	12	13	14	15
	BOARD FEET.									
8							39	49	58	71
9							44	55	64	80
10							49	61	72	89
11							54	67	79	98
12	14	18	23	30	38	48	59	73	86	107
13	15	20	26	32	41	52	64	79	93	116
14	16	22	28	35	45	56	69	85	100	125
15			30	38	49	60	74	91	107	134
16	18	24	32	42	54	64	79	97	114	142
17			34	45	58	68	84	103	122	151
18			36	48	62	72	88	109	129	160
19			38	51	66	76	93	116	136	169
20			40	54	70	80	98	122	143	178
21							103	128	150	187
22							108	134	157	196
23							113	140	164	205
24							118	146	172	214
25							123	152	179	223
26							128	158	186	232
27							133	164	193	241
28							138	170	200	250
29							143	176	207	259
30							148	182	214	268
31							153	188	221	276
32							158	194	228	284
33							163	200	236	293
34							168	206	244	302
35							173	212	251	311
36							178	218	258	320

[a]This table is protected by copyright. See joint resolution of Congress on back of title page.

NOTE.—The figures below 12 inches are those used by the Santa Clara Lumber Company, Santa Clara, N. Y.; the figures above 25 feet are those published by Hurley Brothers, Bay City, Mich.

Scribner Rule—Continued.

Length in feet.	DIAMETER IN INCHES.							
	16	17	18	19	20	21	22	23
	BOARD FEET.							
8	79	93	106	120	140	152	167	188
9	89	104	120	135	157	171	188	212
10	99	116	133	150	175	190	209	235
11	109	127	147	165	192	209	230	259
12	119	139	160	180	210	228	251	283
13	129	150	173	195	227	247	272	306
14	139	162	187	210	245	266	292	330
15	149	173	200	225	262	285	313	353
16	159	185	213	240	280	304	334	377
17	168	196	227	255	297	323	355	400
18	178	208	240	270	315	342	376	424
19	188	219	253	285	332	361	397	447
20	198	232	267	300	350	380	418	470
21	208	243	280	315	368	399	439	495
22	218	255	293	330	385	418	460	518
23	228	266	307	345	403	437	480	542
24	238	278	320	360	420	456	501	566
25	248	289	333	375	438	475	522	589
26	258	300	346	390	454	494	544	612
27	268	312	360	405	472	513	564	636
28	278	324	374	420	490	532	584	660
29	288	335	387	435	507	551	605	683
30	298	346	400	450	524	570	626	706
31	308	368	413	465	542	589	647	730
32	318	370	426	480	560	608	668	754
33	329	381	440	495	577	627	689	777
34	338	392	454	510	594	646	710	800
35	346	404	467	525	612	665	731	824
36	356	416	480	540	630	684	752	848

Scribner Rule—Continued.

Length in feet.	DIAMETER IN INCHES.						
	24	25	26	27	28	29	30
	BOARD FEET.						
8	202	230	250	274	290	305	329
9	227	258	282	308	327	343	369
10	252	287	313	342	363	381	411
11	278	315	344	377	400	419	451
12	303	344	375	411	436	457	493
13	328	373	408	445	473	495	534
14	353	401	439	479	509	533	575
15	379	430	469	514	545	571	616
16	404	459	500	548	582	609	657
17	429	487	531	582	618	647	698
18	454	516	562	616	654	685	739
19	480	545	594	650	692	723	780
20	505	573	625	684	728	761	821
21	530	602	656	719	764	800	863
22	555	631	688	753	800	838	904
23	571	659	719	787	837	876	945
24	606	688	750	821	873	914	986
25	631	717	781	856	910	952	1,027
26	656	746	816	890	946	990	1,068
27	681	774	847	924	982	1,025	1,109
28	706	806	878	958	1,018	1,066	1,150
29	732	831	908	993	1,054	1,104	1,191
30	758	860	936	1,028	1,090	1,142	1,232
31	783	889	969	1,062	1,127	1,180	1,273
32	808	918	1,000	1,096	1,164	1,218	1,314
33	833	946	1,031	1,130	1,200	1,256	1,355
34	858	974	1,061	1,164	1,236	1,294	1,396
35	883	1,003	1,093	1,198	1,272	1,332	1,437
36	908	1,046	1,124	1,232	1,308	1,370	1,478

Scribner Rule—Continued.

Length in feet.	DIAMETER IN INCHES.						
	31	32	33	34	35	36	37
	BOARD FEET.						
8	355	368	392	400	438	462	515
9	395	414	441	450	493	519	579
10	444	460	490	500	547	577	644
11	448	506	539	550	602	634	708
12	532	552	588	600	657	692	772
13	576	598	637	650	712	750	836
14	622	644	686	700	766	807	901
15	666	690	735	750	821	865	965
16	710	736	784	800	876	923	1,029
17	755	782	833	850	931	980	1,094
18	799	828	882	900	985	1,038	1,158
19	843	874	931	950	1,040	1,096	1,222
20	888	920	980	1,000	1,095	1,152	1,287
21	932	966	1,029	1,050	1,150	1,210	1,252
22	976	1,012	1,078	1,100	1,204	1,268	1,317
23	1,021	1,058	1,127	1,150	1,259	1,322	1,382
24	1,065	1,104	1,176	1,200	1,314	1,380	1,558
25	1,109	1,150	1,225	1,250	1,369	1,438	1,623
26	1,154	1,196	1,274	1,300	1,423	1,499	1,688
27	1,198	1,242	1,323	1,350	1,478	1,557	1,753
28	1,244	1,288	1,372	1,400	1,532	1,614	1,818
29	1,286	1,334	1,421	1,450	1,587	1,672	1,883
30	1,332	1,380	1,470	1,500	1,642	1,730	1,948
31	1,376	1,426	1,519	1,550	1,697	1,788	2,013
32	1,420	1,472	1,568	1,600	1,752	1,846	2,076
33	1,465	1,518	1,617	1,650	1,807	1,903	2,141
34	1,510	1,564	1,666	1,700	1,862	1,960	2,206
35	1,554	1,610	1,715	1,750	1,916	2,018	2,271
36	1,598	1,656	1,764	1,800	1,971	2,076	2,336

Scribner Rule—Continued.

Length in feet.	DIAMETER IN INCHES.						
	38	39	40	41	42	43	44
	BOARD FEET.						
8	535	560	602	636	672	698	740
9	601	630	677	716	756	786	833
10	669	700	752	795	840	872	925
11	734	770	828	874	924	959	1,017
12	801	840	903	954	1,007	1,046	1,110
13	868	910	978	1,033	1,091	1,135	1,203
14	934	980	1,053	1,113	1,175	1,222	1,295
15	1,001	1,050	1,129	1,192	1,259	1,309	1,388
16	1,068	1,120	1,204	1,272	1,343	1,396	1,480
17	1,134	1,190	1,279	1,351	1,427	1,484	1,573
18	1,201	1,260	1,354	1,431	1,511	1,571	1,665
19	1,268	1,330	1,430	1,510	1,595	1,658	1,758
20	1,335	1,400	1,505	1,590	1,679	1,745	1,850

The Doyle Rule.

This rule is known in some sections as the Connecticut River Rule, the St. Croix Rule, the Thurber Rule, the Moore and Beeman Rule, and the Scribner Rule. It is often called the Scribner Rule because it is now printed in Scribner's Lumber and Log Book. The Doyle Rule is used throughout the entire country and is more generally employed than any other rule. It is constructed by the following formula: Deduct 4 inches from the diameter of the log as an allowance for slab; square one-quarter of the remainder and multiply the result by the length of the log in feet. It was originally intended that in the use of this rule the average diameter of the log should be taken, but the usual custom is to measure the diameter inside the bark at the small end.

Doyle Rule.[a]

Length in feet.	DIAMETER IN INCHES.								
	6	7	8	9	10	11	12	13	14
	BOARD FEET.								
8	2.0	4.5	8	12	18	24	32	40	50
9	2.3	5.1	9	14	20	28	36	46	56
10	2.5	5.6	10	16	23	31	40	50	62
11	2.8	6.2	11	17	25	34	44	55	69
12	3.0	6.8	12	19	27	37	48	61	75
13	3.3	7.3	13	20	29	40	52	66	81
14	3.5	7.9	14	22	32	43	56	71	88
15	3.8	8.4	15	23	34	46	60	76	94
16	4.0	9.0	16	25	36	49	64	81	100
17	4.3	9.6	17	27	38	52	68	86	106
18	4.5	10.1	18	28	41	55	72	91	112
19	4.8	10.7	19	30	43	58	76	96	119
20	5.0	11.3	20	31	46	61	80	101	125
21	5.3	11.8	21	33	48	64	84	106	131
22	5.5	12.4	22	34	50	67	88	111	137
23	5.8	12.9	23	36	52	70	92	116	144
24	6.0	13.5	24	37	54	74	96	122	150
25	6.3	14.0	25	39	56	77	100	127	156
26	6.5	14.6	26	41	59	80	104	132	163
27	6.8	15.2	27	42	61	83	108	137	169
28	7.0	15.8	28	44	63	86	112	142	175
29	7.3	16.3	29	45	65	89	116	147	182
30	7.5	16.8	30	47	68	92	120	152	188
31	7.8	17.4	31	48	70	95	124	157	193
32	8.0	18.0	32	50	72	98	128	162	200
33	8.3	18.5	33	52	74	101	132	167	206
34	8.5	19.1	34	53	77	104	136	172	212
35	8.8	19.7	35	55	79	107	140	177	219
36	9.0	20.3	36	56	81	110	144	182	225
37	9.3	20.8	37	58	83	113	148	187	231
38	9.5	21.4	38	59	85	116	152	192	237
39	9.8	21.9	39	61	88	119	156	197	243
40	10.0	22.5	40	62	90	122	160	202	250

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Doyle Rule—Continued.

Length in feet.	DIAMETER IN INCHES.							
	15	16	17	18	19	20	21	22
	BOARD FEET.							
8	60	72	84	98	112	128	144	162
9	68	81	95	110	127	144	163	182
10	75	90	106	122	141	160	181	202
11	83	99	116	135	155	176	199	223
12	91	108	127	147	169	192	217	243
13	98	117	137	159	183	208	235	263
14	106	126	148	171	197	224	253	283
15	113	135	158	184	211	240	271	303
16	121	144	169	196	225	256	289	324
17	128	153	180	208	239	272	307	344
18	136	162	190	220	253	288	325	364
19	143	171	201	233	267	304	343	384
20	151	180	211	245	280	320	361	404
21	158	189	222	257	295	336	379	425
22	166	198	232	269	309	352	397	445
23	174	207	243	282	323	368	415	465
24	181	216	253	294	338	384	433	486
25	189	225	264	306	351	400	451	506
26	196	234	275	318	366	416	470	526
27	204	243	285	331	380	432	488	546
28	212	252	296	343	394	448	506	566
29	219	261	306	355	408	464	524	586
30	226	270	317	367	421	480	542	606
31	234	279	327	380	436	496	560	627
32	242	288	338	392	450	512	578	648
33	249	297	349	404	464	528	596	668
34	256	306	359	416	478	544	614	688
35	265	315	370	429	492	560	632	708
36	272	324	380	441	506	576	650	729
37	280	333	391	453	520	592	668	749
38	287	342	401	465	534	608	686	769
39	295	351	412	478	548	624	704	790
40	302	360	422	490	562	640	722	810

Doyle Rule—Continued.

Length in feet.	DIAMETER IN INCHES.						
	23	24	25	26	27	28	29
	BOARD FEET.						
8	180	200	220	242	264	288	312
9	203	225	248	272	297	324	352
10	226	250	276	302	330	360	391
11	248	275	303	334	363	396	430
12	271	300	331	363	397	432	469
13	293	325	358	393	430	468	508
14	313	350	386	423	463	504	547
15	336	375	413	458	496	540	586
16	359	400	441	484	530	576	625
17	383	425	469	514	563	612	664
18	406	450	496	544	596	648	703
19	429	475	524	575	630	684	742
20	452	500	551	605	661	720	782
21	473	525	579	635	693	756	820
22	496	550	606	665	726	792	860
23	519	575	634	696	760	828	898
24	541	600	661	726	794	864	938
25	562	625	689	756	827	900	977
26	586	650	717	786	860	936	1,016
27	606	675	744	817	893	972	1,055
28	626	700	772	847	926	1,008	1,094
29	649	725	799	877	959	1,044	1,133
30	672	750	827	907	992	1,080	1,172
31	695	775	854	938	1,026	1,116	1,211
32	718	800	882	968	1,060	1,152	1,250
33	742	825	910	998	1,093	1,188	1,289
34	766	850	937	1,028	1,126	1,224	1,328
35	789	875	965	1,059	1,159	1,260	1,367
36	812	900	992	1,089	1,192	1,296	1,406
37	835	925	1,020	1,119	1,223	1,332	1,445
38	857	950	1,047	1,149	1,256	1,368	1,484
39	880	975	1,075	1,180	1,289	1,404	1,523
40	903	1,000	1,102	1,210	1,322	1,440	1,562

Doyle Rule—Continued.

Length in feet.	DIAMETER IN INCHES.							
	30	31	32	33	34	35	36	37
	BOARD FEET.							
8	338	364	392	420	450	480	512	544
9	380	410	441	473	506	540	576	613
10	422	456	490	526	562	601	640	681
11	465	502	539	578	619	661	704	749
12	507	547	588	631	675	721	768	817
13	549	592	637	683	731	781	832	884
14	591	638	686	736	787	841	896	953
15	633	683	735	789	844	901	960	1,021
16	676	729	784	841	900	961	1,024	1,089
17	718	774	833	894	956	1,021	1,088	1,157
18	761	820	882	946	1,012	1,081	1,152	1,225
19	803	865	931	999	1,069	1,141	1,216	1,293
20	845	912	980	1,051	1,125	1,202	1,280	1,361
21	887	957	1,029	1,104	1,181	1,261	1,344	1,430
22	930	1,004	1,078	1,156	1,237	1,322	1,408	1,497
23	972	1,049	1,127	1,209	1,293	1,381	1,472	1,566
24	1,014	1,094	1,176	1,262	1,350	1,442	1,536	1,634
25	1,056	1,139	1,225	1,314	1,406	1,501	1,600	1,702
26	1,098	1,184	1,274	1,367	1,462	1,562	1,664	1,768
27	1,140	1,230	1,323	1,420	1,518	1,622	1,728	1,838
28	1,182	1,276	1,372	1,472	1,575	1,682	1,792	1,906
29	1,224	1,321	1,421	1,524	1,631	1,742	1,856	1,974
30	1,266	1,366	1,470	1,577	1,687	1,802	1,920	2,042
31	1,309	1,412	1,519	1,629	1,743	1,862	1,984	2,110
32	1,352	1,458	1,568	1,682	1,800	1,922	2,048	2,178
33	1,394	1,503	1,617	1,735	1,856	1,982	2,112	2,246
34	1,436	1,548	1,666	1,787	1,912	2,042	2,176	2,314
35	1,479	1,594	1,715	1,840	1,968	2,102	2,240	2,383
36	1,522	1,640	1,764	1,892	2,025	2,162	2,304	2,450
37	1,563	1,686	1,813	1,945	2,081	2,222	2,368	2,518
38	1,606	1,731	1,862	1,998	2,138	2,282	2,432	2,586
39	1,648	1,778	1,911	2,050	2,194	2,342	2,496	2,654
40	1,690	1,822	1,960	2,102	2,250	2,402	2,560	2,722

Doyle Rule—Continued.

Length in feet.	DIAMETER IN INCHES. 38	39	40	41	42	43	44
	BOARD FEET.						
8	578	612	648	684	722	761	800
9	650	689	729	770	812	856	900
10	723	765	810	856	902	951	1,000
11	795	842	891	941	993	1,046	1,100
12	867	910	972	1,027	1,083	1,141	1,200
13	939	996	1,053	1,112	1,173	1,237	1,300
14	1,011	1,070	1,134	1,198	1,264	1,331	1,400
15	1,083	1,149	1,215	1,284	1,354	1,426	1,500
16	1,156	1,225	1,296	1,369	1,444	1,521	1,600
17	1,228	1,302	1,377	1,455	1,534	1,616	1,700
18	1,300	1,379	1,458	1,540	1,625	1,711	1,800
19	1,372	1,455	1,539	1,626	1,715	1,806	1,900
20	1,446	1,530	1,620	1,711	1,805	1,902	2,000
21	1,518	1,607	1,701	1,797	1,895	1,997	2,100
22	1,590	1,684	1,782	1,882	1,986	2,091	2,200
23	1,662	1,761	1,863	1,968	2,076	2,187	2,300
24	1,734	1,838	1,944	2,053	2,166	2,282	2,400
25	1,806	1,915	2,025	2,139	2,256	2,376	2,500
26	1,878	1,992	2,106	2,225	2,346	2,472	2,600
27	1,950	2,067	2,187	2,310	2,437	2,567	2,700
28	2,022	2,144	2,268	2,396	2,527	2,662	2,800
29	2,095	2,221	2,349	2,481	2,617	2,756	2,900
30	2,166	2,298	2,430	2,567	2,708	2,852	3,000
31	2,239	2,373	2,511	2,652	2,798	2,946	3,100
32	2,312	2,450	2,592	2,738	2,888	3,042	3,200
33	2,386	2,526	2,673	2,824	2,978	3,137	3,300
34	2,456	2,604	2,754	2,909	3,068	3,232	3,400
35	2,529	2,681	2,835	2,995	3,159	3,327	3,500
36	2,601	2,756	2,916	3,080	3,249	3,423	3,600
37	2,673	2,833	2,997	3,166	3,339	3,517	3,700
38	2,745	2,909	3,078	3,251	3,429	3,612	3,800
39	2,818	2,986	3,159	3,337	3,520	3,707	3,900
40	2,890	3,062	3,240	3,423	3,610	3,802	4,000

The Spaulding Rule.

This is the statute rule of California, adopted by an act of the legislature in 1878. It is also used in Oregon, Washington, Utah, and Nevada. The Spaulding Rule was computed from carefully drawn diagrams of logs from 10 to 96 inches in diameter at the small end.

The Doyle and Scribner Rule.

This is a combination of the Scribner Rule and the Doyle Rule. It is used in New York, New Jersey, Pennsylvania, Virginia, Tennessee, Kentucky, Alabama, Louisiana, Arkansas, Mississippi, Missouri, Indiana, Illinois, Michigan, Ohio, Iowa, Wisconsin, Montana, Idaho, South Dakota, and probably elsewhere. It has been adopted as the official scale of the National Hardwood Lumber Association. The values for diameters under 28 inches are taken from the Doyle Rule; those for 28 inches and over from the Scribner Rule.

The Maine Rule.

This is also known as the Holland Rule, and as Fabian's Rule. Its use is restricted to northern New England, and chiefly to Maine, where it has long been the principal log scale.

The Maine Rule was prepared from diagrams representing the small ends of logs of all diameters from 6 to 48 inches. The inscribed square of the logs was first determined, and the contents of the logs were then computed by allowing 1 inch for each board and one-fourth of an inch between the boards for saw kerf. The boards outside the square were reckoned, if not less than 6 inches in width; otherwise the whole slab was discarded. In practice logs over 32 feet long are reckoned as two logs, the scaler measuring the diameter of the uppermost at the small end, and estimating the diameter of the small end of the lower log.

The New Hampshire Rule.

By an act of the legislature in 1866 this rule became the legal scale for the State of New Hampshire. It is used also in certain parts of Maine and Vermont. It is based upon an imaginary cubic foot

equal to about 1.4 of the standard cubic foot. The Statutes of New Hampshire, 1901, give the law as follows:

All round timber, the quantity of which is estimated by the thousand, shall be measured according to the following rule: A stick of timber sixteen inches in diameter and twelve inches in length shall constitute one cubic foot, and the same ratio shall apply to any other size and quantity. Each cubic foot shall constitute ten feet of a thousand board feet.

In the practical use of this rule it is customary to consider 115 cubic feet equivalent to 1,000 board feet, instead of 100 cubic feet, according to the wording of the Statute. In this case the diameter is taken at the middle of the log inside the bark. If the diameter is measured at the small end of the log 106 cubic feet are allowed for 1,000 board feet. The New Hampshire Rule is also called the Blodgett Rule.

The New Hampshire Rule.

Length of log in feet.	DIAMETER IN INCHES.							
	4	5	6	7	8	9	10	11
	CONTENTS IN BOARD FEET.							
10	5	8	12	16	22	27	34	41
12	6	10	14	19	26	33	41	50
14	7	11	16	22	30	38	48	57
16	9	13	19	26	35	43	54	66
18	10	15	22	29	39	50	61	74
20	10	17	24	33	43	54	68	82
22	11	18	26	36	48	60	75	90
24	13	20	29	39	52	65	82	98
26	14	21	31	43	57	70	88	107
28	15	23	34	46	61	77	95	115
30	16	24	37	50	65	81	102	123
32	17	26	38	52	70	87	109	131
34	18	28	41	56	74	93	116	140
36	19	30	43	59	78	98	123	148
38	20	31	46	63	83	103	129	157
40	21	33	49	66	87	108	136	164

The New Hampshire Rule—Continued.

Length of log in feet.	DIAMETER IN INCHES. 12	13	14	15	16	17	18	19
	CONTENTS IN BOARD FEET.							
10	49	57	66	77	87	98	110	123
12	58	70	80	91	104	117	132	148
14	69	80	93	107	122	137	154	171
16	78	92	106	123	139	157	176	197
18	88	103	120	137	157	177	198	221
20	97	115	133	153	174	197	220	245
22	108	126	146	168	191	216	242	270
24	117	137	160	183	209	236	264	294
26	127	149	174	199	226	255	284	319
28	137	161	186	214	243	275	308	343
30	147	172	200	230	261	295	330	368
32	157	183	213	244	278	314	352	392
34	166	195	226	260	296	334	374	417
36	177	207	240	275	313	353	397	442
38	186	218	253	290	330	373	418	466
40	196	230	266	305	348	392	440	490

Length of log in feet.	DIAMETER IN INCHES. 20	21	22	23	24	25	26	27
	CONTENTS IN BOARD FEET.							
10	136	150	165	180	196	212	230	248
12	163	180	197	216	235	255	276	297
14	190	210	230	251	274	297	322	347
16	217	240	262	287	313	339	367	397
18	244	270	296	323	352	383	413	446
20	271	300	329	359	391	424	459	496
22	299	330	363	396	430	467	505	544
24	326	360	395	431	469	509	551	594
26	353	390	427	467	509	551	597	643
28	380	420	460	503	548	595	643	693
30	408	450	493	539	587	637	689	743

The New Hampshire Rule—Continued.

Length of log in feet.	DIAMETER IN INCHES.							
	20	21	22	23	24	25	26	27
	CONTENTS IN BOARD FEET.							
32	435	480	526	575	626	679	735	792
34	462	510	559	610	665	722	781	842
36	490	540	592	647	704	764	827	891
38	517	570	624	683	739	807	872	94
40	543	600	657	718	783	849	918	990

Length of log in feet.	DIAMETER IN INCHES.						
	28	29	30	31	32	33	34
	CONTENTS IN BOARD FEET.						
10	266	285	306	326	348	370	392
12	319	343	367	391	417	443	471
14	373	400	428	457	487	517	549
16	426	457	489	514	557	592	628
18	479	514	550	588	626	666	707
20	533	572	611	653	696	740	785
22	586	629	672	718	765	814	863
24	639	685	734	783	835	888	943
26	692	743	795	849	904	962	1,021
28	745	800	856	914	974	1,036	1,099
30	799	865	917	979	1,043	1,110	1,178
32	852	914	978	1,044	1,113	1,183	1,257
34	905	971	1,039	1,110	1,183	1,257	1,335
36	958	1,029	1,101	1,175	1,252	1,331	1,414
38	1,012	1,085	1,162	1,240	1,322	.....	.....
40	1,065	1,143	1,223	.....	.....	.....	.....

The New Hampshire Rule—Continued.

Length of log in feet.	DIAMETER IN INCHES.						
	35	36	37	38	39	40	41
	CONTENTS IN BOARD FEET.						
10	416	440	465	490	517	543	571
12	499	528	558	589	620	652	685
14	583	617	651	687	723	761	799
16	666	704	744	785	827	870	914
18	749	792	837	883	930	978	1,028
20	832	880	930	981	1,034	1,087	1,142
22	916	969	1,023	1,079	1,137	1,196	1,257
24	998	1,057	1,116	1,177	1,240	1,304	1,370
26	1,082	1,144	1,209	1,275	1,343	1,413	1,484
28	1,165	1,232	1,302	1,374	1,446	1,522	1,598
30	1,251	1,321	1,395	1,471	1,550	1,630	.....
32	1,331	1,409	1,488	1,569	.....	.....	.....
34	1,415	1,497	.....	.....	.....	.....	.....

Length of log in feet.	DIAMETER IN INCHES.						
	42	43	44	45	46	47	48
	CONTENTS IN BOARD FEET.						
10	599	626	657	688	718	742	783
12	719	751	790	826	863	900	939
14	839	877	921	963	1,006	1,050	1,096
16	959	1,002	1,052	1,101	1,149	1,201	1,252
18	1,078	1,126	1,183	1,238	1,294	1,350	1,409
20	1,198	1,251	1,315	1,376	1,437	1,501	1,565
22	1,318	1,377	1,447	1,513	1,581	1,650	1,722
24	1,438	1,502	1,578	1,650	1,725	.....	.....
26	1,557	1,627	1,709	.....	.....	.....	.....
28	1,678	.....	.....	.....	.....	.....	.....

The Humphrey or Vermont Rule.

This scale is used in Maine and New Hampshire, and locally in Delaware, New York, Pennsylvania, and Maryland. It is the statute rule of Vermont. The Revised Statutes of Vermont give the law as follows:

In all bargains for or sales of logs of round timber by measure the number of feet, unless otherwise stipulated by the parties, shall be ascertained as follows: Multiply the average diameter of the top of the log, inside the bark, in inches by half such diameter in inches, disregarding fractions of an inch less than one-half and regarding fractions greater than one-half as a full inch, and the number obtained as the product will represent the contents in feet of a log of that diameter twelve feet long. The actual contents will be the same fraction of the above product as the actual length of the log is of twelve feet. If the log is more than twelve feet long, commence at the upper end and measure it into sections of twelve feet, then find according to the above rule the contents of each section and fractional section. The aggregate of the contents of the sections will be the contents of the whole log.

In some localities this rule, with very slight variations, is known as the Winder Rule.

The Bangor Rule.

This is also called the Penobscot Scale and the Miller Rule. It is used in Maine, Vermont, New Hampshire, and locally in Washington. The Bangor Rule is based upon computations derived from diagrams drawn for logs of different diameters. The figures thus secured were afterwards adjusted by comparison with measurements of logs actually sawed at the mill.

The Cumberland River Rule.

This rule is known in some parts of the country as the Evansville Rule, and the Third and Fifth Rule. It is used in Tennessee, Kentucky, Indiana, Ohio, Michigan, Illinois, Massachusetts, and probably in some other States.

It is based upon the following formula: Deduct one-third from the diameter at the small end inside the bark to reduce the round log to square timber. Then from one side of the square thus obtained deduct one-fifth for saw kerf; multiply the remainder by

the side of the square and the product will be the contents of a log 12 feet long. For logs of other lengths multiply by the length and divide by 12.

The Hanna Rule.

The Hanna Rule is used in Pennsylvania, Tennessee, Virginia, New York, and Massachusetts, and locally elsewhere. It was computed from diagrams drawn for every size of log from 8 to 50 inches in diameter. In constructing these diagrams lines accurately measured 1 inch apart one way and 1¼ inches apart the other way were drawn crosswise; thus allowing a quarter of an inch to each board for saw kerf. Practical millmen were consulted by the author of the rule to check the results.

The Favorite Rule.

The Favorite, or Lumberman's Favorite Rule, is used in Virginia, West Virginia, Michigan, New York, Texas, Tennessee, Indiana, Pennsylvania, North Carolina, and Missouri. It is based upon diagrams drawn for logs of different diameters, the results being corrected by sawyer's tallies.

The Baxter Rule.

This rule is used chiefly in Pennsylvania. It is based upon diagrams, the results being afterwards checked by measurements of logs at the mill.

The Doyle and Baxter Rule.

This rule is a combination of the Doyle and the Baxter rules. The figures for logs 20 inches in diameter and under are from the Doyle Rule, and the remainder are from the Baxter Rule. It is used in Pennsylvania.

The Square of Two-thirds Rule.

This is also known as the St. Louis Hardwood Rule, the Two-thirds Rule, the Tennessee River Rule, and the Lehigh Rule. It is used in Tennessee, Pennsylvania, North Carolina, Kentucky,

Illinois, Indiana, New Jersey, Virginia, and West Virginia, and probably in some other States. It is based on the following formula: Deduct one-third of the diameter at the small end of the log inside the bark for saw kerf and slab, square the remainder, multiply by the length, and divide this product by 12. The result will be the contents in board feet.

The Square of Three-fourths Rule.

Other names for this rule are the Portland Scale, the Noble and Cooley Rule, the Cook Rule, the Crooked River Rule, and the Lumberman's Scale. It is used in Maine, Massachusetts, and New Hampshire. The formula upon which it is based is as follows: Deduct one-fourth of the diameter at the small end of the log inside the bark for saw kerf and slab, square the remainder, multiply by the length of the log, and divide this last product by 12 for the contents in board feet.

The Drew Rule.

This rule has been adopted as the official scale of the Puget Sound Timbermen's Association. It is used only in the extreme Northwestern States. It is based upon diagrams drawn for logs of different diameters from 10 to 65 inches. The results were afterwards corrected by sawyer's tallies.

The Herring Rule.

This is also called the Beaumont Rule, and is used in Texas. It is based upon measurements of logs sawed at the mill.

The Dusenberry Rule.

This rule is used in Pennsylvania, New York, Ohio, and Indiana. It is based upon the measurement of logs actually sawed into boards. It was made originally for white pine, but is now used also for other soft woods.

The Orange River Rule.

This rule is also known as the Ochiltree Rule and as the Sabine River Rule. It is used in Texas. It is based on the following

formula: Multiply the square of the diameter of the small end of the log inside the bark by the length of the log, and divide the product by 30. The result is the contents in board feet.

The Chapin Rule.

The Chapin Rule is based on measurements of logs actually sawed into lumber. It is claimed that it gives the greatest amount of lumber which can be manufactured from straight, smooth logs. It is a comparatively new rule and has not yet come into very general use.

The Northwestern Rule.

This rule is used in Michigan, Illinois, New York, Massachusetts, and Pennsylvania. It is based upon the tallies of logs sawed at the mill.

The Derby Rule.

This rule, which is also known as the Holden and Robinson Rule, is used in Massachusetts. It is based primarily upon diagrams. The table thus secured was adjusted by tallies kept at the mill.

The Partridge Rule.

This is also known as the Murdoch and Fairbank Rule. It is used in Massachusetts. It is based upon diagrams and shows the number of feet of seven-eighths inch boards that can be sawed from logs of different sizes. It is often incorrectly used for inch boards.

The Preston Rule.

The Preston Rule is based upon the principle that one-fifth of the contents of a log should be deducted for saw kerf. The waste for slabs is calculated by deducting $1\frac{3}{4}$ inches for small logs and $1\frac{1}{2}$ inches for large logs. The results are given in board feet and inches. This is a comparatively new rule.

The Parsons Rule.

This rule was probably made from diagrams. It is used in a few places in Maine.

The Ropp Rule.

This rule is used in Illinois. It is based on the following formula: Subtract 60 from the square of the diameter of the small end of the log inside the bark, multiply the remainder by half the length of the log, and point off the right-hand figure.

The Stillwell Rule.

This is also known as the Stillwell Vade Mecum Rule, and is used in Georgia. It gives the contents, in board feet of square timber, which can be obtained from logs of different diameters and lengths without deduction for saw kerf.

The Baughman Rotary Saw Rule.

This rule is used in the Middle West. It shows the number of board feet which can be sawed from logs by a rotary saw. It is based upon diagrams drawn for logs of different sizes. The table thus secured was corrected by the author of the rule from his experience in manufacturing lumber.

The Baughman Band Saw Rule.

This rule was made up in the same way as the preceding rule, except that a smaller allowance was made for saw kerf.

The Saco River Rule.

This rule is used in Maine. It is based upon tallies kept by the surveyor at the mill. It was originally intended for white pine.

The Ballon Rule.

The Ballon Rule is used by M. E. Ballon & Son, of Becket, Mass., chiefly in measuring small hardwood timber, such as basket ash.

The Wilson Rule.

This rule is used in Massachusetts. It is probably based upon diagrams.

The Wilcox Rule.

This rule is based upon sawyer's tallies. It is used in Pennsylvania for softwood timber.

The Warner Rule.

The Warner Rule is used in New York. It is probably based upon diagrams.

The Boynton Rule.

This rule is based upon a compromise of the Vermont Rule and the Scribner Rule adjusted by sawyer's tallies. It is used in Vermont.

The Carey Rule.

This rule is used in Massachusetts. It was probably made from sawyer's tallies.

The Forty-five Rule.

This rule is used in New York. It is based upon the following rule: For a 24-inch log multiply the square of the diameter, that is, 24, by the length of the log and the result by 45, then point off three places. The figures at the left of the decimal point will represent contents in board feet. For every variation of 2 inches in the diameter from the standard 24-inch log add or subtract 1 from the number 45 in the formula, according as the diameter is larger or smaller than 24 inches.

The White Rule.

This rule is used in Montana to a limited extent. It is based on the Scribner Rule adjusted by sawyer's tallies.

The Finch and Apgar Rule.

This rule is used occasionally in New York. It is sometimes known as the Excelsior Log Book Table.

The Constantine Rule.

This rule is used chiefly in New York. It gives the full contents of logs without deduction for saw kerf or slab. It is employed in measuring veneer lumber, in the manufacture of which there is very little waste. Some sawmill men use this rule for measuring other kinds of timber, deducting a third or fourth from the figures for saw kerf and other waste. It is based upon the following formula: Square the diameter of the small end of the log inside the bark and multiply by the decimal 0.785; multiply the result by the length of the log and divide the last product by 12.

The Ake Rule.

This rule is used locally in Clearfield County, Pa. It is based upon the following rule of thumb: Multiply the diameter of the log, measured at the small end inside the bark, by 0.7; square the result; multiply the product by the length of the log, and divide by 12. The final result will be the contents in board feet.

The Younglove Rule.

This is a very old rule formerly used in New England and still occasionally employed in Massachusetts. The author was unable to obtain the rule, and therefore did not include it in the comparison tables.

The British Columbia Rule.

This is the statute rule of British Columbia, Dominion of Canada. It is based upon the following formula: For logs up to 40 feet in length deduct 1½ inches from the diameter at the small end inside the bark; square the result and multiply by the decimal 0.7854; from the product deduct three-elevenths; multiply the remainder by the length of the log and divide by 12. For logs over 40 feet in length an allowance is made on half the length of the log in order to compensate for the increase in diameter. This allowance consists of an increase in the diameter at the small end of the log of 1 inch for each 10 feet in length over 40 feet. Thus for logs 51 to 60 feet

long the contents of half the log are computed by the diameter at the small end. The other half is considered to have a diameter 1 inch larger.

The Quebec Rule.

The rule has been adopted in official work in the Province of Quebec. It differs materially from the other Canadian rules, as will be seen from the comparison table.

The New Brunswick Rule.

This has been adopted by the Province of New Brunswick as the official rule to be used in cases of dispute. The part of the rule for logs under 18 inches in diameter is like the Vermont Rule. The figures for logs 18 inches in diameter and over are similar to those given in the Maine Rule.

STANDARD MEASURE.

The unit of standard measure is the merchantable contents of a log of a fixed diameter and length agreed upon as the standard log. The contents of logs of other diameters and lengths are determined by reference to, and in terms of, the standard log.

The Nineteen Inch Standard Rule.

The unit of the Nineteen Inch Standard, or, as it is often called, the Market, is a log 13 feet long and 19 inches in diameter inside the bark at the small end. The contents of 13-foot logs of other diameters are determined by squaring the diameter and dividing by the square of 19. This is based on the principle that the contents of logs vary as the square of their diameters. Mathematical accuracy would require the use of the average diameters of logs instead of their diameters at the small end. One 19-inch standard is equivalent to 195 feet board measure (Scribner Rule). Most lumbermen assign to this standard the round sum of 200 board feet, which makes 5 standards equivalent to 1,000 board feet. It is customary to consider 2.92 standards equivalent to 1 cord.

This rule is used most extensively in the Adirondack Mountains. It is sometimes called the Glens Falls Standard Rule.

The contents of logs longer than 13 feet are obtained by adding one-thirteenth of the contents of the 13-foot or standard log for each foot over 13 feet. The contents of logs shorter than 13 feet are obtained by subtracting one-thirteenth of the contents of the 13-foot or standard log for each foot under 13 feet.

The Nineteen Inch Standard Rule.

BASED ON THIRTEEN-FOOT LOGS.

Length in feet.	DIAMETER IN INCHES.								
	4	5	6	7	8	9	10	11	12
	CONTENTS IN STANDARDS.								
10..	0.08	0.05	0.08	0.11	0.14	0.17	0.21	0.26	0.31
11..	.03	.06	.08	.12	.15	.19	.23	.28	.34
12..	.04	.06	.09	.13	.17	.20	.26	.31	.37
13..	.04	.07	.10	.14	.18	.22	.28	.34	.40
14..	.04	.08	.11	.15	.19	.24	.30	.36	.43
15..	.05	.08	.12	.16	.21	.25	.32	.39	.46
16..	.05	.09	.12	.17	.22	.27	.34	.41	.49
17..	.05	.09	.13	.18	.24	.29	.36	.44	.52
18..	.06	.10	.14	.19	.25	.30	.38	.46	.55
19..	.06	.10	.15	.20	.26	.32	.40	.49	.58
20..	.06	.11	.15	.22	.28	.34	.43	.52	.61
21..	.06	.11	.16	.23	.29	.36	.45	.54	.64
22..	.07	.12	.17	.24	.31	.37	.47	.57	.67
23..	.07	.12	.18	.25	.32	.39	.49	.59	.71
24..	.07	.13	.18	.26	.33	.41	.51	.62	.74
25..	.08	.13	.19	.27	.35	.42	.53	.65	.77
26..	.08	.14	.20	.28	.36	.44	.55	.67	.80
27..	.08	.15	.21	.29	.37	.46	.58	.70	.83
28..	.09	.15	.22	.31	.39	.49	.60	.72	.86
29..	.09	.16	.22	.31	.40	.49	.62	.75	.89
30..	.09	.16	.23	.32	.42	.51	.64	.77	.92

The Nineteen Inch Standard Rule—Continued.

BASED ON THIRTEEN-FOOT LOGS—Continued.

Length in feet.	DIAMETER IN INCHES.								
	13	14	15	16	17	18	19	20	21
	CONTENTS IN STANDARDS.								
10..	0.36	0.42	0.48	0.55	0.62	0.69	0.77	0.85	0.94
11..	.40	.46	.53	.60	.68	.76	.85	.94	1.03
12..	.43	.50	.58	.65	.74	.83	.92	1.02	1.13
13..	.47	.54	.62	.71	.80	.90	1.00	1.11	1.22
14..	.50	.58	.67	.76	.86	.97	1.08	1.19	1.32
15..	.54	.63	.72	.82	.92	1.04	1.15	1.28	1.41
16..	.58	.67	.77	.87	.99	1.10	1.23	1.36	1.50
17..	.61	.71	.81	.93	1.05	1.17	1.31	1.45	1.60
18..	.65	.75	.86	.98	1.11	1.24	1.38	1.53	1.69
19..	.68	.79	.91	1.04	1.17	1.31	1.46	1.62	1.79
20..	.72	.84	.96	1.09	1.23	1.38	1.54	1.70	1.88
21..	.76	.88	1.01	1.15	1.29	1.45	1.62	1.79	1.97
22..	.79	.92	1.05	1.20	1.35	1.52	1.69	1.88	2.07
23..	.83	.96	1.10	1.25	1.42	1.59	1.77	1.96	2.16
24..	.86	1.00	1.15	1.31	1.48	1.66	1.85	2.05	2.26
25..	.90	1.04	1.20	1.36	1.54	1.73	1.92	2.13	2.35
26..	.94	1.09	1.25	1.42	1.60	1.80	2.00	2.23	2.44
27..	.97	1.13	1.29	1.47	1.66	1.86	2.08	2.30	2.54
28..	1.01	1.17	1.34	1.53	1.72	1.93	2.15	2.39	2.63
29..	1.04	1.21	1.39	1.58	1.79	2.00	2.23	2.47	2.73
30..	1.08	1.25	1.44	1.64	1.85	2.07	2.31	2.56	2.82

The Nineteen Inch Standard Rule—Continued.

BASED ON THIRTEEN-FOOT LOGS—Continued.

Length in feet.	DIAMETER IN INCHES.							
	22	23	24	25	26	27	28	29
	CONTENTS IN STANDARDS.							
10	1.03	1.13	1.23	1.33	1.44	1.55	1.67	1.79
11	1.13	1.24	1.35	1.46	1.58	1.71	1.84	1.97
12	1.24	1.35	1.47	1.60	1.73	1.86	2.00	2.15
13	1.34	1.47	1.60	1.73	1.87	2.02	2.17	2.33
14	1.44	1.58	1.72	1.86	2.02	2.17	2.34	2.51
15	1.55	1.69	1.84	2.00	2.16	2.33	2.51	2.69
16	1.65	1.80	1.96	2.13	2.30	2.49	2.67	2.87
17	1.75	1.92	2.09	2.26	2.45	2.64	2.84	3.05
18	1.86	2.03	2.21	2.40	2.59	2.80	3.01	3.23
19	1.96	2.14	2.33	2.53	2.74	2.95	3.17	3.40
20	2.06	2.25	2.46	2.66	2.88	3.11	3.34	3.58
21	2.17	2.37	2.58	2.80	3.02	3.26	3.51	3.76
22	2.27	2.48	2.70	2.93	3.17	3.42	3.68	3.94
23	2.37	2.59	2.82	3.06	3.31	3.57	3.84	4.12
24	2.48	2.71	2.95	3.20	3.46	3.73	4.01	4.30
25	2.58	2.82	3.07	3.33	3.60	3.88	4.18	4.48
26	2.68	2.93	3.19	3.46	3.75	4.04	4.34	4.66
27	2.78	3.04	3.31	3.60	3.89	4.19	4.51	4.84
28	2.89	3.16	3.44	3.73	4.03	4.35	4.68	5.02
29	2.99	3.27	3.56	3.86	4.18	4.51	4.84	5.20
30	3.09	3.38	3.68	4.00	4.32	4.66	5.01	5.38

The Nineteen Inch Standard Rule—Continued.

BASED ON THIRTEEN-FOOT LOGS—Continued.

Length in feet.	DIAMETER IN INCHES.						
	30	31	32	33	34	35	36
	CONTENTS IN STANDARDS.						
10	1.92	2.05	2.18	2.32	2.46	2.61	2.76
11	2.11	2.25	2.40	2.55	2.71	2.87	3.04
12	2.30	2.46	2.62	2.78	2.96	3.13	3.31
13	2.49	2.66	2.84	3.02	3.20	3.39	3.59
14	2.68	2.87	3.05	3.25	3.45	3.65	3.87
15	2.88	3.07	3.27	3.48	3.69	3.92	4.14
16	3.07	3.28	3.49	3.71	3.94	4.18	4.42
17	3.26	3.48	3.71	3.94	4.19	4.44	4.69
18	3.45	3.69	3.93	4.18	4.43	4.70	4.97
19	3.64	3.89	4.15	4.41	4.68	4.96	5.25
20	3.84	4.10	4.36	4.64	4.93	5.22	5.52
21	4.03	4.30	4.58	4.87	5.17	5.48	5.80
22	4.22	4.51	4.80	5.10	5.42	5.74	6.08
23	4.41	4.71	5.02	5.34	5.66	6.00	6.35
24	4.60	4.91	5.24	5.57	5.91	6.26	6.63
25	4.79	5.12	5.45	5.80	6.16	6.53	6.90
26	4.99	5.32	5.67	6.03	6.40	6.79	7.18
27	5.18	5.53	5.89	6.27	6.65	7.05	7.46
28	5.37	5.73	6.11	6.50	6.90	7.31	7.73
29	5.56	5.94	6.33	6.73	7.14	7.57	8.01
30	5.75	6.14	6.55	6.96	7.39	7.83	8.28

The Twenty-two Inch Standard Rule.

This standard rule is still used to some extent in New York State and probably elsewhere. The unit is a log 13 feet long and 22 inches in diameter at the small end inside the bark. The rule is used in the same way as the Nineteen Inch Standard Rule, and a table may be constructed on the same principle, namely, that the contents of logs of the same length vary as the squares of their diameters.

The 22-inch standard log contains 252 board feet (Scribner Rule). Common usage gives four standards to the thousand board feet.

The Twenty-two Inch Standard Rule is sometimes called the Saranac River Standard Rule.

The Twenty-four Inch Standard Rule.

This rule is based on a standard log 24 inches in diameter inside the bark at the small end and 12 feet long. The standard log contains 300 feet, board measure, according to the Doyle Rule. In the use of this rule timber is usually sold by the standard or by the 300 feet, instead of by the thousand feet as commonly. The logs are scaled by the Doyle Rule and the total number of feet divided by 300, the unit of sale being a certain sum per standard. To obtain the value of the odd number of feet the latter are divided by 300 and multiplied by the price per standard.

The table which follows will be found convenient for the reason that the exact number of standards or fractions of a standard can be found directly without reference to the Doyle Rule.

The Twenty-four Inch Standard Rule.

Based on Twelve-foot Logs.

Length in feet.	DIAMETER IN INCHES.								
	4	5	6	7	8	9	10	11	12
	CONTENTS IN STANDARDS.								
10..	0.02	0.03	0.05	0.07	0.09	0.12	0.15	0.18	0.21
11..	.03	.04	.05	.08	.10	.13	.16	.19	.23
12..	.03	.04	.06	.09	.11	.14	.17	.21	.25
13..	.03	.04	.07	.10	.12	.15	.18	.23	.27
14..	.04	.05	.07	.11	.13	.16	.19	.24	.29
15..	.04	.05	.08	.11	.14	.17	.20	.26	.31
16..	.04	.05	.08	.12	.15	.18	.21	.28	.33
17..	.04	.06	.09	.13	.16	.19	.22	.30	.36
18..	.05	.06	.09	.14	.16	.20	.23	.31	.38
19..	.05	.06	.10	.14	.17	.21	.24	.33	.40
20..	.05	.07	.10	.15	.18	.22	.25	.35	.42
21..	.05	.07	.11	.16	.19	.23	.26	.36	.44
22..	.06	.07	.11	.17	.20	.24	.27	.38	.46
23..	.06	.08	.12	.17	.21	.25	.28	.40	.48
24..	.06	.08	.12	.18	.22	.26	.29	.41	.50

The Twenty-four Inch Standard Rule—Continued.

BASED ON TWELVE-FOOT LOGS—Continued.

Length in feet.	DIAMETER IN INCHES.							
	13	14	15	16	17	18	19	20
	CONTENTS IN STANDARDS.							
10..	0.24	0.28	0.33	0.37	0.42	0.45	0.53	0.58
11..	.27	.31	.36	.40	.46	.51	.58	.63
12..	.29	.34	.39	.44	.50	.56	.63	.69
13..	.31	.37	.42	.48	.54	.61	.68	.75
14..	.34	.40	.45	.51	.58	.65	.73	.80
15..	.36	.42	.48	.55	.62	.70	.79	.86
16..	.39	.45	.51	.58	.66	.74	.84	.92
17..	.41	.48	.54	.62	.71	.79	.89	.98
18..	.43	.51	.57	.66	.75	.84	.94	1.03
19..	.46	.54	.60	.69	.79	.88	.99	1.09
20..	.48	.56	.63	.73	.83	.93	1.05	1.15
21..	.51	.59	.66	.76	.87	.97	1.10	1.20
22..	.53	.62	.69	.80	.91	1.02	1.15	1.26
23..	.55	.65	.72	.84	.95	1.07	1.20	1.32
24..	.58	.68	.75	.87	.99	1.11	1.25	1.37

The Twenty-four Inch Standard Rule—Continued.

Based on Twelve-foot Logs—Continued.

Length in feet.	DIAMETER IN INCHES.							
	21	22	23	24	25	26	27	28
	CONTENTS IN STANDARDS.							
10	0.64	0.70	0.77	0.83	0.91	0.98	1.06	1.14
11	.71	.77	.84	.92	1.00	1.07	1.16	1.25
12	.77	.84	.92	1.00	1.09	1.17	1.27	1.36
13	.83	.91	1.00	1.08	1.18	1.27	1.38	1.47
14	.90	.98	1.07	1.17	1.27	1.36	1.48	1.58
15	.96	1.05	1.15	1.25	1.36	1.46	1.59	1.69
16	1.03	1.12	1.22	1.33	1.45	1.56	1.69	1.80
17	1.09	1.19	1.30	1.42	1.54	1.66	1.80	1.91
18	1.15	1.26	1.38	1.50	1.63	1.75	1.90	2.02
19	1.22	1.33	1.45	1.58	1.72	1.85	2.01	2.13
20	1.28	1.40	1.53	1.66	1.81	1.95	2.11	2.24
21	1.35	1.47	1.60	1.75	1.90	2.04	2.22	2.35
22	1.41	1.54	1.68	1.83	1.99	2.14	2.32	2.46
23	1.47	1.61	1.76	1.91	2.08	2.24	2.43	2.57
24	1.54	1.68	1.83	2.00	2.17	2.33	2.53	2.68

The Twenty-four Inch Standard Rule—Continued.

Based on Twelve-foot Logs—Continued.

Length in feet.	DIAMETER IN INCHES.							
	29	30	31	32	33	34	35	36
	CONTENTS IN STANDARDS.							
10	1.22	1.30	1.39	1.48	1.58	1.68	1.78	1.87
11	1.34	1.43	1.53	1.63	1.73	1.84	1.95	2.06
12	1.46	1.56	1.67	1.78	1.89	2.01	2.13	2.25
13	1.58	1.69	1.81	1.93	2.05	2.18	2.31	2.44
14	1.70	1.82	1.95	2.08	2.20	2.34	2.48	2.63
15	1.82	1.95	2.09	2.22	2.36	2.51	2.66	2.81
16	1.94	2.08	2.23	2.37	2.52	2.68	2.84	3.00
17	2.06	2.21	2.37	2.52	2.68	2.85	3.02	3.19
18	2.18	2.34	2.50	2.67	2.83	3.01	3.19	3.38
19	2.30	2.47	2.64	2.82	2.99	3.18	3.37	3.57
20	2.42	2.60	2.78	2.96	3.15	3.35	3.55	3.75
21	2.54	2.73	2.92	3.11	3.30	3.51	3.72	3.94
22	2.66	2.86	3.06	3.26	3.46	3.68	3.90	4.13
23	2.78	2.99	3.20	3.41	3.62	3.85	4.08	4.32
24	2.90	3.12	3.34	3.56	3.77	4.01	4.25	4.51

Canadian Standard Rules.

The Canadian Standard Rules are based on logs 12 feet instead of 13 feet in length. These two standard rules are now used less than formerly. The units on which they are based are 12-foot logs, 21 and 22 inches, respectively, in diameter. These rules are used in the same way as the American standard rules already described.

The Canadian 22-inch standard log contains 243 board feet, and the 21-inch standard log contains 217 board feet by the Doyle Rule.

CORD MEASURE.

Firewood, small pulpwood, and material cut into short sticks for excelsior, etc., is usually measured by the cord. A cord is 128 cubic feet of stacked wood. The wood is usually cut into 4-foot

lengths, in which case a cord is a stack 4 feet high and 8 feet long. Sometimes, however, pulpwood is cut 5 feet long, and a stack of it 4 feet high and 8 feet long is considered 1 cord. In this case the cord contains 160 cubic feet of stacked wood. In localities where firewood is cut in 5-foot lengths a cord makes a stack 4 feet high and 6½ feet long, and contains 130 cubic feet of stacked wood. Where it it desirable to use shorter lengths for special purposes, the sticks are often cut 1½, 2, and even 3 feet long. A stack of such wood, 4 feet high and 8 feet long, is considered 1 cord, but the price is always made to conform to the shortness of the measure.

A cord foot is one-eighth of a cord. A cord foot is a stack of 4-foot wood 4 feet high and 1 foot long. Farmers frequently speak of a foot of cord wood, meaning a cord foot. By the expression "surface foot" is meant the number of square feet measured on the side of a stack.

In some localities, particularly in New England, cord wood is measured by means of calipers. Instead of stacking the wood and computing the cords in the ordinary way, the average diameter of each log is determined with calipers and the number of cords obtained by consulting a table which gives the amount of wood in logs of different diameters and lengths, expressed in so-called cylindrical feet. A cylindrical foot is one one-hundred and twenty-eighth of a cord. A better term would be "stacked cubic foot," as it represents a cubic foot of stacked wood, as opposed to a cubic foot of solid wood. The number of cylindrical or stacked cubic feet in a log is computed by squaring the average diameter of the log in inches, multiplying by the length of the log in feet, and dividing the result by 144.

Some tables give the result in feet and inches (cylindrical or stacked cubic, not linear feet). In the table which follows, the result is given in cylindrical feet and tenths.

A special caliper rule for measuring cord wood has been made by Mr. John Humphrey, of Keene, N. H. Instead of considering a cylindrical or stacked cubic foot equivalent to one one-hundred and twenty-eighth of a cord, he has assumed it to be equivalent to one one-hundredth of a cord. In either case the cylindrical or stacked cubic foot is a purely arbitrary unit and the final results in cords are the same.

In actual practice the table given on page 66 is used as follows: The number of cylindrical or stacked cubic feet in the different

logs is determined by means of calipers and reference to the table, or by means of the calipers alone if the results are inscribed directly upon them. The total number of cylindrical or stacked cubic feet is then divided by 128.

Table for Measuring Cord Wood with Calipers.

Length in feet.	DIAMETER IN INCHES. 4	5	6	7	8	9	10
	CONTENTS IN CUBIC FEET OF STACKED WOOD (STACKED, NOT SOLID, CUBIC FEET).						
6.....	0.7	1.0	1.5	2.0	2.7	3.3	4.2
7.....	.8	1.2	1.8	2.3	3.1	3.9	4.8
8.....	.9	1.3	2.0	2.7	3.5	4.5	5.5
9.....	1.0	1.6	2.3	3.0	4.0	5.0	6.3
10.....	1.1	1.8	2.5	3.3	4.4	5.6	6.9
11.....	1.2	1.9	2.8	3.7	4.8	6.2	7.6
12.....	1.3	2.1	3.0	4.1	5.3	6.8	8.3
13.....	1.4	2.3	3.3	4.4	5.8	7.3	9.0
14.....	1.6	2.4	3.5	4.8	6.2	7.8	9.7
15.....	1.7	2.6	3.8	5.1	6.7	8.5	10.4
16.....	1.8	2.8	4.0	5.4	7.1	9.0	11.1
17.....	1.9	2.9	4.2	5.8	7.5	9.5	11.8
18.....	2.0	3.1	4.5	6.1	8.0	10.1	12.5
19.....	2.1	3.3	4.8	6.4	8.4	10.7	13.2
20.....	2.3	3.5	5.0	6.8	8.8	11.3	13.8

Length in feet.	DIAMETER IN INCHES. 11	12	13	14	15	16	17
	CONTENTS IN CUBIC FEET OF STACKED WOOD (STACKED, NOT SOLID, CUBIC FEET).						
6.....	5.0	6.0	7.0	8.2	9.3	10.7	12.0
7.....	5.8	7.0	8.2	9.5	10.9	12.4	14.0
8.....	6.7	8.0	9.3	10.8	12.5	14.2	16.0
9.....	7.5	9.0	10.5	12.3	14.0	16.0	18.0
10.....	8.3	10.0	11.7	13.6	15.6	17.8	20.0

Table for Measuring Cord Wood with Calipers—Continued.

Length in feet.	DIAMETER IN INCHES.						
	11	12	13	14	15	16	17
	CONTENTS IN CUBIC FEET OF STACKED WOOD (STACKED, NOT SOLID, CUBIC FEET).						
11	9.3	11.0	12.8	14.9	17.2	19.5	22.0
12	10.1	12.0	14.1	16.3	18.8	21.3	24.1
13	10.9	13.0	15.3	17.7	20.3	23.1	26.1
14	11.8	14.0	16.4	19.0	21.8	24.8	28.1
15	12.6	15.0	17.6	20.4	23.4	26.7	30.1
16	13.4	16.0	18.8	21.8	25.0	28.4	32.1
17	14.3	17.0	19.9	23.1	26.5	30.2	34.1
18	15.1	18.0	21.1	24.5	28.1	32.0	36.1
19	15.9	19.0	22.3	25.8	29.7	33.8	38.1
20	16.8	20.0	23.4	27.2	31.4	35.5	40.1

Length in feet.	DIAMETER IN INCHES.						
	18	19	20	21	22	23	24
	CONTENTS IN CUBIC FEET OF STACKED WOOD (STACKED, NOT SOLID, CUBIC FEET).						
6	13.5	15.0	16.7	18.3	20.2	22.0	24.0
7	15.9	17.6	19.4	21.4	23.5	25.7	28.0
8	18.0	20.0	22.2	24.5	26.8	29.3	32.0
9	20.3	22.5	25.0	27.5	30.3	33.0	36.0
10	22.5	25.0	27.8	30.6	33.6	36.7	40.0
11	24.8	27.4	30.5	33.7	36.9	40.3	44.0
12	27.0	30.1	33.3	36.8	40.3	44.1	48.0
13	29.3	32.6	36.1	39.8	43.7	47.8	52.0
14	31.5	35.1	38.8	42.8	47.0	51.4	56.0
15	33.8	37.6	41.7	45.9	50.4	55.1	60.0
16	36.0	40.1	44.4	49.0	53.8	58.8	64.0
17	38.3	42.6	47.2	52.0	57.1	62.4	68.0
18	40.5	45.1	50.0	55.1	60.5	66.1	72.0
19	42.8	47.3	52.8	58.1	63.8	69.8	76.0
20	45.0	50.1	55.5	61.3	67.2	73.4	80.0

Solid Cord Measure.

The so-called "solid cord" is sometimes used in Massachusetts. In this case the number of cubic feet in each stack is computed, and 128 solid cubic feet are called 1 cord. The number of cubic feet in each log is determined by calipers, the measurement of each log being taken inside the bark at one-third the distance from the larger end. The calipers give the results in units of 4 cubic feet each, 32 units being equivalent to 1 solid cord.

Conversion of Cord Measure into Cubic Measure.

Dealers in wood frequently wish to convert cord measure into cubic measure, and vice versa. The converting factor used depends primarily on the form of the wood. If the wood is split, there is more solid contents in a stacked cord than if the wood is in round sticks. There is more wood in a given stack if the sticks are smooth and straight than if they are rough and crooked. The converting factor depends, further, on the character of the stacking. If the wood is skillfully stacked there is more solid contents than when the work is poorly done. It has been found in Europe through a series of careful measurements that a stack of wood may be reduced to solid cubic measure by multiplying the number of cubic feet in the stack by the following factors:

For split firewood	0.7
For small round firewood	.6

Thus, a cord of split firewood is equivalent to 128 cubic feet multiplied by 0.7, which equals 89.6 cubic feet. To convert a given number of cords into solid cubic feet, multiply by 128 and then multiply the product by 0.7 or 0.6, according as the wood is split or consists of small round sticks; or multiply directly by 89.6.

To convert a given number of solid cubic feet into cords, divide by 128 and then divide the result by 0.7 or 0.6, according to the form of the wood; or divide directly by 89.6. If the stacking is very poor or if the wood is rough and crooked, the figures must be modified.

No rule can be given for converting cord measure into board measure. Lumbermen assign to a cord of wood values varying

from 500 to 1,000 board feet. So much depends upon the quality of the wood, the purpose for which it is to be used, the method of piling, etc., that no constant converting factor can be given.

Bark is piled in stacks and measured in the same way as firewood.

CUBIC MEASURE.

The cubic foot is not generally used in the United States. When used it is employed to measure spars and other long sticks and occasionally to measure cord wood. From the statement just made the New Hampshire or Blodgett Rule must be excepted, because that rule is based on an artificial cubic foot, established by statute, and larger than the standard cubic foot. (Cf. page 44.)

In measuring logs for their cubic contents, it is customary to take the average diameter of the log, either measuring it at the middle point or averaging its two end diameters. The measurement is taken inside the bark.

The cubic foot is often used by foresters in studying the growth of trees. It is also used as a basis for the construction of tables of contents of standing timber, as explained on page 109.

Cubic Contents of Logs, including Slabs.

The table which follows shows the total cubic contents, including slabs, of logs of different diameters and lengths. The diameters given are obtained by averaging both ends of the log or by measuring its diameter at the middle point with calipers. This table assumes that the contents of a log are equivalent to the contents of a cylinder having the same length as the log and the same diameter as the average diameter of the log.

The rule for determining the contents of logs is as follows: Find the area in square feet of a circle having the same diameter as the average diameter of the log, and multiply this by the length. The result is the contents in cubic feet. The areas of circles of different diameters have been computed and will be shown among the tables in Part II of the Woodsman's Handbook.

In using the table for cubic feet more accurate results can be obtained for short than for long logs.

Solid Cubic Contents of Log, including Slab.

Length in feet.	AVERAGE DIAMETER IN INCHES.						
	6	7	8	9	10	11	12
	CONTENTS IN CUBIC FEET.						
10	1.96	2.67	3.49	4.42	5.45	6.60	7.85
11	2.16	2.94	3.84	4.86	6.00	7.26	8.64
12	2.36	3.21	4.19	5.30	6.55	7.92	9.42
13	2.55	3.47	4.54	5.74	7.09	8.58	10.21
14	2.75	3.74	4.89	6.19	7.64	9.24	11.00
15	2.95	4.01	5.24	6.63	8.18	9.90	11.78
16	3.14	4.28	5.59	7.07	8.73	10.56	12.57
17	3.34	4.54	5.93	7.51	9.27	11.22	13.35
18	3.53	4.81	6.28	7.95	9.82	11.88	14.14
19	3.73	5.08	6.63	8.39	10.36	12.54	14.92
20	3.93	5.35	6.98	8.84	10.91	13.20	15.71
21	4.12	5.61	7.33	9.28	11.45	13.86	16.49
22	4.32	5.88	7.68	9.72	12.00	14.52	17.28
23	4.52	6.15	8.03	10.16	12.54	15.18	18.06
24	4.71	6.41	8.38	10.60	13.09	15.84	18.85
25	4.91	6.68	8.73	11.04	13.64	16.50	19.64
26	5.11	6.95	9.08	11.49	14.18	17.16	20.42
27	5.30	7.22	9.42	11.93	14.73	17.82	21.21
28	5.50	7.48	9.77	12.37	15.27	18.48	21.99
29	5.69	7.75	10.12	12.81	15.82	19.14	22.78
30	5.89	8.02	10.47	13.25	16.36	19.80	23.56
31	6.09	8.28	10.82	13.70	16.91	20.46	24.35
32	6.28	8.55	11.17	14.14	17.45	21.12	25.13
33	6.48	8.82	11.52	14.58	18.00	21.78	25.92
34	6.68	9.09	11.87	15.02	18.54	22.44	26.70
35	6.87	9.35	12.22	15.46	19.09	23.10	27.49
36	7.07	9.62	12.57	15.90	19.64	23.76	28.27
37	7.26	9.89	12.92	16.35	20.18	24.42	29.06
38	7.46	10.16	13.26	16.79	20.73	25.08	29.85
39	7.66	10.42	13.61	17.23	21.27	25.74	30.63
40	7.85	10.69	13.96	17.67	21.82	26.40	31.42
41	8.05	10.96	14.31	18.11	22.36	27.06	32.20
42	8.25	11.22	14.66	18.56	22.91	27.72	32.99

Solid Cubic Contents of Log, including Slab—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.						
	6	7	8	9	10	11	12
	CONTENTS IN CUBIC FEET.						
43	8.44	11.49	15.01	19.00	23.45	28.38	33.77
44	8.64	11.76	15.36	19.44	24.00	29.04	34.56
45	8.84	12.03	15.71	19.88	24.54	29.70	35.34
46	9.03	12.29	16.06	20.32	25.09	30.36	36.13
47	9.23	12.56	16.41	20.76	25.63	31.02	36.91
48	9.42	12.83	16.76	21.21	26.18	31.68	37.70
49	9.62	13.10	17.10	21.65	26.73	32.34	38.48
50	9.82	13.36	17.45	22.09	27.27	33.00	39.27
51	10.01	13.63	17.80	22.53	27.82	33.66	40.06
52	10.21	13.90	18.15	22.97	28.36	34.32	40.84
53	10.41	14.16	18.50	23.41	28.91	34.98	41.63
54	10.60	14.43	18.85	23.86	29.45	35.64	42.41
55	10.80	14.70	19.20	24.30	30.00	36.30	43.20
56	11.00	14.97	19.55	24.74	30.54	36.96	43.98
57	11.19	15.23	19.90	25.18	31.08	37.62	44.77
58	11.39	15.50	20.25	25.62	31.63	38.28	45.55
59	11.58	15.77	20.60	26.07	32.18	38.94	46.34
60	11.78	16.04	20.94	26.51	32.73	39.60	47.12
61	11.98	16.30	21.29	26.95	33.27	40.26	47.91
62	12.17	16.57	21.64	27.39	33.82	40.92	48.69
63	12.37	16.84	21.99	27.83	34.36	41.58	49.48
64	12.57	17.10	22.34	28.27	34.91	42.24	50.27
65	12.76	17.37	22.69	28.72	35.45	42.90	51.05
66	12.96	17.64	23.04	29.16	36.00	43.56	51.84
67	13.16	17.91	23.39	29.60	36.54	44.22	52.62
68	13.35	18.17	23.74	30.04	37.09	44.88	53.41
69	13.55	18.44	24.09	30.48	37.63	45.54	54.19
70	13.74	18.71	24.43	30.93	38.18	46.20	54.98
71	13.94	18.97	24.78	31.37	38.72	46.86	55.76
72	14.14	19.24	25.13	31.81	39.27	47.52	56.55
73	14.33	19.51	25.48	32.25	39.82	48.18	57.33
74	14.53	19.78	25.83	32.69	40.36	48.84	58.12
75	14.73	20.04	26.18	33.13	40.91	49.50	58.91

Solid Cubic Contents of Log, including Slab—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.					
	13	14	15	16	17	18
	CONTENTS IN CUBIC FEET.					
10	9.22	10.69	12.27	13.96	15.76	17.67
11	10.14	11.76	13.50	15.36	17.34	19.44
12	11.06	12.83	14.73	16.76	18.92	21.21
13	11.98	13.90	15.95	18.15	20.49	22.97
14	12.90	14.97	17.18	19.55	22.07	24.74
15	13.83	16.04	18.41	20.94	23.64	26.51
16	14.75	17.10	19.63	22.34	25.22	28.27
17	15.67	18.17	20.86	23.74	26.80	30.04
18	16.59	19.24	22.09	25.13	28.37	31.81
19	17.51	20.31	23.32	26.53	29.95	33.58
20	18.44	21.38	24.54	27.93	31.53	35.34
21	19.36	22.45	25.77	29.32	33.10	37.11
22	20.28	23.52	27.00	30.72	34.68	38.88
23	21.20	24.59	28.23	32.11	36.25	40.64
24	22.12	25.66	29.45	33.51	37.83	42.41
25	23.04	26.73	30.68	34.91	39.41	44.18
26	23.97	27.79	31.91	36.30	40.98	45.95
27	24.89	28.86	33.13	37.70	42.56	47.71
28	25.81	29.93	34.36	39.10	44.14	49.48
29	26.73	31.00	35.59	40.49	45.71	51.25
30	27.65	32.07	36.82	41.89	47.29	53.01
31	28.57	33.14	38.04	43.28	48.86	54.78
32	29.50	34.21	39.27	44.68	50.44	56.55
33	30.42	35.28	40.50	46.08	52.02	58.32
34	31.34	36.35	41.72	47.47	53.59	60.08
35	32.26	37.42	42.95	48.87	55.17	61.85
36	33.18	38.48	44.18	50.27	56.75	63.62
37	34.10	39.55	45.41	51.66	58.32	65.38
38	35.03	40.62	46.63	53.06	59.90	67.15
39	35.95	41.69	47.86	54.45	61.47	68.92
40	36.87	42.76	49.09	55.85	63.05	70.69
41	37.79	43.83	50.31	57.25	64.63	72.45
42	38.71	44.90	51.54	58.64	66.20	74.22

Solid Cubic Contents of Log, including Slab—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.					
	13	14	15	16	17	18
	CONTENTS IN CUBIC FEET.					
43	39.64	45.97	52.77	60.04	67.78	75.99
44	40.56	47.04	54.00	61.44	69.36	77.75
45	41.48	48.11	55.22	62.83	70.93	79.52
46	42.40	49.17	56.45	64.23	72.51	81.29
47	43.32	50.24	57.68	65.62	74.08	83.06
48	44.24	51.31	58.90	67.02	75.66	84.82
49	45.17	52.38	60.13	68.42	77.24	86.59
50	46.09	53.45	61.36	69.81	78.81	88.36
51	47.01	54.52	62.59	71.21	80.39	90.12
52	47.93	55.59	63.81	72.61	81.97	91.89
53	48.85	56.66	65.04	74.00	83.54	93.66
54	49.77	57.73	66.27	75.40	85.12	95.43
55	50.70	58.80	67.49	76.79	86.69	97.19
56	51.62	59.86	68.72	78.19	88.27	98.96
57	52.54	60.93	69.95	79.59	89.85	100.73
58	53.46	62.00	71.18	80.98	91.42	102.49
59	54.38	63.07	72.40	82.38	93.00	104.26
60	55.31	64.14	73.63	83.78	94.58	106.03
61	56.23	65.21	74.86	85.17	96.15	107.80
62	57.15	66.28	76.09	86.57	97.73	109.56
63	58.07	67.35	77.31	87.96	99.30	111.33
64	58.99	68.42	78.54	89.36	100.88	113.10
65	59.91	69.49	79.77	90.76	102.46	114.86
66	60.84	70.55	80.99	92.15	104.03	116.63
67	61.76	71.62	82.22	93.55	105.61	118.40
68	62.68	72.69	83.45	94.95	107.19	120.17
69	63.60	73.76	84.68	96.34	108.76	121.93
70	64.52	74.83	85.90	97.74	110.34	123.70
71	65.44	75.90	87.13	99.13	111.91	125.47
72	66.37	76.97	88.36	100.53	113.49	127.23
73	67.29	78.04	89.58	101.93	115.07	129.00
74	68.21	79.11	90.81	103.32	116.64	130.77
75	69.13	81.18	92.04	104.72	118.22	132.54

Solid Cubic Contents of Log, including Slab—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.					
	19	20	21	22	23	24
	CONTENTS IN CUBIC FEET.					
10	19.69	21.82	24.05	26.40	28.85	31.42
11	21.66	24.00	26.46	29.04	31.74	34.56
12	23.63	26.18	28.86	31.68	34.62	37.70
13	25.60	28.36	31.27	34.32	37.51	40.84
14	27.57	30.54	33.67	36.96	40.39	43.98
15	29.53	32.72	36.08	39.60	43.28	47.12
16	31.50	34.91	38.48	42.24	46.16	50.27
17	33.47	37.09	40.89	44.88	49.05	53.41
18	35.44	39.27	43.30	47.52	51.93	56.55
19	37.41	41.45	45.70	50.16	54.82	59.69
20	39.38	43.63	48.11	52.80	57.71	62.83
21	41.35	45.82	50.51	55.44	60.59	65.97
22	43.32	48.00	52.92	58.08	63.48	69.11
23	45.29	50.18	55.32	60.72	66.36	72.26
24	47.25	52.36	57.73	63.36	69.25	75.40
25	49.22	54.54	60.13	66.00	72.13	78.54
26	51.19	56.72	62.54	68.64	75.02	81.68
27	53.16	58.90	64.94	71.27	77.90	84.82
28	55.13	61.09	67.35	73.91	80.79	87.96
29	57.10	63.27	69.75	76.55	83.67	91.11
30	59.07	65.45	72.16	79.19	86.56	94.25
31	61.04	67.63	74.56	81.83	89.44	97.39
32	63.01	69.81	76.97	84.47	92.33	100.53
33	64.98	71.99	79.37	87.11	95.21	103.67
34	66.94	74.18	81.78	89.75	98.10	106.81
35	68.91	76.36	84.18	92.39	100.98	109.96
36	70.88	78.54	86.59	95.03	103.87	113.10
37	72.85	80.72	89.00	97.67	106.75	116.24
38	74.82	82.90	91.40	100.31	109.64	119.38
39	76.79	85.08	93.81	102.95	112.52	122.52
40	78.76	87.27	96.21	105.59	115.41	125.66
41	80.73	89.45	98.62	108.23	118.30	128.81
42	82.70	91.63	101.02	110.87	121.18	131.95

Solid Cubic Contents of Log, including Slab—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.					
	19	20	21	22	23	24
	CONTENTS IN CUBIC FEET.					
43	84.66	93.81	103.43	113.51	124.07	135.09
44	86.63	95.99	105.83	116.15	126.95	138.23
45	88.60	98.17	108.24	118.79	129.84	141.37
46	90.57	100.36	110.64	121.43	132.72	144.51
47	92.54	102.54	113.05	124.07	135.61	147.65
48	94.51	104.72	115.45	126.71	138.49	150.80
49	96.48	106.90	117.86	129.35	141.38	153.94
50	98.45	109.08	120.26	131.99	144.26	157.08
51	100.42	111.26	122.67	134.63	147.15	160.22
52	102.39	113.45	125.07	137.27	150.03	163.36
53	104.35	115.63	127.48	139.91	152.92	166.50
54	106.32	117.81	129.89	142.55	155.80	169.65
55	108.29	119.99	132.29	145.19	158.69	172.79
56	110.26	122.17	134.70	147.83	161.57	175.93
57	112.23	124.35	137.10	150.47	164.46	179.07
58	114.20	126.54	139.51	153.11	167.34	182.21
59	116.17	128.72	141.91	155.75	170.23	185.35
60	118.14	130.90	144.32	158.39	173.12	188.50
61	120.11	133.08	146.72	161.03	176.00	191.64
62	122.07	135.26	149.13	163.67	178.89	194.78
63	124.04	137.44	151.53	166.31	181.77	197.92
64	126.01	139.63	153.94	168.95	184.66	201.06
65	127.98	141.81	156.34	171.59	187.54	204.20
66	129.95	143.99	158.75	174.23	190.43	207.34
67	131.92	146.17	161.15	176.87	193.31	210.49
68	133.89	148.35	163.56	179.51	196.20	213.63
69	135.86	150.53	165.96	182.15	199.08	216.77
70	137.83	152.72	168.37	184.79	201.97	219.91
71	139.80	154.90	170.77	187.43	204.85	223.05
72	141.76	157.08	173.18	190.07	207.74	226.19
73	143.73	159.26	175.59	192.71	210.62	229.34
74	145.70	161.44	177.99	195.35	213.51	232.48
75	147.67	163.62	180.40	197.99	216.39	235.62

Solid Cubic Contents of Log, including Slab—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.					
	25	26	27	28	29	30
	CONTENTS IN CUBIC FEET.					
10.....	34.09	36.87	39.76	42.76	45.87	49.09
11.....	37.50	40.56	43.74	47.04	50.46	54.00
12.....	40.91	44.24	47.71	51.31	55.04	58.90
13.....	44.31	47.93	51.69	55.59	59.63	63.81
14.....	47.72	51.62	55.67	59.86	64.22	68.72
15.....	51.13	55.31	59.64	64.14	68.80	73.63
16.....	54.54	58.99	63.62	68.42	73.39	78.54
17.....	57.95	62.68	67.59	72.69	77.98	83.45
18.....	61.36	66.37	71.57	76.97	82.56	88.36
19.....	64.77	70.05	75.55	81.24	87.15	93.27
20.....	68.18	73.74	79.52	85.52	91.74	98.17
21.....	71.59	77.43	83.50	89.80	96.33	103.08
22.....	74.99	81.11	87.47	94.07	100.91	107.99
23.....	78.40	84.80	91.45	98.35	105.50	112.90
24.....	81.81	88.49	95.43	102.63	110.09	117.81
25.....	85.22	92.18	99.40	106.90	114.67	122.72
26.....	88.63	95.86	103.38	111.18	119.26	127.63
27.....	91.04	99.55	107.35	115.45	123.85	132.54
28.....	95.45	103.24	111.33	119.73	128.43	137.44
29.....	98.86	106.92	115.31	124.01	133.02	142.35
30.....	102.27	110.61	119.28	128.28	137.61	147.26
31.....	105.67	114.30	123.26	132.56	142.20	152.17
32.....	109.08	117.98	127.23	136.83	146.78	157.08
33.....	112.49	121.67	131.21	141.11	151.37	161.99
34.....	115.90	125.36	135.19	145.39	155.96	166.90
35.....	119.31	129.05	139.16	149.66	160.54	171.81
36.....	122.72	132.73	143.14	153.94	165.13	176.71
37.....	126.13	136.42	147.11	158.21	169.72	181.62
38.....	129.54	140.11	151.09	162.49	174.30	186.53
39.....	132.94	143.79	155.07	166.77	178.89	191.44
40.....	136.35	147.48	159.04	171.04	183.48	196.35
41.....	139.76	151.17	163.02	175.32	188.06	201.26
42.....	143.17	154.85	167.00	179.59	192.65	206.17

Solid Cubic Contents of Log, including Slab—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.					
	25	26	27	28	29	30
	CONTENTS IN CUBIC FEET.					
43	146.58	158.54	170.97	183.87	197.24	211.08
44	149.99	162.23	174.95	188.15	201.83	215.98
45	153.40	165.92	178.92	192.42	206.41	220.89
46	156.81	169.60	182.90	196.70	211.00	225.80
47	160.22	173.29	186.88	200.97	215.59	230.71
48	163.62	176.98	190.85	205.25	220.17	235.62
49	167.03	180.66	194.83	209.53	224.76	240.53
50	170.44	184.35	198.80	213.80	229.35	245.44
51	173.85	188.04	202.78	218.08	233.93	250.35
52	177.26	191.72	206.76	222.35	238.52	255.25
53	180.67	195.41	210.73	226.63	243.11	260.16
54	184.08	199.10	214.71	230.91	247.69	265.07
55	187.49	202.79	216.68	235.18	252.28	269.98
56	190.90	206.47	222.66	239.46	256.87	274.89
57	194.30	210.16	226.64	243.73	261.46	279.80
58	197.71	213.85	230.61	248.01	266.04	284.71
59	201.12	217.53	234.59	252.29	270.63	289.62
60	204.53	221.22	238.56	256.56	275.22	294.52
61	207.94	224.91	242.54	260.84	279.80	299.43
62	211.35	228.59	246.52	265.12	284.39	304.34
63	214.76	232.28	250.49	269.39	288.98	309.25
64	218.17	235.97	254.47	273.67	293.56	314.16
65	221.57	239.66	258.45	277.94	298.15	319.07
66	224.98	243.34	262.42	282.22	302.74	323.98
67	228.39	247.03	266.40	286.50	307.32	328.89
68	231.80	250.72	270.37	290.77	311.91	333.79
69	235.21	254.40	274.35	295.05	316.50	338.70
70	238.62	258.09	278.33	299.32	321.09	343.61
71	242.03	261.78	282.30	303.60	325.67	348.52
72	245.44	265.46	286.28	307.88	330.26	353.43
73	248.85	269.15	290.25	312.15	334.85	358.34
74	252.25	272.84	294.23	316.42	339.43	363.25
75	255.66	276.53	298.21	320.70	344.02	368.16

Solid Cubic Contents of Log, including Slab—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.					
	31	32	33	34	35	36
	CONTENTS IN CUBIC FEET.					
10.....	52.41	55.85	59.40	63.05	66.81	70.69
11.....	57.66	61.44	65.34	69.36	73.49	77.75
12.....	62.90	67.02	71.27	75.66	80.18	84.82
13.....	68.14	72.61	77.21	81.97	86.86	91.89
14.....	73.38	78.19	83.15	88.27	93.54	98.96
15.....	78.62	83.78	89.09	94.58	100.22	106.03
16.....	83.86	89.36	95.03	100.88	106.90	113.10
17.....	89.10	94.95	100.97	107.18	113.58	120.17
18.....	94.35	100.53	106.91	113.49	120.26	127.23
19.....	99.59	106.12	112.85	119.80	126.95	134.30
20.....	104.83	111.70	118.79	126.10	133.63	141.37
21.....	110.07	117.29	124.73	132.41	140.31	148.44
22.....	115.31	122.87	130.67	138.71	146.99	155.51
23.....	120.55	128.46	136.61	145.02	153.67	162.58
24.....	125.79	134.04	142.55	151.32	160.35	169.65
25.....	131.04	139.63	148.49	157.63	167.03	176.71
26.....	136.28	145.21	154.43	163.93	173.71	183.78
27.....	141.52	150.80	160.37	170.24	180.40	190.85
28.....	146.76	156.38	166.31	176.54	187.08	197.92
29.....	152.00	161.97	172.25	182.85	193.76	204.99
30.....	157.24	167.55	178.19	189.15	200.44	212.06
31.....	162.48	173.14	184.13	195.45	207.12	219.13
32.....	167.73	178.72	190.07	201.76	213.80	226.19
33.....	172.97	184.31	196.01	208.06	220.48	233.26
34.....	178.21	189.89	201.95	214.37	227.17	240.33
35.....	183.45	195.48	207.88	220.68	233.85	247.40
36.....	188.69	201.06	213.82	226.98	240.53	254.47
37.....	193.93	206.65	219.76	233.28	247.21	261.54
38.....	199.17	212.23	225.70	239.59	253.89	268.61
39.....	204.42	217.82	231.64	245.89	260.57	275.67
40.....	209.66	223.40	237.58	252.20	267.25	282.74
41.....	214.90	228.99	243.52	258.50	273.93	289.81
42.....	220.14	234.57	249.46	264.81	280.62	296.88

Solid Cubic Contents of Log, including Slab—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.					
	31	32	33	34	35	36
	CONTENTS IN CUBIC FEET.					
43	225.38	240.16	255.40	271.11	287.30	303.95
44	230.62	245.74	261.34	277.42	293.98	311.02
45	235.86	251.33	267.28	283.72	300.66	318.09
46	241.11	256.91	273.22	290.03	307.34	325.15
47	246.35	262.50	279.16	296.33	314.02	332.22
48	251.59	268.08	285.10	302.64	320.70	339.29
49	256.83	273.67	291.04	308.94	327.39	346.36
50	262.07	279.25	296.98	315.25	334.07	353.43
51	267.31	284.84	302.92	321.55	340.75	360.50
52	272.55	290.42	308.86	327.86	347.43	367.57
53	277.80	296.01	314.80	334.16	254.11	374.63
54	283.04	301.59	320.74	340.47	360.79	381.70
55	288.28	307.18	326.68	346.77	367.47	388.77
56	293.52	312.76	332.62	353.08	374.15	395.84
57	298 76	318.35	338.56	359.38	380.84	402.91
58	304.00	323.93	344.50	365.69	387.52	409.98
59	309.24	329.52	350.43	371.99	394.20	417.05
60	314.49	335.10	356.37	378.30	400.88	424.11
61	319.73	340.69	362.34	384.61	407.54	431.21
62	324.97	346.27	368.28	390.91	414.22	438.28
63	330.21	351.86	374.22	397.22	420.80	445.35
64	335.45	357.44	380.16	403.52	427.58	452.42
65	340.69	363.03	386.07	409.82	434.29	459.46
66	345.93	368.61	392.04	416.13	440.95	466.55
67	351.18	374.20	397.98	422.44	447.63	473.62
68	356.42	379.78	403.92	428.74	454.31	480.69
69	361.66	385.37	409.86	435.05	460.99	487.76
70	366.90	390.95	415.77	441.35	467.69	494.80
71	372.14	396.54	421.74	447.66	474.35	501.90
72	377.38	402.12	427.68	453.96	481.03	508.97
73	382.62	470.71	433.62	460.27	487.61	516.04
74	387.87	413.29	449.56	466.57	494.39	523.11
75	393.11	418.88	445.47	472.87	501.10	530.14

Cubic Contents of Logs Without Slabs.

The two rules in use for determining the amount of square timber contained in round logs are the Two-thirds Rule and the Inscribed Square Rule.

THE TWO-THIRDS RULE.

The diameter of the log is taken at its middle point or the diameters of the two ends of the log are averaged. The diameter of the log is reduced one-third to allow for slab and the remaining two-thirds is taken as the width of the square piece which may be hewn or sawn out of the log. The cubic contents of the squared log are then obtained by squaring this width and multiplying by the length of the log.

This rule gives smaller results than the Inscribed Square Rule, which shows the contents of a square piece that may be exactly inscribed in a cylinder of the same diameter as the log. In support of the Two-thirds Rule it is claimed that there is a certain amount of waste, due to the fact that logs are seldom perfectly round and straight, and that the rule makes approximately the correct allowance for such irregularities.

The Two-thirds Rule is sometimes called the Big Sandy Cube Rule.

Round Timber Reduced to Square Timber.

TWO-THIRDS RULE.

Length in feet.	AVERAGE DIAMETER IN INCHES.								
	6	7	8	9	10	11	12	13	14
	CONTENTS IN CUBIC FEET.								
10....	1.0	1.5	2.0	2.5	3.1	3.7	4.5	5.2	6.1
12....	1.2	1.8	2.4	3.0	3.7	4.5	5.4	6.3	7.3
14....	1.4	2.1	2.8	3.5	4.3	5.2	6.2	7.3	8.5
16....	1.6	2.4	3.2	4.0	4.9	6.0	7.1	8.3	9.7
18....	1.8	2.7	3.6	4.5	5.5	6.7	8.0	9.4	10.9
20....	2.0	3.0	3.9	5.0	6.2	7.5	8.9	10.4	12.1
22....	2.2	3.3	4.3	5.5	6.8	8.2	9.8	11.5	13.3
24....	2.4	3.6	4.7	6.0	7.4	9.0	10.7	12.5	14.5
26....	2.6	3.9	5.1	6.5	8.0	9.7	11.6	13.5	15.7
28....	2.8	4.2	5.5	7.0	8.6	10.4	12.5	14.6	16.9
30....	3.0	4.5	5.9	7.5	9.2	11.2	13.4	15.6	18.2
32....	3.2	4.8	6.3	8.0	9.9	11.9	14.3	16.7	19.4
34....	3.4	5.1	6.7	8.5	10.5	12.7	15.2	17.7	20.6
36....	3.6	5.4	7.1	9.0	11.1	13.4	16.1	18.8	21.8
38....	3.8	5.7	7.5	9.5	11.7	14.2	16.9	19.8	23.0
40....	4.0	6.0	7.9	10.0	12.3	14.9	17.8	20.8	24.2
42....	4.2	6.3	8.3	10.5	12.9	15.7	18.7	21.9	25.4
44....	4.4	6.6	8.7	11.0	13.6	16.4	19.6	22.9	26.6
46....	4.6	6.9	9.1	11.5	14.2	17.2	20.5	24.0	27.8
48....	4.8	7.2	9.6	12.0	14.8	17.9	21.4	25.0	29.0
50....	5.0	7.5	9.9	12.5	15.4	18.7	22.3	26.1	30.1
52....	5.2	7.9	10.2	13.0	16.0	19.4	23.2	27.1	31.5
54....	5.4	8.2	10.6	13.5	16.6	20.1	24.1	28.1	32.7
56....	5.6	8.5	11.0	14.0	17.2	20.9	25.0	29.2	33.9
58....	5.9	8.8	11.4	14.5	17.9	21.6	25.9	30.2	35.1
60....	6.1	9.1	11.8	15.0	18.5	22.4	26.7	31.3	36.3
62....	6.3	9.4	12.2	15.5	19.1	23.1	27.7	32.3	37.5
64....	6.5	9.7	12.6	16.0	19.7	23.9	28.5	33.3	38.7
66....	6.7	10.0	13.0	16.5	20.3	24.6	29.4	34.4	39.9
68....	6.9	10.3	13.4	17.0	20.9	25.4	30.3	35.4	41.1
70....	7.1	10.6	13.8	17.5	21.6	26.1	31.2	36.5	42.4
72....	7.3	10.9	14.2	18.0	22.2	26.9	32.1	37.5	43.6
74....	7.5	11.2	14.6	18.5	22.8	27.6	33.0	38.6	44.8
76....	7.7	11.5	15.0	19.0	23.4	28.3	33.9	39.6	46.0

Round Timber Reduced to Square Timber—Continued.

Two-thirds Rule—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.							
	15	16	17	18	19	20	21	22
	CONTENTS IN CUBIC FEET.							
10	6.9	7.9	8.7	10.0	11.1	12.3	13.6	14.9
12	8.3	9.5	10.5	12.0	13.4	14.8	16.3	17.9
14	9.7	11.0	12.2	14.0	15.6	17.3	19.1	20.9
16	11.1	12.6	13.9	16.0	17.8	19.7	21.8	23.9
18	12.5	14.2	15.7	18.0	20.0	22.2	24.5	26.9
20	13.9	15.8	17.4	20.0	22.3	24.7	27.2	29.9
22	15.3	17.4	19.2	22.0	24.5	27.1	29.9	32.8
24	16.7	18.9	20.9	24.0	26.7	29.6	32.7	35.8
26	18.0	20.5	22.6	26.0	28.9	32.1	35.4	38.8
28	19.4	22.1	24.4	28.0	31.2	34.6	38.1	41.8
30	20.8	23.7	26.1	30.0	33.4	37.0	40.8	44.8
32	22.2	25.2	27.9	32.0	35.6	39.5	43.6	47.8
34	23.6	26.8	29.6	34.0	37.8	42.0	46.3	50.8
36	25.0	28.4	31.4	36.0	40.1	44.4	49.0	53.7
38	26.4	30.0	33.1	38.0	42.3	46.9	51.7	56.7
40	27.8	31.6	34.8	40.0	44.5	49.4	54.4	59.7
42	29.1	33.1	36.6	42.0	46.7	51.8	57.2	62.7
44	30.5	34.7	38.3	44.0	49.0	54.3	59.9	65.7
46	31.9	36.3	40.1	46.0	51.2	56.8	62.6	68.7
48	33.3	37.9	41.8	48.0	53.4	59.2	65.3	71.7
50	34.7	39.5	43.6	50.0	55.7	61.7	68.1	74.7
52	36.1	41.0	45.3	52.0	57.9	64.2	70.8	77.6
54	37.5	42.6	47.0	54.0	60.1	66.6	73.5	80.6
56	38.9	44.2	48.8	56.0	62.3	69.1	76.2	83.6
58	40.3	45.8	50.5	58.0	64.6	71.6	78.9	86.6
60	41.6	47.3	52.3	60.0	66.8	74.0	81.7	89.6
62	43.0	48.9	54.0	62.0	69.0	76.5	84.4	92.6
64	44.4	50.5	55.7	64.0	71.2	79.0	87.1	95.6
66	45.8	52.1	57.5	66.0	73.5	81.4	89.8	98.5
68	47.2	53.7	59.2	68.0	75.7	83.9	92.5	101.5
70	48.6	55.2	61.0	70.0	77.9	86.4	95.3	104.5
72	50.0	56.8	62.7	72.0	80.1	88.8	98.0	107.5
74	51.4	58.4	64.5	74.0	82.4	91.3	100.7	110.5
76	52.7	60.0	66.0	76.0	84.6	93.8	103.4	113.5

Round Timber Reduced to Square Timber—Continued.

TWO-THIRDS RULE—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.						
	23	24	25	26	27	28	29
	CONTENTS IN CUBIC FEET.						
10....	16.3	17.8	19.3	20.9	22.5	24.2	26.0
12....	19.6	21.3	23.1	25.0	27.0	29.0	31.1
14....	22.9	24.9	27.0	29.2	31.5	33.9	36.3
16....	26.1	28.4	30.8	33.4	36.0	38.7	41.5
18....	29.4	32.0	34.7	37.5	40.5	43.5	46.7
20....	32.7	35.5	38.5	41.7	45.0	48.4	51.9
22....	35.9	39.1	42.4	45.9	49.5	53.2	57.1
24....	39.2	42.6	46.2	50.0	54.0	58.0	62.3
26....	42.5	46.2	50.1	54.2	58.5	62.9	67.5
28....	45.7	49.7	54.0	58.4	63.0	67.7	72.7
30....	49.0	53.3	57.8	62.6	67.5	72.5	77.9
32....	52.3	56.8	61.7	66.7	72.0	77.4	83.0
34....	55.5	60.4	65.5	70.9	76.5	82.2	88.2
36....	58.8	63.9	69.4	75.1	81.0	87.0	93.4
38....	62.1	67.5	73.2	79.2	85.5	91.9	98.6
40....	65.3	71.0	77.1	83.4	90.0	96.7	103.8
42....	68.6	74.6	80.9	87.6	94.5	101.6	109.0
44....	71.9	78.1	84.8	91.7	99.0	106.4	114.2
46....	75.1	81.7	88.6	95.9	103.5	111.2	119.4
48....	78.4	85.2	92.5	100.1	108.0	116.1	121.6
50....	81.7	88.8	96.4	104.3	112.5	120.9	129.8
52....	84.9	92.4	100.2	108.4	117.0	125.7	134.9
54....	88.2	95.9	104.1	112.6	121.5	130.6	140.1
56....	91.4	99.5	107.9	116.8	126.0	135.4	145.3
58....	94.7	103.0	111.8	120.9	130.5	140.2	150.5
60....	98.0	106.6	115.6	125.1	135.0	145.1	155.7
62....	101.2	110.1	119.5	129.3	139.5	149.9	160.9
64....	104.5	113.7	123.3	133.4	144.0	154.8	166.0
66....	107.8	117.2	127.2	137.6	148.5	159.6	171.1
68....	111.0	120.8	131.0	141.8	153.0	164.4	176.5
70....	114.3	124.3	134.9	146.0	157.5	169.3	181.7
72....	117.6	127.9	138.7	150.1	162.0	174.1	186.8
74....	120.8	131.4	142.6	154.3	166.5	178.9	192.0
76....	124.1	135.0	146.5	158.5	171.0	183.8	197.2

Round Timber Reduced to Square Timber—Continued.

TWO-THIRDS RULE—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.						
	30	31	32	33	34	35	36
	CONTENTS IN CUBIC FEET.						
10....	27.8	29.7	31.6	33.6	35.7	37.8	40.0
12....	33.3	35.6	38.0	40.3	42.8	45.3	48.0
14....	38.9	41.5	44.3	47.0	49.9	52.9	56.0
16....	44.4	47.4	50.6	53.8	57.0	60.5	64.0
18....	50.0	53.4	57.0	60.5	64.2	68.0	72.0
20....	55.5	59.3	63.3	67.2	71.3	75.6	80.0
22....	61.1	65.2	69.6	73.9	78.4	83.1	88.0
24....	66.6	71.2	75.9	80.6	85.6	90.7	96.0
26....	72.2	77.1	82.3	87.4	92.7	98.2	104.0
28....	77.7	83.0	88.6	94.1	99.8	105.8	112.0
30....	83.3	89.0	94.9	100.8	107.0	113.4	120.0
32....	88.8	94.9	101.2	107.5	114.1	120.9	128.0
34....	94.4	100.8	107.6	114.2	121.2	128.5	136.0
36....	99.9	106.7	113.9	121.0	128.3	136.0	144.0
38....	105.5	112.7	120.2	127.7	135.5	143.6	152.0
40....	111.0	118.6	126.6	134.4	142.6	151.2	160.0
42....	116.6	124.5	132.9	141.1	149.7	158.7	168.0
44....	122.1	130.5	139.2	147.8	156.9	166.3	176.0
46....	127.7	136.4	145.5	154.6	164.0	173.8	184.0
48....	133.2	142.3	151.9	161.3	171.1	181.4	192.0
50....	138.8	148.3	158.2	168.0	178.3	189.0	200.0
52....	144.4	154.2	164.5	174.7	185.4	196.5	208.0
54....	149.9	160.1	170.9	181.4	192.5	204.1	216.0
56....	155.5	166.0	177.2	188.2	199.6	211.6	224.0
58....	161.0	172.0	183.5	194.9	206.8	219.2	232.0
60....	166.6	177.9	189.8	201.6	213.9	226.7	240.0
62....	172.1	183.8	196.2	208.3	221.0	234.3	248.0
64....	177.7	189.8	202.5	215.0	228.2	241.9	256.0
66....	183.2	195.7	208.8	221.8	235.3	250.4	264.0
68....	188.8	201.6	215.2	228.9	242.4	257.0	272.0
70....	194.3	207.6	221.5	235.2	249.6	264.5	280.0
72....	199.9	213.5	227.8	241.9	256.7	272.1	288.0
74....	205.4	219.4	234.1	248.6	263.8	279.6	296.0
76....	211.0	225.3	240.5	255.4	270.9	287.2	304.0

THE INSCRIBED SQUARE RULE.

This rule gives the cubic contents of square pieces which can be exactly inscribed in cylinders of different sizes. The width of this square piece is usually obtained by multiplying the diameter of the cylinder by 17 and dividing the result by 24, or by multiplying the diameter by 0.7071. This rule of thumb for calculating the width of the inscribed square piece is based on the fact that one side of the square inscribed in a circle 24 inches in diameter is 17 inches long.

The exact mathematical rule for determining the side of a square inscribed in a circle is to square the diameter, divide by 2, and extract the square root. The table following was computed by this method.

Practically the same results are obtained by the Seventeen-inch Rule, which is based on the fact that a 17-inch log will square 12 inches. According to the Seventeen-inch Rule the cubic contents of a log are obtained as follows: Multiply the square of the diameter of the log by its length and divide by the square of 17.

Round Timber Reduced to Square Timber.

Inscribed Square Rule.

Length in feet.	AVERAGE DIAMETER IN INCHES.								
	6	7	8	9	10	11	12	13	14
	CONTENTS IN CUBIC FEET.								
10....	1.3	1.7	2.2	2.8	3.5	4.2	5.0	5.9	6.8
12....	1.5	2.0	2.7	3.4	4.2	5.0	6.0	7.0	8.2
14....	1.8	2.4	3.1	3.9	4.9	5.9	7.0	8.2	9.5
16....	2.0	2.7	3.6	4.5	5.6	6.7	8.0	9.4	10.9
18....	2.3	3.0	4.0	5.1	6.2	7.6	9.0	10.5	12.3
20....	2.5	3.4	4.4	5.6	7.0	8.4	10.0	11.7	13.6
22....	2.8	3.7	4.9	6.2	7.6	9.2	11.0	12.9	15.0
24....	3.0	4.0	5.3	6.7	8.3	10.1	12.0	14.1	16.3
26....	3.3	4.4	5.8	7.3	9.0	11.0	13.0	15.3	17.7
28....	3.5	4.7	6.2	7.9	9.7	11.8	14.0	16.4	19.1
30....	3.8	5.0	6.7	8.4	10.4	12.6	15.0	17.6	20.4
32....	4.0	5.4	7.1	9.0	11.1	13.4	16.0	18.8	21.8
34....	4.3	5.7	7.5	9.6	11.8	14.3	17.0	19.9	23.2
36....	4.5	6.0	8.0	10.1	12.5	15.1	18.0	20.9	24.5
38....	4.8	6.4	8.4	10.7	13.2	16.0	19.0	22.3	25.9
40....	5.0	6.7	8.9	11.2	13.9	16.8	20.0	23.4	27.2
42....	5.3	7.1	9.3	11.8	14.6	17.6	21.0	24.6	28.6
44....	5.5	7.4	9.8	12.4	15.3	18.5	22.0	25.8	30.0
46....	5.8	7.7	10.2	12.9	16.0	19.3	23.0	27.0	31.3
48....	6.0	8.1	10.7	13.5	16.6	20.2	24.0	28.1	32.7
50....	6.3	8.4	11.1	14.1	17.4	21.0	25.0	29.3	34.1
52....	6.5	8.7	11.5	14.6	18.0	21.8	26.0	30.5	35.4
54....	6.8	9.1	12.0	15.2	18.7	22.7	27.0	31.6	36.8
56....	7.0	9.4	12.4	15.7	19.4	23.5	28.0	32.8	38.1
58....	7.3	9.7	12.9	16.3	20.1	24.4	29.0	34.1	39.5
60....	7.5	10.1	13.3	16.9	20.8	25.2	30.0	35.2	40.9
62....	7.8	10.4	13.8	17.4	21.5	26.0	31.0	36.3	42.2
64....	8.0	10.8	14.2	18.0	22.2	26.9	32.0	37.5	43.6
66....	8.3	11.1	14.7	18.5	22.9	27.7	33.0	38.7	44.9
68....	8.5	11.4	15.1	19.1	23.6	28.6	34.0	39.9	46.3
70....	8.8	11.8	15.5	19.7	24.3	29.4	35.0	41.0	47.7
72....	9.0	12.1	16.0	20.2	25.0	30.2	36.0	42.2	49.0
74....	9.3	12.4	16.4	20.8	25.7	31.1	37.0	43.4	50.4
76....	9.5	12.8	16.9	21.4	26.4	31.9	38.0	44.5	51.8

Round Timber Reduced to Square Timber—Continued.

Inscribed Square Rule—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.							
	15	16	17	18	19	20	21	22
	CONTENTS IN CUBIC FEET.							
10....	7.3	8.9	10.0	11.3	12.5	13.9	15.3	16.8
12....	8.8	10.7	12.0	13.5	15.0	16.7	18.4	20.1
14....	10.2	12.4	14.1	15.8	17.5	19.4	21.4	23.5
16....	11.7	14.2	16.1	18.0	20.0	22.2	24.5	26.9
18....	13.2	16.0	18.1	20.3	22.3	25.0	27.6	30.2
20....	14.6	17.8	20.1	22.5	25.1	27.8	30.6	33.6
22....	16.1	19.5	22.1	24.8	27.6	30.1	33.7	37.0
24....	17.5	21.3	24.1	27.0	30.1	33.3	36.7	40.3
26....	19.0	23.1	26.1	29.3	32.6	36.1	39.8	43.7
28....	20.5	24.9	28.1	31.5	35.1	38.9	42.9	47.0
30....	22.0	26.6	30.1	33.8	37.6	41.7	45.9	50.4
32....	23.4	28.4	32.1	36.0	40.1	44.4	49.0	53.8
34....	24.9	30.2	34.1	38.3	42.6	47.2	52.1	57.1
36....	26.3	32.0	36.1	40.2	45.1	50.0	55.1	60.5
38....	27.8	33.7	38.2	42.8	47.6	52.8	58.2	63.8
40....	29.2	35.6	40.2	45.0	50.1	55.6	61.2	67.2
42....	30.7	37.3	42.2	47.3	52.6	58.3	64.3	70.6
44....	32.2	39.1	44.2	49.5	55.1	61.1	67.4	73.9
46....	33.6	40.8	46.2	51.8	57.6	63.9	70.4	77.3
48....	35.1	42.6	48.2	54.0	60.1	66.7	73.5	80.6
50....	36.6	44.4	50.2	56.3	62.7	69.5	76.6	84.0
52....	38.0	46.2	52.2	58.5	65.2	72.2	79.6	87.4
54....	39.5	48.0	54.2	60.8	67.7	75.0	82.7	90.7
56....	41.0	49.7	56.2	63.0	70.2	77.8	85.7	94.1
58....	42.4	51.5	58.2	65.3	72.7	80.6	88.8	97.4
60....	43.9	53.3	60.2	67.5	75.2	83.3	91.9	100.8
62....	45.3	55.1	62.4	69.8	77.7	86.1	94.9	104.2
64....	46.8	56.8	64.3	72.0	80.2	89.9	98.0	107.5
66....	48.2	58.6	66.3	74.3	82.7	91.7	101.0	110.9
68....	49.7	60.4	68.3	76.5	85.2	94.5	104.1	114.2
70....	51.2	62.2	70.3	78.8	87.7	97.2	107.2	117.6
72....	52.6	63.9	72.3	81.0	90.2	100.0	110.2	121.0
74....	54.1	65.7	74.3	83.3	92.7	102.8	113.3	124.3
76....	55.6	67.5	76.3	85.5	95.2	105.6	116.4	127.7

Round Timber Reduced to Square Timber—Continued.

Inscribed Square Rule—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.						
	23	24	25	26	27	28	29
	CONTENTS IN CUBIC FEET.						
10....	18.4	20.0	21.7	23.5	25.3	27.2	29.2
12....	22.0	24.0	26.0	28.2	30.4	32.7	35.1
14....	25.7	28.0	30.4	32.9	35.4	38.1	40.9
16....	29.4	32.0	34.7	37.6	40.5	43.5	48.7
18....	33.1	36.0	39.0	42.3	45.6	49.0	52.6
20....	36.7	40.0	43.4	47.0	50.6	54.4	58.4
22....	40.4	44.0	47.7	51.7	55.7	59.9	64.3
24....	44.1	48.0	52.1	56.4	60.7	65.3	70.1
26....	47.8	52.0	56.4	61.1	65.8	70.7	75.9
28....	51.4	56.0	60.7	65.8	70.9	76.2	81.8
30....	55.1	60.0	65.1	70.5	75.9	81.6	87.6
32....	58.8	64.0	69.4	75.2	81.0	87.1	93.5
34....	62.5	68.0	73.7	79.9	86.1	92.5	99.3
36....	66.1	72.0	78.1	84.6	91.1	98.0	105.2
38....	69.8	76.0	82.4	89.3	96.2	103.4	111.0
40....	73.5	80.0	86.8	94.0	101.2	108.8	116.8
42....	77.2	84.0	91.1	98.7	106.3	114.3	122.7
44....	80.8	88.0	95.4	103.4	111.4	119.7	128.5
46....	84.5	92.0	99.8	108.1	116.4	125.2	134.4
48....	88.2	96.0	104.1	112.8	121.5	130.6	140.2
50....	91.9	100.0	108.5	117.5	126.6	136.1	146.1
52....	95.5	104.0	112.8	122.1	131.6	141.5	151.9
54....	99.2	108.0	117.1	126.8	136.7	146.9	157.7
56....	102.9	112.0	121.5	131.5	141.7	152.4	163.6
58....	106.5	116.0	125.8	136.2	146.8	157.8	169.4
60....	110.2	120.0	130.1	140.9	151.9	163.3	175.3
62....	113.8	124.0	134.5	145.6	156.9	168.7	181.1
64....	117.6	128.0	138.8	150.3	162.0	174.1	186.9
66....	121.2	132.0	143.2	155.0	167.0	179.6	192.8
68....	124.9	136.0	147.5	159.7	172.1	185.0	198.6
70....	128.6	140.0	151.8	164.4	177.2	190.5	204.5
72....	132.3	144.0	156.2	169.1	182.2	195.9	210.3
74....	135.9	148.0	160.5	173.8	187.3	201.4	216.2
76....	139.6	152.0	164.8	178.5	192.4	206.8	222.0

Round Timber Reduced to Square Timber—Continued.

Inscribed Square Rule—Continued.

Length in feet.	AVERAGE DIAMETER IN INCHES.						
	30	31	32	33	34	35	36
	CONTENTS IN CUBIC FEET.						
10....	31.8	33.4	35.5	37.8	40.1	42.5	45.0
12....	38.1	40.0	42.6	45.4	48.2	51.0	54.0
14....	44.5	46.7	49.8	52.9	56.2	59.6	63.0
16....	50.8	53.4	56.9	60.5	64.2	68.1	72.0
18....	57.2	60.0	64.0	68.1	72.2	76.6	81.0
20....	63.5	66.7	71.1	75.6	80.3	85.1	90.0
22....	69.9	73.4	78.2	83.2	88.3	93.6	99.0
24....	76.2	80.1	85.3	90.8	96.3	102.1	108.0
26....	82.6	86.7	92.4	98.3	104.3	110.6	117.0
28....	88.9	93.4	99.5	105.9	112.4	119.1	126.0
30....	95.3	100.0	106.6	113.5	120.4	127.6	135.0
32....	101.6	106.8	113.7	121.0	128.4	136.1	144.0
34....	108.0	113.4	120.8	128.6	136.4	144.6	153.0
36....	114.3	120.1	127.9	136.2	144.5	153.1	162.0
38....	120.7	126.7	135.1	143.7	152.5	161.7	171.0
40....	127.0	133.4	142.2	151.3	160.5	170.2	180.0
42....	133.4	140.1	149.3	158.8	168.5	178.7	189.0
44....	139.7	146.8	156.4	166.4	176.6	187.2	198.0
46....	146.1	153.5	163.5	174.0	184.6	195.7	207.0
48....	152.4	160.1	170.6	181.5	192.6	204.2	216.0
50....	158.8	166.8	177.7	189.1	200.7	212.7	225.0
52....	165.1	173.5	184.8	196.7	208.7	221.2	234.0
54....	171.2	180.1	191.9	204.2	216.7	229.7	243.0
56....	177.8	186.8	199.0	211.8	224.7	238.2	252.0
58....	184.2	193.5	206.1	219.4	232.8	246.7	261.0
60....	190.5	200.2	213.2	226.9	240.8	255.2	270.0
62....	196.9	206.8	220.3	234.5	248.8	263.7	279.0
64....	203.2	213.5	227.5	242.0	256.8	272.3	288.0
66....	209.6	220.2	234.6	249.6	264.9	280.8	297.0
68....	215.9	226.8	241.7	257.2	272.9	289.3	306.0
70....	222.3	233.5	248.8	264.7	280.9	297.8	315.0
72....	228.6	240.2	255.9	272.3	288.9	306.3	324.0
74....	235.0	246.9	263.0	279.9	297.0	314.8	333.0
76....	241.3	253.5	270.1	287.4	305.0	323.3	342.0

Conversion of Cubic Measure into Board Measure.

The ratio between the number of board feet and cubic feet in logs depends on the species of tree, on the size of the logs, and on the method of scaling. The ratio for standing trees depends, further, on the minimum size of the merchantable log. For example, the ratio would be different, if 4 logs were cut from a tree, from the result if only 3 logs were taken. Satisfactory figures can, therefore, be obtained only by comparing the scales of logs and trees actually measured in the woods. Such tables are now being prepared by the Bureau of Forestry for different species in different regions. They will appear in a subsequent edition of the Handbook.

MEASUREMENT OF SAWED LUMBER.

BOARD MEASURE.

The superficial measure of inch boards is obtained by multiplying the width in inches by the length in feet and dividing by 12. Tables showing the contents of boards of different widths and lengths are published in practically every lumberman's ready reckoner, of which there are many on the market.

The contents of boards thicker than 1 inch are obtained by multiplying the width in inches by the thickness in inches and the product by the length in feet, and then dividing by 12.

MEASUREMENT OF STANDING TREES.

VOLUME TABLES.

Volume tables show the contents of standing trees in board feet, cords, standards, and cubic feet. They are used to aid cruisers in estimating the amount of standing timber.

In estimating timber it is the custom to first determine the number of merchantable trees on a given tract by actual count of every tree on the whole area, or by calculating the average number of trees per acre and then multiplying this result by the number of acres. Sometimes the trees are simply counted, but often their diameters are also measured or estimated. After determining the number of trees on a given tract or on an acre, the amount of timber is obtained by multiplying the contents of an average

tree by the number of trees. Or, if the diameters are measured, the contents of an average tree of each diameter is multiplied by the number of trees having that diameter. This calculation is made for every diameter measured and the results are added together. The total result is the amount of standing timber on the tract or acre.

Sometimes cruisers estimate the contents of each tree as it is counted in order to avoid computations. For example, the trees are noted which contain 100 board feet, those containing 200 board feet, 300, 400, 500 board feet, etc. This method is not used except where the timber is large.

Timber cruisers usually know from experience what an average tree, or an average tree of any given diameter, will yield in the region in which they are working. This knowledge is obtained by measuring a large number of felled trees. If a cruiser undertakes to work in a country unfamiliar to him, his first task is to determine the contents of the average merchantable tree or of average trees of different diameters.

For some kinds of work, especially where great accuracy is necessary, it is desirable to know the contents of trees of different heights as well as of different diameters. In this case the cruiser measures not only the diameters of the trees which he counts, but also determines their average heights. The heights are measured by means of special instruments described on page 135. The details of this method of estimating are fully explained on page 126.

Volume Tables for Trees of Different Diameters.

Volume tables which show the average contents of trees of different diameters are constructed in the following way:

A large number of felled trees are measured and the contents of each determined. The contents of all the trees of each diameter are then averaged together. Thus an average is obtained of the contents of all 10-inch trees, of all 11-inch trees, etc. These averages are grouped together in the form of a table. The value of the table is proportionate to the number of trees measured.

The tables which follow have been made up in the manner described above. They have been constructed in each case from measurements taken in comparatively restricted regions, and no claim is made for their accuracy when used elsewhere.

Volume Table for Adirondack White Pine.[a]

Diameter, breasthigh (inches).	Contents in standards.[b]	Diameter, breasthigh (inches).	Contents in standards.[b]	Diameter, breasthigh (inches).	Contents in standards.[b]
10	0.3	24	3.9	38	11.5
11	.5	25	4.3	39	12.3
12	.7	26	4.6	40	13.0
13	.9	27	5.1	41	13.9
14	1.1	28	5.5	42	14.7
15	1.4	29	6.0	43	15.7
16	1.6	30	6.5	44	16.6
17	1.9	31	7.1	45	17.8
18	2.1	32	7.6	46	18.9
19	2.4	33	8.2	47	20.1
20	2.6	34	8.8	48	21.3
21	2.9	35	9.5	49	22.6
22	3.2	36	10.1	50	23.9
23	3.6	37	10.8		

[a] From measurements taken near Brandon, N. Y., by T. H. Sherrard.
[b] By the 19-inch Standard Rule.

Volume Table for Wisconsin White Pine.[a]

THREE-LOG TREES.

Diameter, breasthigh (inches).	Contents in board feet.	Number of logs to the thousand.
20	300	10.00
21	340	8.85
22	380	7.88
23	425	7.04
24	470	6.05
25	520	5.78
26	570	5.26
27	625	4.80
28	680	4.44
29	740	4.04
30	800	3.70

FOUR-LOG TREES.

20	340	11.77
21	400	10.00
22	460	8.7
23	520	7.7
24	585	6.85
25	650	6.17
26	720	5.55
27	790	5.05
28	860	4.65
29	930	4.31
30	1,000	4.00
31	1,070	3.73
32	1,140	3.5
33	1,215	3.29
34	1,290	3.09
35	1,370	2.92
36	1,450	2.76
37	1,535	2.6
38	1,620	2.47
39	1,710	2.34
40	1,800	2.22

FIVE-LOG TREES.

20	420	11.9

FIVE-LOG TREES—Continued.

Diameter, breasthigh (inches).	Contents in board feet.	Number of logs to the thousand.
21	480	10.41
22	540	9.26
23	605	8.26
24	670	7.46
25	740	6.75
26	815	6.13
27	890	5.61
28	970	5.15
29	1,055	4.74
30	1,145	4.37
31	1,240	4.11
32	1,340	3.73
33	1,445	3.46
34	1,550	3.22
35	1,660	3.00
36	1,770	2.82
37	1,885	2.65
38	2,000	2.5
39	2,120	2.34
40	2,240	2.23
41	2,365	2.11
42	2,495	2.00
43	2,630	1.90
44	2,770	1.80
45	2,915	1.71
46	3,065	1.63
47	3,220	1.55
48	3,380	1.48
49	3,545	1.41
50	3,715	1.35
51	3,895	1.28
52	4,085	1.22
53	4,285	1.16
54	4,485	1.11
55	4,715	1.06
56	4,945	1.00
57	5,185	.095
58	5,440	.091
59	5,710	.087
60	6,000	.083

[a] This table was devised and is used by H. P. Elsemore.

Volume Table for Pennsylvania Hemlock.[a]

Diameter, breasthigh (inches).	Contents in board feet.[b]	Diameter, breasthigh (inches).	Contents in board feet.[b]	Diameter, breasthigh (inches).	Contents in board feet.[b]
10	45	17	240	24	490
11	65	18	275	25	530
12	90	19	308	26	575
13	118	20	340	27	622
14	143	21	372	28	685
15	175	22	410		
16	205	23	450		

[a] From measurements of 160 trees taken in Pennsylvania by E. M. Griffith.
[b] By the Scribner Rule.

Volume Table for Adirondack Hemlock.[a]

Diameter, breasthigh (inches).	Contents in standards.[b]	Diameter, breasthigh (inches).	Contents in standards.[b]	Diameter, breasthigh (inches).	Contents in standards.[b]
9	0.16	17	1.74	25	4.33
10	.33	18	1.99	26	4.77
11	.50	19	2.26	27	5.23
12	.68	20	2.55	28	5.70
13	.87	21	2.87	29	6.20
14	1.07	22	3.21	30	6.72
15	1.28	23	3.56	31	7.26
16	1.50	24	3.93		

[a] From measurements of 200 trees obtained near Brandreth Lake, N. Y., by R. S. Hosmer.
[b] By the 19-inch Standard Rule.

Volume Table for Adirondack Spruce.[a]

Diameter breasthigh (inches).	Contents in standards.[b]	Diameter breasthigh (inches).	Contents in standards.[b]	Diameter breasthigh (inches).	Contents in standards.[b]
6	0.15	15	1.15	24	3.60
7	.20	16	1.35	25	3.98
8	.26	17	1.56	26	4.40
9	.33	18	1.79	27	4.86
10	.42	19	2.03	28	5.36
11	.52	20	2.29	29	5.90
12	.65	21	2.58	30	6.48
13	.80	22	2.89	31	
14	.97	23	3.23		

[a] From measurements of 1,100 trees obtained by R. S. Hosmer, near Brandreth Lake, N. Y.
[b] By the 19-inch Standard Rule

Volume Table for Adirondack Spruce.[a]

Diameter breasthigh (inches).	Contents in standards.[b]	Diameter breasthigh (inches).	Contents in standards.[b]	Diameter breasthigh (inches).	Contents in standards.[b]
8	0.24	15	1.00	22	2.38
9	.31	16	1.17	23	2.61
10	.38	17	1.36	24	2.86
11	.46	18	1.54	25	3.13
12	.57	19	1.73	26	3.39
13	.70	20	1.93	27	3.64
14	.84	21	2.15	28	3.90

[a] From measurements obtained near Brandon, N. Y., by T. H. Sherrard.
[b] By the 19-inch Standard Rule.

Volume Table for Adirondack Hardwoods.[a]

Diameter breasthigh (inches).	Contents of standing trees in board feet.			
	Yellow Birch.	Beech.	Basswood.	Sugar Maple.
15	121	128	127	126
16	134	141	146	152
17	152	166	175	180
18	180	204	214	210
19	211	252	250	242
20	249	306	287	276
21	285	362	324	310
22	322	420	358	345
23	359	479	391	382
24	398	543	420	424
25	435	608	446	474
26	474	678	470	534
27	518	.....	496	596
28	564	.....	519	670
29	608	.....	543	758
30	658	.....	562	.....
31	704	.....	580	.....
32	757	.....	596	.....
33	810	.....	612	.....
34	866	.....	.....	.....

[a] From measurements of about 350 trees obtained near St. Regis Falls, N. Y., by Overton W. Price.
[b] By the Scribner Rule.

Volume Table for Adirondack Balsam Fir.[a]

Diameter breasthigh (inches).	Contents in standards.[b]	Diameter breasthigh (inches).	Contents in standards.[b]	Diameter breasthigh (inches).	Contents in standards.[b]
6	0.06	10	0.38	14	1.00
7	.14	11	.50	15	1.21
8	.20	12	.65	16	1.43
9	.28	13	.82	17	1.66

[a] From measurements obtained near Brandon, N. Y., by T. H. Sherrard.
[b] By the 19-inch Standard Rule.

Volume Table for Adirondack Soft Maple.[a]

Diameter breasthigh (inches).	Contents in board feet.[b]	Diameter breasthigh (inches).	Contents in board feet.[b]	Diameter breasthigh (inches).	Contents in board feet.[b]
15	113	20	248	25	427
16	137	21	279	26	481
17	162	22	311	27	536
18	189	23	344	28	603
19	218	24	382	29	682

[a] From measurements obtained near Brandon, N. Y., by T. H. Sherrard.
[b] By the 19-inch Standard Rule.

Volume Table for Adirondack Cedar.[a]

Diameter breasthigh (inches).	Contents in standards.[b]	Diameter breasthigh (inches).	Contents in standards.[b]	Diameter breasthigh (inches).	Contents in standards.[b]
8	0.18	15	0.75	22	1.79
9	.23	16	.88	23	1.96
10	.29	17	1.02	24	2.15
11	.35	18	1.16	25	2.35
12	.43	19	1.30	26	2.54
13	.53	20	1.45	27	2.73
14	.63	21	1.61	28	2.93

[a] From measurements obtained near Brandon, N. Y., by T. H. Sherrard.
[b] By the 19-inch Standard Rule.

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Volume Table for Shortleaf and Loblolly Pines.[a]

Diameter breasthigh (inches).	Contents in board feet.[b]	Diameter breasthigh (inches).	Contents in board feet.[b]	Diameter breasthigh (inches).	Contents in board feet.[b]
12	60	22	600	32	1,680
13	70	23	690	33	1,800
14	90	24	780	34	1,930
15	120	25	880	35	2,060
16	180	26	980	36	2,200
17	240	27	1,080	37	2,340
18	300	28	1,190	38	2,490
19	370	29	1,300	39	2,630
20	440	30	1,420	40	2,780
21	520	31	1,550		

[a] From measurements of 325 trees obtained near Pine Bluff, Ark., by F. E. Olmsted. [b] By the Doyle Rule.

Volume Table for Missouri Hardwoods.[a]

Diameter breasthigh (inches).	Contents of trees in board feet.[b]								
	Ash.	Elm.	Maple.	Cypress.	Gum.	Oak.	Hackberry.	Hickory.	Cottonwood.
10	118	78	73	89	91	62	65	84	.....
11	148	100	91	116	126	83	85	110	.....
12	184	122	112	147	166	109	108	138	.....
13	220	148	135	184	207	135	135	169	.....
14	265	176	161	231	253	166	167	205	.....
15	309	208	190	280	300	205	203	240	.....
16	359	250	222	336	347	245	244	279	.....
17	405	289	257	399	399	295	289	321	.....
18	462	332	295	468	454	346	332	367	.....
19	523	379	329	546	506	401	388	409	.....
20	590	430	373	632	569	462	450	453	.....
21	662	.....	427	715	637	519	518	500	.....
22	726	.....	473	817	699	591	593	559	.....
23	807	.....	529	928	776	658	.....	611	.....
24	893	.....	576	1,037	845	730	.....	666	.....
25	985	.....	639	1,153	931	792	.....	723	.....
26	.....	.....	706	1,277	1,007	871	.....	781	.....
27	.....	.....	778	1,309	1,085	940	.....	842	.....
28	.....	.....	854	1,551	1,185	1,011	.....	906	976
29	.....	.....	934	1,700	1,271	1,083	.....	990	1,083
30	.....	.....	1,020	1,840	1,360	1,160	.....	1,060	1,180
31	.....	.....	1,110	1,986	1,453	1,238	.....	.....	1,306
32	.....	.....	.....	2,139	1,548	.....	.....	.....	1,434

[a] From measurements obtained in southeastern Missouri by E. M. Griffith. [b] By the Doyle Rule.

Volume Table for Yellow Poplar.[a]

Diameter breasthigh (inches).	Contents in board feet.		
	Under good conditions of growth.	Under average conditions of growth.	Under poor conditions of growth.
18	82	60	.....
20	216	186	.....
22	370	340	280
24	584	520	465
26	838	744	.....
28	1,120	.....	.....

[a] From measurements of 20 trees obtained near Biltmore, N. C., by Dr. C. A. Schenck.

Volume Table for Western Yellow Pine.[a]

Diameter breast-high (inches).	Contents in board feet.[b]		Diameter breast-high (inches).	Contents in board feet.[b]	
	First growth.	Second growth.		First growth.	Second growth.
10	.....	47	18	294	.....
11	.....	73	19	350	.....
12	60	92	20	420	.....
13	88	118	21	500	.....
14	107	165	22	580	.....
15	148	208	23	660	.....
16	180	257	24	751	.....
17	242	308	25	840	.....

[a] From measurements of 299 trees obtained in the Black Hills by E. M. Griffith.

[b] By the Doyle Rule.

Volume Tables for Trees of Different Diameters and Heights.

In regions where the country is hilly or mountainous, trees of the same diameter vary considerably in height, owing to differences in situation, and there is a proportionate variation in their merchantable contents. In making rough estimates these variations in height are usually disregarded and the contents of trees of an average diameter is used. For accurate estimates, however, it is desirable to know the average contents of trees of different heights as well as of different diameters. The manner in which these estimates are made is described on page 126.

Very few volume tables have been made for heights and diameters. Those given in the following pages were made in connection with investigations carried on by the author in association with Mr. Gifford Pinchot, except the table for White Pine on page 111, which was prepared under the direction of Dr. B. E. Fernow, and the table for spruce on page 106, which was constructed by Mr. E. M. Griffith.

VOLUME TABLE FOR SPRUCE, IN STANDARDS.

The table which follows is based upon the measurement of 2,006 trees by the author at Santa Clara, N. Y. The table was constructed in the following way:

The contents of each tree in standards was first determined. The trees were then grouped together according to diameter and height, the diameter groups differing by 1 inch and the height groups by 5 feet. Thus all trees 10 inches in diameter and 35 feet high were grouped together, trees 10 inches in diameter and 40 feet high, trees 10 inches diameter and 45 feet high, etc. The average number of standards was then determined for each group of trees. When arranged in a table these results formed a very regular gradation for trees of different diameters and heights. There were, however, a few irregularities in the table which were rounded off.

Volume Table for Spruce, in Standards.[a]

Diameter, breasthigh (inches)	HEIGHT OF TREE IN FEET.															
	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	CONTENTS IN STANDARDS.[b]															
6	0.05	0.06	0.07	0.07	0.08	0.09	0.10	0.12	0.13	.....	.....	.....	.....	.....	.....	.....
7	.07	.09	.10	.11	.12	.14	.15	.17	.20	0.22	.....	.....	.....	.....	.....	.....
8	.10	.12	.13	.15	.17	.19	.21	.23	.26	.30	0.34	.....	.....	.....	.....	.....
9	.13	.15	.17	.19	.21	.24	.27	.30	.34	.38	.42	.....	.....	.....	.....	.....
10	.....	.17	.20	.23	.26	.30	.34	.38	.42	.46	.50	0.54	.....	.....	.....	.....
11	.....	.....	.22	.27	.31	.35	.40	.45	.50	.54	.58	.64	.....	.....	.....	.....
12	.....	.....	.24	.30	.35	.40	.46	.52	.58	.63	.68	.74	0.80	.....	.....	.....
13	.....	.....	.....	.34	.40	.46	.53	.60	.66	.73	.80	.87	.94	.....	.....	.....
14	.....	.....	.....	.38	.44	.51	.59	.67	.75	.83	.91	.99	1.07	.....	.....	.....
15	.....	.....	.....	.....	.48	.56	.66	.75	.84	.93	1.02	1.11	1.22	.....	.....	.....
16	.....	.....	.....	.....	.....	.62	.72	.82	.92	1.03	1.13	1.24	1.38	1.52	.....	.....
17	.....	.....	.....	.....	.....	.....	.79	.89	1.01	1.13	1.25	1.38	1.52	1.65	.....	.....
18	.....	.....	.....	.....	.....	.....	.....	.96	1.09	1.23	1.37	1.52	1.67	1.81	1.95	.....
19	.....	.....	.....	.....	.....	.....	.....	.....	1.17	1.34	1.50	1.66	1.82	1.98	2.14	.....
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.47	1.63	1.80	1.97	2.15	2.33	2.51
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.76	1.95	2.14	2.33	2.52	2.71
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.90	2.10	2.31	2.51	2.71	2.91
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.25	2.48	2.70	2.91	3.11
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.65	2.89	3.12	3.32

[a] From The Adirondack Spruce, by Gifford Pinchot.

[b] By the 19-inch Standard Rule.

VOLUME TABLE FOR SPRUCE, IN BOARD FEET.

The volume table for spruce, in board feet, was based on the volume table for spruce, in standards. From the measurement of about 300 trees the relation between board feet and standards for trees of different diameters was determined. This relationship is shown in the following table:

Diameter, breasthigh (inches).	Board feet in 1 standard.	Diameter, breasthigh (inches).	Board feet in 1 standard.	Diameter, breasthigh (inches).	Board feet in 1 standard.
9	141	15	164	20	180
10	146	16	168	21	183
11	150	17	171	22	186
12	154	18	174	23	189
13	158	19	177	24	192
14	161				

The table of standards given on page 101 was then converted into a table for board feet by multiplying the number of standards for trees of each diameter by the factor corresponding to the diameter in the table just given.

Volume Table for Spruce, in Board Feet.[a]

Diameter, breasthigh (inches).	HEIGHT OF TREE IN FEET.															
	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	CONTENTS IN BOARD FEET.[b]															
9	18	21	24	27	30	34	38	42	48	53	59					
10		25	29	34	38	44	50	55	61	67	73					
11			34	41	47	53	61	68	74	81	87	93				
12			39	48	56	63	72	81	88	97	105	114				
13					63	73	84	94	104	115	126	137	148			
14					71	82	96	108	121	134	147	160	172			
15					79	92	108	122	138	153	167	182	200			
16						102	121	137	155	173	190	208	232	255		
17							135	152	173	193	214	236	260	282		
18								167	190	214	238	264	290	315	339	
19									207	237	266	294	322	350	379	
20										265	294	324	355	387	419	452
21											322	357	392	426	461	496
22											353	390	430	467	504	541
23												425	469	510	550	588
24													509	555	600	637

[a] From The Adirondack Spruce, by Gifford Pinchot.

[b] By the Scribner Rule.

VOLUME TABLE FOR SPRUCE, IN MERCHANTABLE CUBIC FEET.

This table was constructed for the purpose of computing the number of cords of pulpwood in trees of different diameters and heights. It was constructed in the same manner as the table for standards, and the same trees were used for the computations. The merchantable cubic feet represent the amount of wood actually available for pulp in each tree.

Volume Table for Spruce, in Cubic Feet.[a]

Diameter, breasthigh (inches).	HEIGHT OF TREE IN FEET.								
	25	30	35	40	45	50	55	60	65
	MERCHANTABLE CUBIC FEET OF PULP WOOD.								
5	1.1	1.2	1.3	1.4	1.5	1.6	1.7	.....	.....
6	1.6	1.8	2.1	2.4	2.8	3.2	3.6	4.0	.....
7	2.1	2.5	3.0	3.6	4.2	4.8	5.4	6.0	6.6
8	.....	3.2	3.9	4.8	5.6	6.5	7.3	8.0	8.8
9	.....	3.8	4.9	5.9	6.9	8.0	9.0	9.9	11.0
10	.....	.....	6.0	7.2	8.4	9.6	10.9	12.2	13.5
11	.....	.....	7.1	8.6	10.1	11.6	13.1	14.6	16.1
12	.....	.....	.....	10.0	11.7	13.5	15.2	17.0	18.8
13	.....	.....	.....	.....	13.4	15.4	17.3	19.4	21.5
14	.....	.....	.....	.....	15.1	17.3	19.5	21.8	24.2

[a] From The Adirondack Spruce, by Gifford Pinchot.

VOLUME TABLE FOR SPRUCE, IN CORDS.

This table is based on the volume table for spruce, in merchantable cubic feet. The table for cubic feet was converted into the table for cords in the following way: Each number of cubic feet was divided by 128, and this result divided by 0.7, according to the method described on page 68.

Volume Table for Spruce, in Cords.[a]

Diameter breast-high (inches).	HEIGHT OF TREE IN FEET.								
	25	30	35	40	45	50	55	60	65
	MERCHANTABLE CORDS OF PULPWOOD.								
5	0.012	0.013	0.014	0.015	0.017	0.018	0.019	.....	.....
6	.019	.020	.023	.026	.030	.035	.040	0.044	.....
7	.023	.028	.033	.040	.047	.054	.060	.067	0.074
8	.....	.035	.043	.054	.062	.072	.081	.089	.098
9	.....	.042	.055	.066	.078	.089	.100	.110	.123
10	.....	.....	.067	.080	.094	.107	.122	.136	.150
11	.....	.....	.079	.096	.112	.128	.145	.163	.180
12	.....	.....	.....	.111	.131	.150	.168	.190	.210
13	.....	.....	.....	.....	.149	.171	.193	.215	.240
14	.....	.....	.....	.....	.168	.193	.217	.242	.270

[a] From The Adirondack Spruce, by Gifford Pinchot.

VOLUME TABLE FOR NEW HAMPSHIRE SPRUCE.

This table was constructed from the measurement of 454 trees at Waterville, N. H., under the direction of Mr. E. M. Griffith. The table was made in the same way as the volume table for standards given on page 101.

Volume Table for New Hampshire Spruce.

Diameter breast-high (inches.)	HEIGHT OF TREE IN FEET.												
	35	40	45	50	55	60	65	70	75	80	85	90	95
	CONTENTS IN BOARD FEET BY THE BLODGETT RULE.												
10..	42	49	55	63	72	79	87	95	104	112	....	....	....
11..	49	59	67	76	87	97	105	115	125	136	....	....	....
12..	56	69	80	90	102	115	125	137	149	162	....	....	....
13..	64	78	90	104	118	132	145	159	174	188	202	....	....
14..	....	87	101	116	132	148	164	180	198	214	232	....	....
15..	....	....	....	130	147	164	184	202	222	242	262	....	....
16..	....	....	....	142	162	182	204	226	250	272	298	324	....
17..	....	....	....	....	177	202	226	252	280	308	336	366	....
18..	....	....	....	....	....	219	249	280	312	345	379	411	....
19..	....	....	....	....	....	....	274	310	346	384	422	458	494
20..	....	....	....	....	....	....	....	340	380	422	463	504	546

VOLUME TABLE FOR WHITE PINE, IN CUBIC FEET.[a]

The volume table for white pine, in cubic feet, which follows, is based on the measurement of about 100 felled trees. Instead of constructing the table by the method described on page 100, the method of form factors was used.

A form factor is the relation between the volume of a tree and the volume of a geometrical solid of the same diameter and height as the tree. It represents the taper of the tree. In the present case the solid chosen is a cylinder, and the form factor is a number by which the volume of a cylinder, which has the same base and height as the tree, must be multiplied in order to obtain the volume of the tree.

If a is the area of the base, or the area of the circle corresponding to the diameter, the so-called basal area; h the height of the tree; V the volume of the tree; f the form factor; then—

$$V = a \times h \times f; \text{ or } f = \frac{V}{a \times h}$$

This formula was used to calculate the form factor of each tree. First the cubic contents was determined, the stem alone, with the

[a] From The White Pine, by Pinchot and Graves.

bark on, being taken into account. This value was then divided by the product of the height of the tree in feet and the number of square feet in the circle corresponding to the diameter of the tree. The form factors of trees of the same diameters were then averaged as shown in the second column of the table on page 108. The volume table was then constructed by these form factors for trees of different diameters and heights in the following way: The area of the circle corresponding to the diameter (10) was multiplied by the height (65) and the product multiplied by the form factor for 10 inches, namely, 0.508. The result was 18 cubic feet. The same calculation was made for the heights 70, 75, 80, and 85 feet, using the same area and form factor. Then the volumes for 11-inch trees were calculated in the same manner for different heights, using the form factor 0.512. The same method was used for other diameters and heights until the table shown on page 108 was completed.

Volume Table for White Pine over 160 Years Old.

Diameter breasthigh (inches).	Stem form factor.	HEIGHT OF TREE IN FEET.																	
		65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155
		CONTENTS OF STEM WITH BARK, IN CUBIC FEET.																		
10	0.508	18.0	19.4	20.8	22.1	23.5														
12	.512	26.1	28.1	30.1	32.1	34.2	36.2	38.2												
14	.509	35.4	38.1	40.8	43.5	46.2	49.0	51.7	54.4											
16	.501		49.0	52.5	56.0	59.4	62.9	66.4	69.9	73.4	76.9									
18	.491			65.1	69.4	73.7	78.1	82.4	86.8	91.1	95.4									
20	.481				84.0	89.2	94.5	99.7	105.0	110.2	115.4	120.7								
22	.471				99.5	105.7	111.9	118.1	124.3	130.6	136.8	143.0	149.2							
24	.461					123.1	130.4	137.6	144.8	152.1	159.3	166.6	173.8	181.1						
26	.452						150.0	158.3	166.6	175.0	183.3	191.7	200.0	208.3	216.6	225.0				
28	.445							180.8	190.3	199.8	209.3	218.8	228.3	237.9	247.4	256.9	266.4			
30	.439								215.5	226.3	237.1	247.8	258.6	269.4	280.2	290.9	301.7			
32	.434										266.6	278.7	290.9	303.0	315.1	327.2	339.3	351.5		
34	.429											311.1	324.6	338.1	351.6	365.2	378.7	392.2		
36	.425												360.5	375.5	390.6	405.6	420.6	435.6	450.6	
38	.422													415.6	432.1	448.7	465.3	481.9	498.5	
40	.420														476.5	494.8	513.2	531.5	549.8	568.1

VOLUME TABLE FOR WHITE PINE, IN BOARD FEET.[a]

Inasmuch as 1 board foot is a board 1 foot long, 1 foot wide, and 1 inch or one-twelfth of a foot thick, 1 cubic foot must be equal to 12 board feet of solid wood.

The actual measurements of the trees in board feet according to the Doyle Rule were thus reduced to cubic feet by dividing by 12, and the relation between the figures obtained and the total volumes of wood and bark given in the table on page 108 were computed. The result was as follows:

Diameter, breasthigh (inches).	Board feet reduced to cubic feet in percentage of the total volume of wood and bark.	Diameter, breasthigh (inches).	Board feet reduced to cubic feet in percentage of the total volume of wood and bark.	Diameter, breasthigh (inches).	Board feet reduced to cubic feet in percentage of the total volume of wood and bark.
10	12	22	35	34	46
12	18	24	38	36	47
14	23	26	40	38	48
16	26	28	42	40	49
18	29	30	44		
20	32	32	45		

The values in the table on page 108 were multiplied by the percentages just given, and the results were multiplied by 12, in order to convert them back to board feet.

[a] From The White Pine, by Pinchot and Graves.

Volume Table for White Pine over 100 Years Old.

HEIGHT OF TREE IN FEET.

Diameter, breast-high (inches)	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155
BOARD FEET BY THE DOYLE RULE.																			
10	26	28	30	32	34														
12	56	61	65	69	74	78	83												
14	98	105	113	120	128	135	143	150											
16		153	164	175	185	196	207	218	229	240									
18			227	242	256	272	287	302	317	332									
20				323	343	363	383	403	423	443	463								
22				418	444	470	496	522	549	575	601	627							
24					561	595	627	660	694	726	760	793	826						
26						720	760	800	840	880	920	960	1,000	1,040	1,080				
28							911	959	1,007	1,055	1,103	1,151	1,199	1,247	1,295	1,343			
30								1,138	1,195	1,252	1,308	1,365	1,422	1,479	1,536	1,593			
32										1,440	1,505	1,571	1,636	1,702	1,767	1,832	2,018		
34											1,717	1,792	1,866	1,941	2,016	2,090	2,165		
36												2,033	2,118	2,203	2,288	2,372	2,457	2,541	
38													2,394	2,490	2,585	2,680	2,776	2,871	
40														2,802	2,909	3,018	3,125	3,233	3,340

VOLUME TABLE FOR WHITE PINE, IN CUBIC FEET.

The volume table for White Pine which follows was constructed in the manner described on page 106. It is based on the measurement of 700 trees from different regions of the country.

Volume Table for White Pine.[a]

CUBIC CONTENTS OF STEMS, INCLUDING BARK.

Diameter, breasthigh (inches).	HEIGHT IN FEET.							
	35	40	45	50	55	60	65	70
	CUBIC FEET.							
5	2.4	2.8	3.1					
6		3.9	4.5	5.0	5.5			
7		5.4	6.0	6.7	7.4	8.0		
8		6.9	7.8	8.7	9.5	10.4		
9		8.7	9.8	10.9	12.0	13.0	14.1	
10		10.7	12.0	13.3	14.6	15.9	17.3	18.6
11		12.8	14.4	16.0	17.6	19.2	20.8	22.4
12			17.0	18.9	20.8	22.7	24.6	26.5
13			19.8	22.0	24.2	26.4	28.6	30.8
14			22.8	25.3	27.8	30.3	32.8	35.3
15					31.7	34.6	37.5	40.4
16						38.9	42.1	45.3
17						43.4	47.0	50.6
18							51.9	55.9
19							56.9	61.3
20								
21								
22								
23								
24								
25								
26								
27								
28								

[a] From The White Pine, Bull. 22, Division of Forestry.

Volume Table for White Pine—Continued.

CUBIC CONTENTS OF STEMS, INCLUDING BARK—Continued.

Diameter, breast high (inches).	HEIGHT IN FEET.							
	75	80	85	90	95	100	105	110
	CUBIC FEET.							
5								
6								
7								
8								
9								
10								
11	24.0	25.6	27.2	28.8	30.4	32.0		
12	28.4	30.3	32.2	34.1	36.0	37.9		
13	33.0	35.2	37.4	39.6	41.8	44.0	46.2	48.4
14	37.8	40.3	42.8	45.3	47.8	50.3	52.8	55.3
15	43.3	46.2	49.1	52.0	54.9	57.8	60.7	63.6
16	48.5	51.7	54.9	58.1	61.3	64.5	67.7	70.9
17	54.2	57.8	61.4	65.0	68.6	72.2	75.8	79.4
18	59.9	63.9	67.9	71.9	75.9	79.9	83.9	87.9
19	65.7	70.1	74.5	78.9	83.3	87.7	92.1	96.5
20	72.0	76.8	81.6	86.4	91.2	96.0	100.8	105.6
21	77.6	82.8	88.0	93.2	98.4	103.6	108.8	114.0
22			95.6	101.2	106.8	112.4	118.0	123.6
23			104.0	110.1	116.2	122.3	128.4	134.5
24			113.0	119.6	126.2	132.8	139.4	146.0
25			121.7	128.8	135.9	143.0	150.1	157.2
26				138.8	146.5	154.2	161.9	169.6
27				149.6	157.9	166.2	174.5	182.8
28					169.4	178.3	187.2	196.1
29					180.8	190.3	199.8	209.3
30					192.6	202.7	212.8	222.9
31					205.1	215.9	226.7	237.5
32						229.0	240.4	251.8
33						242.9	255.0	267.1
34						257.2	270.1	283.0
35							285.5	299.1
36							301.3	315.6
37								332.6
38								

Volume Table for White Pine—Continued.

CUBIC CONTENTS OF STEMS, INCLUDING BARK—Continued.

Diameter, breasthigh (inches).	HEIGHT IN FEET.							
	115	120	125	130	135	140	145	150
	CUBIC FEET.							
13	50.6	52.8						
14	57.8	60.3						
15	66.5	69.4	72.3					
16	74.1	77.3	80.5					
17	83.0	86.6	90.2					
18	91.9	95.9	99.9					
19	100.9	105.3	109.7	114.1				
20	110.4	115.2	120.0	124.8				
21	119.2	124.4	129.6	134.8	140.0			
22	129.2	134.8	140.4	146.0	151.6			
23	140.6	146.7	152.8	158.9	165.0	171.1	177.2	
24	146.6	153.2	159.8	166.4	173.0	179.6	186.2	
25	164.3	171.4	178.5	185.6	192.7	199.8	206.9	
26	177.3	185.0	192.7	200.4	208.1	215.8	223.5	
27	191.1	199.4	207.7	216.0	224.3	232.6	240.9	249.2
28	205.0	213.9	222.8	231.7	240.6	249.5	258.4	267.3
29	218.8	228.3	237.8	247.3	256.8	266.3	275.8	285.3
30	233.0	240.1	250.2	260.3	270.4	280.5	290.6	300.7
31	248.3	259.1	269.9	280.7	291.5	302.3	313.1	323.9
32	263.2	274.6	286.0	297.4	308.8	320.2	331.6	343.0
33	279.2	291.3	303.4	315.5	327.6	339.7	351.8	363.9
34	295.9	308.8	321.7	334.6	347.5	360.4	373.3	386.2
35	312.7	326.3	339.9	353.5	367.1	380.7	394.3	407.9
36	329.9	344.2	358.5	372.8	387.1	401.4	415.7	430.0
37	347.7	362.8	377.9	393.0	408.1	423.2	438.3	453.4
38	365.9	381.8	397.7	413.6	429.5	445.4	461.3	477.2
39			418.1	434.8	451.5	468.2	484.9	501.6
40			437.4	454.9	472.4	489.9	507.4	524.9
41						513.4	531.7	550.0
42						537.4	556.6	575.8
43						561.9	582.0	602.1
44						586.9	607.8	628.7
45						612.3	634.2	656.1
46						638.2	661.0	683.8

Volume Table for White Pine—Continued.

CUBIC CONTENTS OF STEMS, INCLUDING BARK—Continued.

Diameter, breasthigh (inches).	HEIGHT IN FEET.					Diameter, breasthigh (inches).	Form factor.
	155	160	165	170	175		
	CUBIC FEET.						
5						5	0.513
6						6	.507
7						7	.502
8						8	.497
9						9	.492
10						10	.488
11						11	.484
12						12	.480
13						13	.477
14						14	.474
15						15	.470
16						16	.465
17						17	.460
18						18	.452
19						18	.445
20						20	.440
21						21	.430
22						22	.426
23						23	.424
24						24	.423
25						25	.420
26						26	.419
27						27	.418
28	276.2					28	.417
29	294.8					29	.415
30	310.8					30	.413
31	334.7					31	.412
32	354.4					32	.410
33	376.0	388.1				33	.409
34	399.1	412.0				34	.408
35	421.5	435.1	448.7	462.3	475.9	35	.407
36	444.3	458.6	472.9	487.2	501.5	36	.406
37	468.5	483.6	498.7	513.8	528.9	37	.405
38	493.1	509.0	524.9	540.8	556.7	38	.404
39	518.3	535.0	551.7	568.4	585.1	39	.403

Volume Table for White Pine—Continued.

CUBIC CONTENTS OF STEMS, INCLUDING BARK—Continued.

Diameter, breasthigh (inches).	HEIGHT IN FEET.					Diameter, breasthigh (inches).	Form factor.
	155	160	165	170	175		
	CUBIC FEET.						
40	542.4	559.9	577.4	594.9	612.4	40	0.401
41	568.3	586.6	604.9	623.2	641.5	41	.400
42	595.0	614.2	633.4	652.6	671.8	42	.399
43	622.2	642.3	662.4	682.5	702.6	43	.398
44	649.6	670.5	691.4	712.3	733.2	44	.397
45	678.0	699.9	721.8	743.7	765.6	45	.396
46	706.6	729.4	752.2	775.0	797.8	46	.395

METHODS OF ESTIMATING STANDING TIMBER.

Methods of estimating timber vary greatly in different parts of the country and vary also among different cruisers in the same region. Where accurate results are desired it is the custom to count every merchantable tree on the tract to be estimated, and frequently the diameters of the trees are measured also. The cruiser knows the contents of an average tree or of trees of different diameters from experience, or he secures the figures from volume tables, which have been made by measuring a large number of felled trees. By multiplying the number of trees on a tract or acre by the contents of an average tree he ascertains the total amount of standing timber. In determining the contents of average trees the cruiser makes the necessary deductions for imperfections and unsoundness.

In counting trees in the woods some cruisers go so far as to mark each tree with a blaze or tag in order not to count it a second time. This is particularly common in the Allegheny Mountains.

In flat country, as, for example, in the Lake States, it is still more difficult to keep track of the counted trees and not to go over the same ground twice. In such country systematic methods

of estimating timber, which vary in detail with different cruisers, have been developed. The method described in the following paragraph is used by a Michigan cruiser and is given as a typical example:

A METHOD OF CRUISING USED IN MICHIGAN.

In Michigan the land has been subdivided into square quarter sections of 160 acres, each of which is further divided into plots of 40 acres. A "forty" is 80 rods square. The cruiser who uses

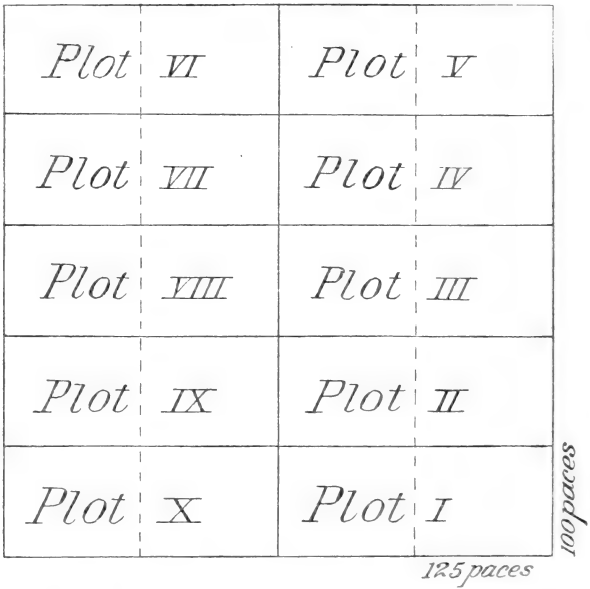


FIG. 1.—Diagram of a Michigan method of cruising.

the method now to be described has found by trial that 500 of his natural paces are required to go 80 rods. He begins at the corner of a "forty," say at the southeast corner, and steps off 125 paces on the south line, and so covers one-quarter of the side of the "forty." (See fig. 1.) He then stops and, facing north, counts the trees first to an estimated distance of 125 paces on the right hand, and then to an estimated distance of 125 paces on

the left hand, and in each case to a distance of 100 paces in front of him, thus including the area represented in the diagram as Plot I. He then steps north 100 paces, and in the same way counts the trees on Plot II, and repeats the operation successively for Plots III, IV, and V. He has then a complete count of the trees on the eastern half of the quarter section. He then walks west 250 paces along the north line of the "forty." Facing south, he now counts all the trees on Plots VI, VII, VIII, IX, and X in the same way as before, and thus completes counting the trees on the entire "forty." As he goes over the ground he constructs a rough map, locating the ridges, streams, swamps, and windfalls. He also makes notes of the general character of the timber and of any other information useful to the owner of the land. When the work is completed the cruiser has a practical working map for carrying on lumber operations, in addition to the other material secured.

A METHOD OF CRUISING A "FORTY" BY SMALL SQUARES.

Another method of cruising which gives good results is to divide each "forty" into 16 small squares of $2\frac{1}{2}$ acres and to estimate the timber on each square separately. This method and the one following were described in an article in Rod and Gun of Canada, November, 1901, by A. Knechtel. The following description is essentially the same as given in that article:

The cruiser begins at one corner of a "forty;" for example, at the southwest corner. He paces along the south line 10 rods east and then turns and paces 10 rods north. This brings him to the center of a square $2\frac{1}{2}$ acres in extent, or one-sixteenth of the "forty." Standing at this point he locates by the eye the boundary lines of the square and then estimates the timber upon it, usually by counting the trees and determining their contents from volume tables.

In dense stands where the trees can not be readily counted a flag may be placed at the center of the square to guide the cruiser. He then paces 5 rods south and then 5 rods west, which brings him to the center of the southwest quarter of the square. He estimates this small plot and then paces 10 rods north, where he stands and

estimates the northwest quarter of the 2½-acre square. He then paces 10 rods east and estimates the northeast quarter of the square and then paces 10 rods south and estimates the southeast quarter. Having completed the estimate of one 2½-acre square, he returns to the flag and paces from this point 20 rods north, which is the center of the second 2½-acre square, which he estimates in the same way as before. This operation is continued until four squares have been estimated. The cruiser then takes in hand the tiers of squares directly east of the first series until the 16 squares, or the entire "forty," have been covered. (See fig. 2.)

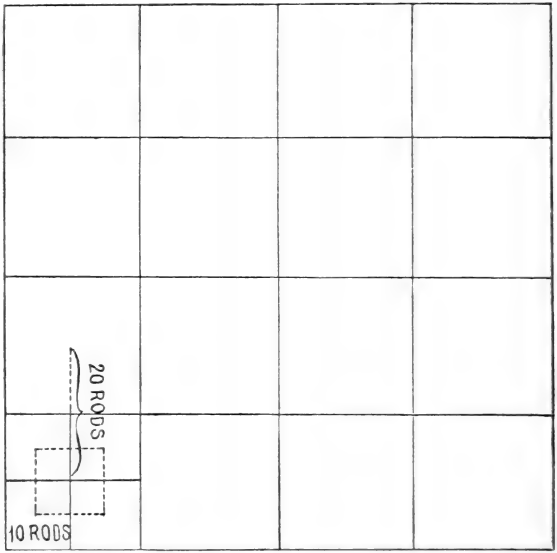


FIG. 2.—Diagram showing the method of cruising by dividing a forty into 16 small squares.

CRUISING IN STRIPS 40 RODS WIDE.

A method sometimes used in Michigan is to estimate the timber in strips 40 rods in width and one-half mile long, which cover exactly 40 acres. The cruiser is assisted by a lineman, who runs a compass line along one side of the strip, measuring its length by

pacing. The cruiser passes back and forth over the strip estimating the timber. He paces the distance when going away from the lineman, who guides the cruiser, when returning, by a policeman's whistle. When a strip of one-half mile, or 40 acres, has been completed, an adjacent strip is cruised in the same manner.

ESTIMATE BY SAMPLE PLOTS.

Where less accurate results will answer, the estimate is made by determining the amount of timber on an average acre and then multiplying the result by the total number of acres on the tract. The contents of the average acre is usually determined not by the measurement of one acre alone, but by averaging the measurements of a number of acres representing different conditions, in order that the less productive portions of the forest may be included as well as the best. These sample acres may be laid off by pacing, but it is more satisfactory to measure their sides accurately with a chain or tape and to make sure that their corners are correct right angles by the use of such instruments as a compass or a mirror right-angle finder. (Cf. p. 132.)

Some cruisers estimate the contents of a sample acre by standing still and counting the trees about them to an estimated distance of 7 rods in each direction. In the forests of Maine and northern New York, where this method is common, 7 rods is about as far as a person can count the trees in a forest of average density. Cruisers sometimes count the trees in a circle about them to a distance of 60 feet, which would include approximately one-quarter of an acre.

It is, of course, not necessary that the sample plot should be exactly 1 acre in size. A fraction of an acre or larger area may be used, provided the cruiser knows the exact area of the plot.

The measuring of sample plots used in estimating timber is technically known among foresters as taking valuation surveys.

ESTIMATE BY THE EYE.

A well-trained cruiser is able to make a fair estimate of the average yield per acre simply by looking over the forest. In many sections cruisers guess at the yield of an entire block of the forest,

as a watershed or township, reaching their conclusions merely by tramping through the forest one or more times. This method can be used only where an accurate estimate is unnecessary.

THE STRIP METHOD (IN USE BY THE DEPARTMENT OF AGRICULTURE).

The above-described methods of estimating standing timber are frequently used by the Bureau of Forestry, but the most satisfactory results, from the standpoint of economy and accuracy, are obtained by the strip method, which was devised in its present form by Mr. Gifford Pinchot, the Forester of the Department of Agriculture. This method is as follows: Sample acres are laid off in the form of strips, 10 surveyor's chains long and 1 chain wide, and the diameters of all trees to be included in the estimate are measured at breastheight with calipers. At least three men are required to do effective work under this method. One man carries a notebook, or tally sheet, and notes the species and their diameters as they are called out by the men who take the measurements. The tallyman carries the forward end of the chain, the other end of which is carried by one of the men taking the measurements. The chain is first stretched on the ground and the trees are calipered within an estimated distance of 33 feet (one-half chain) on each side of the chain. When all trees adjacent to the chain have been calipered the whole crew moves on the length of another chain in the direction chosen by the tallyman. The chain is again stretched on the ground and the trees are calipered on each side of it as before. This same operation is repeated until the trees have been measured on a strip 10 chains long. Notes are then made of the general character of the forest and the land, according to the requirements of the investigation. If heights are desired they may be taken by a separate crew, or as the calipering crew encounter from time to time trees whose heights are desired, they may stop long enough to take such measurements.

In an average virgin forest a crew of three men will caliper the trees on from 20 to 40 acres in one day if only trees of merchantable size are included, or from 15 to 25 acres if the small trees also

are calipered. Small trees are measured principally in studying the question of future growth.

The advantage of the strip method is that it gives an excellent average of the whole area, because the strips are run through the open as well as the dense portions of the forest. Where square surveys are used the cruiser is often tempted to locate them only in the best portions of the forest.

On large tracts satisfactory estimates can be made by the measurement of about one out of every 30 acres. In very extensive forest tracts the Bureau of Forestry usually measures not more than one or two out of every hundred acres.

Great care must be taken to lay off the sample strips in such a way that they will represent the average conditions in the forest. On mountain slopes the strips should be run vertically or diagonally up and down the slopes, and not horizontally around them, because the character of the forest is usually different at different elevations.

Where the country is divided into square townships a good method is to run sample strips straight across each township at stated distances apart. One side of the township is first traversed by the cruiser, who locates the points where he wishes the sample strips to begin. The calipering crew then measures strips, beginning at these points and running across the township in a stated compass direction. Plate I shows the manner in which the strips were located by the Bureau of Forestry in making a forest working plan for a township in the Adirondack Mountains.

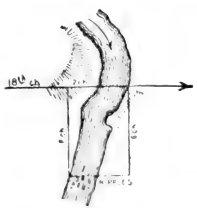
For convenience in measuring sample acres a tally sheet has been devised which is easily used in the woods and which is of great value in working up the results. A sample tally sheet has been filled in with the figures of an actual valuation survey.

U. S. DEPARTMENT OF AGRICULTURE.

BUREAU OF FORESTRY.

Locality. Township 5, Range 18, Maine.
Type. Hardwood slope. *Date.* Sept. 17, 1901. *No.* A 610″.

Diameter, breasthigh (inches.)	Spruce.	Dead.	Balsam.	Dead.	White birch.	Yellow birch.	Hard maple.	Beech.	Pine.	Poplar.
2	⊠ □		□		:					
3	⊠ : •		: •							
4	⊠ •		: :		:					
5	⊠ •		:							
6	: •		: •		□ :	•	| |			:
7	| |		:		⊠ •	:		:		•
8			:		⊠ • +	•	: :			: :
9	•		:		⊠ : •	•	:	•		⊠ •
10		•	•		:	•	•			| |
11					•		:			:
12					:			:		: :
13							:			: •
14	•						:			: :
15							•	•		: •
16										•
17								•		•
18										
19										
20										



20th chain. Deep dead water of North Branch running SSW. Offset 6 chains S. from end of 18th chain to ripples; then east 4 chains. Offset N. again 6 chains. Branch 2 chains wide where course crossed it.

These tally sheets may be fastened to a thin board by thumb tacks when the tallyman is using them, or they may be carried in a special tally-sheet holder made to hold approximately 50 sheets. This device, shown in fig. 3, is tray-like in form and consists of a rectangular board or panel provided on three sides of its upper face with wooden strips or cleats, the inner edges of which are grooved to receive the edges of the sheets, which are held in place by a

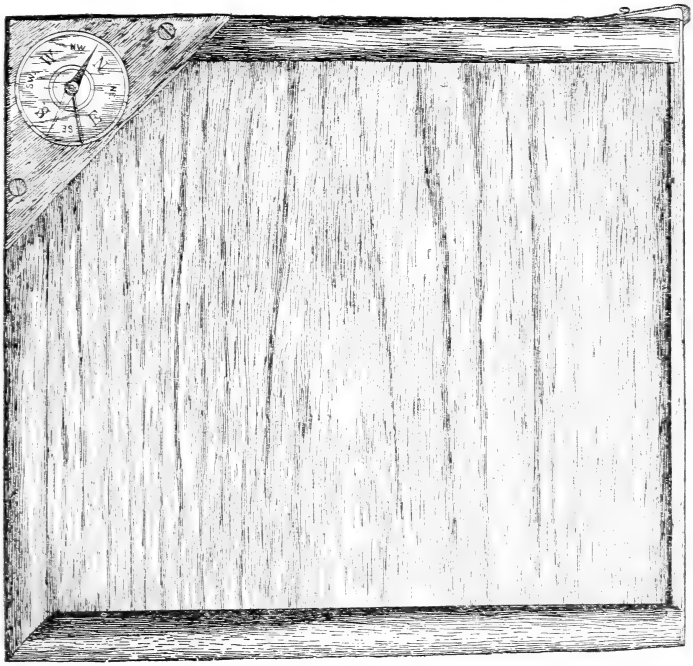


FIG. 3.—Tally-sheet holder.

narrow hinged leaf secured to the fourtn side. A spring hook holds the leaf in its closed position. The upper left-hand corner of the holder carries a small compass for the guidance of the tallyman as he moves forward. A narrow leather strap secured to the back of the holder forms a loop to receive the left hand, in which the holder is carried.

As the strip valuation surveys are being made, the tallyman makes careful notes on the tally sheet of the character of the land. As each chain is measured he notes the exact direction and change in elevation, the location of streams, ponds, roads, and trails. These notes are afterwards used in making a surface map.

When the measurement of an acre is completed, the tallyman makes additional notes of the character of the land and the forest on the back of the tally sheet opposite printed headings. The facts noted are best shown by an actual example:

Situation, two acres east of Station 10 on base line.
Course, 6° S. of east.
Absolute altitude, 480 feet.
Slope and aspect, southwest 5° to 11th chain—rest level.
Rock, slaty trap outcrop.
Soil, fairly deep fresh clayey loam.
Humus, moderate, well decomposed (mixed broadleaf and conifer).
Ground cover, moss, rotten logs, ferns.
Underbrush, spotted and striped maples, witch hobble, and hardwood reproduction.
Reproduction, balsam and spruce good; mixed evenly in small scattered groups. Hard maple, white and yellow birches, fair, scattered.
Density, dense (.90).
Quality of locality, good for popple and spruce.
Silvicultural condition, birch and popple mature and overtopping the conifers. Young growth thrifty. Crowns of hardwoods admitting sufficient light for reproduction.
Merchantable condition, timber good for pulp, but not for saw logs.
Damage, very old burn (about 100 yrs.). Beech suffering from attack of fungus.
Remarks: Very little dead or down timber. Logs could go down slope drained by driveable stream. Slope gentle enough to admit of easy construction of wagon, sled, or logging roads.

In hilly or mountainous regions, where the character of the timber varies with the difference in soil and exposure, the best estimates are made by dividing the forest into forest types and estimating the timber on each type separately. Thus, if the forest on the slopes is decidedly different from that on the flats, the average yield per acre is best found separately for each of these two forest types. After each sample acre is measured note is made on the tally sheet whether it belongs to the slope type of forest or to the flat type. The percentage of the total area covered by each forest type is then estimated from a general study

of the tract. The total yield for each type is obtained by multiplying the contents of the average acre by the total number of acres covered by the type. This type method of cruising is particularly applicable to regions like the southern Allegheny Mountains, where the character of the timber situated in the coves and on the flats and gentle slopes is quite different from that in other situations.

COMPUTATION OF RESULTS.

No explanation has yet been made of how the average yield per acre is computed after the measurements are secured. This is done in two ways:

(1) The yield of each acre is computed separately and all are averaged together; or (2) a model acre is constructed by adding together the number of trees of each diameter which occur on all the sample plots and dividing the result by the number of plots, which gives the average number per acre of trees of each diameter. For example, to construct a model acre the average number of 6-inch trees on all the acres measured is calculated; then the average number of 7-inch trees; then of 8-inch trees, of 9-inch trees, etc. The result is a model acre having the average number of trees of each inch diameter. Only one computation of yield is then required, and this will represent the average of all the sample acres.

The method of computing the contents of a model acre or of any sample acre depends upon whether or not height measurements have been taken. If heights have been disregarded, the computation may be made in the following way:

Make four columns of figures as shown below. In the first column place the diameters, in the second column the number of trees of each diameter, in the third column the average contents of trees of different diameters, and in the fourth column the total contents of all trees of each diameter, which is found by multiplying together the values in the second and third columns. The figures in the fourth column are then added together for the total contents of the acre.

Form for Computing the Contents of Sample Plots.

HEMLOCK.

Diameter breasthigh.	Number of trees.	Contents of average tree from volume table.	Total contents.
Inches.		*Board feet.*	*Board feet.*
10	10	45	450
11	11	65	715
12	9	90	810
13	8	118	944
14	8	143	1,144
15	9	175	1,575
16	7	205	1,435
17	6	240	1,440
18	6	275	1,650
			10,163

The Use of Heights in Estimating.

Some cruisers classify the trees, as they measure them, into two-log, three-log, four-log trees, etc. They have on their tally sheets several columns for each kind of tree, as follows:

	WHITE PINE.					HEMLOCK.			
Diameter breast-high.	Two-log trees.	Three-log trees.	Four-log trees.	Five-log trees.	Six-log trees.	Two-log trees.	Three-log trees.	Four-log trees.	Five-log trees.

The total amount of timber on the area on which the trees are counted is then determined as follows: Find from a volume table, such as that given on page 93, the amount of timber in an average two-log tree of each diameter and multiply this amount in each case by the number of trees of the diameter in question.

Add together the results thus secured for the total amount of timber in the two-log trees. Make a similar calculation for the three-log trees, the four-log trees, etc. Then add together the total contents of the two-log, three-log, four-log trees, etc., for the total amount of timber on the area.

Another method is to estimate the total height of each tree when measured and to group the trees in height classes as follows:

WHITE PINE.					
Diameter breasthigh.	Under 60 feet.	60 to 80 feet.	80 to 100 feet.	100 to 120 feet.	Over 120 feet.

The total amount of timber on the area may be determined in the way described on page 126, if volume tables exist which give the contents of average trees under 60 feet, 60 to 80 feet, 80 to 100 feet, etc., in height.

If no such tables exist but there are tables for trees of all heights, the cruiser should measure in the woods the average heights of trees under 60 feet, 60 to 80 feet, 80 to 100 feet, etc. He should then compute the average diameter of the counted trees under 60 feet, 60 to 80 feet, 80 to 100 feet, etc. Knowing the diameter and the height of the average tree under 60 feet, its content is secured from a volume table of heights and diameters. This value is then multiplied by the number of trees under 60 feet in height. The contents of the trees 60 to 80 feet, 80 to 100 feet, etc., are found in the same way, and the totals are added together for the total amount of timber on the area.

The most accurate method of using heights in cruising is to determine the average heights of trees of different diameters in the following way: After the trees on a sample acre have been calipered in the usual way the heights of a limited number of trees of different diameters, including small, medium, and large trees, are measured. Generally three to ten trees for each species are measured. The cruiser selects for measurement trees which appear to him to be of average height in their class, whether small,

medium, or large. When the height of a tree is measured the diameter also is noted. After these height measurements have

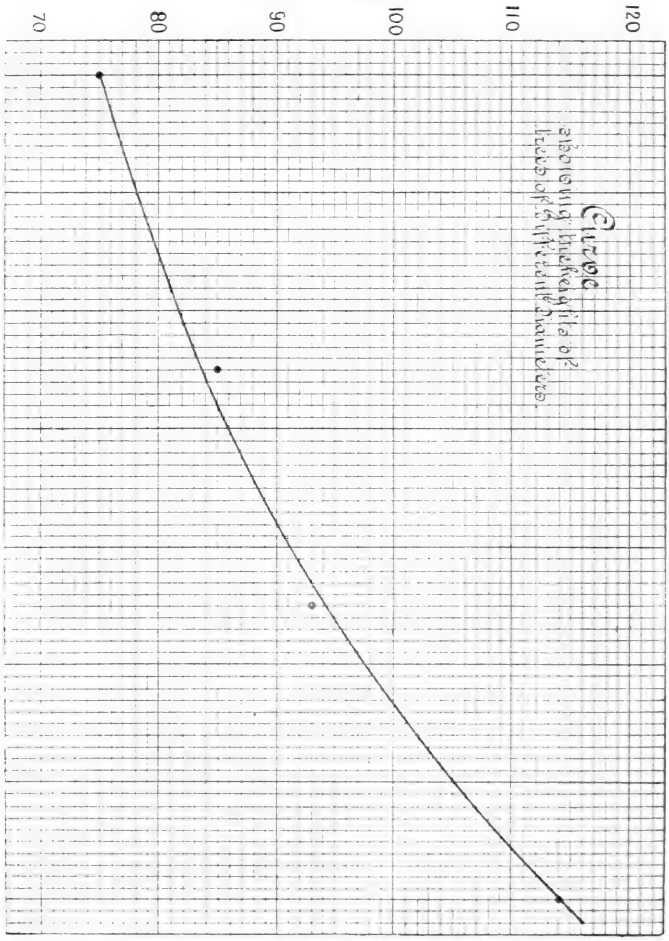


FIG. 4.—Curve showing heights of trees of different diameters.

been made a curve is constructed from which a table may be made to show the average height of trees of any diameter. This

is done in the following way: Take a sheet of cross-section paper (fig. 4), lay off on the horizontal lines the diameters, calling each small square 1 inch; lay off on the vertical lines the heights, calling each small square 1 foot. Assume, for example, that the following measurements were taken for White Pine:

Diameter in inches	10	15	19	24
Height in feet	75	85	93	114

Mark on the cross-section paper the point where the vertical line running from the diameter point 10 meets the horizontal line running from the height point 75. Mark the points of intersection for the other diameters and heights in the same way. Then draw a regular curve through or as near the points as possible in the way shown in fig. 4. The height corresponding to any diameter may then be read off from this curve. Thus, to find the height of a 16-inch tree, note the point where the vertical line running up from the 16-inch point meets the curve; then from this point of intersection follow the horizontal line to ascertain the height. In the example given the average height of a 16-inch tree is 86 feet.

This method is used to find the contents of sample acres in the following way: Make a table of four columns. In the first column place the diameters; in the second column the number of trees of each diameter given in the first column; in the third column the average height of trees of each diameter, these average heights being obtained from a curve such as has been described; in the fourth column the contents of an average tree from a volume table; in the fifth column the total contents of all trees of each diameter. Then add the fifth column and the result will be the total contents of the sample acre.

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The following is an example of such a table:

WHITE PINE.				
Diameter breasthigh (inches).	Number of trees.	Height (feet).	Contents of average tree from volume table (board feet).	Total contents (board feet).
10	10	75	30	300
12	11	78	69	759
14	3	82	120	360
16	4	86	185	740
18	4	91	272	1,088
20	5	97	383	1,915
22	2	105	549	1.098
				6,260

There are a number of other methods used by foresters when very accurate results are desired. These are not given because they involve complicated mathematical computations, and are beyond the scope of this book.

FOREST WORKING PLANS.

A forest working plan, as the term is used by foresters, is a detailed plan for the conservative management of a specified forest. Like the forest plans of lumber companies, it contains an estimate of merchantable timber and a plan for lumber operations. It includes, in addition, a study of the growth and production of the forest, and also a plan of management insuring its continuous productiveness, and at the same time satisfactory financial returns. Forest working plans provide not only for marketing the standing timber, but also contain directions for cutting the timber in such a way that future crops may be larger and obtained oftener than under the common systems of lumbering. The conditions in America are such that the information contained in forest working plans necessarily varies widely on different forest tracts. In all cases, however, they contain the essential idea of the management

of the forest so as to secure the continuous production of wood and timber.

It is beyond the scope of this book to discuss at length the details of the preparation of forest working plans. That belongs to a treatise on forest management. It will be of interest, however, to lumbermen to know the main items of information usually included in such plans.

Forest working plans usually include:

(1) Maps showing the boundaries of the tract, ridges, rivers, streams, ponds, roads, trails, and, if possible, contour lines, the distribution of the timber, cut-over land, burned land, waste land, large windfalls, and other useful information of kindred character.

(2) A general description of the forest, by watersheds or some other natural or artificial divisions, to supplement the information given on the forest map.

(3) An estimate of the merchantable timber, together with information as to the best methods and cost of lumbering, the construction and location of camps, roads, dams, and other necessary works, such as railroads, tramroads, slides, flumes, etc.

(4) Tables of yield, based on the study of the growth of the different trees under the conditions prevailing on the tract, showing how much timber can be cut now and progressively at different periods in the future if the forest is lumbered in a specified manner.

(5) A study of the reproduction of the forest and a plan for cutting the merchantable timber in such a way that reproduction will be secured and the productive power of the forest will not be impaired.

(6) Directions for cutting so that there will be the least possible waste and the least possible damage to young trees.

(7) A plan for the protection of the forest against fire and theft.

(8) A plan for a working force to manage the forest, including, when necessary, a superintendent, one or more inspectors, and rangers, according to the requirements of the particular tract.

(9) On tracts where such operations will pay, forest working plans include directions for thinnings to open up the forest, and thereby improve the conditions of growth for the remaining trees, and also plans for tree planting where advisable.

SPECIAL INSTRUMENTS USEFUL TO A WOODSMAN.

It is unnecessary to describe the instruments which are familiar to every woodsman. It is believed, however, that those described in the following pages are not generally known, at least in the form recommended. They will prove useful in many cases to cruisers and other woodsmen. Further information regarding the instruments will be furnished upon application to the Bureau of Forestry, Washington, D. C. They may be procured through any first-class dealer in field instruments.

STAFF COMPASS.

This instrument (shown in fig. 5) is used for running lines in the woods. It consists of a compass set into a shallow, circular metal box, having two sights hinged to its edge. A removable support, screwed into the bottom of the box, terminates in a socket, adapting the instrument to be mounted upon a staff or upon a tripod. The support also comprises a ball-and-socket joint, by which the compass is leveled with the aid of spirit tubes located in its bed, a swivel, which permits the compass to be turned in sighting it, and a set screw for securing it against turning after sighting. When not in use the sights are folded down and the support unscrewed from the box. When taken apart the entire instrument is in compact form for transportation. It is made in different sizes, with needles from 2½ to 4 inches long. The price varies from $10.50 to $13; without spirit tubes, from $8 to $11.50.

MIRROR RIGHT-ANGLE FINDER.

This handy instrument (shown in fig. 6) is used for finding right angles in laying out rectangular valuation surveys. It consists of an open triangular metal box containing two small mirrors mounted in frames secured to the sides of the box and set at an angle of 45° to each other. Rectangular sight openings are formed above the mirrors in the sides of the box. The device is provided with a handle, preferably made removable for convenience. The observer looks directly into the box through its open side and sights the instrument through one or the other of its two sight openings at some given object. At the same time an object at a right angle

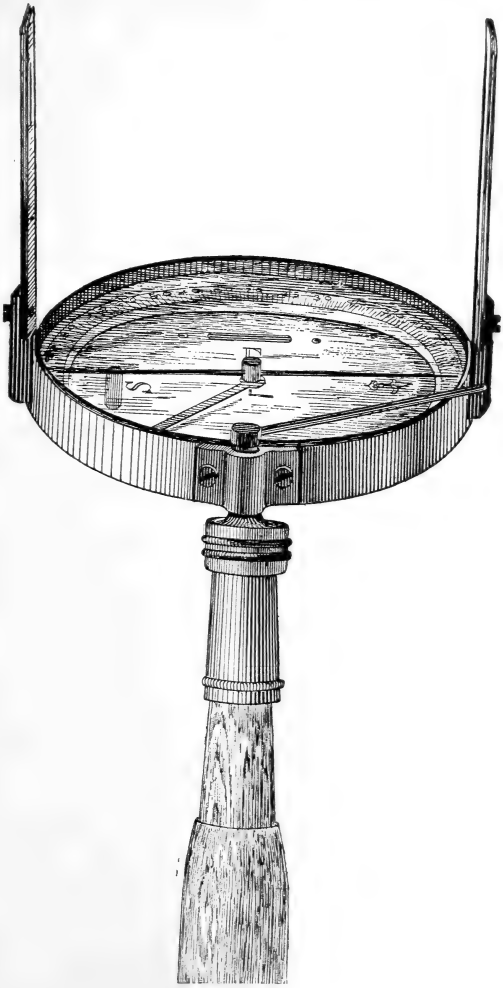


FIG. 5.—Staff compass.

to the object sighted is visible to him in the mirror below the sight opening through which he is looking, and is in the same vertical line as the object sighted. The principle of the device is

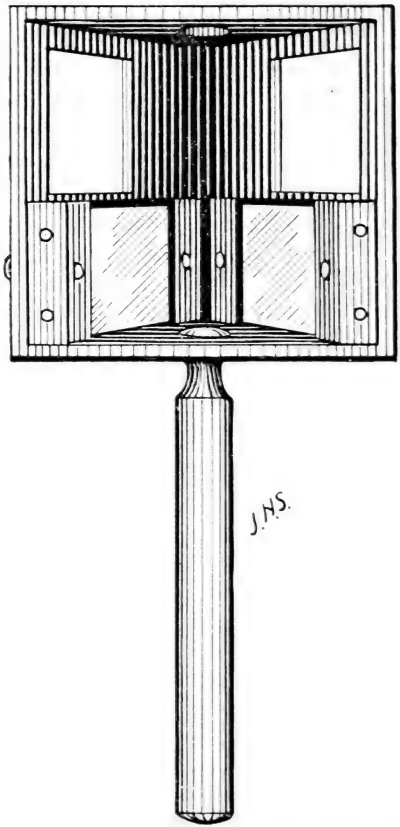


FIG. 6.—Mirror right-angle finder.

that the reflected object is first imaged through the open side of the box in the mirror opposite the sight opening through which the observer is looking and then reflected across from one mirror to the other, and thus brought into his vision.

In laying off a square the cruiser first runs out one side of it and then takes a position at the point where he wishes to determine a right angle. With the instrument in one hand he then looks through one of its sight openings at an object in the predetermined line, such as stake or pole. An assistant in the approximate location of the desired new line now moves about until his image appears in the mirror below the sight opening being used and exactly in line with the stake or pole. The assistant is then standing in a line at a right angle to the predetermined line and establishes the new line.

The box of the instrument shown in the plate is about an inch and a half long and about an inch and a quarter high, and with its handle fits in a small box. Cost, $4.

INSTRUMENTS FOR MEASURING HEIGHTS.

There are several methods of determining the height of a standing tree. One of the simplest is to measure the shadow of the tree and the shadow of a straight pole of known length set perpendicular to the earth. Multiply the length of the shadow of the tree by the length of the pole and divide the product by the length of the shadow of the pole. The result will be the height of the tree.

A method used when the sun is not shining is to set two poles in a line with the tree. (See fig. 7.) From a point on one pole sight across the second pole to the base and to the top of the tree. Let an assistant note the points where the lines of vision cross the second pole and measure the distance between these points. Also measure the distances from the sighting point on the first pole to the base of the tree and to the lowest vision point on the second pole. Multiply the distance between the upper and lower vision points on the second pole by the longer of the other two measurements and divide by the shorter; the result will be the height of the tree.

Example: Let $ab=6$; $Sb=4$; and $SB=30$; then $\frac{6\times 30}{4}=45$, height of tree.

Another method sometimes used is as follows: The observer walks on level ground to a distance from the foot of the tree about equal to its estimated height. He then lies on his back, stretched at full length (fig. 8), and an assistant notes on a perpendicular staff erected at his feet, the exact point where his line of vision

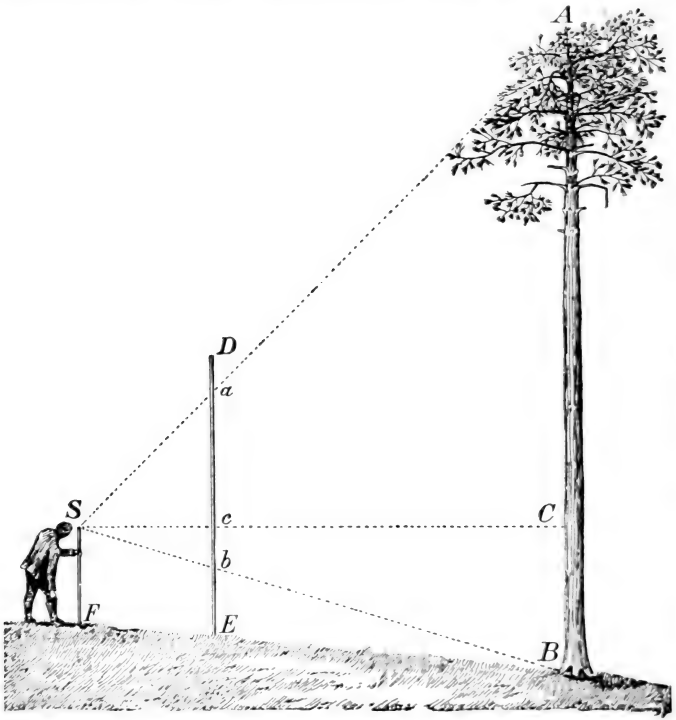


FIG. 7.—Measuring the height of a tree by means of two poles.

to the top of the tree crosses the staff. The height of this point from the ground BC is measured and his own height from his feet to his eyes AB. Then: $AB : BC = AD : DE$. $DE = \frac{BC \times AD}{AB}$.

Example: Let $AB = 6$; $BC = 5$; $AD = 60$; then $\frac{5 \times 60}{6} = 50$, height of tree.

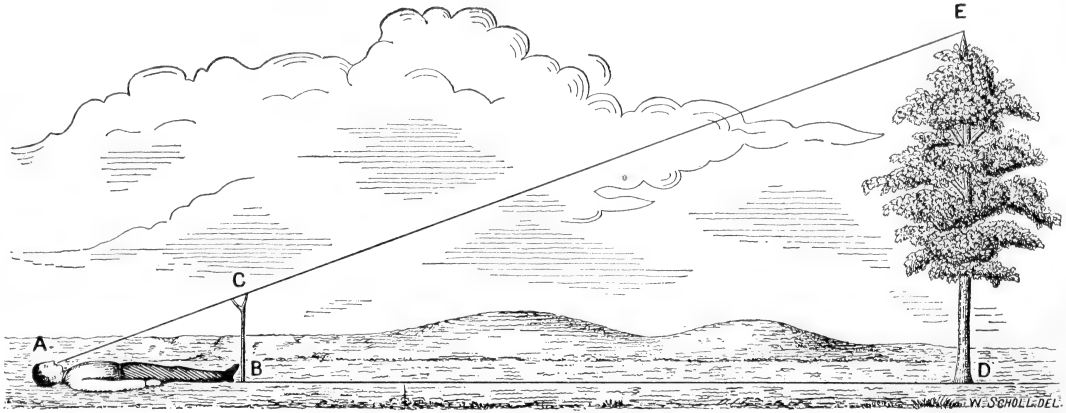


FIG. 8.—Measuring height of tree by use of known height to eye of observer.

Faustmann's Height Measure.

This instrument, shown in fig. 9, consists of a skeleton rectangular metal frame having two crossbars at one side of its longitudinal center, the frame and bars being in one piece. A slide, reversible end for end and having beveled edges, works in undercut grooves formed in the inner edges of the crossbars. This slide is provided at its ends with thumb notches, and with transversely arranged index marks, designated I and II. A plumb line carrying a plummet is attached to the slide in the center of the index

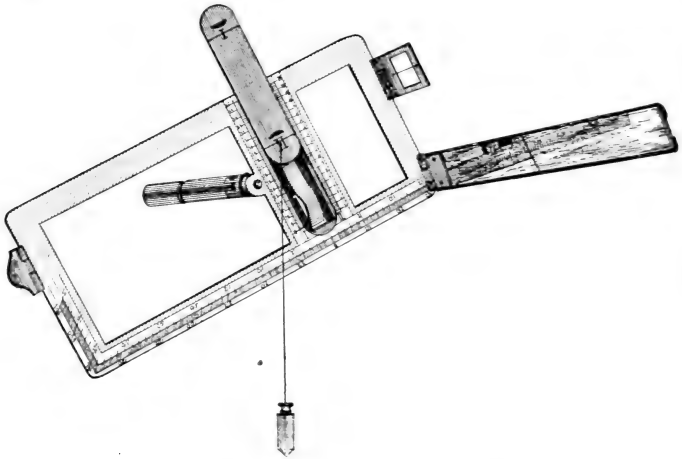


FIG. 9.—Faustmann's height measure.

mark II. A retaining spring secured to the back of the frame and bearing against the inner face of the slide holds it in any position in which it may be set. The left-hand end bar of the frame is furnished with an eyepiece, and the right-hand end bar with an objective, these being made of metal and hinged so as to be folded down out of the way when the device is not in use. A long, narrow mirror, hinged to the frame at a point below the objective, is furnished to reflect a right-hand horizontal scale and a left-hand horizontal scale engraved upon the lower bar of the frame, and

meeting at a zero point which is intersected by a line passing through the longitudinal center of the slide. The right-hand scale runs to 75 and the left-hand scale to 225, the latter scale extending upward on the left-hand end bar of the frame. The right-hand crossbar is provided with a vertical scale running upward from zero to 100, and continued on the left-hand crossbar with a scale running upward to 175. These scales are divided in fifths and numbered. The lines forming the scales are equally separated from each other and represent units of distance under any system of measurement that may be adopted. The handle of the device is attached to the left-hand crossbar.

To use the instrument, the observer measures the horizontal distance in feet, yards, or in any other desirable unit, from where he is to stand to the base of the tree. He then sets the slide by one or the other of its two index marks, which is brought into line with the graduation on the vertical scale corresponding to the measurement just secured. If the distance is less than 75, the slide should be set so that the upper end of the plumb line will take a position opposite the required number on the portion of the vertical scale on the right-hand crossbar. If the distance is more than 75, the slide should be pulled out and reversed end for end and adjusted until the index mark at its then lower end is brought opposite the required number on that portion of the vertical scale on the left-hand crossbar. The observer then looks through the eyepiece and objective and brings the hair of the latter into line with the top of the tree. The plumb line is allowed full play and crosses the left-hand horizontal scale. As soon as the plumb line is at rest the number which it crosses is read off in the mirror. This number indicates the height of the tree from the level of the observer's eye to its top. He then sights through the instrument to the base of the tree and reads the number crossed by the plumb line on the right-hand horizontal scale. This number indicates the distance from the level of the observer's eye to the base of the tree, and is added to the number before secured, which gives the total height of the tree. If the observer should be standing so that the level of his eye is below the base of the tree, he should first determine the height from the level of his eye to the top of the tree, then the height from the level of his eye to the base of

the tree, and subtract the last result from the first, which gives the true height of the tree. Cost about $10. (See fig. 10.)

A cheaper form of this instrument has a wooden frame and slide, and scales printed upon strips of paper pasted upon the frame.

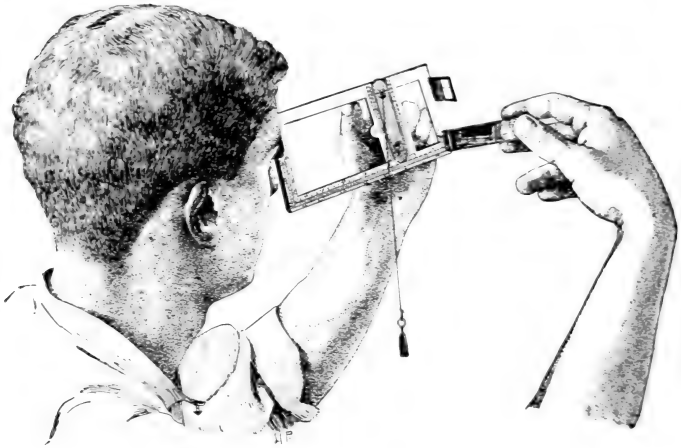


FIG. 10.—Manner of using Faustmann's height measure.

Clinometer for Measuring Heights.

This instrument, shown in fig. 11, consists of a square panel of wood recessed to receive a metal disk and a glass which protects it. The disk has a curved right-hand scale and a curved left-hand scale engraved upon it below its center. These scales meet each other at a zero point, and correspond to each other in their graduations, which run outward in opposite directions from the zero point to 100. The graduations of these scales represent percentages of angles instead of degrees of angles, as do the graduations of most clinometers. These two scales are swept by a pendulum ball, the lower half of which is beveled and brought to an edge having a central index mark. The pendulum rod is formed at its upper end with an eye receiving a movable screw stud passing through the disk and panel and terminating at its rear end in a

push button. A spring secured to the back of the panel engages with the button and draws the head of the screw against the eye of the rod, and so holds the pendulum against swinging, except when the button is pushed inward to take the tension of the spring off the pendulum, which is then free to swing by gravity when the instrument is held in a vertical plane. The disk of the clinometer, shown in the figure, also has some directions engraved upon

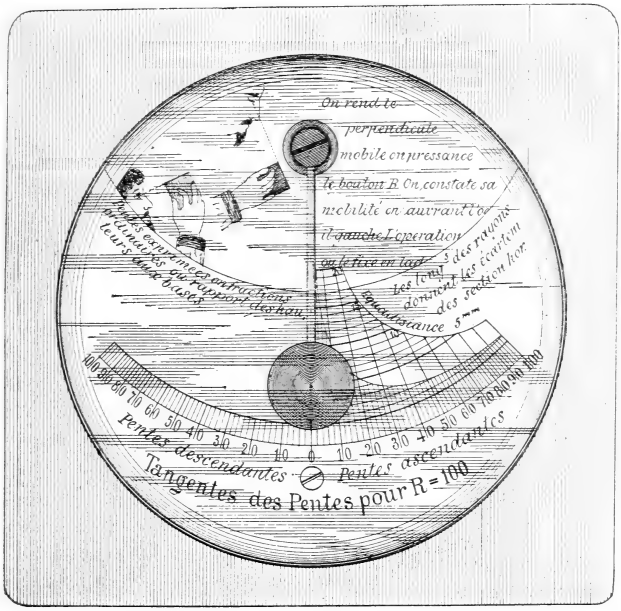


FIG. 11.—Clinometer for measuring heights.

it. The instrument is only about 3 inches square and may be easily carried in the vest pocket.

To use the instrument the observer sights along its upper edge to the top of the tree and releases the pendulum by pressing the push button. When the pendulum comes to rest over the right-hand scale, the pressure on the push button is removed, permitting the spring to act to hold the pendulum until the reading

can be taken. The number now opposite the index mark is the percentage of the angle formed by a line running from the observer's eye to the top of the tree and a horizontal line running from him to its trunk. This percentage is the ratio between the height of the tree above the level of the observer's eye and the horizontal distance from the observer to the tree. This value is multiplied by the horizontal distance from the observer to the tree. The result is the height of the tree above the level of the observer's eye. The observer then sights the instrument to the base of the tree, operates it as before, takes the reading from the left-hand scale, multiplies the value thus secured by the horizontal distance from him to the tree, and adds this result to the result previously obtained, and thus secures the total height of the tree. These computations may be greatly simplified by taking all observations at a distance of 100 feet or 100 yards from the tree.

A more elaborate form of the instrument is furnished with a hinged cover to shut over the glass and with two sights located at the upper corners of the panel.

COMBINED SURVEYORS' HAND LEVEL AND CLINOMETER.

This instrument (shown in fig. 12) has a telescoping surveyors' hand level of ordinary construction, except that its spirit tube is located above instead of in its main tube, which, however, contains the usual inclined steel mirror and sighting cross wire.

Combined with the hand level is a clinometer comprising a plate screwed to one side of the main tube of the hand level and having engraved upon it a curved right-hand scale and a curved left-hand scale. These scales are struck from the same center and meet at a zero point, from which they are graduated outward in degrees to 90. A measuring arm, having a spatulate lower end beveled to receive vernier graduations, sweeps these scales. This arm is carried by a short shaft journaled in the upper edge of the plate and concentric with the two curved scales. The outer end of the shaft is furnished with a knurled hand wheel, by which the clinometer is operated. The inner end of the shaft carries a frame supporting the tubular case containing the spirit tube of the hand level, the center of the case being cut away to show the bubble in

the tube. A jam nut for setting the instrument is applied to the extreme inner end of the shaft, and when turned inward holds the same against turning. The measuring arm and frame are rigid with the shaft, so that when the same is turned in either direction they turn together and to the same extent, the same as if of one piece. The case stands at a right angle to the measuring arm, so that when the arm is placed at the zero point of the two scales the case will be exactly parallel with the longitudinal axis of the hand level.

A slot formed in the top of the main tube is located in line below the exposed middle portion of the spirit tube and in line above the mirror, and permits the bubble to be reflected in the mirror, which is so narrow and placed so close to the off side of the main

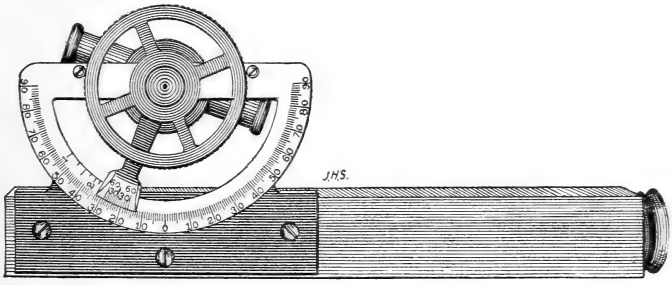


FIG. 12.—Combined surveyor's hand level and clinometer.

tube that it does not interfere with the line of vision through the same and a view of the cross wire.

The hand level is often of use to lumbermen in laying out roads and trails and in locating dams. To use the instrument as a hand level it must first be set by swinging the case containing the spirit tube into line with the main tube. The observer then sights at an object through the tube, which he brings to a level by the bubble reflected in the mirror, and then notes whether or not the object is above or below the cross wire. If the object is in direct line with the cross wire it is on the same level with his eye; otherwise the object is above or below the level of his eye, as the case may be.

The lumberman may also use the hand level in finding the height of a hill, or the height of any point on the slope of a hill, as is necessary in making topographical maps. To find the height of a hill, the observer begins at its base, and after leveling the instrument, sights in the desired direction, and notes the point ahead intersected by the cross wire; he then advances to that point and repeats the operation, and so moves up the hill from point to point until the top is reached. As between each observation he advances a height equal to the distance from the ground to his eye, the height of the hill will be the product of that distance by the number of observations taken.

The instrument may also be used as a clinometer to ascertain the slope of a hill. To do this the observer sights the instrument at an object on the slope which is the same height above the ground as his eye and located above or below where he stands, according as he is sighting up or down the hill. He now uses the hand wheel to swing the tubular case until the bubble shows it is level. The measuring arm, which swings with the case, is at the same time swept over one or the other of the two scales, and indicates upon it the slope of the hill in degrees.

If the observer will provide himself with a table of natural tangents he may use the instrument for measuring the height of trees. He sights the instrument at the top of a tree and turns the handwheel until the bubble shows that the case is level, at which time the measuring arm, which swings with the case, indicates upon the right-hand scale in degrees the angle formed by a line running from the observer's eye to the top of the tree and a horizontal line extending from his eye to the trunk of the tree. He then consults his table of natural tangents, which gives him the value of the angle secured, expressed as its tangent or percentage, the meaning of which is described on page 142. The tangent or percentage of this angle multiplied by the horizontal distance from the observer to the tree gives the height of the tree above the level of the observer's eye. He then sights to the base of the tree, and in the same manner ascertains the angle formed by a horizontal line running from him to the tree and a line running from his eye to the base of the tree. He now consults his table again for the value of this angle expressed as its tangent or percentage and

multiplies this value by his horizontal distance from the tree, which gives the height of the tree from the ground to the level of his eye. The figures thus secured are added together, giving the total height of the tree. Cost, $13.

The scales of the instrument are sometimes graduated in tangents or percentages of angles instead of in degrees, in which case the table of tangents is not needed.

A number of other height measures are used in Europe, but a full description of them is not given, as that would make this Handbook too voluminous. The most important instruments are the Brandis height measure, the Weise height measure, the Christen height measure, the Klaussner height measure, and the Winkler height measure.

Several instruments have been devised to measure the diameter of a tree at any desired height. They are of practical use when extremely accurate measurements of standing trees are desired, but will probably not be extensively used by timber cruisers. The names of these instruments are the Breymann dendrometer, the Winkler dendrometer (combined with the Winkler height measure), and the Wimmenauer dendrometer.

CALIPERS FOR MEASURING DIAMETERS.

Calipers are supplied to the trade in a variety of forms, but the form shown in fig. 13 is recommended for its simplicity. It consists of a beam having a scale on both sides, graduated in inches and tenths. This beam is provided at one end with an arm held in place by a bolt and nut which permit it to be detached for convenience of transportation. The beam is provided also with a sliding arm fitted loosely, so as to slide easily over it, but constructed so that when pressure is applied to its inner edge, as when it is brought against a tree trunk, it swings into a position in which it is at a true right angle to the beam.

For use in Eastern forests the most convenient caliper is one having a beam measuring 36 inches and arms half that length. Cost, $4. In forests where trees over 3 feet in diameter occur, a caliper having a beam measuring 50 inches and proportionately long arms should be used.

Care should be taken to secure calipers made of perfectly seasoned wood, for otherwise they will warp. Calipers graduated to show the contents of logs in board feet or cords are being introduced in many sections of the country.

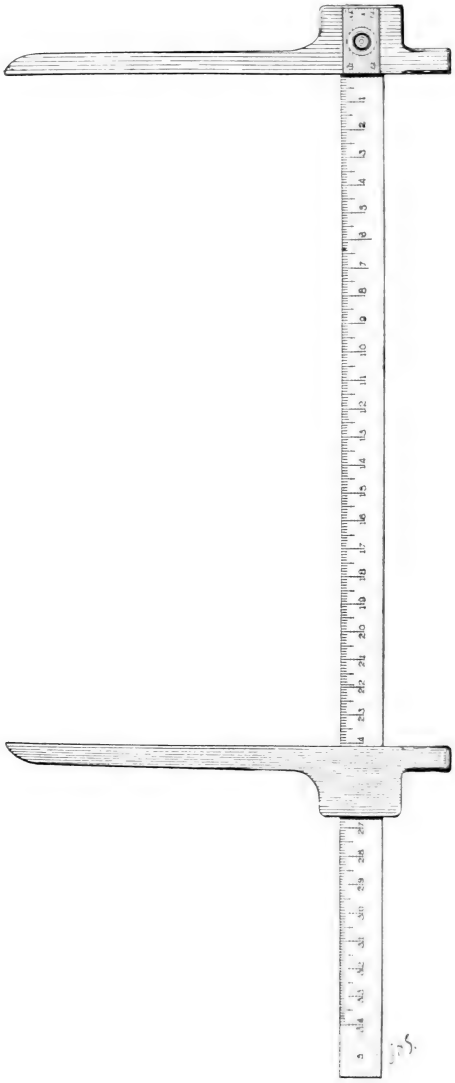


FIG. 13.—Calipers for measuring diameters.

DIAMETER TAPE.

This is a tape for ascertaining the diameter of very large trees, such as the Redwoods of the Pacific coast. It is furnished with special graduations, so that when the girth of a tree has been measured its diameter is read directly from the tape. No cut of this tape is shown.

CRUISERS' TREE COUNTER.

This is a useful device for counting trees in cruising. It consists of a metal box or case about 2 inches in diameter and half an inch thick, containing a mechanism including three numbered

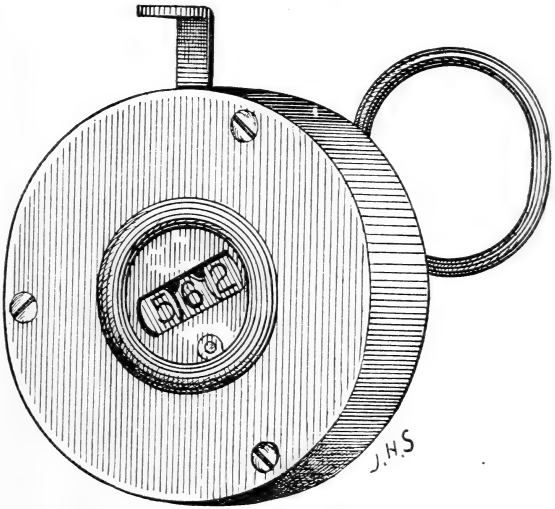


FIG. 14.—Cruiser's tree counter.

wheels, the edges of which are exposed through a small glass disk set in the center of the front of the case. The wheels are turned step by step by a plunger projecting through the edge of the case in position to be operated by the thumb. The box is carried within the palm of the hand and held by a ring through which the middle finger is passed. It counts from 1 to 999, and costs $2.50. (See fig. 14.)

CRUISER'S BARK BLAZER.

One form of this consists of a flat elliptical iron plate having its center cut away to receive the hand and provided on one side and near one end with a hook-like gouge offsetting from the plate at such an angle that when struck with a drawing motion into the bark of a tree a clean blaze will be made. Two wooden handle pieces are riveted to the plate on the opposite side from the gouge. (See fig. 15.)

This instrument is useful in spotting trees, in making estimates, and in laying out roads and trails. It is so simple in construction that it may be made by any blacksmith.

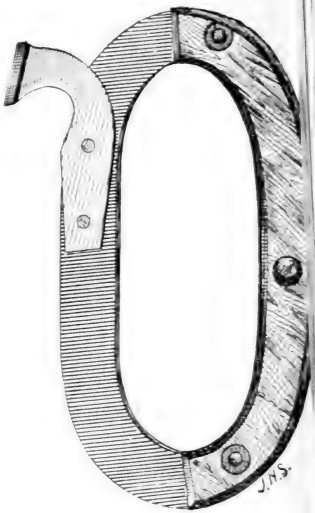
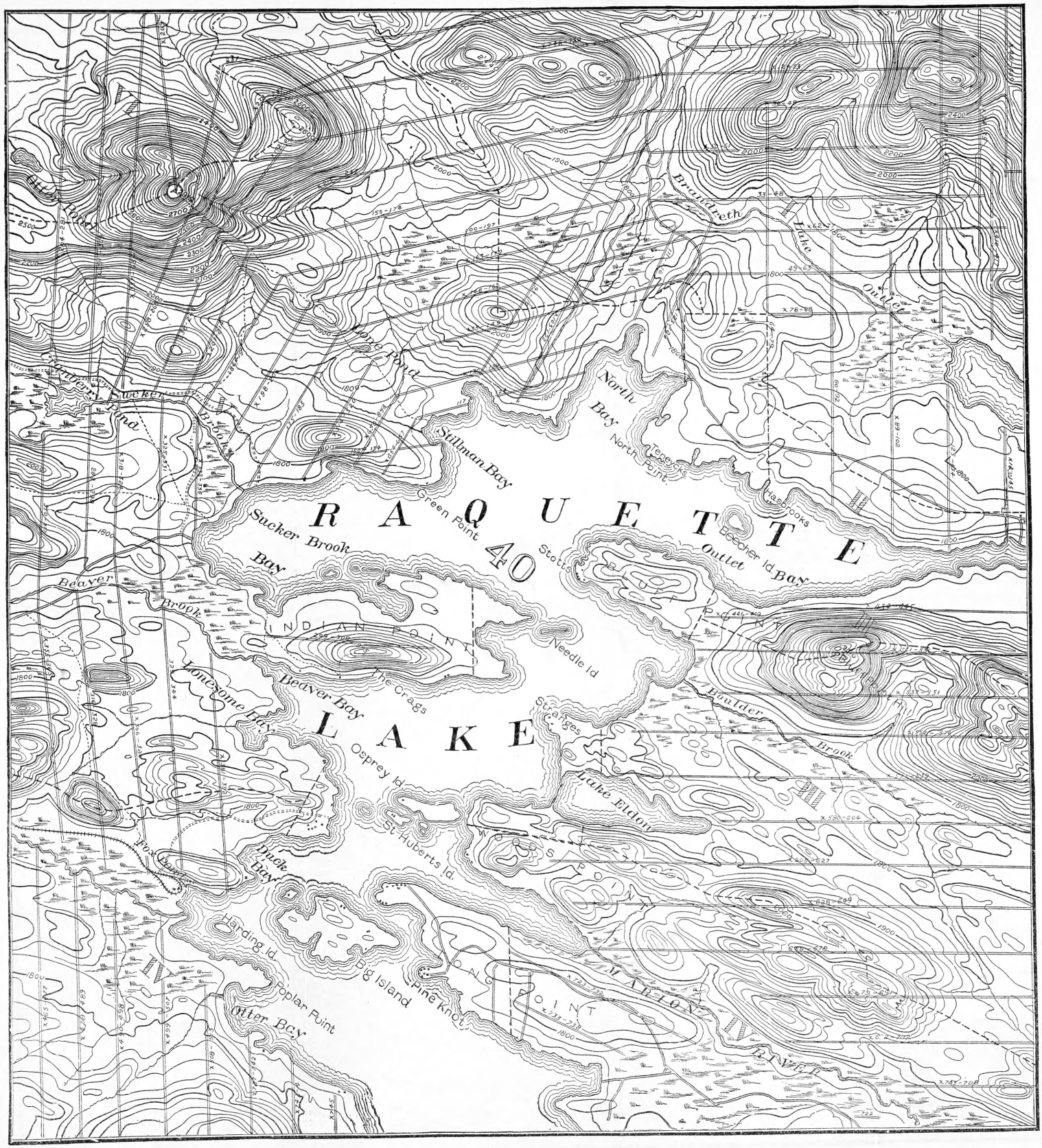


FIG. 15.—Cruiser's bark blazer.



FOREST WORKING PLAN FOR A TOWNSHIP IN THE ADIRONDACK MOUNTAINS.