BARBOW'S BOOKLET

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*Scale and
Section Diagram*

USEFUL TO

Timber Estimators
Timber Owners
and Compass Men

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"Let things that have to be done
be learned by doing them"

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Barbow's Mirror Cruising Compass.

BARBOW'S BOOKLET

Tree Scale and Section Diagram

USEFUL TO

Timber Estimators
Timber Graders
and Company Men

Let things that have to be done be
done by doing them.

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Portland, Oregon

Barbours, Joseph

BARBOW'S

BOOKLET

ON

Tree Scale and Section Diagram

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P R E F A C E

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GOOD AUTHORITIES claim that a precise rule to scale standing timber is most difficult to be arrived at; indeed, we believe it. My method is merely to arrive at the next best.

The author's desire is merely to place before the intelligent beginner and the old woodmen condensed information which he sincerely hopes will be found of value.

JOSEPH BARBOW,

PORTLAND, OREGON

Let things that have to be done be
learned by doing them

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Portland, Oregon

See Remark 2nd
Page 5,

60"

height. 12 logs.
Scale, $.44 = 60''$
 $= 32\ 400'$ B.M.
log per. M. $.37$

18 Paces = 96' from the stump.

Barbow's Mirror Cruising Compass

Includes elements to facilitate compassing. Also a simple device, comprising, an indicator, a log division, a reading mirror, a pair of sights, and a folding scale. For the purposes of determining the number of logs in a tree, and its diameter at the point of mean height.

First Observation. Pace out 18 paces, or measure 96 feet from the base of the tree. At this point hold up compass box vertically and sight along the upper edge to top of tree, and note the number of 16-foot logs indicated in mirror.

Second Observation. Standing at the same point, sight between the pair of sights, to point of mean height on the tree, at the same time holding knot on cord at the eye (the eye is now equal to 12 inches from the sights.) (having previously opened the folding scale which now rests on partly closed cover.) Carefully sight and continue to close cover until each sight coincides with the width of the tree. This having been done carefully, read the scale which is divided in one hundredths of an inch, to correspond with the width of the tree in inches, when the reading on scale is .40, the tree is 40 inches diameter, if .55, the tree is 55 inches diameter. etc.

NOTE—This scale corresponding with the width of the tree will be found precise enough for all trees containing no more than four logs.

And all trees above four logs one may trace its diameter by consulting "Tree Scale in Booklet."

First Example. One finds the tree to contain 5 logs, and the reading of the "Scale" to be .38. See Page 13, find 5 logs line, then

.38 stands under the head of 40 inches diameter. Amount in feet, 5950. Size of timber, .84 log per thousand feet.

Second Example. One finds the tree to contain 12 logs, and the reading of scale .55 See page 20, in the same manner find 12 logs line, then .55 under the head of 75 inches diameter, amount in feet 51600. Size of timber .23 log per thousand feet, etc.

Remark First. Ascertain diameter at the point of mean height on the tree, and deduct the bark.

(Except in case of one log tree, when diameter of top end should be used.)

Remark Second. There may be found cases when the woodsman may find it advisable to deduct 1 and even 2 inches, as well as the bark from the ascertained diameter. For instance, when a tree is both small and short, another, may be large but short, deduct 1 and 2 inches, respectively.

NOTE—Remark 2nd applies to contents of trees in feet only.

Remark Third. To contents of cordwood given add 1 to 10% for close to loose piling respectively, as well as retaining the bark; add tops if used.

Remark Fourth. Number of Ties is approximated.

Remark Fifth. The contents given in feet for each tree is based on Spaulding Log Rule.

First Column--Number of 16 feet logs in the tree
 Second Column--Diameter of tree, in bold face figures, at mean height, with reading of Folding Scale in inches, and hundredths underneath it.

Third Column--Number of feet B. M. in the

	1	2	3	4	5	2	3	4	5
Logs	Dia 10	Feet	Cord	Ties	Dia 11	Feet	Cord	Ties	
1	.10	50	.09	2	.11	60	.10	2	
2	.10	100	.18	4	.11	120	.20	4	
3	.10	150	.27	6	.11	180	.30	6	
4	.10	200	.36	8	.11	240	.40	8	
5	...	...	...	...	.10	300	.50	10	
6	...	...	...	...	.10	360	.60	12	
7	...	...	...	...	...	...	...	...	
8	...	...	...	...	...	...	...	...	
9	...	...	...	...	...	...	...	...	
10	...	...	...	...	...	...	...	...	
11	...	...	...	...	...	...	...	...	
12	...	...	...	...	...	...	...	...	
		20.00				16.67			

Logs	Dia 12	Feet	Cord	Ties	Dia 13	Feet	Cord	Ties
1	.12	80	.12	2	.13	100	.15	2
2	.12	160	.25	4	.13	200	.30	4
3	.12	240	.37	6	.13	300	.45	6
4	.12	320	.50	8	.13	400	.60	8
5	.11	400	.62	10	.12	500	.75	10
6	.11	480	.75	12	.12	600	.90	12
7	.11	560	.87	14	.12	700	1.05	14
8	.10	640	1.00	16	.11	800	1.20	16
9	...	...	...	...	.11	900	1.35	18
10	...	...	...	...	.10	1000	1.50	20
11	...	...	...	...	...	...	...	...
12	...	...	...	...	...	...	...	...
		12.50				10.00		

tree, with number of logs per M., given in logs and hundredths, underneath it.
 Fourth Column—Number of cords of wood in the tree, given in cords and hundredths.
 Fifth Column—Number of ties in tree, tie 7 by 9 inches, and 8 feet long.

1	2	3	4	5	2	3	4	5
Logs	Dia 14	Feet	Cord	Ties	Dia 15	Feet	Cord	Ties
1	.14	120	.17	2	.15	140	.20	4
2	.14	240	.34	4	.15	280	.40	8
3	.14	360	.51	6	.15	420	.60	12
4	.14	480	.68	8	.15	560	.80	16
5	.13	600	.85	10	.14	700	1.00	20
6	.13	720	1.02	12	.14	840	1.20	24
7	.13	840	1.19	14	.14	980	1.40	28
8	.12	960	1.36	16	.13	1120	1.60	32
9	.12	1080	1.53	18	.12	1260	1.80	36
10	.11	1200	1.70	20	.12	1400	2.00	40
11	.11	1320	1.87	22	.12	1540	2.20	44
12	.10	1440	2.04	24	.11	1680	2.40	48
		8.33				7.14		

Logs	Dia 16	Feet	Cord	Ties	Dia 17	Feet	Cord	Ties
1	.16	160	.22	4	.17	190	.25	4
2	.16	320	.44	8	.17	380	.50	8
3	.16	480	.66	12	.17	570	.75	12
4	.16	640	.88	16	.17	760	1.00	16
5	.15	800	1.10	20	.16	950	1.25	20
6	.15	960	1.32	24	.16	1140	1.50	24
7	.14	1120	1.54	28	.15	1330	1.75	28
8	.14	1280	1.76	32	.15	1520	2.00	32
9	.13	1440	1.98	36	.14	1710	2.25	36
10	.13	1600	2.20	40	.14	1900	2.50	40
11	.12	1760	2.42	44	.13	2090	2.75	44
12	.12	1920	2.64	48	.12	2280	3.00	48
		6.25				5.26		

First Column—Number of 16 feet logs in the tree
 Second Column—Diameter of tree, in bold face figures, at mean height, with reading of Folding Scale in inches, and hundredths underneath it.

Third Column—Number of feet B. M. in the

1	2	3	4	5	2	3	4	5
Logs	Dia 18	Feet	Cord	Ties	Dia 19	Feet	Cord	Ties
1	.18	220	.28	4	.19	250	.31	6
2	.18	440	.56	8	.19	500	.62	12
3	.18	660	.84	12	.19	750	.93	18
4	.18	880	1.12	16	.19	1000	1.24	24
5	.17	1100	1.40	20	.18	1250	1.55	30
6	.17	1320	1.68	24	.18	1500	1.86	36
7	.16	1540	1.96	28	.17	1750	2.17	42
8	.16	1760	2.24	32	.17	2000	2.48	48
9	.15	1980	2.52	36	.16	2250	2.79	54
10	.14	2200	2.80	40	.15	2500	3.10	60
11	.14	2420	3.08	44	.15	2750	3.41	66
12	.13	2640	3.36	48	.14	3000	3.72	72
		4.55				4.00		

Logs	Dia 20	Feet	Cord	Ties	Dia 21	Feet	Cord	Ties
1	.20	280	.35	6	.21	310	.38	8
2	.20	560	.70	12	.21	620	.76	16
3	.20	840	1.05	18	.21	930	1.14	24
4	.20	1120	1.40	24	.21	1240	1.52	32
5	.19	1400	1.75	30	.20	1550	1.90	40
6	.19	1680	2.10	36	.20	1860	2.28	48
7	.18	1960	2.45	42	.19	2170	2.66	56
8	.17	2240	2.80	48	.18	2480	3.04	64
9	.17	2520	3.15	54	.18	2790	3.42	72
10	.16	2800	3.50	60	.17	3100	3.80	80
11	.15	3080	3.85	66	.16	3410	4.18	88
12	.15	3360	4.20	72	.15	3720	4.56	96
		3.57				3.23		

tree with number of logs per M., given in logs and hundredths, underneath it.
 Fourth Column—Number of cords of wood in the tree, given in cords and hundredths.
 Fifth Column—Number of ties in tree, tie, 7 by 9 inches, and 8 feet long.

1	2	3	4	5	2	3	4	5
Logs	Dia 22	Feet	Cord	Ties	Dia 23	Feet	Cord	Ties
1	.22	340	.42	8	.23	380	.46	8
2	.22	680	.84	16	.23	760	.92	16
3	.22	1020	1.26	24	.23	1140	1.38	24
4	.22	1360	1.68	32	.23	1520	1.84	32
5	.21	1700	2.10	40	.22	1900	2.30	40
6	.21	2040	2.52	48	.21	2280	2.76	48
7	.20	2380	2.94	56	.21	2660	3.22	56
8	.19	2720	3.36	64	.20	3040	3.68	64
9	.18	3060	3.78	72	.19	3420	4.14	72
10	.18	3400	4.20	80	.18	3800	4.60	80
11	.17	3740	4.62	88	.18	4180	5.06	88
12	.16	4080	5.04	96	.17	4560	5.52	96
		2.94				2.63		

Logs	Dia 24	Feet	Cord	Ties	Dia 25	Feet	Cord	Ties
1	.24	410	.50	10	.25	450	.54	10
2	.24	820	1.00	20	.25	900	1.08	20
3	.24	1230	1.50	30	.25	1350	1.62	30
4	.24	1640	2.00	40	.25	1800	2.16	40
5	.23	2050	2.50	50	.24	2250	2.70	50
6	.22	2460	3.00	60	.23	2700	3.24	60
7	.22	2870	3.50	70	.23	3150	3.78	70
8	.21	3280	4.00	80	.22	3600	4.32	80
9	.20	3690	4.50	90	.21	4050	4.86	90
10	.19	4100	5.00	100	.20	4500	5.40	100
11	.18	4510	5.50	110	.19	4950	5.94	110
12	.18	4920	6.00	120	.18	5400	6.48	120
		2.44				2.22		

First Column--Number of 16 feet logs in the tree
 Second Column--Diameter of tree, in bold face figures, at mean height, with reading of Folding Scale in inches, and hundredths underneath it.

Third Column--Number of feet B. M. in the

1	2	3	4	5	2	3	4	5
Logs	Dia 26	Feet	Cord	Ties	Dia 27	Feet	Cord	Ties
1	.26	490	.59	10	.27	530	.63	12
2	.26	980	1.18	20	.27	1060	1.26	24
3	.26	1470	1.77	30	.27	1590	1.89	36
4	.26	1960	2.36	40	.27	2120	2.52	48
5	.25	2450	2.95	50	.26	2650	3.15	60
6	.24	2940	3.54	60	.25	3180	3.78	72
7	.23	3430	4.13	70	.24	3710	4.41	84
8	.23	3920	4.72	80	.23	4240	5.04	96
9	.22	4410	5.31	90	.22	4770	5.67	108
10	.21	4900	5.90	100	.22	5300	6.30	120
11	.20	5390	6.49	110	.21	5830	6.93	132
12	.19	5880	7.08	120	.20	6360	7.56	144
		2.04				1.89		

Logs	Dia 28	Feet	Cord	Ties	Dia 29	Feet	Cord	Ties
1	.28	570	.68	12	.29	610	.73	12
2	.28	1140	1.36	24	.29	1220	1.46	24
3	.28	1710	2.04	36	.29	1830	2.19	36
4	.28	2280	2.72	48	.29	2440	2.92	48
5	.27	2850	3.40	60	.28	3050	3.65	60
6	.26	3420	4.08	72	.27	3660	4.38	72
7	.25	3990	4.76	84	.26	4270	5.11	84
8	.24	4560	5.44	96	.25	4880	5.84	96
9	.23	5130	6.12	108	.24	5490	6.57	108
10	.22	5700	6.80	120	.23	6100	7.30	120
11	.22	6270	7.48	132	.22	6710	8.03	132
12	.21	6840	8.16	144	.21	7320	8.76	144
		1.75				1.64		

tree, with number of logs per M., given in logs and hundredths, underneath it.
 Fourth Column—Number of cords of wood in the tree, given in cords and hundredths.
 Fifth Column—Number of ties in tree, tie 7 by 9 inches, and 8 feet long.

1	2	3	4	5	2	3	4	5
Logs	Dia 30	Feet	Cord	Ties	Dia 31	Feet	Cord	Ties
1	.30	660	.78	14	.31	700	.83	14
2	.30	1320	1.56	28	.31	1400	1.66	28
3	.30	1980	2.34	42	.31	2100	2.49	42
4	.30	2640	3.12	56	.31	2800	3.32	56
5	.29	3300	3.90	70	.30	3500	4.15	70
6	.28	3960	4.68	84	.29	4200	4.98	84
7	.27	4620	5.46	98	.28	4900	5.81	98
8	.26	5280	6.24	112	.27	5600	6.64	112
9	.25	5940	7.02	126	.26	6300	7.47	126
10	.24	6600	7.80	140	.25	7000	8.30	140
11	.23	7260	8.58	154	.24	7700	9.13	154
12	.22	7920	9.36	168	.23	8400	9.96	168
		1.52				1.43		

Logs	Dia 32	Feet	Cord	Ties	Dia 33	Feet	Cord	Ties
1	.32	750	.89	16	.33	800	.95	20
2	.32	1500	1.78	32	.33	1600	1.90	40
3	.32	2250	2.67	48	.33	2400	2.85	60
4	.32	3000	3.56	64	.33	3200	3.80	80
5	.31	3750	4.45	80	.32	4000	4.75	100
6	.30	4500	5.34	96	.31	4800	5.70	120
7	.29	5250	6.23	112	.30	5600	6.65	140
8	.28	6000	7.12	128	.29	6400	7.60	160
9	.27	6750	8.01	144	.27	7200	8.55	180
10	.26	7500	8.90	160	.26	8000	9.50	200
11	.25	8250	9.79	176	.25	8800	10.45	220
12	.24	9000	10.68	192	.24	9600	11.40	240
		1.33				1.25		

First Column—Number of 16 feet logs in the tree
 Second Column—Diameter of tree, in bold face figures, at mean height, with reading of Folding Scale in inches, and hundredths underneath it.

Third Column—Number of feet B. M. in the

1	2	3	4	5	2	3	4	5
Logs	Dia 34	Feet	Cord	Ties	Dia 35	Feet	Cord	Ties
1	.34	850	1.00	20	.35	900	1.06	24
2	.34	1700	2.00	40	.35	1800	2.12	48
3	.34	2550	3.00	60	.35	2700	3.18	72
4	.34	3400	4.00	80	.35	3600	4.24	96
5	.33	4250	5.00	100	.34	4500	5.30	120
6	.32	5100	6.00	120	.33	5400	6.36	144
7	.31	5950	7.00	140	.32	6300	7.42	168
8	.30	6800	8.00	160	.30	7200	8.48	192
9	.28	7650	9.00	180	.29	8100	9.54	216
10	.27	8500	10.00	200	.28	9000	10.60	240
11	.26	9350	11.00	220	.27	9900	11.66	264
12	.25	10200	12.00	240	.26	10800	12.72	288
		1.18				1.11		

Logs	Dia 36	Feet	Cord	Ties	Dia 37	Feet	Cord	Ties
1	.36	950	1.12	24	.37	1010	1.19	28
2	.36	1900	2.25	48	.37	2020	2.38	56
3	.36	2850	3.37	72	.37	3030	3.57	84
4	.36	3800	4.50	96	.37	4040	4.76	112
5	.35	4750	5.62	120	.36	5050	5.95	140
6	.34	5700	6.75	144	.35	6060	7.14	168
7	.32	6650	7.87	168	.33	7070	8.33	196
8	.31	7600	9.00	192	.32	8080	9.52	224
9	.30	8550	10.12	216	.31	9090	10.71	252
10	.29	9500	11.25	240	.30	10100	11.90	280
11	.28	10450	12.37	264	.28	11110	13.09	308
12	.26	11400	13.50	288	.27	12120	14.28	336
		1.05				1.00		

tree with number of logs per M., given in logs and hundredths, underneath it.
 Fourth Column—Number of cords of wood in the tree, given in cords and hundredths.
 Fifth Column—Number of ties in tree, tie 7 by 9 inches, and 8 feet long.

1	2	3	4	5	2	3	4	5
Logs	Dia 38	Feet	Cord	Ties	Dia 39	Feet	Cord	Ties
1	.38	1060	1.25	28	.39	1120	1.32	28
2	.38	2120	2.50	56	.39	2240	2.64	56
3	.38	3180	3.75	84	.39	3360	3.96	84
4	.38	4240	5.00	112	.39	4480	5.28	112
5	.37	5300	6.25	140	.37	5600	6.60	140
6	.35	6360	7.50	168	.36	6720	7.92	168
7	.34	7420	8.75	196	.35	7840	9.24	196
8	.33	8480	10.00	224	.34	8960	10.56	224
9	.32	9540	11.25	252	.32	10080	11.88	252
10	.30	10600	12.50	280	.31	11200	13.20	280
11	.29	11660	13.75	308	.30	12320	14.52	308
12	.28	12720	15.00	336	.29	13440	15.84	336
		.94				.89		

Logs	Dia 40	Feet	Cord	Ties	Dia 41	Feet	Cord	Ties
1	.40	1190	1.39	28	.41	1250	1.46	32
2	.40	2380	2.78	56	.41	2500	2.92	64
3	.40	3570	4.17	84	.41	3750	4.38	96
4	.40	4760	5.56	112	.41	5000	5.84	128
5	.38	5950	6.95	140	.39	6250	7.30	160
6	.37	7140	8.34	168	.38	7500	8.76	192
7	.36	8330	9.73	196	.37	8750	10.22	224
8	.35	9520	11.12	224	.36	10000	11.68	256
9	.33	10710	12.51	252	.34	11250	13.14	288
10	.32	11900	13.90	280	.33	12500	14.60	320
11	.31	13090	15.29	308	.32	13750	16.06	352
12	.29	14280	16.68	336	.30	15000	17.52	384
		.84				.80		

First Column—Number of 16 feet logs in the tree
 Second Column—Diameter of tree, in bold face figures, at mean height, with reading of Folding Scale in inches, and hundredths underneath it.

Third Column—Number of feet B. M. in the

	1	2	3	4	5	2	3	4	5
Logs	Dia 42	Feet	Cord	Ties	Dia 43	Feet	Cord	Ties	
1	.42	1310	1.53	32	.43	1380	1.60	32	
2	.42	2620	3.06	64	.43	2760	3.20	64	
3	.42	3930	4.59	96	.43	4140	4.80	96	
4	.42	5240	6.12	128	.43	5520	6.40	128	
5	.40	6550	7.65	160	.41	6900	8.00	160	
6	.39	7860	9.18	192	.40	8280	9.60	192	
7	.38	9170	10.71	224	.39	9660	11.20	224	
8	.37	10480	12.24	256	.37	11040	12.80	256	
9	.35	11790	13.77	288	.36	12420	14.40	288	
10	.34	13100	15.30	320	.34	13800	16.00	320	
11	.32	14410	16.83	352	.33	15180	17.60	352	
12	.31	15720	18.36	384	.32	16560	19.20	384	
		.76				.72			

Logs	Dia 44	Feet	Cord	Ties	Dia 45	Feet	Cord	Ties
1	.44	1450	1.68	36	.45	1510	1.76	36
2	.44	2900	3.36	72	.45	3020	3.52	72
3	.44	4350	5.04	108	.45	4530	5.28	108
4	.44	5800	6.72	144	.45	6040	7.04	144
5	.42	7250	8.40	180	.43	7550	8.80	180
6	.41	8700	10.08	216	.42	9060	10.56	216
7	.40	10150	11.76	252	.41	10570	12.32	252
8	.38	11600	13.44	288	.39	12080	14.08	288
9	.37	13050	15.12	324	.37	13590	15.84	324
10	.35	14500	16.80	360	.36	15100	17.60	360
11	.34	15950	18.48	396	.35	16610	19.36	396
12	.32	17400	20.16	432	.33	18120	21.12	432
		.69				.66		

tree, with number of logs per M., given in logs and hundredths, underneath it.
 Fourth Column—Number of cords of wood in the tree, given in cords and hundredths.
 Fifth Column—Number of ties in tree, tie 7 by 9 inches, and 8 feet long.

1	2	3	4	5	2	3	4	5
Logs	Dia 46	Feet	Cord	Ties	Dia 47	Feet	Cord	Ties
1	.46	1580	1.84	36	.47	1650	1.92	36
2	.46	3160	3.68	72	.47	3300	3.84	72
3	.46	4740	5.52	108	.47	4950	5.76	108
4	.46	6320	7.36	144	.47	6600	7.68	144
5	.44	7900	9.20	180	.45	8250	9.60	180
6	.43	9480	11.04	216	.44	9900	11.52	216
7	.41	11060	12.88	252	.42	11550	13.44	252
8	.40	12640	14.72	288	.41	13200	15.36	288
9	.38	14220	16.56	324	.39	14850	17.28	324
10	.37	15800	18.40	360	.38	16500	19.20	360
11	.35	17380	20.24	396	.36	18150	21.12	396
12	.34	18960	22.08	432	.35	19800	23.04	432
		.63				.61		

Logs	Dia 48	Feet	Cord	Ties	Dia 49	Feet	Cord	Ties
1	.48	1720	2.00	40	.49	1800	2.08	40
2	.48	3440	4.00	80	.49	3600	4.16	80
3	.48	5160	6.00	120	.49	5400	6.24	120
4	.48	6880	8.00	160	.49	7200	8.32	160
5	.46	8600	10.00	200	.47	9000	10.40	200
6	.45	10320	12.00	240	.46	10800	12.48	240
7	.43	12040	14.00	280	.44	12600	14.56	280
8	.42	13760	16.00	320	.43	14400	16.64	320
9	.40	15480	18.00	360	.41	16200	18.72	360
10	.38	17200	20.00	400	.39	18000	20.80	400
11	.37	18920	22.00	440	.38	19800	22.88	440
12	.35	20640	24.00	480	.36	21600	24.96	480
		.58				.56		

First Column—Number of 16 feet logs in the tree
 Second Column—Diameter of tree, in bold face figures, at mean height, with reading of Folding Scale in inches, and hundredths underneath it.

Third Column—Number of feet B. M. in the tree, with number of logs per M., given in logs and hundredths, underneath it.

Fourth Column—Number of cords of wood in the tree, given in cords and hundredths.

Fifth Column—Number of ties in tree, tie 7 by 9 inches, and 8 feet long.

1	2	3	4	5
Logs	Dia 50	Feet	Cord	Ties
1	.50	1870	2.17	44
2	.50	3740	4.34	88
3	.50	5610	6.51	132
4	.50	7480	8.68	176
5	.48	9350	10.85	220
6	.47	11220	13.02	264
7	.45	13090	15.19	308
8	.43	14960	17.36	352
9	.42	16830	19.53	396
10	.40	18700	21.70	440
11	.38	20570	23.87	484
12	.37	22440	26.04	528
		.53		

First Column--Number of 16 feet logs in the tree
 Second Column--Diameter of tree, in bold face figures, at mean height, with reading of Folding Scale in inches, and hundredths underneath it.

Third Column--Number of feet B. M. in the tree, with number of logs per M., given in logs and hundredths, underneath it.

1 2 3 2 3 2 3 2 3

Logs	Dia 51	Feet	Dia 52	Feet	Dia 53	Feet	Dia 54	Feet
1	.51	1950	.52	2030	.53	2100	.54	2180
2	.51	3900	.52	4060	.53	4200	.54	4360
3	.51	5850	.52	6090	.53	6300	.54	6540
4	.51	7800	.52	8120	.53	8400	.54	8720
5	.49	9750	.50	10150	.51	10500	.52	10900
6	.48	11700	.49	12180	.50	12600	.50	13080
7	.46	13650	.47	14210	.48	14700	.49	15260
8	.44	15600	.45	16240	.46	16800	.47	17440
9	.42	17550	.43	18270	.44	18900	.45	19620
10	.41	19500	.42	20300	.42	21000	.43	21800
11	.39	21450	.40	22330	.41	23100	.42	23980
12	.37	23400	.38	24360	.39	25200	.40	26160
		.51		.49		.48		.46

Logs	Dia 55	Feet	Dia 56	Feet	Dia 57	Feet	Dia 58	Feet
1	.55	2270	.56	2350	.57	2440	.58	2520
2	.55	4540	.56	4700	.57	4880	.58	5040
3	.55	6810	.56	7050	.57	7320	.58	7560
4	.55	9080	.56	9400	.57	9760	.58	10080
5	.53	11350	.54	11750	.55	12200	.56	12600
6	.51	13620	.52	14100	.53	14640	.54	15120
7	.50	15890	.50	16450	.51	17080	.52	17640
8	.48	18160	.49	18800	.50	19520	.50	20160
9	.46	20430	.47	21150	.48	21960	.48	22680
10	.44	22700	.45	23500	.46	24400	.46	25200
11	.42	24970	.43	25850	.44	26840	.45	27720
12	.40	27240	.41	28200	.42	29280	.43	30240
		.44		.43		.41		.40

First Column—Number of 16 feet logs in the tree
 Second Column—Diameter of tree, in bold
 face figures, at mean height, with reading
 of Folding Scale in inches, and hundredths

1	2	3	2	3	2	3	2	3
Logs	Dia 59	Feet	Dia 60	Feet	Dia 61	Feet	Dia 62	Feet
1	.59	2610	.60	2700	.61	2800	.62	2890
2	.59	5220	.60	5400	.61	5600	.62	5780
3	.59	7830	.60	8100	.61	8400	.62	8670
4	.59	10440	.60	10800	.61	11200	.62	11560
5	.57	13050	.58	13500	.59	14000	.60	14450
6	.55	15660	.56	16200	.57	16800	.58	17340
7	.53	18270	.54	18900	.55	19600	.56	20230
8	.51	20880	.52	21600	.53	22400	.54	23120
9	.49	23490	.50	24300	.51	25200	.52	26010
10	.47	26100	.48	27000	.49	28000	.50	28900
11	.45	28710	.46	29700	.47	30800	.48	31790
12	.43	31320	.44	32400	.45	33600	.46	34680
		.38		.37		.36		.35

Logs	Dia 63	Feet	Dia 64	Feet	Dia 65	Feet	Dia 66	Feet
1	.63	2990	.64	3090	.65	3190	.66	3290
2	.63	5980	.64	6180	.65	6380	.66	6580
3	.63	8970	.64	9270	.65	9570	.66	9870
4	.63	11960	.64	12360	.65	12760	.66	13160
5	.61	14950	.62	15450	.63	15950	.63	16450
6	.59	17940	.60	18540	.61	19140	.62	19740
7	.57	20930	.58	21630	.59	22330	.59	23030
8	.55	23920	.56	24720	.57	25520	.57	26320
9	.52	26910	.53	27810	.54	28710	.55	29610
10	.50	29900	.51	30900	.52	31900	.53	32900
11	.48	32890	.49	33990	.50	35090	.51	36190
12	.46	35880	.47	37080	.48	38280	.49	39480
		.33		.32		.31		.30

underneath it.
 Third Column—Number of feet B. M. in the tree, with number of logs per M., given in logs and hundredths, underneath it.

1	2	3	2	3	2	3	2	3
Logs	Dia 67	Feet	Dia 68	Feet	Dia 69	Feet	Dia 70	Feet
1	.67	3390	.68	3500	.69	3610	.70	3720
2	.67	6780	.68	7000	.69	7220	.70	7440
3	.67	10170	.68	10500	.69	10830	.70	11160
4	.67	13560	.68	14000	.69	14440	.70	14880
5	.64	16950	.65	17500	.66	18050	.67	18600
6	.63	20340	.64	21000	.64	21660	.65	22320
7	.60	23730	.61	24500	.62	25270	.63	26040
8	.58	27120	.59	28000	.60	28880	.61	29760
9	.56	30510	.57	31500	.57	32490	.58	33480
10	.54	33900	.54	35000	.55	36100	.56	37200
11	.52	37290	.52	38500	.53	39710	.54	40920
12	.49	40680	.50	42000	.51	43320	.51	44640
		.29		.29		.28		.27

Logs	Dia 71	Feet	Dia 72	Feet	Dia 73	Feet	Dia 74	Feet
1	.71	3830	.72	3950	.73	4060	.74	4180
2	.71	7660	.72	7900	.73	8120	.74	8360
3	.71	11490	.72	11850	.73	12180	.74	12540
4	.71	15320	.72	15800	.73	16240	.74	16720
5	.68	19150	.69	19750	.70	20300	.71	20900
6	.66	22980	.67	23700	.68	24360	.69	25080
7	.64	26810	.65	27650	.66	28420	.67	29260
8	.62	30640	.63	31600	.63	32480	.64	33440
9	.59	34470	.60	35550	.61	36540	.62	37620
10	.57	38300	.58	39500	.58	40600	.59	41800
11	.55	42130	.55	43450	.56	44660	.57	45980
12	.52	45960	.53	47400	.54	48720	.54	50160
		.26		.25		.25		.24

First Column—Number of 16 feet logs in the tree
 Second Column—Diameter of tree, in bold
 face figures, at mean height, with reading
 of Folding Scale in inches, and hundredths

1	2	3	2	3	2	3	2	3
Logs	Dia 75	Feet	Dia 76	Feet	Dia 77	Feet	Dia 78	Feet
1	.75	4300	.76	4420	.77	4540	.78	4660
2	.75	8600	.76	8840	.77	9080	.78	9320
3	.75	12900	.76	13260	.77	13620	.78	13980
4	.75	17200	.76	17680	.77	18160	.78	18640
5	.72	21500	.73	22100	.74	22700	.75	23300
6	.70	25800	.71	26520	.72	27240	.73	27960
7	.68	30100	.68	30940	.69	31780	.70	32620
8	.65	34400	.66	35360	.67	36320	.68	37280
9	.62	38700	.63	39780	.64	40860	.65	41940
10	.60	43000	.61	44200	.62	45400	.62	46600
11	.58	47300	.58	48620	.59	49940	.60	51260
12	.55	51600	.56	53040	.57	54480	.57	55920
		.23		.23		.22		.21

Logs	Dia 79	Feet	80	Feet	Dia 81	Feet	Dia 82	Feet
1	.79	4790	.80	4910	.81	5040	.82	5170
2	.79	9580	.80	9820	.81	10080	.82	10340
3	.79	14370	.80	14730	.81	15120	.82	15510
4	.79	19160	.80	19640	.81	20160	.82	20680
5	.76	23950	.77	24550	.78	25200	.79	25850
6	.74	28740	.75	29460	.76	30240	.77	31020
7	.71	33530	.72	34370	.73	35280	.74	36190
8	.69	38320	.70	39280	.70	40320	.71	41360
9	.66	43110	.67	44190	.67	45360	.68	46530
10	.63	47900	.64	49100	.65	50400	.66	51700
11	.61	52690	.62	54010	.62	55440	.63	56870
12	.58	57480	.59	58920	.60	60480	.60	62040
		.21		.20		.20		.19

underneath it.

Third Column—Number of feet B. M. in the tree, with number of logs per M., given in logs and hundredths, underneath it.

	1	2	3	2	3	2	3	2	3
Logs	Dia 83	Feet	Dia 84	Feet	Dia 85	Feet	Dia 86	Feet	
1	.83	5290	.84	5420	.85	5550	.86	5690	
2	.83	10580	.84	10840	.85	11100	.86	11380	
3	.83	15870	.84	16260	.85	16650	.86	17070	
4	.83	21160	.84	21680	.85	22200	.86	22760	
5	.80	26450	.81	27100	.82	27750	.83	28450	
6	.78	31740	.79	32520	.79	33300	.80	34140	
7	.75	37030	.76	37940	.77	38850	.77	39830	
8	.72	42320	.73	43360	.74	44400	.75	45520	
9	.69	47610	.70	48780	.71	49950	.72	51210	
10	.66	52900	.67	54200	.68	55500	.69	56900	
11	.64	58190	.65	59620	.65	61050	.66	62590	
12	.61	63480	.62	65040	.62	66600	.63	68280	
		.19		.18		.18		.18	

Logs	Dia 87	Feet	Dia 88	Feet	Dia 89	Feet	Dia 90	Feet
1	.87	5820	.88	5950	.89	6090	.90	6220
2	.87	11640	.88	11900	.89	12180	.90	12440
3	.87	17460	.88	17850	.89	18270	.90	18660
4	.87	23280	.88	23800	.89	24360	.90	24880
5	.84	29100	.85	29750	.86	30450	.87	31100
6	.81	34920	.82	35700	.83	36540	.84	37320
7	.78	40740	.79	41650	.80	42630	.81	43540
8	.76	46560	.77	47600	.77	48720	.78	49760
9	.72	52380	.73	53550	.74	54810	.75	55980
10	.70	58200	.70	59500	.71	60900	.72	62200
11	.67	64020	.68	65450	.68	66990	.69	68420
12	.64	69840	.65	71400	.65	73080	.66	74640
		.17		.17		.16		.16

First Column—Number of 16 feet logs in the tree
 Second Column—Diameter of tree, in bold
 face figures, at mean height, with reading
 of Folding Scale in inches, and hundredths

1	2	3	2	3	2	3	2	3
Logs	Dia 91	Feet	Dia 92	Feet	Dia 93	Feet	Dia 94	Feet
1	.91	6360	.92	6500	.93	6640	.94	6780
2	.91	12720	.92	13000	.93	13280	.94	13560
3	.91	19080	.92	19500	.93	19920	.94	20340
4	.91	25440	.92	26000	.93	26560	.94	27120
5	.87	31800	.88	32500	.89	33200	.90	33900
6	.85	38160	.86	39000	.87	39840	.88	40680
7	.82	44520	.83	45500	.84	46480	.85	47460
8	.79	50880	.80	52000	.81	53120	.82	54240
9	.76	57240	.77	58500	.77	59760	.78	61020
10	.73	63600	.74	65000	.74	66400	.75	67800
11	.70	69960	.71	71500	.72	73040	.72	74580
12	.67	76320	.68	78000	.68	79680	.69	81360
		.16		.15		.15		.15

Logs	Dia 95	Feet	Dia 96	Feet	Dia 97	Feet	Dia 98	Feet
1	.95	6920	.96	7070	.97	7210	.98	7360
2	.95	13840	.96	14140	.97	14420	.98	14720
3	.95	20760	.96	21210	.97	21630	.98	22080
4	.95	27680	.96	28280	.97	28840	.98	29440
5	.91	34600	.92	35350	.93	36050	.94	36800
6	.89	41520	.90	42420	.91	43260	.92	44160
7	.86	48440	.86	49490	.87	50470	.88	51520
8	.83	55360	.83	56560	.84	57680	.85	58880
9	.79	62280	.80	63630	.81	64890	.82	66240
10	.76	69200	.77	70700	.78	72100	.78	73600
11	.73	76120	.74	77770	.75	79310	.75	80960
12	.70	83040	.71	84840	.71	86520	.72	88320
		.14		.14		.14		.14

underneath it.
 Third Column—Number of feet B. M. in the
 tree with number of logs per M., given in
 logs and hundredths, underneath it.

1	2	3	2	3	2	3
Logs	Dia 99	Feet	Dia 100	Feet	Dia. 101	Feet
1	.99	7510	1.00	7640	1.01	7790
2	.99	15020	1.00	15280	1.01	15580
3	.99	22530	1.00	22920	1.01	23370
4	.99	30040	1.00	30560	1.01	31160
5	.95	37550	.96	38200	.97	38950
6	.93	45060	.93	45840	.94	46740
7	.89	52570	.90	53480	.91	54530
8	.86	60080	.87	61120	.88	62320
9	.82	67590	.83	68760	.84	70110
10	.79	75100	.80	76400	.81	77900
11	.76	82610	.77	84040	.78	85690
12	.73	90120	.74	91680	.74	93480
		.13		.13		.13

Logs	Dia. 102	Feet	Dia. 103	Feet	Dia. 104	Feet
1	1.02	7950	1.03	8100	1.04	8250
2	1.02	15900	1.03	16200	1.04	16500
3	1.02	23850	1.03	24300	1.04	24750
4	1.02	31800	1.03	32400	1.04	33000
5	.98	39750	.99	40500	1.00	41250
6	.95	47700	.96	48600	.97	49500
7	.92	55650	.93	56700	.94	57750
8	.89	63600	.90	64800	.90	66000
9	.85	71550	.86	72900	.87	74250
10	.82	79500	.82	81000	.83	82500
11	.78	87450	.79	89100	.80	90750
12	.75	95400	.76	97200	.76	99000
		.13		.12		.12

First Column—Number of 16 feet logs in the tree
 Second Column—Diameter of tree, in bold face figures, at mean height, with reading of Folding Scale in inches, and hundredths underneath it.

Third Column—Number of feet B. M. in the tree, with number of logs per M., given in logs and hundredths, underneath it.

1	2	3	2	3	2	3
Logs	Dia. 105	Feet	Dia. 106	Feet	Dia. 107	Feet
1	1.05	8410	1.06	8570	1.07	8730
2	1.05	16820	1.06	17140	1.07	17460
3	1.05	25230	1.06	25710	1.07	26190
4	1.05	33640	1.06	34280	1.07	34920
5	1.01	42050	1.02	42850	1.03	43650
6	.98	50460	.99	51420	1.00	52380
7	.95	58870	.95	59990	.96	61110
8	.91	67280	.92	68560	.93	69840
9	.87	75690	.88	77130	.89	78570
10	.84	84100	.85	85700	.86	87300
11	.81	92510	.82	94270	.82	96030
12	.77	100920	.78	102840	.79	104760
		.12		.12		.11

Logs	Dia. 108	Feet	Dia. 109	Feet	Dia. 110	Feet
1	1.08	8890	1.09	9060	1.10	9230
2	1.08	17780	1.09	18120	1.10	18460
3	1.08	26670	1.09	27180	1.10	27690
4	1.08	35560	1.09	36240	1.10	36920
5	1.04	44450	1.05	45300	1.06	46150
6	1.01	53340	1.02	54360	1.03	55380
7	.97	62230	.98	63420	.99	64610
8	.94	71120	.95	72480	.96	73840
9	.90	80010	.91	81540	.92	83070
10	.86	88900	.87	90600	.88	92300
11	.83	97790	.84	99660	.85	101530
12	.79	106680	.80	108720	.81	110760
		.11		.11		.11

HINTS ON CRUISING.

Where timber is small and dense and rapid cruise is desired, apply "Averaging System." Run twice through each forty acres, count all trees on 8 acres *as you go*, base estimates on the average acre. If for example, the S. W. $\frac{1}{4}$ of the S. W. $\frac{1}{4}$ of a Section is to be examined, pace East one tally (20 rods) from S. W. corner of Section, thence run North. Have Compassman call out each tally (20 rods); the Cruiser will judge as accurately as possible by sight an 8 rods strip, run through center of strip, counting all trees 4 rods each side of him. (4 rods equals $12\frac{1}{2}$ paces). In counting or tabulating your trees as found, of course, due regard must be given noticeable defects in considering Heights and Diameters and proper allowance made therefor. Class the kinds of timber separately. It is very important to the *owner* to note streams, and prominent topographical features even in a rapid examination. At three tallies North (60 rods), run east one tally (20 rods); then you will have counted all the trees on four acres. (Check average acre and other observations made of the West half, etc.). Continue run one tally further East, thence South 3 tallies, you will be proceeding through East half of the 40 acres to Section Line. Tabulating the trees *as you go* or counting and booking the total results found, when you have finished this run. Therefore, having examined carefully the 8 acres you then have gained the knowledge of stand per acre. Assuming the timber on the 40 acres is equally dense, then 40, multiplied by the average acre gained is the total stand, of course, due allowance and judgment must be used for bare spots, light stands, burns, etc.

NOTE—Whenever the term "Pace" appears, it means *two* steps or 64 inches.

A Close Cruise.

Run 5 times through each 40 acres, count all trees on each 2 acres *as you go*, booking

knowledge gained at each tally (20 rods). If for example, the S. W. $\frac{1}{4}$ of the S. W. $\frac{1}{4}$ of a Section is to be examined, pace East (25 paces) from the S. W. corner of Section, thence run North. Have Compassman call one tally (20 rods) stop, and give a right angle, the Cruiser will judge as accurately as possible by sight a 16 rods strip, run through center of strip, counting all trees (8 rods) on each side of him. (8 rods equals 25 paces). Therefore having carefully counted the trees on 2 acres and booking the results. Continue North one tally further, counting, observing and again booking knowledge gained. Continue North and repeat at each tally until you have reached 4 tallies. then run East (25 paces) and book final observations of this 8 acre strip. Thence continue East 25 paces further, thence south one tally, again booking knowledge gained. Continue back and forth through the 40, observing, counting and booking at each tally (2 acres), and proving up at the Section Line at each strip. Therefore having examined carefully the 40 acres by 2 acres, you then have gained the knowledge of stand, sizes, kinds, quality and contents of timber of each kind, etc. as well as the minutes of the topography of the surface, etc.

NOTE—The Cruiser should have an assistant.

NOTE—Observations should include in your diagram locations and width of streams and their courses, hills, divides, low passes, roads, trails, undergrowth, dead trees, down trees, canyons, etc., burns, improvements, if any, and what may be the fire risk, etc., quality of soil, 1st, 2nd, or 3rd grade, etc. At best, the average estimate is only an approximate one; have your deduction, therefore, safe. Judgment as to quality and logging conditions as well as the knowledge of finding, counting and estimating timber should be cultivated.

PRESERVATION OF TIMBER.

Disease, Cause and Effects.

The decay of timber is caused by the growth and activities of fungi. The minute spores of one of these fungi, germinating on a piece of wood, send out fine threads, which enter the wood cells and soon give off a complex compound called a ferment or enzyme, which dissolves certain parts of the wood fibre. The dissolved fibre serves as food for the fungus. The threads throw out branches and sub-branches, and soon the timber is permeated by a mass of such threads, the growing parts of which give off ferment. The action of the ferment changes the chemical and physical properties of the wood, rendering it, in some cases, like brown charcoal, in others white, soft and stringy, and the wood is said to be rotten or decayed. Eventually some of the threads grow out from the surface of the timber, and form toadstools and other excrescences. Under these are found cavities containing thousands of spores, which, when ripe, are blown off into the air and settle upon other timbers, where the process is repeated. Moisture and heat are favorable to the growth of the fungi, as are also the starches, sugars and oils found in the cells of the sapwood but wanting in the heartwood. If protected from the action of these fungi, wood will last indefinitely. Hence the accumulation of dead wood should be avoided. If air is excluded, as when timber is kept constantly and entirely immersed in salt or fresh water, the fungi cannot thrive. Sap confined in timber with air, ferments, producing *dry rot*; as where beams are enclosed air-tight in brick work, etc., and where green timber is painted or varnished, or treated with creosote, etc. The sap then not only prevents the thorough penetration of the oil, etc., but may cause the greater part of the wood to rot although its firm outer shell gives it a deceptive appearance

of strength. Sap should therefore be first removed by seasoning; that is, either by drying the wood in air at natural or higher temperatures, or by first steaming the wood under pressure so as to vaporize the sap, and then removing the latter by means of a vacuum. Thorough seasoning of large timbers in dry air at ordinary temperatures may require years; too rapid kiln-drying cracks and weakens the wood. But it is questionable whether steaming and vacuum removes sap as thoroughly as do the slower dry processes. Alternate exposure to water and air is very destructive. It causes wet rot.

Sea worms, the *limnoria terebrans*, works from near high water mark to a little below the surface of mud bottom; the *teredo navalis* within somewhat less limits. The *teredo* is said to be rendered less active by the presence of sewage in water.

The best timber-preserving processes are practically useless unless thoroughly well done. If the gain in durability will not warrant the expenditure of time and money required for this, it is more economical to use the wood in its natural state. The woods best adapted to treatment are those of an open or porous texture. They absorb the oil, etc., better than the denser woods; and their cheapness renders the use of the treatment more economical. Most of the processes in common use seem to render wood less combustible. After treatment by any process, the wood should be well dried before using. Creosote oil, or dead oil, is the best known preservative. Against sea worms it is effective for 15 to 20 years. The *teredo* is less active in the north than in the south.

See paper by Dr. Hermann von Schrenk, read before the American Railway Engineering and Maintenance of Way Association, March, 1901.

Section

Diagram.

KEY TO SECTION DIAGRAM.

Woodsmen, Geometrical Pace Equals 64 Inches.

(Count alternate step.)

62 Paces equals 1 Tally = 20 Rods. 495 Paces equals 2 Forties = 160 Rods.
 247½ Paces equals 1 Forty = 80 Rods. 742½ Paces equals 3 Forties = 240 Rods.
 990 Paces equals 4 Forties = 320 Rods.

Courses	1 Tally	Across 1 Forty	Across 2 Forties	Across 3 Forties	Across 4 Forties	Angle	Distance in Chains and Links	Natural Secants
	Paces	Paces	Paces	Paces	Paces	North		
0	62	247½	495	742½	990	14° 02'	80.00	0.00000
1	64	255	510	765	1020	26° 34'	82.46	1.03076
2	69	277	554	830	1107	36° 52'	89.44	1.11805
3	77	309	618	927	1237	45° 00'	100.00	1.24995
4	88	350	700	1050	1400	53° 08'	113.14	1.41421
5	77	309	618	927	1237	63° 26'	100.00	1.24995
6	69	277	554	830	1107	75° 58'	89.44	1.11805
7	64	255	510	765	1020	East	82.46	1.03076
8	62	247½	495	742½	990		80.00	0.00000

SECTION DIAGRAM AND KEY THERE- TO AND NATURAL SECANTS.

The Diagram and Key will enable a Compassman to easily approach, from a given point, any of the several corners bounding a Section and call out the various 40 lines to the Cruiser. (One may, too, solve other problems from it, should circumstances require). The seven courses shown on diagram are North-Easterly, but the method applies to any direction. It may occur at times that the Compassman may have to solve his own problem. (The key will assist him). If Compassman stands, for instance, at 1-8 post, four tallies North of the S. E. corner of Section, desiring to reach center of Section (course 6 suggests itself, latitude being half of departure). See course 6 in Key. One tally equals 69 paces, 2 forties equal 554 paces. Angle $63^{\circ} 26'$ (marked on inner edge of Compass Circle) Therefore, run North $63^{\circ} 26'$ West, a distance of 554 paces, and you have center of section. At four tallies of 69 paces each you have the 40 line (call it to your Cruiser), at 8 tallies (4 more from 40 line) you reach central point of Section.

The compiler of this book recommends (the use of paces) the value of one pace equaling 64 inches or two ordinary steps. Therefore 62 paces equals one tally, equals 20 rods distance, etc.

NATURAL SECANTS.

In furnishing the natural secants for each course, perhaps a rapid, easy and accurate means will be found to determine on a given course the diagonal distances. Multiply secant number by length of one side of the square, product will be required distance. If for instance, you desire to ascertain distance in rods from corner of Section *diagonally* to opposite corner, the angle is 45 degrees, secant number 1.41421. Multiply 1.41421 by 320 rods, the result is 452.54720. Cut off 5 decimals. Therefore the result is $452\frac{1}{2}$ rods.

HINTS—Use Barbow's Mirror Cruising Compass.

Made useful. Assists Compassmen as well as Cruisers. Divided in quadrants. Graduated in degrees from 0 to 90 each way. Cardinal letters on raised circle as well as a conspicuous black pointer at each letter. Letter E. and W. reversed so as to facilitate angles readings. Variation turned off and set for locality to be used. Inner edge of raised circle graduations harmonize with the several corners bounding a section. A simple device attached to (stop to needle bar) preventing the adherence of bar upwards when it should be downwards, removing one great annoyance.

Hints to Beginners—The art of Compassing is best learned by doing it. Should state briefly however—Hold Compass squarely before you, cover or North end always ahead, practice to run straight and pace correctly, face course as nearly as possible, when you either open or close compass, tilt compass a little to prevent unnecessary swinging of needle. Practice to take a sight quickly, don't wait until needle comes to a stop, course known as soon as needle swings equally on each side of (pointer). See that you hold compass level, let the continuous center line through compass guide your sight to object ahead on your line. In case of an open country, sight object as far as possible (rather two objects) on your line, keeping the nearer object covering the farther one, etc. (cultivating the art of running a straight line). When it is desired to run diagonally through a Section or ascertain the distance across a canyon, streams or any points not accessible, consult section diagram and Key thereto.

To avoid obstructions, etc., found in your *course* bear *off*, say, 10 degrees from said *course*, distance one tally. Then having gotten around obstructions, bear *in* 10 degrees, one tally, back to original course. (Add two paces to two tallies.)

Remember—Always read the North end of needle, it will indicate your angle. If, for example, while sighting to an object the north end points 10 degrees between S. and E., read the angle South 10° East.

Number of Paces.

You will vary from a given point in running one mile ($17\frac{1}{3}$ paces) for each degree. If you err to the right, variation is too low; raise it. If to the left, you are too high; lower it. $\frac{1}{4}$ or $\frac{1}{2}$ of one mile will cause you to vary $\frac{1}{4}$ or $\frac{1}{2}$ of the number of paces given, etc.

NOTE—Please remember that surveys don't always show true corners. Too often is it found that the Governmental Surveyors have been careless or negligent in their establishment of proper Section or quarter posts. Therefore be diligent in your search for them.

Standard Corners and Closing Corners, marked S. C. and C. C. respectively, are established by the government on township lines (rather Correction lines) from a few feet to several hundred feet apart. Therefore guard against taking the wrong one. The government establishes no Quarter Post on Correction lines to a *Closing Section*; in other words, between two *Closing Corners*.

Sight Trees—Are those which the line actually passes through, and are marked with two notches on each side, and are called for in the field notes—mark the line.

TEXAS LAND MEASURE.

(Also used in Mexico, New Mexico, Arizona and California.)

1 vara equals $33\frac{1}{3}$ inches.

1,900.8 varas equals 1 mile.

3,612,800 square varas equals 1 section equals 640 acres.

225,800 square varas equals $1\frac{1}{16}$ section equals 40 acres.

Square of 475 varas equals $\frac{1}{16}$ section equals 40 acres.

To find the number of acres in any number of square varas, multiply the latter by 177 (or to be more exact, by $177\frac{1}{8}$), and cut off six decimals.

San Antonio, Texas, variation in 1904, $-8^{\circ} 3' +3.1$.

MAGNETIC DECLINATIONS.

Variations of the compass for the Epoch January, 1904:

With the annual change from 1900 to ~~1905~~ for the principal places in the United States.

A (+) sign denotes West Declinations; a minus (—) sign East Declinations. For the annual change a plus sign denotes increasing West or decreasing East Declination, and a minus sign the reverse.

(Part of reports of the United States Coast and Geodetic Survey given.)

	Variation Jan., 1904	Annual Change
Sitka, Alaska	$-29^{\circ} 53'$	$0'.0''$
Olympia, Wash.	$-22 \quad 41$	$0 \quad .0$
Portland, Oregon	$-22 \quad 32$	$0 \quad .0$
San Francisco, Cal.	$-16 \quad 42$	$0 \quad .0$
Madison, Wis.	$-4 \quad 57$	$+5 \quad .0$
Portland, Maine	$+14 \quad 32$	$+1 \quad .3$
Columbia, S. C.	$-0 \quad 12$	$+3 \quad .1$
Demarcation Point, Alas.	$-39 \quad 50$	$+10 \quad .0$
Philippines, Manila	$-0 \quad 52$	$-1 \quad .0$

THE MAGNETIC POLE.

In a lecture at Glasgow, by Professor Thompson, he stated that the magnetic pole is at present near Boothia Felix, more than 1000 miles to the west of the geographical pole.

In 1557 the position of the needles showed the magnetic pole to be due north. It had been eastward before that; it then began to point westward, and this westward variation continued to increase until 1816, when the maximum was attained; it has since steadily diminished, and in 1976 it will again point to the true north.

Professor Thompson says that the changes which have been observed, not only in this direction but in the strength of the earth's magnetism, show that the same causes which originally magnetized the earth are still at work; and, strangely enough, these changes do not occur at long intervals in the course of centuries but are going on from day to day, from week to week and from year to year.

—Authority.

AGREEMENT FIXES BOUNDARY.

Decision in Case of Washington Line Fence in 1906.

The Supreme Court decided that where a boundary line between two tracts of land has been fixed by mutual agreement between the owners and remains the recognized dividing line for a period of 20 years, it in fact becomes the actual boundary, notwithstanding a subsequent Government survey finds it is wrongly located.

The case on which the point was decided was appealed from Columbia County where two neighbor farmers agreed on the boundary line between their land in 1881 and set their fence on that line. In 1903 a Government survey developed the fact that the fence was not on the true line and one of the owners set his fence over on the line fixed by the Government survey. His neighbor brought an action to compel the removal of the fence to its original location and the courts have upheld him. The case was entitled E. L. Lindley, respondent, vs. K. A. Johnston, appellant.

Note.—Oregon Statute limitation is 10 years.

Conclusion:

I am indebted to many kind friends for suggestions, help and encouragement extended me. My chief endeavor has been to place in compact form information of value to them and to others.

JOSEPH BARBOW.

Portland, Oregon.

which have been removed but only in this
 direction in the interest of the public
 health. It is not the intention of the
 which originally intended the public
 and at present, and especially enough, these
 changes do not seem at all likely to be
 the course of events but it is not from
 day to day, from week to week and from
 year to year.

AGREEMENT FIXES BOUNDARY Between the State of Washington and Texas in 1902

The Supreme Court decided that a
 boundary line between two states of land
 has been fixed by an agreement between
 the two states and that the boundary
 dividing the two states is in
 fact the same as the original boundary, notwithstanding a subsequent survey
 which is strongly located.
 The case in which the land was decided
 was appealed from Columbia County, where
 two boundary lines existed on the boundary
 line between the two states in 1902 and in 1903 a Government
 survey developed the fact that the line
 was not on the true line and one of the
 owners of the land over the line had
 by the Government survey. His neighbor
 brought an action to compel the removal of
 the fence to its original location and the
 court gave judgment in his favor. The case was
 decided by the United States Supreme Court in 1902.
 Note—Oregon Statute limitation is 10
 years.
 Conclusion
 I am inclined to very kind friends in
 the State and numerous other friends
 and friends who have been to place in
 the interest of the nation of value to them
 and to others.

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