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Torbert, William W.
Tables, drawings, notes,
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1. Length 100 ft Width 25 ft Slope 1:1
- 5 " 100 ft " 25 ft " $1\frac{1}{2}:1$
- 9 Varⁿ for 100 ft Length " 1:1
- 10 " " 100 ft " " $1\frac{1}{2}:1$
- 11 Length 100 ft Width 24 ft " 1:1
- 15 " 100 ft " 24 ft " $1\frac{1}{2}:1$
- 19 " 100 ft " 22 ft " $1\frac{1}{2}:1$
- 24 Varⁿ for 100 ft Length " $1\frac{1}{2}:1$
- 25 Length 100 ft Width 24 ft " $1\frac{1}{4}:1$
- 29 " 100 ft " 25 ft " $1\frac{1}{4}:1$
- 33 Varⁿ for 66 ft Length " 1:1
- 34 " " 66 ft " " $1\frac{1}{2}:1$
- 35 " " 66 ft " " $1\frac{1}{4}:1$
- 37 Length 66 ft Width 25 ft " 1:1
- 41 " 66 ft " 24 ft $1\frac{1}{2}:1$
- 45 " 66 ft " 22 ft $1\frac{1}{2}:1$

80769

Length 100 ft Base 25 ft

	0	1	2	3	4
0	0	9.2	18.6	28.1	37.6
1	96.3	106.3	116.4	126.6	137.0
2	200.	210.7	221.6	232.4	243.5
3	311.1	322.6	334.2	345.7	357.6
4	429.5	441.9	454.2	466.6	479.1
5	555.5	568.5	581.6	594.8	608.0
6	688.8	702.5	716.4	730.3	744.3
7	829.6	844.1	858.6	873.2	888.0
8	977.7	992.9	1008.3	1023.6	1039.1
9	1133.3	1149.3	1165.3	1181.3	1197.3
10	1296.3	1313.0	1329.8	1346.5	1363.5
11	1466.6	1484.3	1502.0	1519.5	1537.0
12	1644.4	1662.6	1680.9	1699.2	1717.6
13	1829.5	1848.5	1867.5	1886.6	1905.8
14	2022.2	2041.8	2061.5	2081.4	2101.3
15	2222.2	2242.7	2263.1	2283.5	2303.9

Slope of Side Banks 1:1

	5	6	7	8	9
	47.2	56.9	66.6	76.4	86.3
	147.3	157.6	168.1	178.6	189.3
	254.6	265.7	277.0	288.3	299.6
	369.7	381.3	393.3	405.3	417.4
	491.6	504.3	517.0	529.7	542.6
	621.3	634.6	648.1	661.6	675.2
	758.3	772.4	786.5	800.9	815.3
	902.8	917.6	932.5	947.5	962.6
	1054.7	1070.2	1085.9	1101.6	1117.4
	1213.9	1230.2	1246.6	1263.1	1279.7
	1380.5	1397.6	1414.6	1431.6	1449.1
	1554.7	1572.4	1590.4	1608.3	1626.3
	1736.0	1754.6	1773.3	1792.0	1810.7
	1925.0	1944.3	1963.7	1983.1	2002.6
	2121.3	2141.3	2161.4	2181.6	2201.8
	2324.8	2345.7	2366.6	2387.5	2408.5

	3				
	0	.1	.2	.3	.4
16	2439.6	2450.8	2472.0	2493.3	2514.6
17	2644.3	2666.3	2688.3	2710.4	2732.4
18	2866.6	2889.3	2912.0	2934.8	2957.6
19	3096.3	3119.7	3143.1	3166.6	3190.2
20	3333.3	3357.4	3381.6	3405.9	3430.2
21	3577.7	3602.6	3627.6	3652.6	3677.6
22	3829.6	3852.2	3880.9	3906.6	3932.4
23	4088.8	4115.2	4141.6	4168.1	4194.6
24	4355.5	4382.6	4409.7	4437.0	4464.2
25	4629.6	4657.4	4685.3	4713.3	4741.3
26	4911.1	4939.7	4968.3	4997.0	5025.7
27	5200.0	5229.3	5258.6	5288.1	5317.6
28	5496.3	5526.3	5556.4	5586.7	5617.0
29	5800.0	5830.8	5861.6	5892.5	5923.5
30	6111.1	6142.6	6174.2	6205.9	6237.6

	4				
	.5	.6	.7	.8	.9
2536.1	2557.6	2579.2	2600.9	2622.6	
2754.6	2776.9	2799.2	2821.6	2844.1	
2980.5	3003.5	3026.6	3049.7	3073.0	
3213.9	3237.6	3261.4	3285.3	3309.3	
3454.6	3479.1	3503.7	3528.3	3553.0	
3702.8	3728.0	3753.3	3778.7	3804.1	
3958.3	3984.3	4010.2	4036.2	4062.5	
4221.3	4248.0	4274.8	4301.6	4328.5	
4491.6	4519.1	4546.6	4574.2	4601.9	
4769.4	4797.6	4825.9	4854.2	4882.6	
5054.6	5083.5	5112.5	5141.6	5170.8	
5347.2	5376.9	5406.6	5436.4	5466.3	
5647.2	5677.6	5708.1	5738.6	5769.3	
5954.6	5985.8	6017.0	6048.3	6079.7	
6269.4	6301.3	6333.3	6365.3	6397.3	

Length 100 ft

	0	1	2	3	4
0	.	9.3	18.7	28.3	37.9
1	98.1	108.6	119.1	129.8	140.5
2	207.4	219.0	230.6	242.4	254.2
3	327.7	340.4	353.1	366.0	379.0
4	459.2	473.0	486.9	500.9	514.9
5	601.7	616.7	631.7	646.8	662.0
6	755.5	771.5	787.6	803.8	820.1
7	920.3	937.4	954.6	972.0	989.4
8	1096.3	1114.5	1132.8	1151.2	1169.7
9	1283.3	1302.6	1322.0	1341.6	1361.2
10	1481.4	1501.9	1522.4	1543.1	1563.8
11	1690.7	1712.3	1733.9	1755.7	1777.5
12	1911.1	1933.8	1956.5	1979.4	2002.4
13	2142.5	2166.3	2190.2	2214.2	2238.3
14	2385.1	2410.0	2435.0	2460.1	2485.3

Top or Base 25 ft Slope of Side Banks 1 1/2:1

5	6	7	8	9
47.7	57.5	67.5	77.6	87.8
151.4	162.3	173.4	184.6	196.0
266.2	278.3	290.5	302.8	315.2
392.1	405.3	418.6	432.0	445.6
529.1	543.4	557.9	572.4	587.0
677.3	692.7	708.3	723.9	739.7
836.6	853.1	869.8	886.5	903.4
1007.0	1024.6	1042.4	1060.2	1078.2
1188.4	1207.1	1226.0	1245.0	1264.1
1380.0	1400.9	1420.9	1440.9	1461.1
1584.7	1605.7	1626.8	1648.0	1669.3
1799.5	1821.6	1843.8	1866.1	1888.6
2025.5	2048.7	2072.0	2095.4	2118.9
2262.5	2286.8	2311.2	2335.7	2360.4
2510.6	2536.0	2561.6	2587.2	2613.0

	0	1	2	3	4
15	2638.8	2664.8	2690.9	2717.2	2743.5
16	2903.6	2930.0	2956.	2985.4	3012.7
17	3179.6	3208.3	3236.1	3264.6	3293.1
18	3466.6	3495.9	3525.3	3554.9	3584.6
19	3764.8	3795.2	3825.7	3856.4	3887.2
20	4074.0	4105.6	4137.2	4169.0	4200.9
21	4394.4	4427.1	4459.8	4492.7	4525.7
22	4725.9	4759.7	4793.5	4827.5	4861.6
23	5068.5	5103.4	5138.3	5173.4	5208.6
24	5422.2	5458.2	5494.3	5530.5	5566.8
25	5787.0	5824.1	5861.3	5898.6	5936.0
26	6162.9	6201.1	6239.4	6277.9	6316.4
27	6550.	6589.8	6628.7	6668.3	6707.9
28	6948.1	6988.6	7029.1	7069.8	7110.5
29	7357.4	7399.0	7440.6	7482.4	7524.2
30	7777.7	7820.4	7863.2	7906.1	7949.-

	5	6	7	8	9
	2769.9	2796.4	2823.1	2849.0	2876.7
	3040.3	3067.9	3095.7	3123.5	3151.5
	3321.8	3350.5	3379.4	3408.3	3437.4
	3614.4	3644.2	3674.2	3704.3	3734.5
	3918.1	3949.0	3980.1	4011.3	4042.6
	4232.9	4264.9	4297.1	4329.4	4361.9
	4558.8	4592.0	4625.3	4658.7	4692.3
	4895.8	4930.1	4964.6	4999.1	5033.8
	5244.0	5279.4	5315.0	5350.6	5386.4
	5603.2	5639.7	5676.4	5713.2	5750.1
	5973.5	6011.1	6048.9	6086.8	6124.8
	6355.1	6393.3	6432.7	6471.7	6510.8
	6747.7	6787.5	6827.5	6867.6	6907.8
	7151.3	7192.2	7233.4	7274.6	7316.-
	7566.2	7608.3	7650.5	7692.8	7735.2
	7992.1	8035.3	8078.6	8122.0	8165.5

L. en Varia- tion		11 100 ft Ex or Emb 72 to 100 In C. Yds	9		
In Ft	In Cu. Yds				
		9	25.00	17½	94.57
1	.31	9½	27.85	18	100.06
1½	.69	10	30.86	18½	105.70
2	1.23	10½	34.02	19	111.50
2½	1.93	11	37.34	19½	117.45
3	2.78	11½	40.81	20	123.56
3½	3.77	12	44.44	20½	129.82
4	4.93	12½	48.22	21	136.24
4½	6.25	13	52.16	21½	142.67
5	7.71	13½	56.25	22	149.38
5½	9.33	14	60.50	22½	156.25
6	11.11	14½	64.90	23	163.27
6½	13.04	15	69.46	23½	170.45
7	15.12	15½	74.17	24	177.78
7½	17.35	16	79.04	24½	185.27
8	19.75	16½	84.06	25	192.90
8½	22.30	17	89.24		

L. en Varia- tion		11 100 ft Ex or Emb 12 to 100 In C. Yds	10		
In Ft	In Cu. Yds				
		9	37.50	17½	141.93
1	.46	9½	41.79	18	150.17
1½	1.04	10	46.30	18½	158.64
2	1.85	10½	51.04	19	167.34
2½	2.90	11	56.02	19½	176.27
3	4.16	11½	61.23	20	185.44
3½	5.67	12	66.68	20½	194.84
4	7.40	12½	72.36	21	204.47
4½	9.36	13	78.27	21½	214.00
5	11.57	13½	84.41	22	224.07
5½	14.00	14	90.79	22½	234.37
6	16.66	14½	97.40	23	244.91
6½	19.56	15	104.24	23½	255.66
7	22.68	15½	111.31	24	266.65
7½	26.04	16	118.62	24½	277.87
8	29.63	16½	126.16	25	289.32
8½	33.45	17	133.93		

11
Length 100 ft ^{Bottom} ~~Top~~ or Base

	0	.1	.2	.3	.4
0	0	8.9	17.9	27.0	36.1
1	92.6	102.3	112.0	121.8	131.7
2	192.6	203.0	213.5	224.0	234.7
3	300.0	311.1	322.4	333.7	345.0
4	414.8	426.7	438.7	450.7	462.8
5	537.0	549.7	562.4	575.1	588.0
6	666.7	680.0	693.5	707.0	720.6
7	803.7	817.8	832.0	846.3	860.6
8	948.1	963.0	977.9	992.9	1008.0
9	1100.0	1115.6	1131.3	1147.0	1162.8
10	1259.3	1275.6	1292.0	1308.5	1325.0
11	1425.9	1443.0	1460.1	1477.4	1494.7
12	1600.0	1617.8	1635.7	1653.7	1671.7
13	1781.5	1800.0	1818.7	1837.4	1856.1
14	1970.4	1989.7	2009.0	2028.5	2048.0

12
24 ft Slope of Side Banks 1 to 1

.5	.6	.7	.8	.9
45.4	54.7	64.0	73.5	83.0
141.7	151.7	161.8	172.0	182.3
245.4	256.1	267.0	277.9	288.9
356.5	368.0	379.6	391.3	403.0
475.0	487.3	499.6	512.0	524.5
600.9	613.9	627.0	640.1	653.4
734.3	748.0	761.8	775.7	789.7
875.0	889.5	904.0	918.7	933.4
1023.1	1038.4	1053.7	1069.0	1084.5
1178.7	1194.7	1210.7	1226.8	1243.0
1341.7	1358.4	1375.1	1392.0	1408.9
1512.0	1529.5	1547.0	1564.6	1582.3
1689.8	1708.0	1726.3	1744.6	1763.0
1875.0	1893.9	1912.9	1932.0	1951.1
2067.6	2087.3	2107.0	2126.8	2146.8

	0	1	2	3	4
15	21667	21867	2206.8	2227.0	22473
16	2370.4	2391.1	2412.0	2432.9	2453.9
17	2581.5	2603.0	2624.6	2646.3	2668.0
18	2800.0	2822.3	2844.6	2867.0	2889.5
19	3025.9	3048.9	3072.0	3095.1	3118.4
20	3259.3	3283.0	3306.8	3330.7	3354.6
21	3500.0	3524.5	3549.0	3573.6	3598.3
22	3748.1	3773.4	3798.7	3824.0	3849.5
23	4003.7	4029.7	4055.7	4081.8	4108.0
24	4266.7	4293.4	4320.1	4347.0	4373.9
25	4537.0	4564.5	4592.0	4619.6	4647.2
26	4814.8	4843.0	4871.2	4899.6	4928.0
27	5100.0	5128.9	5157.9	5186.9	5216.0
28	5392.6	5422.2	5452.0	5481.8	5511.7
29	5692.6	5723.0	5753.5	5784.0	5814.6
30	6000.0	6031.1	6062.3	6093.6	6124.9

	5	6	7	8	9
	2267.6	2288.0	2308.5	2329.0	2349.7
	2475.0	2496.1	2517.4	2538.7	2560.0
	2689.8	2711.7	2733.7	2755.7	2777.8
	2912.0	2934.7	2957.4	2980.1	3003.0
	3141.7	3165.0	3188.5	3212.0	3235.6
	3378.7	3402.8	3427.0	3451.2	3475.5
	3623.1	3648.0	3672.9	3697.9	3722.9
	3875.0	3900.6	3926.2	3951.9	3977.8
	4134.2	4160.5	4186.9	4213.4	4240.0
	4400.9	4427.9	4455.1	4482.3	4509.6
	4675.0	4702.8	4730.6	4758.6	4786.6
	4956.4	4985.0	5013.6	5042.3	5071.1
	5245.3	5274.6	5304.0	5333.4	5362.9
	5541.6	5571.6	5601.7	5631.9	5662.2
	5845.3	5876.1	5906.9	5937.8	5968.8
	6156.4	6187.9	6219.4	6251.1	6282.8

Length 100 ft Top or Base

	0	1	2	3	4
0	0	8.9	18.0	27.2	36.6
1	94.4	104.5	114.7	124.9	135.3
2	200.0	211.2	222.4	233.8	245.3
3	316.7	328.9	341.3	353.8	366.4
4	444.4	457.8	471.3	484.9	498.7
5	583.3	597.8	612.4	627.2	642.0
6	733.3	748.9	764.7	780.5	796.4
7	894.4	911.2	928.0	944.9	962.0
8	1066.7	1084.5	1102.4	1120.5	1138.7
9	1250.0	1268.9	1288.0	1307.2	1326.4
10	1444.4	1464.5	1484.7	1504.9	1525.3
11	1650.0	1671.2	1692.4	1713.8	1735.3
12	1866.7	1888.9	1911.3	1933.8	1956.4
13	2094.4	2117.8	2141.3	2164.9	2188.7
14	2333.3	2357.8	2382.4	2407.2	2432.0

Slope of Side banks $1\frac{1}{2}$ to 1.

	5	6	7	8	9
	45.8	55.3	64.9	74.7	84.5
	145.8	156.4	167.2	178.0	188.9
	256.9	268.7	280.5	292.4	304.5
	379.2	392.0	404.9	418.0	431.2
	512.5	526.4	540.5	554.7	568.9
	656.9	672.0	687.2	702.4	717.8
	812.5	828.7	844.9	861.3	877.8
	979.2	996.4	1013.8	1031.3	1048.9
	1156.9	1175.3	1193.8	1212.4	1231.2
	1345.8	1365.3	1384.9	1404.7	1424.5
	1545.8	1566.4	1587.2	1608.0	1628.9
	1756.9	1778.7	1800.5	1822.4	1844.5
	1979.2	2002.0	2024.9	2048.0	2071.2
	2212.5	2236.4	2260.5	2284.7	2308.9
	2456.9	2482.0	2507.2	2532.4	2557.8

	0	1	2	3	4
15	2583.3	2608.9	2634.7	2660.5	2686.4
16	2844.4	2871.2	2898.0	2924.9	2952.0
17	3116.7	3144.5	3172.4	3200.5	3228.7
18	3400.0	3428.9	3458.0	3487.2	3516.4
19	3694.4	3724.5	3754.7	3784.9	3815.3
20	4000.0	4031.2	4062.4	4093.8	4125.3
21	4316.7	4348.9	4381.3	4413.8	4446.4
22	4644.4	4677.8	4711.3	4744.9	4778.7
23	4983.3	5017.8	5052.4	5087.2	5122.0
24	5333.3	5368.9	5404.6	5440.5	5476.4
25	5694.4	5731.2	5768.0	5804.9	5842.0
26	6066.6	6104.4	6142.4	6180.4	6218.6
27	6449.9	6488.8	6527.9	6567.0	6606.3
28	6844.4	6884.5	6924.7	6964.9	7005.3
29	7249.9	7291.1	7332.3	7373.7	7415.3
30	7666.6	7708.9	7751.2	7793.7	7836.3

	5	6	7	8	9
27	2712.5	2738.7	2764.9	2791.3	2817.8
28	2979.2	3006.4	3033.8	3061.3	3088.9
29	3256.9	3285.3	3313.8	3342.4	3371.2
30	3545.8	3575.3	3604.9	3634.7	3664.5
31	3845.8	3876.4	3907.2	3938.0	3968.9
32	4156.9	4188.7	4220.5	4252.4	4284.5
33	4479.2	4512.0	4544.9	4578.0	4611.2
34	4812.5	4846.4	4880.5	4914.7	4948.9
35	5156.9	5192.0	5227.1	5262.4	5297.8
36	5512.5	5548.6	5584.9	5621.3	5657.8
37	5879.1	5916.4	5953.8	5991.3	6028.9
38	6256.9	6295.3	6333.7	6372.4	6411.1
39	6645.7	6685.2	6724.8	6764.5	6804.3
40	7045.8	7086.4	7127.1	7167.9	7208.9
41	7456.8	7498.5	7540.4	7582.4	7624.4
42	7879.0	7921.9	7964.8	8007.8	8051.0

Length 100 ft Top or Base

	0	.1	.2	.3	.4
0	0.2	8.2	16.5	24.9	33.5
1	87.0	96.4	105.8	115.3	125.0
2	185.2	195.6	206.1	216.8	227.5
3	294.4	306.0	317.6	329.4	341.2
4	414.8	427.5	440.2	453.1	466.1
5	546.3	560.0	573.9	587.9	602.0
6	688.9	703.8	718.7	733.8	749.0
7	842.6	858.6	874.7	890.8	907.2
8	1007.4	1024.5	1041.7	1059.0	1076.4
9	1183.3	1201.5	1219.8	1238.2	1256.8
10	1370.4	1389.7	1409.1	1428.6	1448.3
11	1568.5	1588.9	1609.5	1630.1	1650.9
12	1777.8	1799.3	1821.0	1842.7	1864.6
13	1998.1	2020.8	2043.5	2066.4	2089.4
14	2229.6	2253.4	2277.2	2301.2	2325.3

2.5% Slope of Side Banks 1 1/2 to 1

	5	.6	.7	.8	.9
	42.1	50.9	59.8	68.7	77.8
	134.7	144.6	154.6	164.7	174.9
	238.4	249.4	260.5	271.7	283.0
	353.2	365.3	377.5	389.8	402.2
	479.1	492.3	505.7	519.1	532.6
	616.2	630.5	644.9	659.4	674.1
	764.3	779.7	795.3	810.9	826.7
	923.6	940.1	956.7	973.5	990.4
	1093.9	1111.6	1129.3	1147.2	1165.2
	1275.4	1294.3	1313.1	1332.1	1351.2
	1468.1	1487.9	1507.9	1528.0	1548.2
	1671.8	1692.7	1713.8	1735.0	1756.3
	1886.6	1908.7	1930.9	1953.2	1975.6
	2112.5	2135.7	2159.0	2182.4	2205.9
	2349.5	2373.8	2398.2	2422.8	2447.4

	21				
	0	.1	.2	.3	.4
15	2472.2	2497.1	2522.1	2547.1	2572.3
16	2725.9	2751.9	2778.0	2804.2	2830.5
17	2990.7	3017.8	3045.0	3072.3	3099.7
18	3266.7	3294.9	3323.2	3351.6	3380.1
19	3553.7	3583.0	3612.4	3642.0	3671.6
20	3851.7	3882.3	3912.8	3943.5	3974.2
21	4161.1	4192.6	4224.3	4256.1	4287.9
22	4481.5	4514.1	4546.9	4579.8	4612.7
23	4813.0	4846.7	4880.6	4914.6	4948.7
24	5155.6	5190.4	5225.4	5260.5	5295.7
25	5509.3	5545.2	5581.3	5617.5	5653.8
26	5874.1	5911.2	5948.4	5985.7	6023.1
27	6250.0	6288.2	6326.5	6364.9	6403.5
28	6637.0	6676.3	6715.8	6755.3	6794.9
29	7035.2	7075.6	7116.1	7156.8	7197.5
30	7444.4	7486.0	7527.6	7569.4	7611.2

	22				
	.5	.6	.7	.8	.9
	2597.7	2623.1	2648.6	2674.2	2700.0
	2856.9	2883.4	2910.1	29368	2963.7
	3127.3	3154.9	3182.7	3210.5	3238.5
	3408.8	3437.5	3466.4	3495.3	3524.4
	3701.3	3731.2	3761.2	3791.3	3821.4
	4005.1	4036.1	4067.2	4098.4	4129.7
	4319.9	4352.0	4384.2	4416.5	4448.9
	4645.8	4679.0	4712.3	4745.8	4779.3
	4982.9	5017.2	5051.6	5086.1	5120.8
	5331.0	5366.4	5401.9	5437.6	5473.3
	5690.2	5726.8	5763.4	5800.2	5837.0
	6060.6	6098.3	6136.0	6173.9	6211.8
	6442.1	6480.8	6519.7	6558.7	6597.8
	6834.7	6874.5	6914.5	6954.6	6994.8
	7238.4	7279.3	7320.4	7361.6	7402.9
	7653.2	7695.3	7737.5	7779.8	7822.2

Variation In Feet	Ex. or Em. In C. Yds	Length 100 ft			
		1 1/4 to 1 add			
		8 1/2	27.89	17	111.49
		9	31.27	17 1/2	118.14
1	.38	9 1/2	34.84	18	124.98
1 1/2	.87	10	38.60	18 1/2	132.02
2	1.54	10 1/2	42.54	19	139.25
2 1/2	2.41	11	46.69	19 1/2	146.67
3	3.47	11 1/2	51.03	20	154.29
3 1/2	4.72	12	55.66	20 1/2	162.09
4	6.17	12 1/2	60.28	21	170.09
4 1/2	7.80	13	65.21	21 1/2	178.31
5	9.63	13 1/2	70.32	22	186.70
5 1/2	11.65	14	75.62	22 1/2	195.28
6	13.87	14 1/2	81.12	23	204.05
6 1/2	16.29	15	86.81	23 1/2	213.01
7	18.90	15 1/2	92.68	24	222.16
7 1/2	21.70	16	98.78	24 1/2	231.51
8	24.70	16 1/2	105.03	25	241.05

Length 100 ft Width

	0	.1	.2	.3	.4
0	0	8.9	17.9	27.1	36.3
1	93.5	103.4	113.3	123.4	133.6
2	194.3	207.1	218.0	228.9	240.0
3	308.3	320.0	331.9	343.8	355.7
4	429.6	442.3	455.0	467.8	480.7
5	560.2	573.7	587.4	601.2	615.0
6	700.0	714.5	729.1	743.8	758.5
7	849.1	864.5	880.0	895.6	911.3
8	1007.4	1023.8	1040.2	1056.7	1073.4
9	1175.1	1192.3	1209.6	1227.1	1244.7
10	1352.9	1370.0	1388.3	1406.7	1425.2
11	1538.0	1557.1	1576.3	1595.6	1615.0
12	1733.3	1753.4	1773.5	1793.7	1814.1
13	1938.0	1958.9	1980.2	2002.1	2022.4
14	2151.8	2173.7	2195.7	2217.8	2240.0

24 ft Slope of Sides $1\frac{1}{2}$ to 1. -

.5	.6	.7	.8	.9
45.6	55.0	64.5	74.1	83.7
143.8	154.1	164.5	175.0	185.6
251.2	262.4	273.7	285.2	296.7
367.8	380.0	392.3	404.6	417.1
493.8	506.9	520.4	533.3	546.7
628.9	643.0	657.1	671.3	685.6
773.4	788.3	803.4	818.5	833.8
927.1	943.0	958.9	975.0	991.2
1090.1	1106.9	1123.8	1140.8	1157.9
1262.3	1280.1	1297.9	1315.8	1333.8
1443.7	1462.4	1481.2	1500.0	1518.9
1634.5	1654.1	1673.7	1693.5	1713.4
1834.5	1855.0	1875.6	1896.3	1917.1
2043.7	2065.2	2086.7	2108.3	2130.0
2262.3	2284.6	2307.1	2329.4	2352.3

	0	.1	.2	.3	.4
15	2375.0	2397.8	2420.7	2443.7	2466.8
16	2607.4	2631.1	2655.0	2678.9	2703.0
17	2849.1	2873.7	2898.5	2923.4	2948.3
18	3100.0	3125.6	3151.3	3177.1	3203.0
19	3360.2	3386.7	3413.3	3440.0	3466.8
20	3629.6	3657.1	3684.6	3712.3	3740.0
21	3908.3	3936.7	3965.2	3993.7	4022.4
22	4196.3	4225.6	4255.0	4284.5	4314.1
23	4493.5	4523.8	4554.1	4584.5	4615.0
24	4800.0	4831.2	4862.4	4893.8	4925.2
25	5115.7	5147.8	5180.0	5212.3	5244.6
26	5440.7	5473.7	5506.9	5540.0	5573.3
27	5775.0	5808.9	5843.0	5877.1	5911.3
28	6118.5	6153.4	6188.3	6223.4	6258.5
29	6471.3	6507.1	6543.0	6578.9	6615.0
30	6833.3	6870.0	6906.9	6943.8	6980.7

.5	.6	.7	.8	9
2490.0	2513.3	2536.7	2560.2	2583.7
2707.1	2751.3	2775.6	2800.0	2824.5
2973.4	2998.5	3023.7	3049.1	3074.5
3228.9	3255.0	3281.2	3307.4	3333.7
3493.7	3520.7	3547.8	3575.0	3602.3
3767.8	3795.7	3823.7	3851.8	3880.0
4051.1	4080.0	4108.9	4138.0	4167.1
4343.8	4373.5	4403.4	4433.3	4463.4
4645.6	4676.3	4707.1	4738.0	4768.9
4956.7	4988.3	5020.0	5051.8	5083.8
5277.1	5309.6	5342.3	5375.0	5407.8
5606.7	5640.2	5673.8	5707.4	5741.2
5943.6	5980.0	6014.5	6049.1	6083.8
6293.8	6329.1	6364.5	6400.0	6435.6
6651.2	6687.4	6723.8	6760.2	6796.7
7017.8	7055.0	7092.3	7129.6	7167.1

Length 100 ft Width

	0	.1	.2	.3	.4
0	0	9.3	18.7	28.2	37.8
1	97.2	107.3	117.8	128.2	138.7
2	203.7	214.9	226.1	237.4	248.9
3	319.4	331.5	343.7	356.0	368.3
4	444.4	457.4	470.5	483.7	497.0
5	578.7	592.6	606.7	620.8	635.0
6	722.2	737.1	752.0	767.1	782.2
7	875.0	890.8	906.7	922.6	938.7
8	1037.1	1053.8	1070.6	1087.5	1104.5
9	1208.3	1226.0	1243.7	1261.6	1279.5
10	1388.9	1407.5	1426.1	1444.9	1463.7
11	1578.7	1598.2	1617.8	1637.5	1657.2
12	1777.8	1798.2	1818.7	1839.3	1860.0
13	1986.1	2007.5	2028.9	2050.4	2072.0
14	2203.7	2226.0	2248.3	2270.8	2293.3

25 ft² Slope of Sides 1/4 to 1

.5	.6	.7	.8	.9
47.5	57.2	67.1	77.0	87.1
149.3	160.0	170.8	181.6	192.6
260.4	272.0	283.7	295.5	307.4
380.8	393.3	405.9	418.7	431.5
510.4	523.9	537.4	551.1	564.8
649.3	663.7	678.2	692.7	707.4
797.4	812.8	828.2	843.7	859.3
954.9	971.1	987.4	1003.9	1020.4
1121.6	1138.7	1156.0	1173.4	1190.9
1297.5	1315.6	1333.8	1352.1	1370.5
1482.7	1501.7	1520.8	1540.0	1559.3
1677.1	1697.0	1717.1	1737.2	1757.5
1880.8	1901.7	1922.7	1943.7	1964.9
2093.7	2115.5	2137.4	2159.4	2181.5
2316.0	2338.7	2361.5	2384.4	2407.4

	0	.1	.2	.3	.4
15	2430.6	2453.7	2477.0	2500.4	2523.9
16	2666.7	2690.8	2715.0	2739.3	2763.7
17	2912.0	2937.1	2962.2	2987.5	3012.8
18	3166.7	3192.6	3218.7	3244.9	3271.1
19	3430.6	3457.5	3484.4	3511.5	3538.7
20	3703.7	3731.5	3759.4	3787.5	3815.6
21	3986.1	4014.9	4043.7	4072.6	4101.7
22	4277.8	4307.5	4337.2	4367.1	4397.0
23	4578.7	4609.3	4640.0	4670.8	4701.7
24	4888.9	4920.4	4952.0	4983.7	5015.6
25	5208.3	5240.8	5273.3	5306.0	5338.7
26	5537.0	5570.4	5603.9	5637.5	5671.1
27	5875.0	5909.3	5943.7	5978.2	6012.8
28	6222.2	6257.5	6292.8	6328.2	6363.7
29	6578.7	6614.9	6651.1	6687.5	6723.9
30	6944.5	6981.5	7018.7	7056.0	7093.3

.5	.6	.7	.8	.9
2547.4	2571.1	2594.9	2618.7	2642.6
2788.2	2812.8	2837.5	2862.2	2887.1
3038.2	3063.7	3089.3	3115.0	3140.8
3297.4	3323.9	3350.4	3377.0	3403.7
3565.9	3593.3	3620.8	3648.3	3675.9
3843.8	3872.0	3900.4	3928.9	3957.5
4130.8	4160.0	4189.3	4218.7	4248.2
4427.1	4457.2	4487.4	4517.8	4548.2
4732.6	4763.7	4794.8	4826.1	4857.4
5047.4	5079.4	5111.5	5143.7	5176.0
5371.5	5404.5	5437.5	5470.6	5503.8
5704.9	5738.7	5772.7	5806.7	5840.8
6047.5	6082.2	6117.1	6152.1	6187.1
6399.3	6435.0	6470.8	6506.7	6542.7
6760.4	6797.1	6833.8	6870.6	6907.5
7130.8	7168.3	7206.0	7243.7	7281.5

Length 66 ft.

33

Var. Ex. or Emb.
iation 1 to 1
in add

Feet In C Yds

8½	14.70	17	58.90
9	16.48	17½	62.41
1	.20	9½	18.37
1½	.46	10	20.35
2	.81	10½	22.46
2½	1.27	11	24.64
3	1.83	11½	26.93
3½	2.49	12	29.32
4	3.26	12½	31.82
4½	4.12	13	34.41
5	5.09	13½	37.11
5½	6.16	14	39.97
6	7.33	14½	42.87
6½	8.60	15	45.89
7	9.97	15½	48.98
7½	11.43	16	52.19
8	13.03	16½	55.49

Length 66 ft.

34

Var. Ex. or Emb.
iation 1½ to 1
in add

Feet In C Yds

8½	22.07	17	88.28
9	24.74	17½	93.54
1	.30	9½	27.57
1½	.69	10	30.35
2	1.22	10½	33.67
2½	1.91	11	36.94
3	2.73	11½	40.37
3½	3.74	12	44.00
4	4.89	12½	47.73
4½	6.19	13	51.61
5	7.64	13½	55.65
5½	9.24	14	59.88
6	11.00	14½	64.26
6½	12.91	15	68.77
7	14.97	15½	73.42
7½	17.18	16	78.22
8	19.55	16½	83.17

Length 66 ft

Ex. or Knob

Varia⁴ 1 1/4 101
in and

Feet in C. Vols

1 .25

1 1/2 .58

2 1.02

2 1/2 1.59

3 2.29

3 1/2 3.12

4 4.09

4 1/2 5.17

5 6.39

5 1/2 7.72

6 9.19

6 1/2 10.79

7 12.51

7 1/2 14.36

8 16.33

8 1/2

9

9 1/2

10

10 1/2

11

11 1/2

12

12 1/2

13

13 1/2

14

14 1/2

15

15 1/2

16

16 1/2

18.44

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17

17 1/2

18

18 1/2

19

19 1/2

20

20 1/2

21

21 1/2

22

22 1/2

23

23 1/2

24

24 1/2

25

73.60

78.06

82.53

87.19

91.97

96.88

101.93

Length 66 ft Width

0	0	.1	.2	.3	.4
0	0	6	12	19	25
1	64	70	77	83	90
2	132	139	146	153	161
3	205	213	221	228	236
4	284	292	300	308	316
5	367	375	384	392	401
6	455	464	473	482	491
7	548	557	567	576	586
8	645	655	665	675	686
9	748	758	769	779	790
10	856	867	878	889	900
11	968	979	991	1002	1014
12	1085	1097	1109	1121	1134
13	1208	1220	1233	1245	1257
14	1335	1348	1361	1374	1387

25 ft Slope of Sides 1 to 1

.5	.6	.7	.8	.9
31	37	44	50	57
97	104	111	118	125
168	175	182	190	197
244	252	260	268	276
324	333	341	350	358
410	419	428	437	446
500	510	519	529	538
596	606	615	625	635
696	706	716	727	737
801	812	823	834	845
911	922	933	945	956
1026	1038	1049	1061	1073
1146	1158	1170	1183	1195
1270	1283	1296	1309	1322
1400	1413	1426	1440	1453

	0	.1	.2	.3	.4
15	1467	1480	1494	1507	1521
16	1604	1618	1632	1646	1660
17	1745	1759	1774	1788	1803
18	1892	1907	1922	1937	1952
19	2044	2059	2075	2090	2106
20	2200	2216	2232	2248	2264
21	2361	2377	2394	2411	2427
22	2528	2544	2561	2578	2595
23	2699	2716	2733	2750	2768
24	2875	2892	2910	2928	2946

.5	.6	.7	.8	9
1534	1548	1562	1576	1590
1674	1688	1702	1717	1731
1818	1833	1847	1862	1877
1967	1982	1997	2013	2028
2121	2137	2152	2168	2184
2280	2296	2312	2329	2345
2443	2460	2477	2494	2511
2612	2630	2647	2664	2681
2786	2804	2821	2839	2857
2964	2983	3001	3019	3037

	Length 66 ft		Width		
	0	.1	.2	.3	.4
0	0	6	12	18	24
1	62	69	76	82	89
2	132	139	146	154	162
3	209	217	225	233	241
4	293	302	311	320	329
5	385	395	404	414	425
6	484	494	505	515	526
7	590	601	612	623	635
8	704	716	728	740	752
9	825	837	850	862	875
10	953	966	979	992	1005
11	1089	1203	1117	1131	1145
12	1232	1247	1261	1276	1291
13	1382	1398	1413	1429	1444
14	1540	1556	1572	1588	1604

	Slope of Sides 1 1/2 to 1				
	5	6	7	8	9
30	36	43	49	56	
96	103	110	117	125	
170	177	185	193	201	
250	259	268	276	284	
338	347	357	366	375	
434	443	453	463	474	
536	547	557	568	579	
646	658	669	681	692	
764	776	788	800	813	
887	900	913	927	940	
1019	1034	1047	1061	1075	
1160	1174	1188	1203	1218	
1306	1321	1336	1351	1367	
1460	1476	1492	1508	1524	
1620	1636	1653	1671	1688	

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9
15	1705	1722	1739	1756	1773	1790	1807	1825	1842	1860
16	1877	1895	1913	1931	1949	1967	1984	2002	2020	2039
17	2057	2076	2094	2113	2131	2150	2168	2187	2206	2225
18	2244	2263	2282	2302	2321	2341	2360	2380	2399	2419
19	2438	2458	2478	2498	2518	2538	2558	2579	2599	2619
20	2640	2661	2681	2702	2723	2744	2765	2786	2807	2828
21	2849	2870	2892	2913	2935	2957	2978	3000	3021	3043
22	3065	3087	3109	3132	3154	3176	3199	3221	3244	3266
23	3289	3312	3335	3358	3381	3404	3427	3450	3473	3497
24	3520	3543	3567	3591	3616	3638	3662	3686	3710	3734

Length 66 ft Width

	0	.1	.2	.3	.4
0	—	5	11	16	22
1	57	63	70	76	82
2	122	128	136	143	150
3	194	202	210	217	225
4	274	283	291	298	307
5	361	370	379	388	397
6	455	464	474	484	494
7	556	567	577	588	599
8	665	676	687	699	710
9	783	792	805	817	829
10	904	916	930	943	956
11	1035	1047	1062	1076	1089
12	1173	1187	1202	1217	1231
13	1319	1332	1349	1364	1379
14	1472	1487	1503	1519	1535

22 ft Slope of Sides 1 1/2 to 1

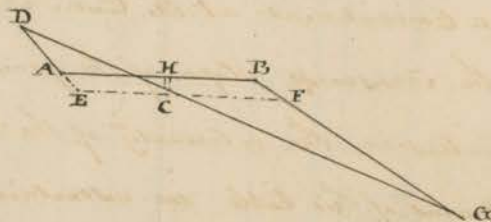
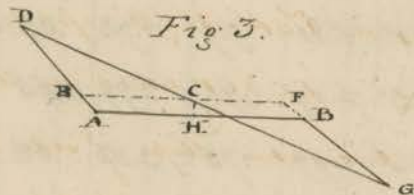
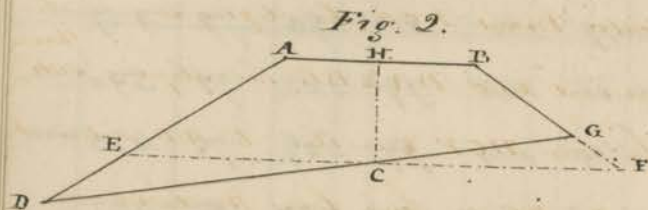
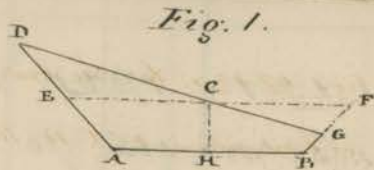
	.5	.6	.7	.8	.9
28	34	39	45	51	
89	95	102	109	116	
158	165	172	179	187	
233	241	249	257	266	
316	325	334	343	352	
407	416	426	435	445	
505	515	525	535	546	
610	620	631	642	654	
722	733	745	757	770	
842	854	867	879	892	
969	982	995	1008	1026	
1103	1117	1131	1145	1159	
1246	1260	1275	1289	1304	
1394	1409	1425	1440	1456	
1551	1567	1583	1599	1616	

	0	.1	.2	.3	.4
15	1632	1648	1664	1681	1698
16	1799	1814	1833	1851	1868
17	1974	1992	2010	2028	2046
18	2156	2173	2193	2212	2231
19	2345	2363	2384	2404	2423
20	2542	2562	2582	2603	2623
21	2746	2767	2788	2809	2830
22	2958	2979	3001	3022	3044
23	3176	3199	3221	3244	3266
24	3403	3426	3449	3472	3495

.5	.6	.7	.8	.9
1715	1731	1748	1765	1782
1886	1903	1921	1938	1956
2064	2082	2101	2120	2138
2250	2269	2288	2307	2326
2443	2463	2483	2502	2522
2643	2664	2684	2705	2726
2851	2872	2893	2915	2936
3066	3088	3110	3132	3154
3289	3311	3334	3357	3380
3518	3542	3565	3589	3612

Rise in 10 feet for each degree of slope	Slope of Ground	1 to 1		1½ to 1		Table 3 ^d Depth
		Table 1 st		Table 2 ^d		
		G.D.	L.D.	G.D.	L.D.	
0.17	1°	1.02	.98	1.03	.97	.21
0.35	2°	1.04	.96	1.06	.95	.42
0.52	3°	1.06	.95	1.09	.93	.63
0.70	4°	1.08	.94	1.12	.91	.84
0.87	5°	1.10	.92	1.15	.89	1.05
1.05	6°	1.12	.91	1.19	.87	1.26
1.22	7°	1.15	.90	1.23	.85	1.47
1.39	8°	1.17	.89	1.28	.83	1.68
1.56	9°	1.20	.87	1.33	.82	1.90
1.74	10°	1.23	.86	1.38	.80	2.11
1.91	11°	1.26	.85	1.44	.79	2.33
2.08	12°	1.30	.84	1.50	.78	2.55
2.25	13°	1.33	.83	1.57	.76	2.77
2.42	14°	1.37	.82	1.65	.75	2.99
2.59	15°	1.41	.82	1.73	.74	3.21

Slope of Ground		1 to 1	1 1/2 to 1	Depth
2.76	16°	1.46	.81	1.83 .73 3.44
2.92	17°	1.51	.80	1.93 .72 3.67
3.09	18°	1.56	.79	2.05 .71 3.90
3.26	19°	1.61	.79	2.19 .70 4.13
3.42	20°	1.67	.78	2.34 .69 4.37
3.58	21°	1.74	.77	2.53 .68 4.61
3.75	22°	1.81	.77	2.74 .67 4.85
3.91	23°	1.89	.76	2.99 .66 5.09
4.07	24°	1.97	.76	3.30 .66 5.34
4.23	25°	2.07	.75	3.67 .65 5.59



Let AB (figs 1.2.3 & 4) be the base of an Excavation or Embankment. CH the depth at Centre Picket. DE the sloping surface of the ground and DA & BG the sloping side. Draw ECF parallel to AB intersecting AD & BG or these lines produced in E & F ; then the columns of greater & lesser distances in Table 1st & 2^d express CD & CG in terms of EC & CF which are reckoned unity.

In Excavation slope of side Banks 1 to 1 in Embankment slope $1\frac{1}{2}$ to 1. -

Table 3^d shows the depth of Excavation or Embankment at the Centre Picket when the Transverse slope of the ground just intersects the extremity of the base. By means of this table we ascertain which of the following cases the examples belong to. -

RULES

For ascertaining Side Distance

Case 1st. When the slope does not intersect the base and there is Excavation at Centre. — Multiply the sum of $\frac{1}{2}$ the base and depth by the numbers in Table 1st opposite the given slope under the G & I distances respectively for the greater & lesser distances.

Case 2nd. When the slope does not intersect the base and there is Embankment at Centre. —

Multiply the sum of $\frac{1}{2}$ the base and $-\frac{3}{2}$ the depth by the numbers in Table 2nd for the G & I distances. —

Case 3rd. When the slope intersects the base and there is Excavation at Centre Fig 3rd.

Find C.D. by the G.D. in Table 1st as in Case 1st. To find C.G. multiply $\frac{1}{2}$ the base $-\frac{3}{2}$ the depth by the G.D. distance in Table 2nd. —

Case 4th. When the slope intersects the base and there is Embankment at Centre. — Find the Lower distance by the G.D. in Table 2nd as in Case 2nd.

To find C.D. Multiply $\frac{1}{2}$ the base $-\frac{3}{2}$ the depth by the number found in Table 1st under the Greater Distance. —

3

	Slope $\frac{3}{4}$ to 1 ^N					Base ^X				
ft	0	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{4}{10}$					
0	—	6	12	18	24					
1	62	68	75	82	88					
2	129	137	144	151	158					
3	203	210	218	226	234					
4	281	290	298	306	314					
5	366	374	383	392	401					
6	455	465	474	484	493					
7	551	561	571	581	591					
8	652	662	673	683	694					
9	758	769	780	791	802					
10	870	882	893	905	917					
11	988	1000	1012	1024	1037					
12	1111	1124	1136	1149	1162					
13	1240	1253	1266	1279	1293					
14	1374	1388	1402	1415	1429					

16 ft Dist 100 ft

Vol. Corrected
ft C. 402

$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{4}{10}$	$\frac{5}{10}$	1. 5. 2. 6
30	36	43	49	56	$1\frac{1}{2}$ 0.51
95	102	109	116	123	2 0.92
165	173	180	188	195	$2\frac{1}{2}$ 1.46
241	249	257	265	273	3 2.09
323	331	340	348	357	$3\frac{1}{2}$ 2.81
410	419	428	437	446	4 3.69
503	512	522	531	541	$4\frac{1}{2}$ 4.70
601	611	621	631	642	5 5.83
704	715	726	737	747	$5\frac{1}{2}$ 7.00
814	825	836	848	859	6 8.34
928	940	952	964	976	$6\frac{1}{2}$ 9.79
1049	1061	1074	1086	1099	7 11.36
1175	1188	1201	1214	1227	$7\frac{1}{2}$ 14.00
1306	1320	1333	1347	1361	8 14.81
1443	1457	1471	1486	1500	$8\frac{1}{2}$ 16.79

	0	1	2	3	4
15	1514	1528	1543	1557	1571
16	1659	1674	1689	1704	1719
17	1810	1825	1841	1856	1872
18	1967	1983	1999	2015	2031
19	2129	2145	2162	2178	2195
20	2296	2313	2330	2345	2365
21	2469	2487	2505	2522	2540
22	2648	2666	2685	2703	2721
23	2832	2851	2870	2889	2908
24	3022	3041	3061	3080	3100
25	3218	3237	3257	3277	3297
26	3418	3439	3459	3480	3500
27	3625	3646	3667	3688	3709
28	3837	3858	3880	3902	3923
29	4055	4077	4099	4121	4143
30	4278	4300	4323	4346	4369
31	4506	4530	4553	4576	4600

	5	6	7	8	9
1586	1600	1615	1630	1645	9 1876
1734	1749	1764	1780	1795	9 2088
1888	1903	1919	1935	1951	10 2314
2047	2063	2080	2096	2112	10 2550
2212	2229	2245	2262	2279	11 2799
2382	2399	2417	2434	2452	11 3057
2558	2576	2594	2612	2630	12 2322
2740	2758	2777	2795	2814	13 3311
2927	2946	2965	2984	3003	14 4022
3119	3139	3158	3178	3198	15 5211
3317	3338	3358	3378	3398	16 5230
3521	3542	3563	3583	3604	17 6639
3730	3752	3773	3794	3816	18 7594
3945	3967	3989	4011	4033	19 8275
4166	4188	4210	4233	4256	20 9222
4392	4414	4437	4460	4484	21 10206
4623	4646	4670	4694	4717	22 11207

Slope $1\frac{1}{4}$ to 1 Base

ft	0	$\frac{1}{16}$	$\frac{2}{16}$	$\frac{3}{16}$	$\frac{4}{16}$
0	—	4	9	13	18
1	49	54	60	65	71
2	107	113	120	126	133
3	175	182	189	197	204
4	252	260	268	277	285
5	338	347	356	365	374
6	433	443	453	463	474
7	537	548	559	571	582
8	651	663	675	687	700
9	775	787	800	813	827
10	907	921	935	949	963
11	1049	1064	1078	1093	1108
12	1201	1215	1231	1247	1262
13	1360	1376	1393	1410	1427
14	1529	1547	1564	1582	1600

12 ft Dist 100 ft

$\frac{1}{16}$	$\frac{2}{16}$	$\frac{3}{16}$	$\frac{4}{16}$	$\frac{5}{16}$
23	28	33	38	43
77	82	88	95	101
140	146	153	160	167
212	220	227	235	243
294	302	311	319	328
384	394	403	413	423
484	494	505	516	527
593	605	616	628	640
712	724	737	749	762
840	853	866	880	893
977	991	1006	1020	1034
1123	1138	1153	1169	1184
1279	1295	1311	1327	1343
1444	1461	1478	1495	1512
1617	1635	1653	1671	1690

	0	1	2	3	4
15	1708	1726	1745	1763	1781
16	1895	1916	1935	1954	1974
17	2093	2113	2134	2154	2175
18	2300	2321	2342	2363	2385
19	2516	2538	2560	2582	2604
20	2741	2763	2786	2810	2833

	5	6	7	8	9
	1802	1820	1838	1857	1877
	1994	2013	2033	2053	2073
	2195	2216	2237	2257	2278
	2406	2428	2450	2471	2493
	2627	2649	2672	2695	2718
	2856	2880	2903		

Slope 1/2 Base 12 ft

	0.0	0.1	0.2	0.3	0.4
0	0	4	9	14	19
1	50	56	61	68	74
2	111	118	125	131	139
3	183	191	199	207	215
4	266	275	284	293	302
5	361	371	381	391	402
6	467	478	489	500	512
7	583	596	608	620	633
8	711	724	737	751	765
9	850	864	879	894	908
10	1000	1015	1031	1047	1063
11	1161	1178	1195	1212	1229
12	1333	1351	1369	1387	1406
13	1517	1535	1554	1574	1593
14	1712	1731	1751	1772	1792

Dist 100 ft

	0.5	0.6	0.7	0.8	0.9
0	24	29	34	39	44
1	80	86	93	99	105
2	146	153	160	168	175
3	213	222	230	240	258
4	282	292	302	312	321
5	352	363	373	384	395
6	423	435	447	459	471
7	496	509	521	535	548
8	579	593	607	621	635
9	663	678	694	709	724
10	749	765	781	797	813
11	836	853	870	887	904
12	924	942	961	979	998
13	1012	1032	1051	1071	1090
14	1102	1123	1144	1165	1186

	0	1	2	3	4
15	1917	1938	1959	1981	2002
16	2133	2156	2178	2200	2223
17	2361	2384	2408	2431	2455
18	2600	2624	2649	2674	2699
19	2837	2876	2901	2926	2952
20	3111	3138	3164	3191	3218
21	3383	3411	3439	3467	3495
22	3666	3696	3724	3754	3783
23	3961	3991	4021	4052	4082
24	4267	4298	4329	4360	4391
25	4583	4615	4648	4680	4713
26	4911	4944	4978	5012	5045
27	5250	5284	5319	5354	5388
28	5600	5636	5671	5707	5743
29	5961	5997	6035	6072	6109
30	6333	6371	6409	6447	6485

	5	6	7	8	9
	2024	2046	2067	2089	2111
	2346	2269	2291	2314	2337
	2479	2503	2526	2552	2576
	2724	2749	2774	2799	2824
	2978	3005	3031	3058	3084
	3246	3273	3301	3328	3356
	3523	3551	3579	3608	3637
	3812	3842	3872	3901	3931
	4112	4143	4173	4204	4235
	4423	4455	4486	4518	4550
	4745	4778	4811	4844	4877
	5079	5113	5147	5181	5216
	5423	5459	5494	5529	5564
	5779	5815	5851	5888	5924
	6146	6184	6221	6259	6296
	6523	6561	6600	6639	6679

V

	.1	.2	.3	.4
31	6717	6756	6795	6834
32	7111	7151	7191	7231
33	7517	7558	7599	7640
34	7933	7976	8018	8060
35	8361	8404	8445	8482
36	8800	8844	8889	8934
37	9231		9303	9376
38				

.5	.6	.7	.8	.9
6912	6952	6992	7031	7071
7312	7353	7394	7435	7476
7724	7765	7807	7849	7891
8146	8189	8232	8275	8318
8579	8623	8667	8711	8756
9024	9069	9114	9159	9205
9469	9514	9559	9604	9649
9938				

CHORD of 100 F

Angle of Deflex Line	Versed Sin in feet	Ordinate in feet	Waclint in feet	
1/2			11460	859.5
1	.217	.162	5730	729.0
1 1/2	.328	.246	3820	598.0
2	.435	.325	2865	467.5
2 1/2	.545	.403	2292	337.0
3	.655	.484	1910	206.5
3 1/2	.762	.571	1637.1	79.5
4	.872	.660	1432.5	0
4 1/2	.981	.740	1273.3	
5	1.090	.820	1146	
5 1/2	1.199	.910	1041.8	
6	1.309	.990	955.3	
6 1/2	1.416	1.070	881.5	
7	1.525	1.150	818.5	
7 1/2	1.635	1.230	764.0	
8	1.744	1.310	716.2	
8 1/2	1.853	1.390	674.1	
9	1.960	1.470	636.6	
9 1/2	2.070	1.560	603.15	
10	2.180	1.640	573	

2 2865 11

1 5730 11

11460
24

CHORD of 100 F

Primary Angle of Deflex	Ord. N ^o 1	Ord. N ^o 2	Ord. N ^o 3	Ord. N ^o 4	Ord. N ^o 5	Ord. N ^o 6	Ord. N ^o 7	Ord. N ^o 8	Ord. N ^o 9	Primary versed Sin
1	.04	.07	.11	.14	.16	.18	.20	.21	.21	.22
1 1/2	.06	.10	.16	.21	.25	.28	.30	.31	.32	.33
2	.08	.14	.22	.28	.33	.37	.40	.41	.43	.44
2 1/2	.11	.20	.28	.35	.41	.46	.50	.52	.54	.55
3	.13	.24	.33	.42	.49	.55	.59	.63	.65	.66
3 1/2	.15	.28	.39	.49	.57	.64	.69	.74	.76	.77
4	.17	.32	.44	.56	.66	.73	.79	.84	.86	.87
4 1/2	.19	.36	.50	.63	.74	.83	.89	.95	.97	.98
5	.21	.40	.56	.70	.82	.92	.99	1.05	1.08	1.09
5 1/2	.23	.43	.61	.77	.91	1.01	1.09	1.16	1.19	1.20
6	.25	.47	.67	.84	.99	1.10	1.19	1.26	1.30	1.31
6 1/2	.27	.51	.72	.91	1.07	1.19	1.29	1.37	1.41	1.42
7	.29	.55	.78	.98	1.15	1.28	1.39	1.47	1.52	1.53
7 1/2	.31	.59	.83	1.05	1.23	1.38	1.49	1.57	1.63	1.64
8	.33	.63	.89	1.13	1.30	1.47	1.59	1.68	1.74	1.75
8 1/2	.35	.67	.94	1.20	1.39	1.56	1.69	1.78	1.84	1.86
9	.37	.71	1.00	1.26	1.47	1.65	1.78	1.89	1.95	1.97
9 1/2	.40	.75	1.06	1.33	1.56	1.74	1.88	1.99	2.05	2.08
10	.42	.79	1.11	1.40	1.64	1.83	1.98	2.10	2.15	2.19



CHORD of 66 ft

Angle of Deflexion	Versed Sine in Links Feet		Ordinate in Links Feet	
$\frac{1}{2}^\circ$				
1°	.22	.14	.16	.11
$1\frac{1}{2}^\circ$	.33	.21	.24	.16
2°	.44	.29	.32	.22
$2\frac{1}{2}^\circ$	.55	.36	.40	.27
3°	.65	.43	.48	.32
$3\frac{1}{2}^\circ$	.76	.50	.56	.38
4°	.87	.58	.64	.43
$4\frac{1}{2}^\circ$	.98	.64	.72	.49
5°	1.09	.72	.80	.54
$5\frac{1}{2}^\circ$	1.20	.78	.88	.59
6°	1.31	.86	.97	.65
$6\frac{1}{2}^\circ$	1.42	.93	1.05	.70
7°	1.53	1.00	1.13	.76
8°	1.74	1.15	1.29	.86
9°	1.96	1.30	1.45	.97
10°	2.18	1.44	1.61	1.08

CHORD of 66 ft

Angle of Deflexion	Versed Sine in Inches	Ordinate in Inches	Radius in Chains	Radius in Feet
$\frac{1}{2}^\circ$	$\frac{7}{8}$	$\frac{3}{8}$	114.60	756.4
1°	$1\frac{3}{4}$	$1\frac{1}{4}$	57.30	378.2
$1\frac{1}{2}^\circ$	$2\frac{1}{2}$	$1\frac{7}{8}$	38.19	252.1
2°	$3\frac{1}{2}$	$2\frac{3}{4}$	28.65	189.1
$2\frac{1}{2}^\circ$	$4\frac{3}{8}$	$3\frac{1}{4}$	22.92	151.3
3°	$5\frac{1}{8}$	$3\frac{7}{8}$	19.10	126.0
$3\frac{1}{2}^\circ$	6	$4\frac{1}{2}$	16.36	108.0
4°	7	$5\frac{1}{8}$	14.32	94.6
$4\frac{1}{2}^\circ$	$7\frac{3}{4}$	$5\frac{3}{8}$	12.72	84.0
5°	$8\frac{1}{4}$	$6\frac{1}{2}$	11.46	75.7
$5\frac{1}{2}^\circ$	$9\frac{3}{8}$	$7\frac{1}{8}$	10.43	68.8
6°	$10\frac{3}{8}$	$7\frac{6}{8}$	9.55	63.1
$6\frac{1}{2}^\circ$	$11\frac{1}{8}$	$8\frac{3}{8}$	8.81	58.2
7°	12	$9\frac{1}{4}$	8.19	54.1
8°	$13\frac{5}{8}$	$10\frac{3}{8}$	7.17	47.3
9°	$15\frac{1}{8}$	$11\frac{3}{8}$	6.37	42.1
10°	$17\frac{1}{4}$	$12\frac{1}{8}$	5.74	37.9

Table of Nat. Secants from 1° to 69°

1° 1.00015	32° 1.1792	63 2.203
2° 1.00061	33° 1.1924	
3° 1.00137	34° 1.2062	64 2.281
4° 1.00244	35° 1.2208	
5° 1.00383	36° 1.2361	65 2.366
6° 1.00551	37° 1.2521	
7° 1.00751	38° 1.2690	66 2.458
8° 1.00983	39° 1.2868	
9° 1.01246	40° 1.3054	67 2.559
10° 1.01543	41° 1.3250	
11° 1.01871	42° 1.3456	68 2.669
12° 1.02324	43° 1.3673	
13° 1.02830	44° 1.3901	69 2.790
14° 1.03361	45° 1.414	
15° 1.03528	46° 1.439	
16° 1.04030	47° 1.466	
17° 1.04569	48° 1.494	
18° 1.05146	49° 1.524	
19° 1.05762	50° 1.555	
20° 1.06418	51° 1.589	
21° 1.07115	52° 1.624	
22° 1.07853	53° 1.661	
23° 1.08636	54° 1.701	
24° 1.09464	55° 1.743	
25° 1.10338	56° 1.788	
26° 1.11260	57° 1.836	
27° 1.1223	58° 1.887	
28° 1.1326	59° 1.941	
29° 1.1433	60° 2.000	
30° 1.1547	61° 2.063	
31° 1.1666	62° 2.130	

Table of Tangents from 1° to 69°

1° .0174	32° .625	63 1.963
2° .0349	33° .649	
3° .0524	34° .674	64 2.050
4° .0699	35° .700	
5° .0875	36° .726	65 2.145
6° .1051	37° .753	
7° .1228	38° .781	66 2.246
8° .1405	39° .810	
9° .1584	40° .839	67 2.356
10° .1763	41° .869	
11° .1944	42° .900	68 2.475
12° .2126	43° .932	
13° .2309	44° .966	69 2.605
14° .2493	45° 1.000	
15° .2679	46° 1.036	
16° .2867	47° 1.072	
17° .3057	48° 1.111	
18° .3249	49° 1.150	
19° .3443	50° 1.192	
20° .3640	51° 1.235	
21° .3839	52° 1.280	
22° .4040	53° 1.327	
23° .4245	54° 1.376	
24° .4452	55° 1.428	
25° .4663	56° 1.482	
26° .4877	57° 1.540	
27° .5096	58° 1.600	
28° .5320	59° 1.664	
29° .5540	60° 1.732	
30° .5770	61° 1.804	
31° .6010	62° 1.881	

Difference between True and apparent Level

Dist. in
Feet Feet in

1000 0" 0.29

1/2 mile 2320 0" 0.50

2000 0" 1.15

1/2 mile 2640 0" 2.00

3000 0" 2.58

4000 0" 4.59

5000 0" 7.18

1/2 mile 5280 0" 8.00

6000 0" 10.34

7000 1" 2.07

8000 1" 6.37

9000 1" 11.25

10000 2" 4.71

11000 2" 10.74

12000 3" 5.34

Weight of One foot Length of Malleable Iron

Square Iron		Round Iron			
Section	Weight	Diameter		Circumference	
Inches	Pounds	Inches	Weight lb.	Inches	Weight lb.
1/4	0.21	1/4	0.16	1	0.26
3/8	0.47	3/8	0.37	1 1/4	0.41
1/2	0.84	1/2	0.66	1 1/2	0.59
5/8	1.34	5/8	1.03	1 3/4	0.82
3/4	1.89	3/4	1.48	2	1.05
7/8	2.57	7/8	2.02	2 1/4	1.34
1 in.	3.36	1	2.63	2 1/2	1.65
1 1/8	4.25	1 1/8	3.33	2 3/4	2.01
1 1/4	5.25	1 1/4	4.12	3	2.37
1 3/8	6.35	1 3/8	4.98	3 1/4	2.79
1 1/2	7.56	1 1/2	5.93	3 1/2	3.24
1 5/8	8.87	1 5/8	6.96	3 3/4	3.69
1 3/4	10.29	1 3/4	8.08	4	4.23
1 7/8	11.81	1 7/8	9.27	4 1/2	5.35
2	13.44	2	10.55	5	6.61
2 1/4	17.01	2 1/4	13.35	5 1/2	7.99
2 1/2	21.00	2 1/2	16.48	6	9.51
2 3/4	25.41	2 3/4	19.95	6 1/2	11.18
3	30.24	3	23.73	7	12.96
3 1/2	41.16	3 1/2	27.85	7 1/2	14.78
4	53.76	4	32.32	8	16.92
4 1/2	68.04	4 1/2	37.09	8 1/2	19.21
5	84.00	5	42.21	9	21.53
5 1/2	100.96	5 1/2	53.41	10	26.43
6	120.96	6	65.93	12	31.99

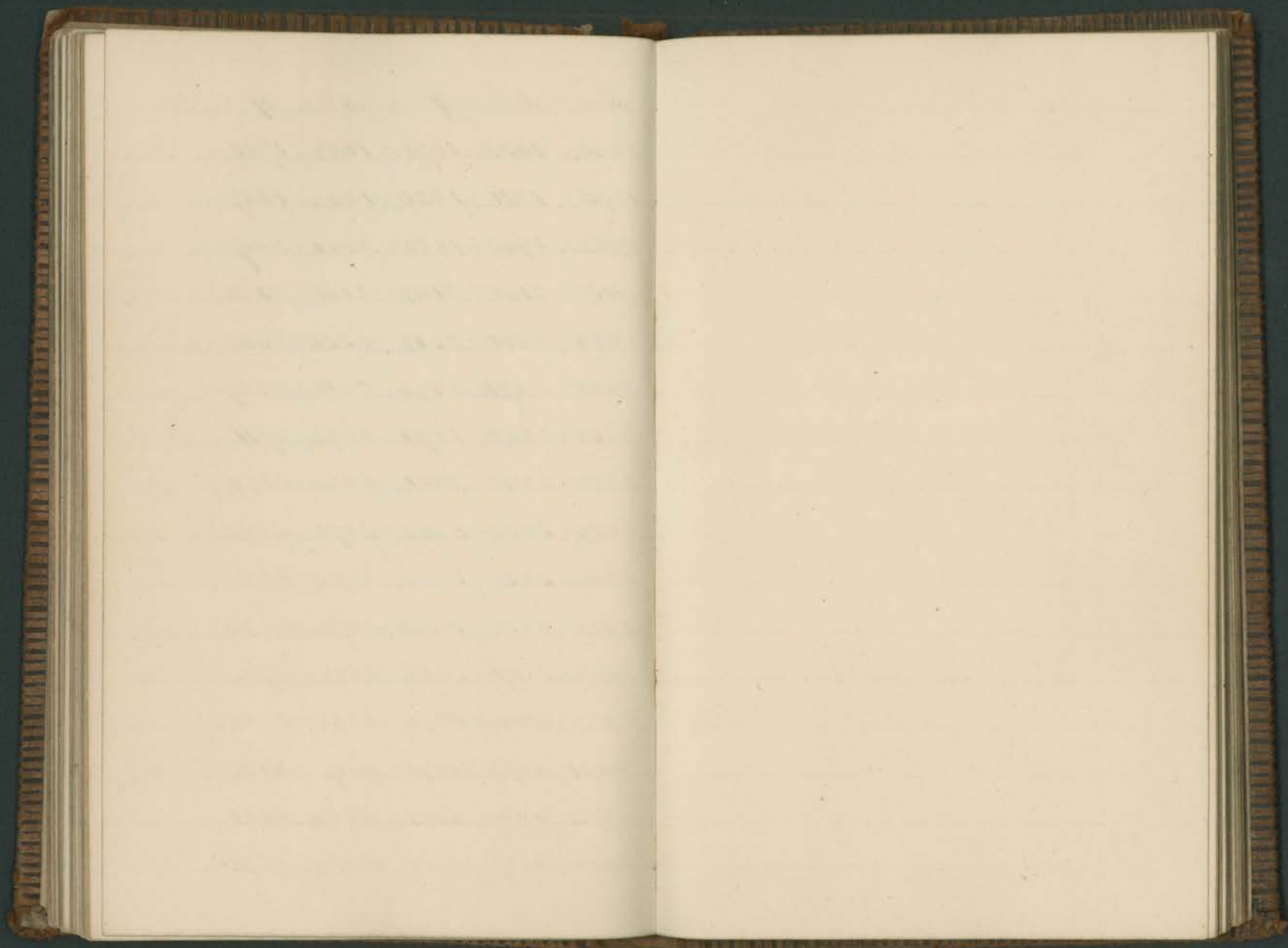
Table for Excavation Length

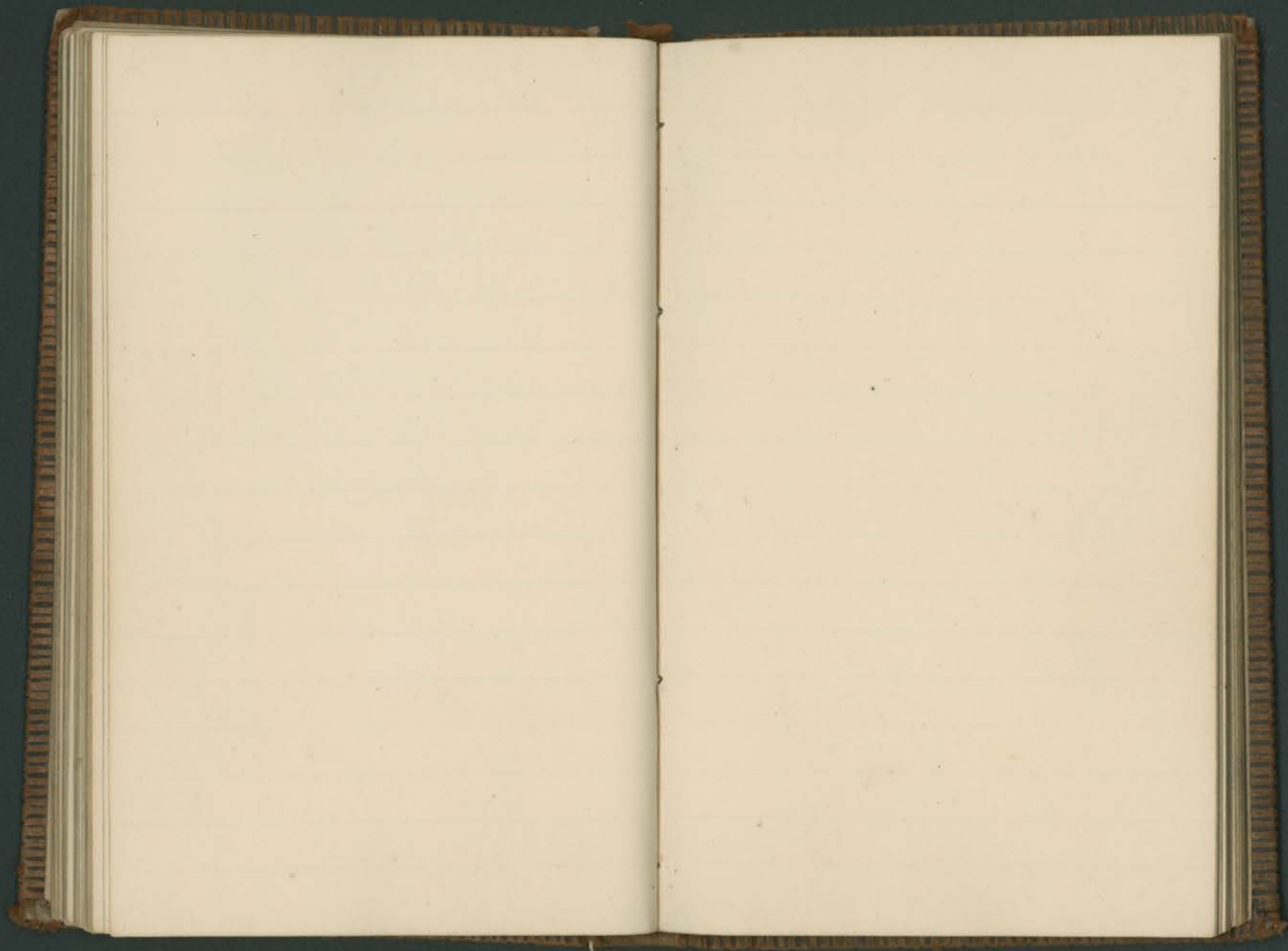
	0.	.1	.2	.3	.4
Depth ft	0	6	13	19	26
1	66	73	80	86	94
2	137	144	152	159	167
3	214	222	230	238	246
4	296	305	313	322	331
5	384	393	403	412	421
6	478	487	497	507	517
7	577	587	597	608	618
8	681	692	703	714	725
9	792	803	814	826	837
10	907	919	931	943	955
11	1029	1041	1053	1066	1079
12	1155	1168	1182	1195	1208
13	1288	1301	1315	1329	1342
14	1426	1440	1454	1468	1482

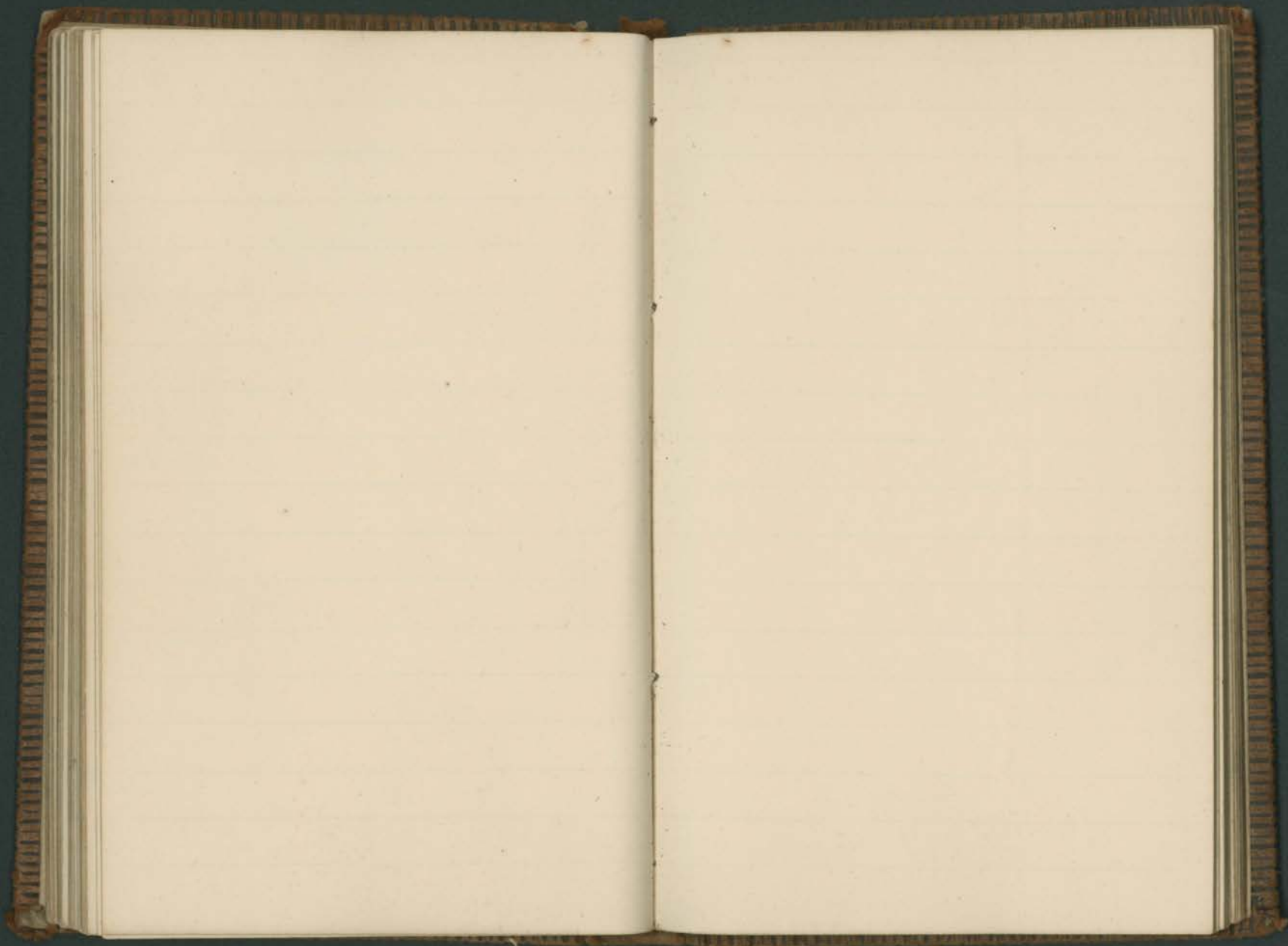
100 feet Bottom or Base 17 ft Slope $\frac{3}{4}$ ft

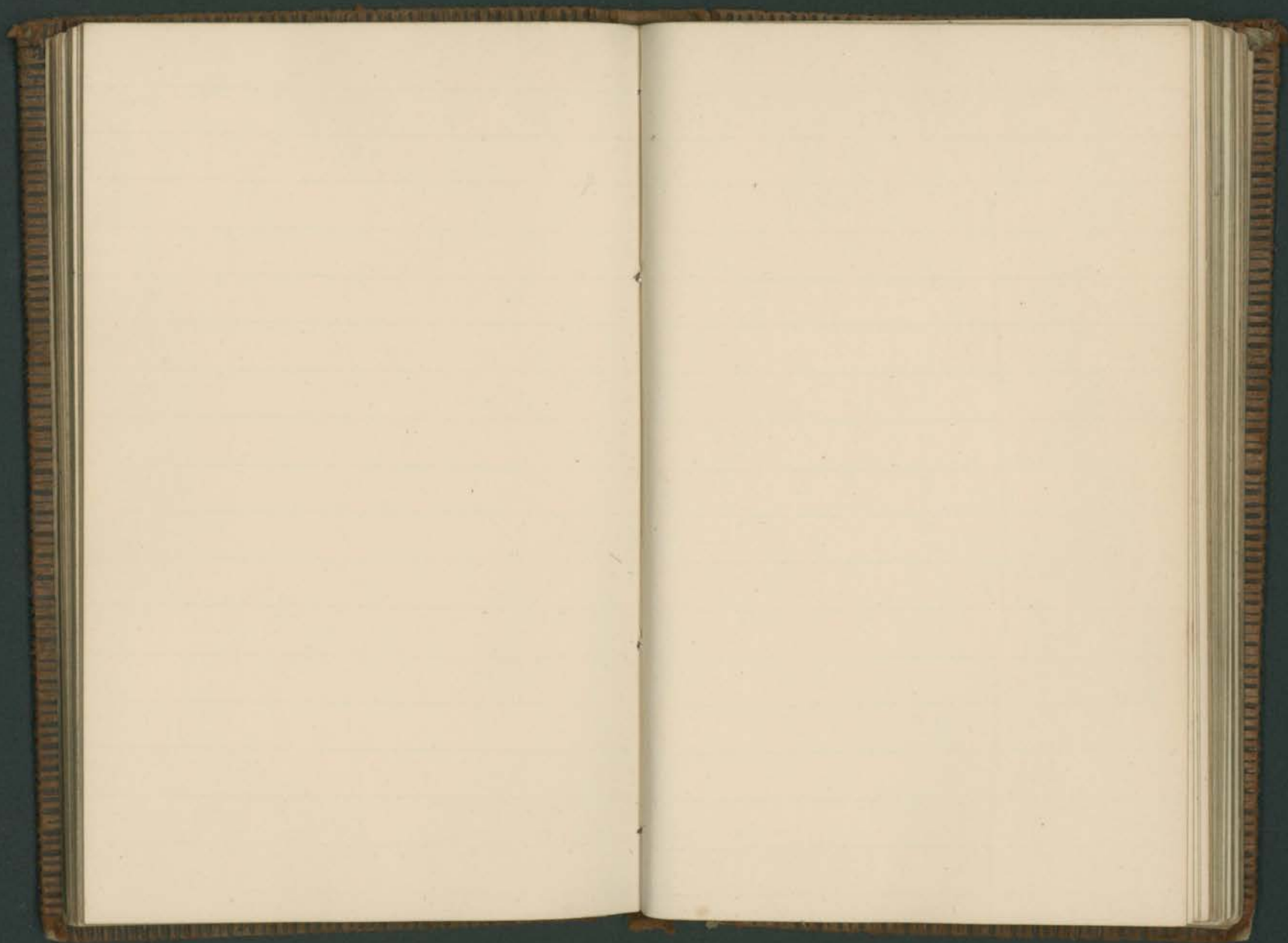
	.5	.6	.7	.8	.9
	32	39	45	52	59
	101	108	115	122	130
	175	183	190	198	206
	254	263	271	279	288
	340	348	357	366	375
	430	440	449	459	468
	527	536	546	556	567
	628	637	647	660	671
	736	747	758	769	780
	849	860	872	884	896
	967	979	992	1004	1016
	1091	1104	1117	1130	1143
	1221	1234	1248	1261	1274
	1356	1370	1384	1398	1412
	1497	1511	1526	1540	1555

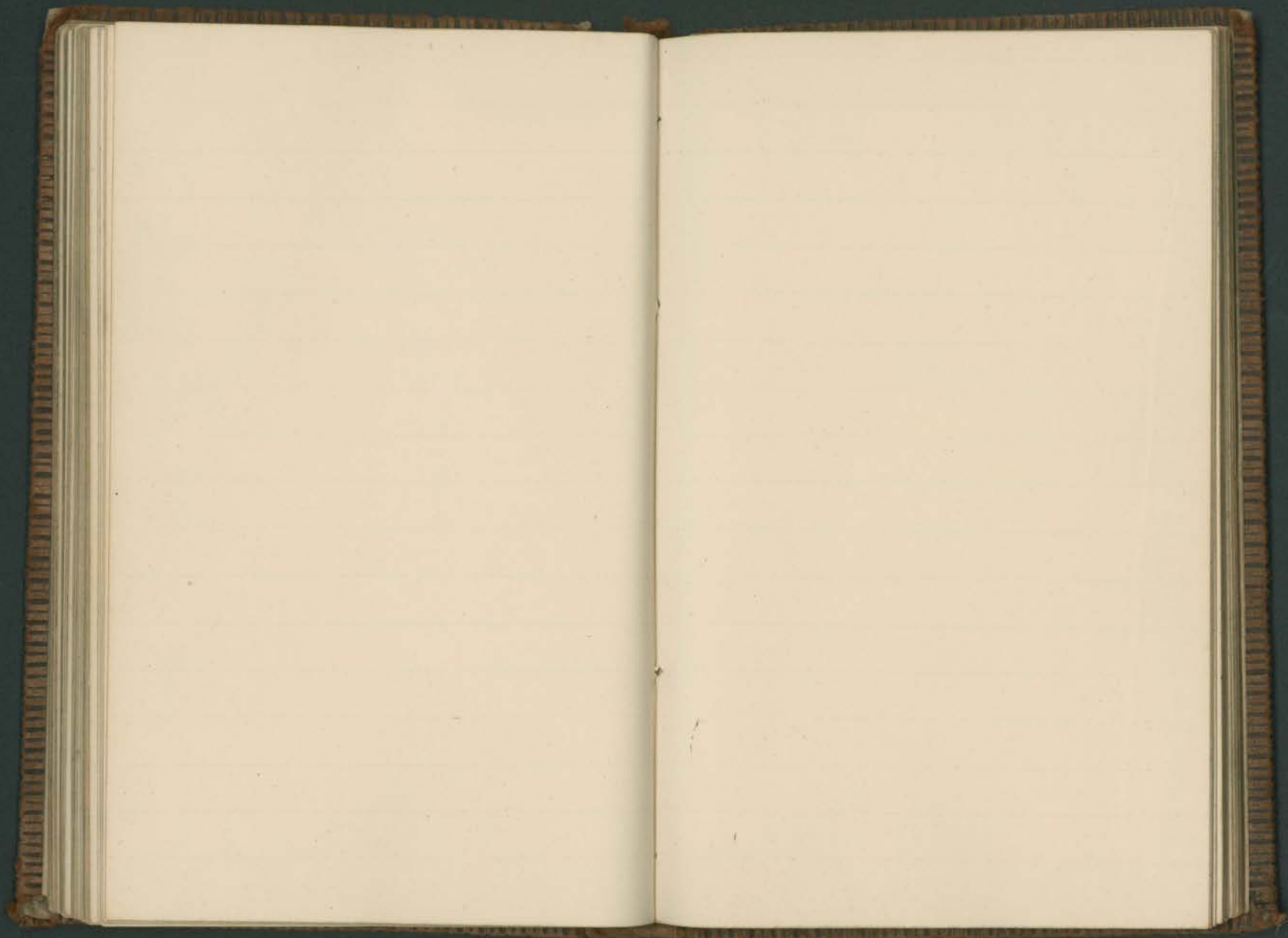
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
15	1569	1584	1599	1614	1628	1643	1658	1673	1688	1703
16	1718	1734	1749	1764	1780	1795	1811	1826	1842	1857
17	1873	1889	1905	1921	1936	1952	1968	1985	2001	2017
18	2033	2050	2066	2082	2099	2115	2132	2149	2165	2182
19	2199	2216	2233	2250	2267	2284	2301	2318	2336	2353
20	2370	2388	2405	2423	2440	2458	2476	2494	2511	2529
21	2547	2565	2583	2601	2619	2638	2656	2674	2693	2711
22	2730	2748	2767	2786	2804	2823	2842	2861	2880	2899
23	2918	2937	2956	2975	2994	3014	3033	3053	3072	3092
24	3111	3131	3150	3170	3190	3210	3230	3250	3270	3290
25	3310	3330	3350	3371	3391	3412	3432	3453	3473	3494
26	3515	3535	3556	3577	3598	3619	3641	3662	3683	3705
27	3726	3747	3769	3790	3812	3833	3855	3876	3898	3920
28	3941	3963	3984	4006	4029	4051	4073	4095	4117	4140
29	4162	4184	4207	4229	4252	4275	4297	4320	4343	4366
30	4389	4412	4435	4458	4481	4504	4527	4551	4574	4598

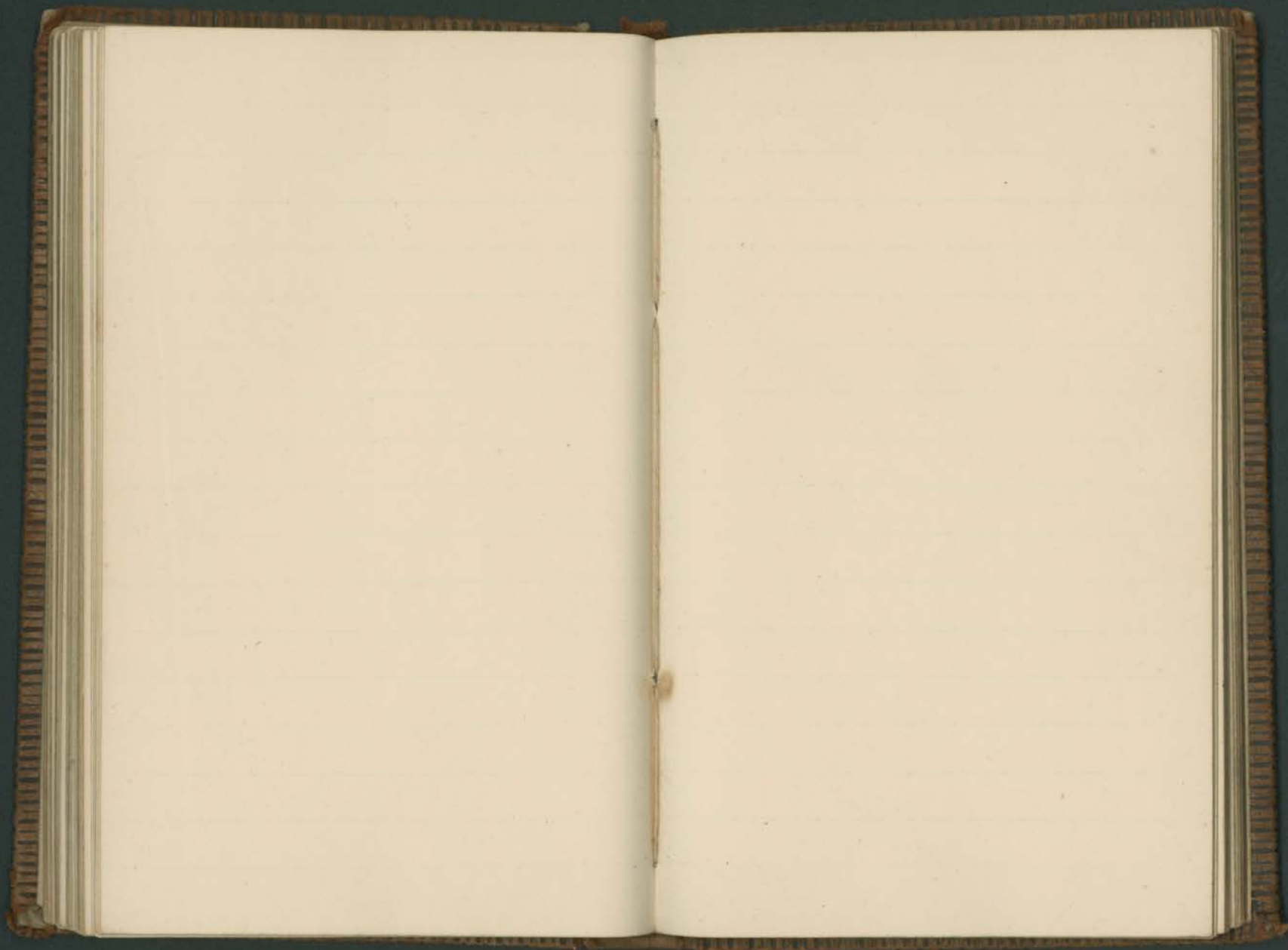


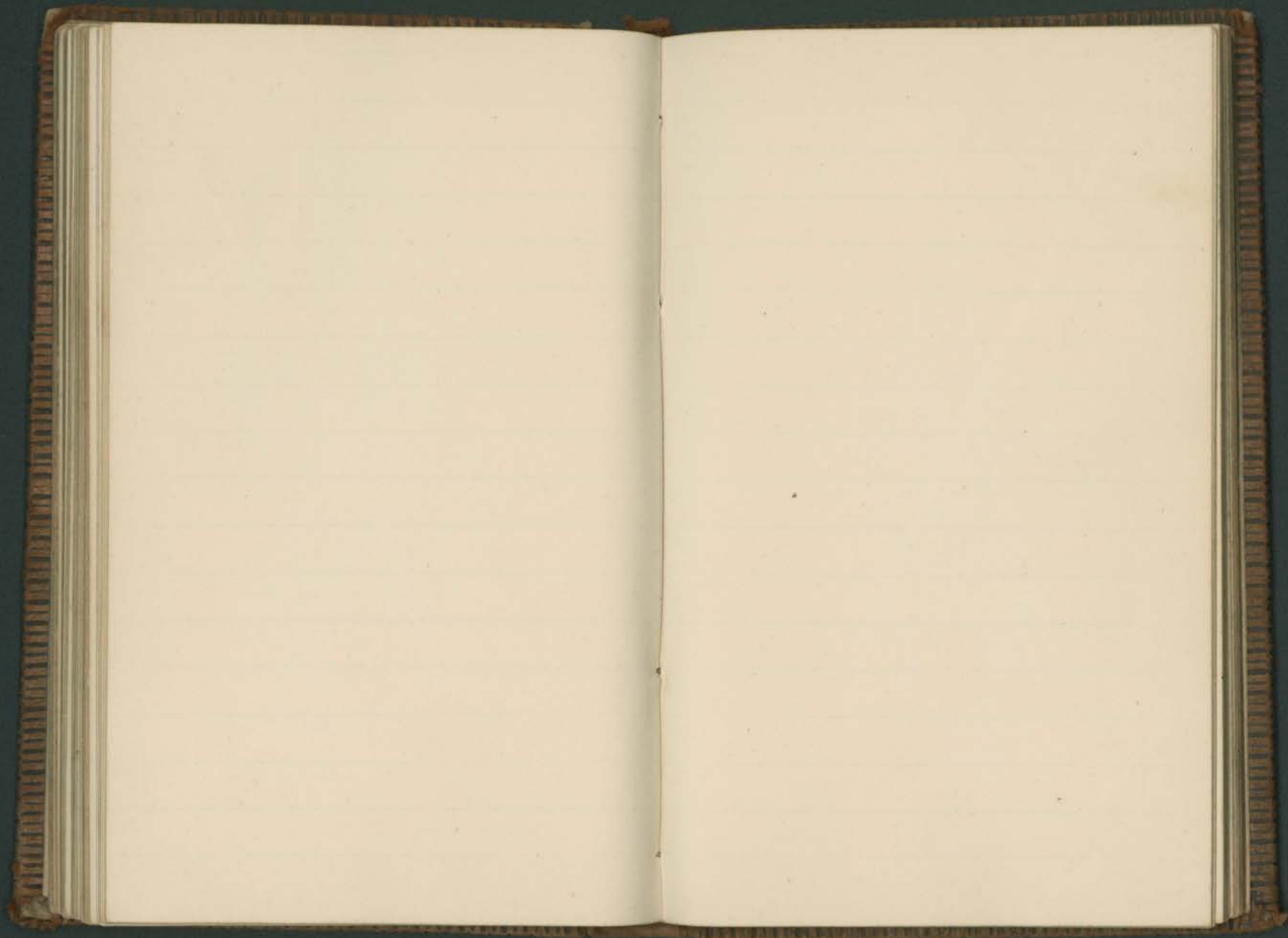


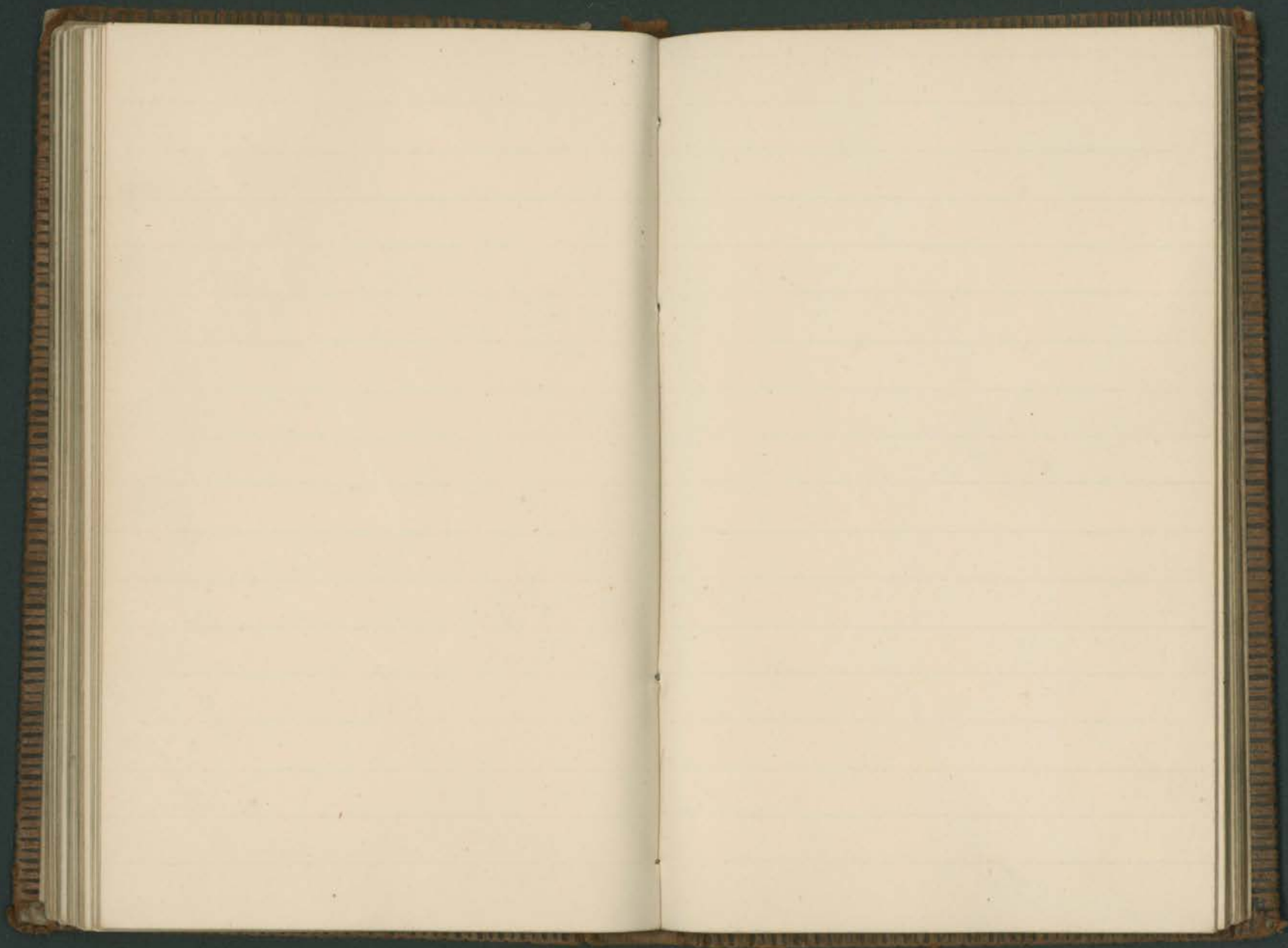


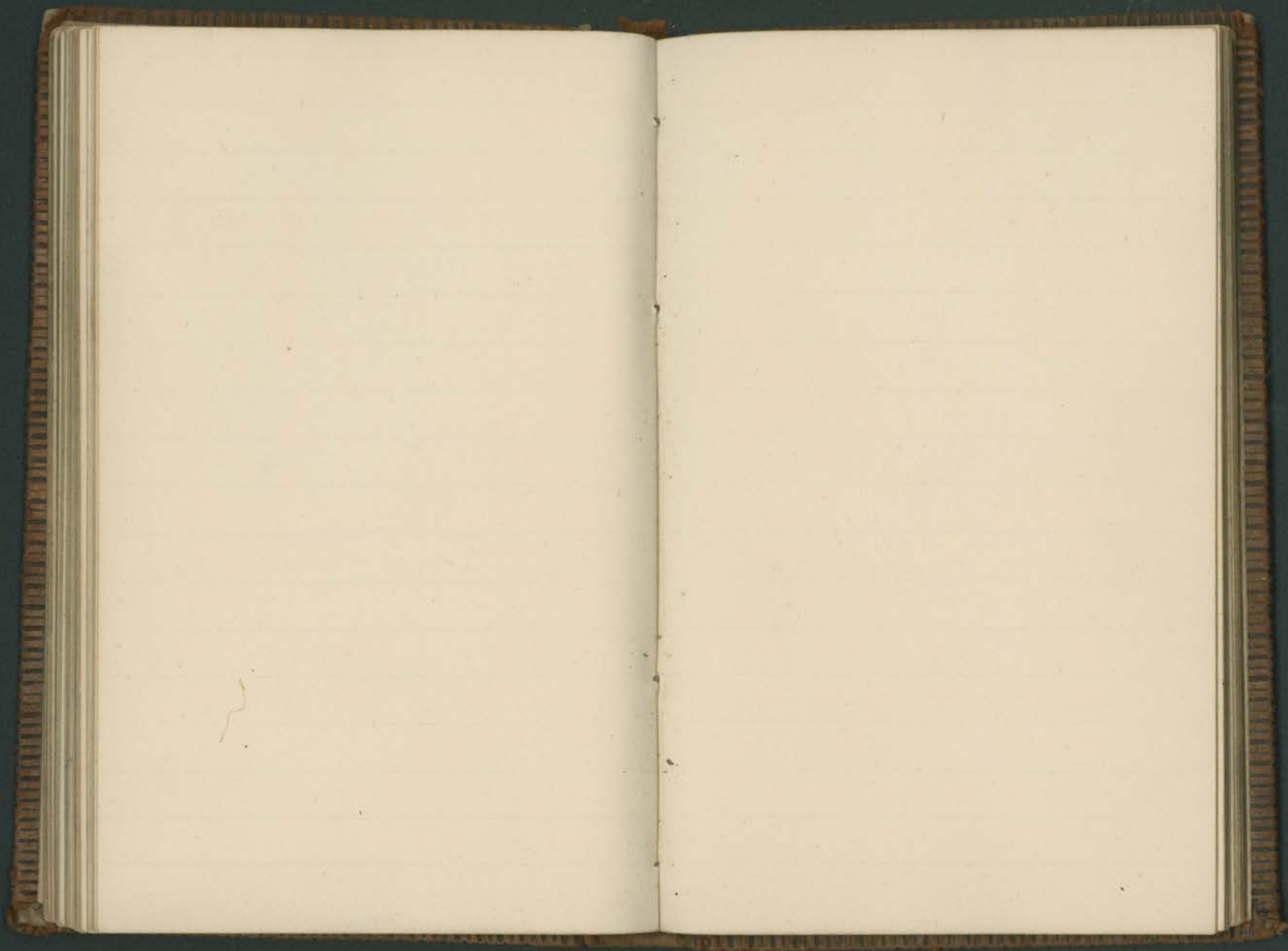


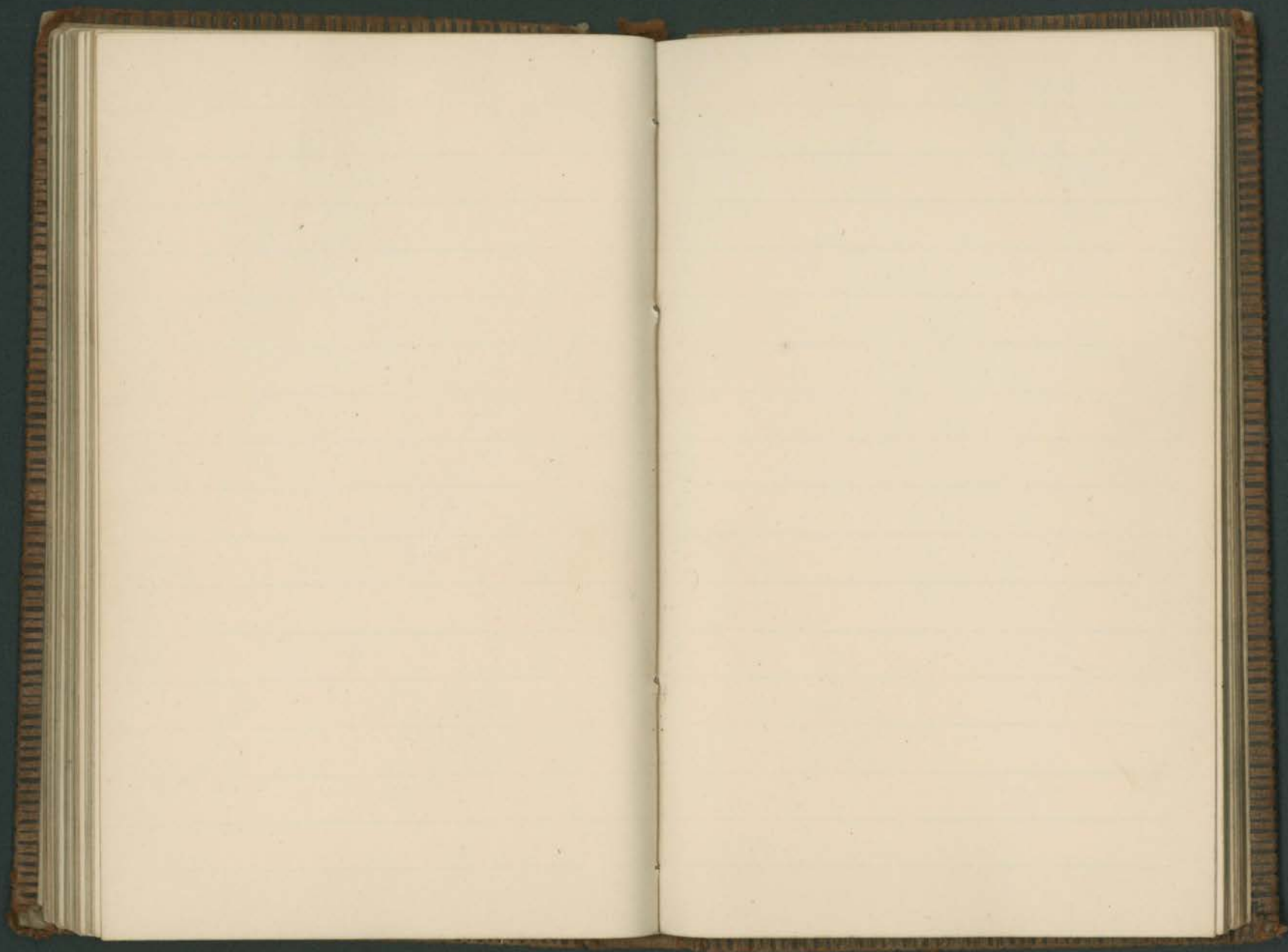


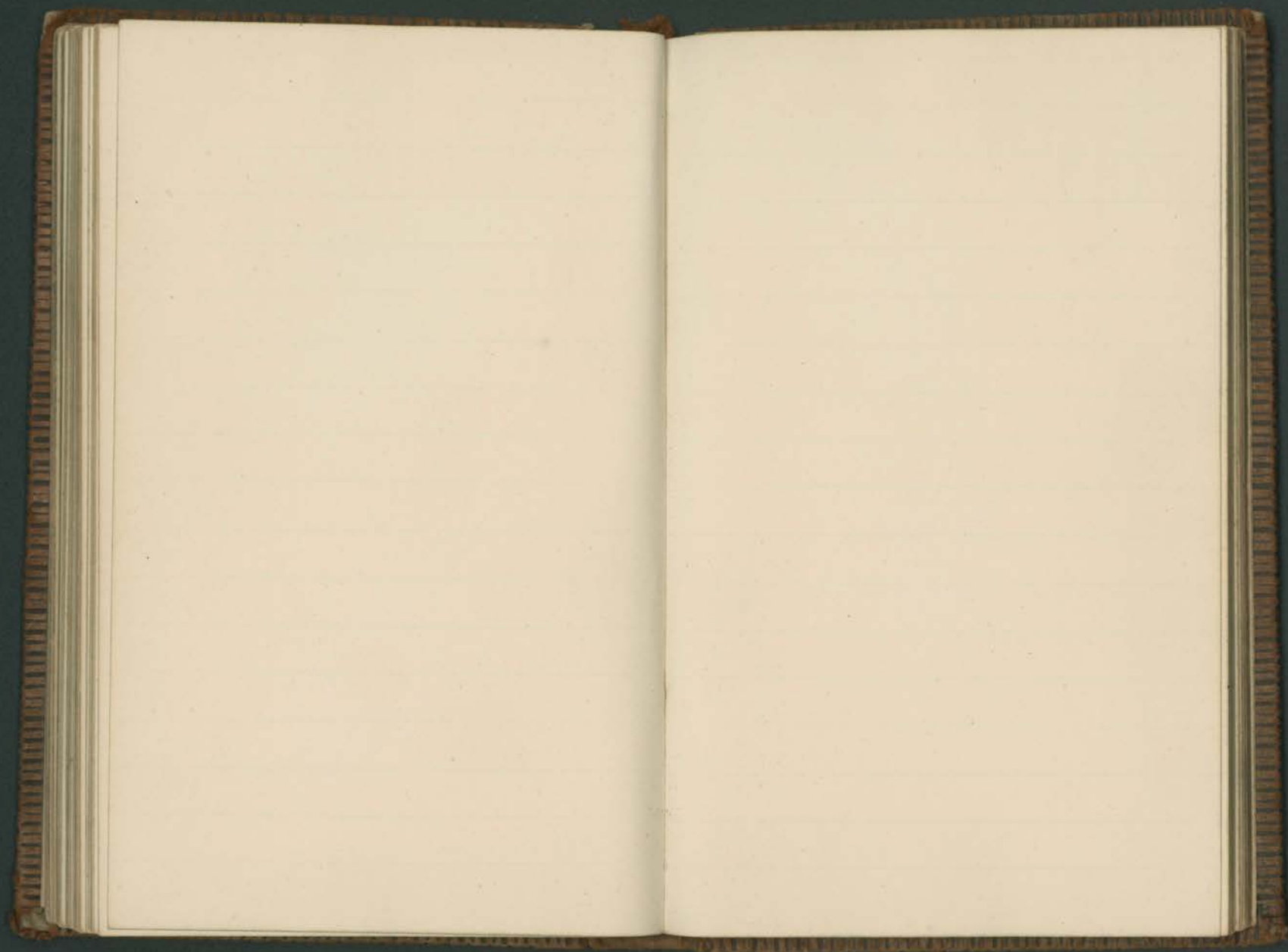


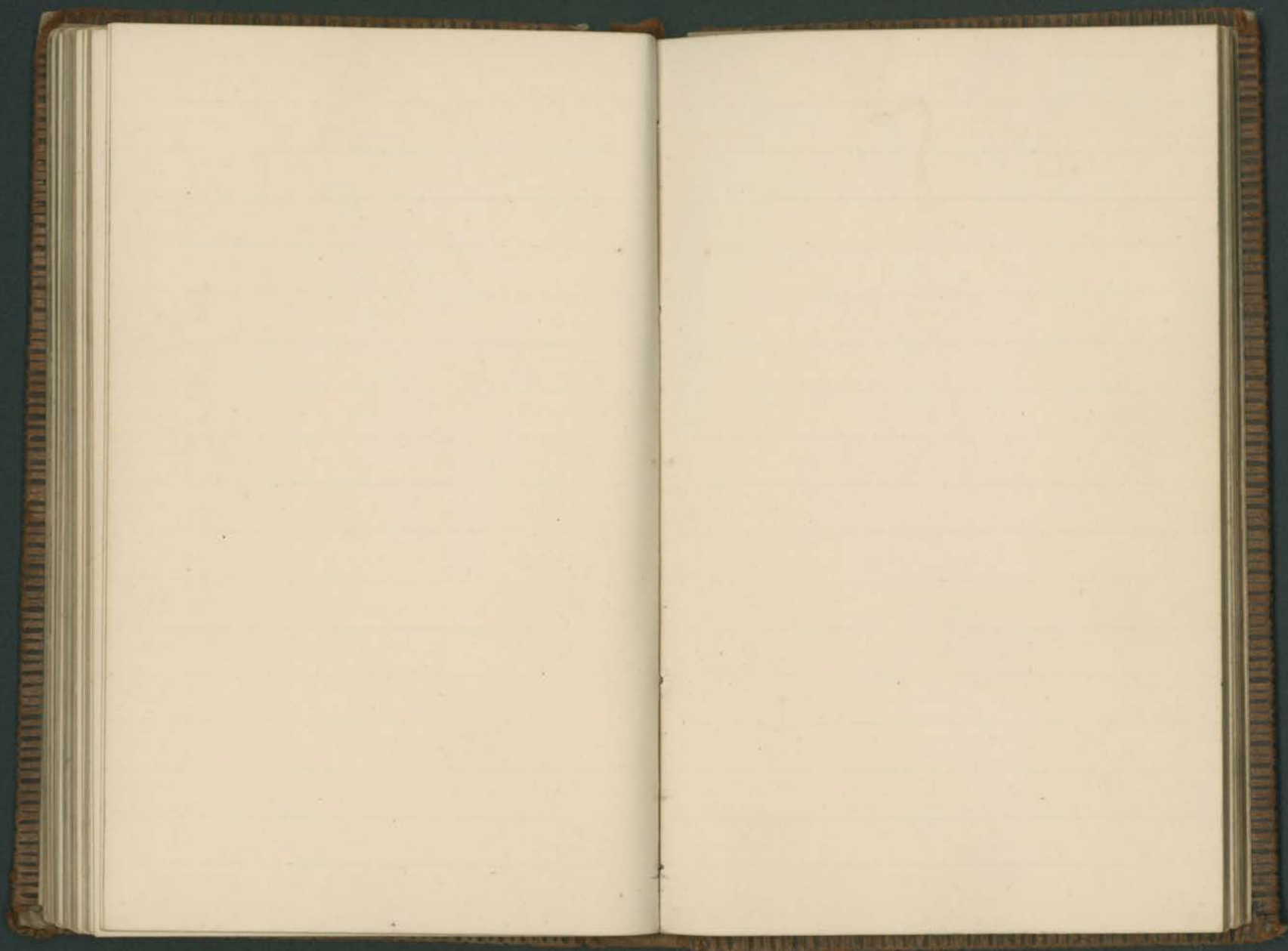


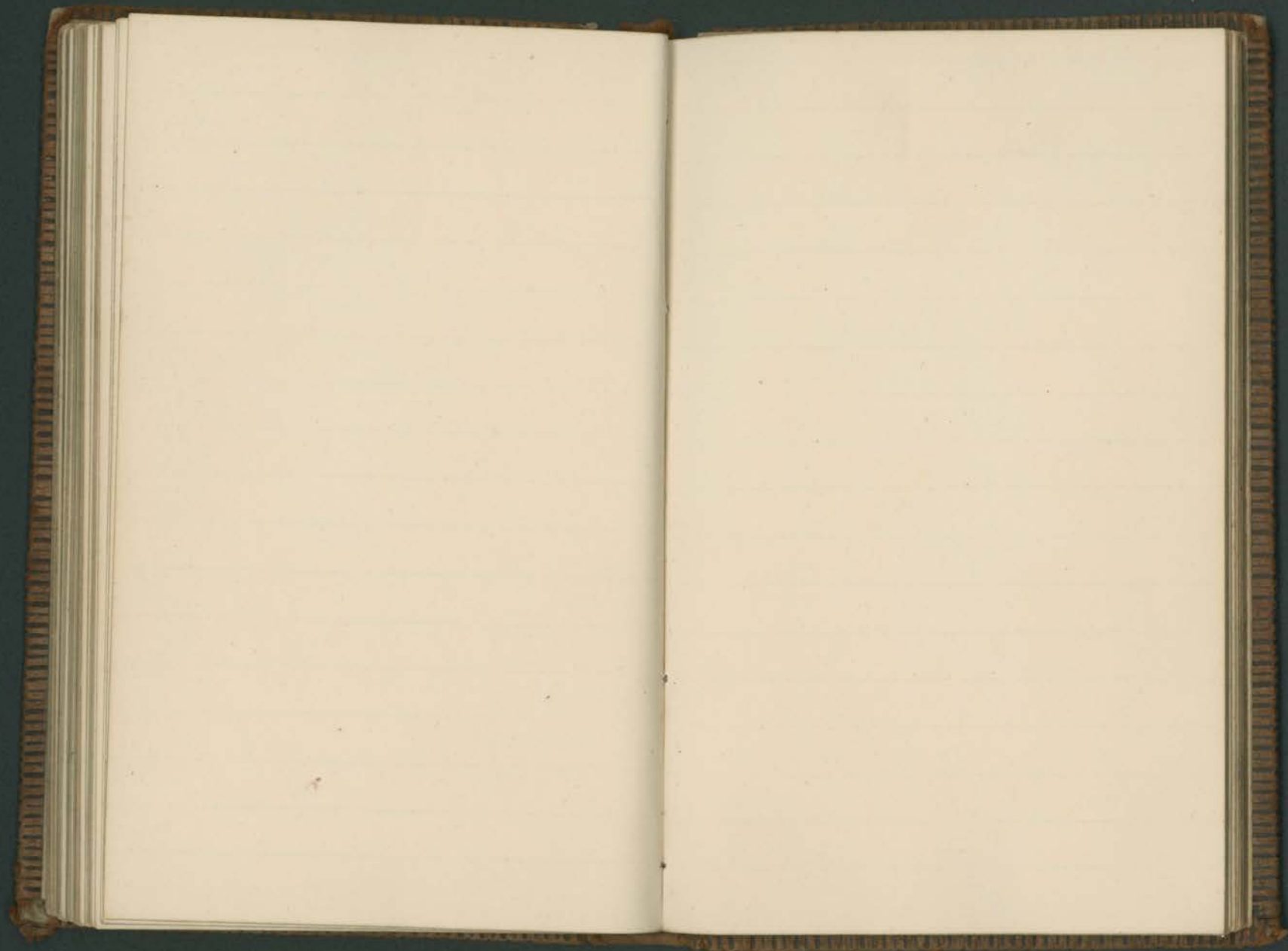


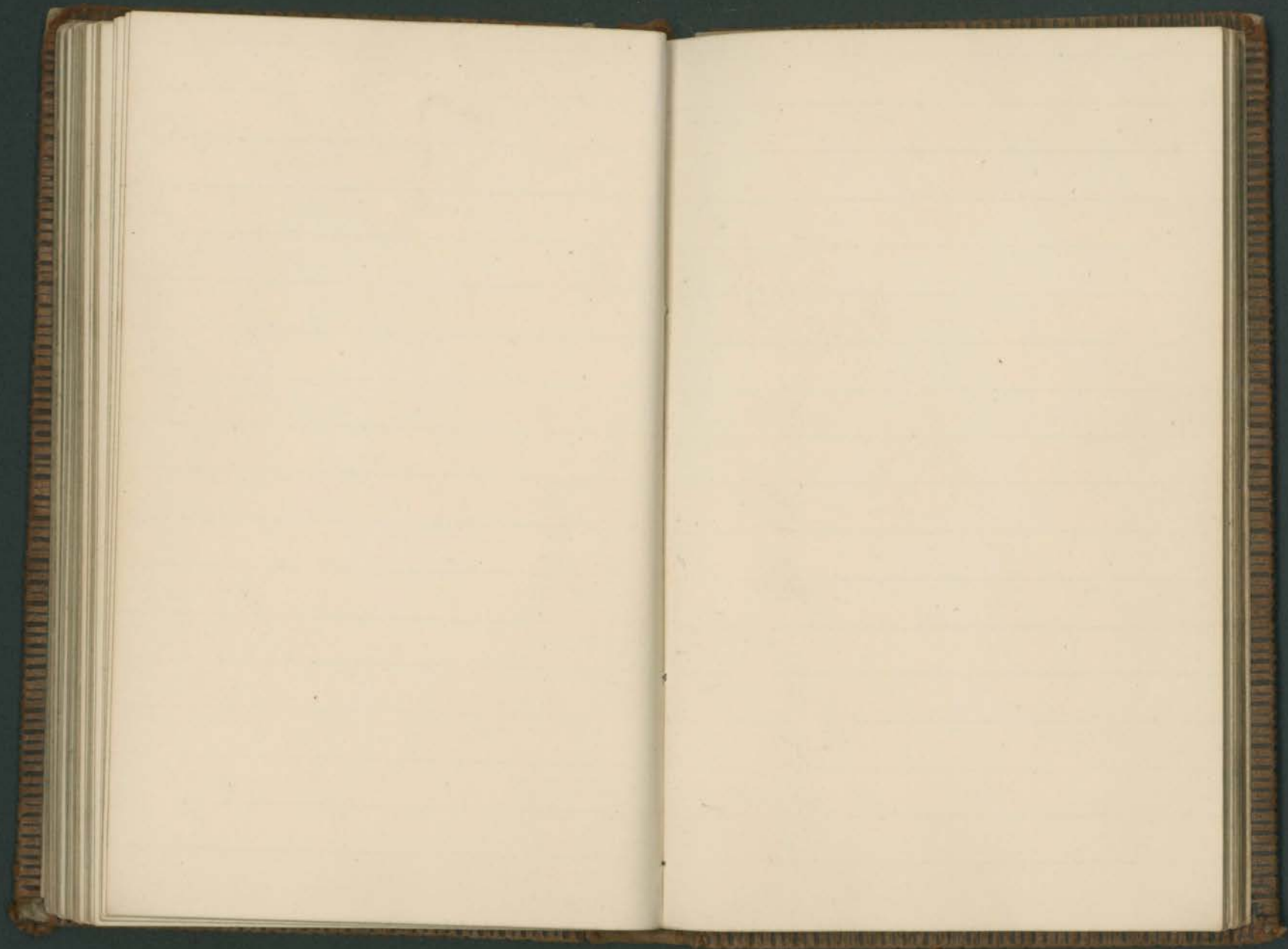


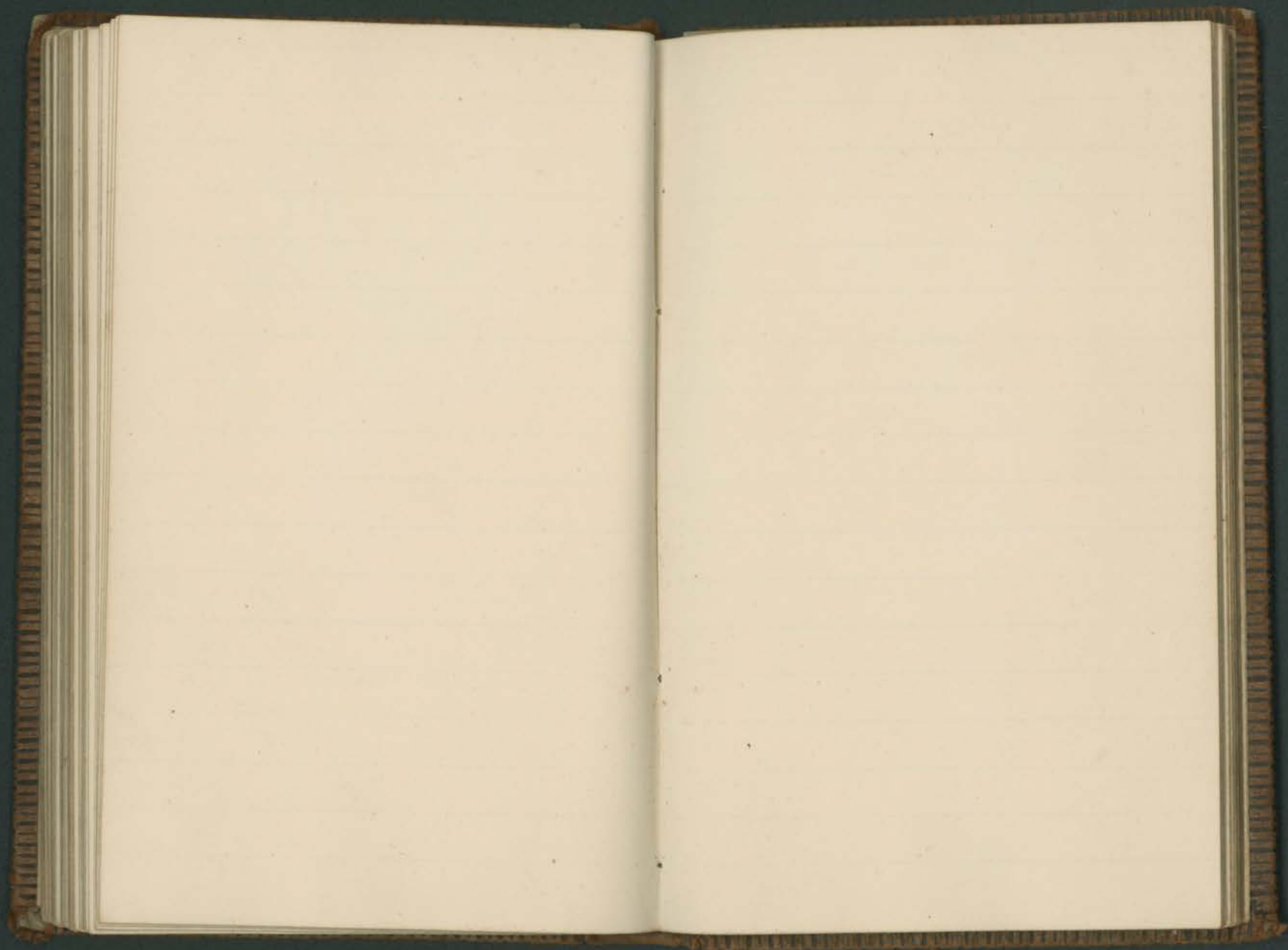


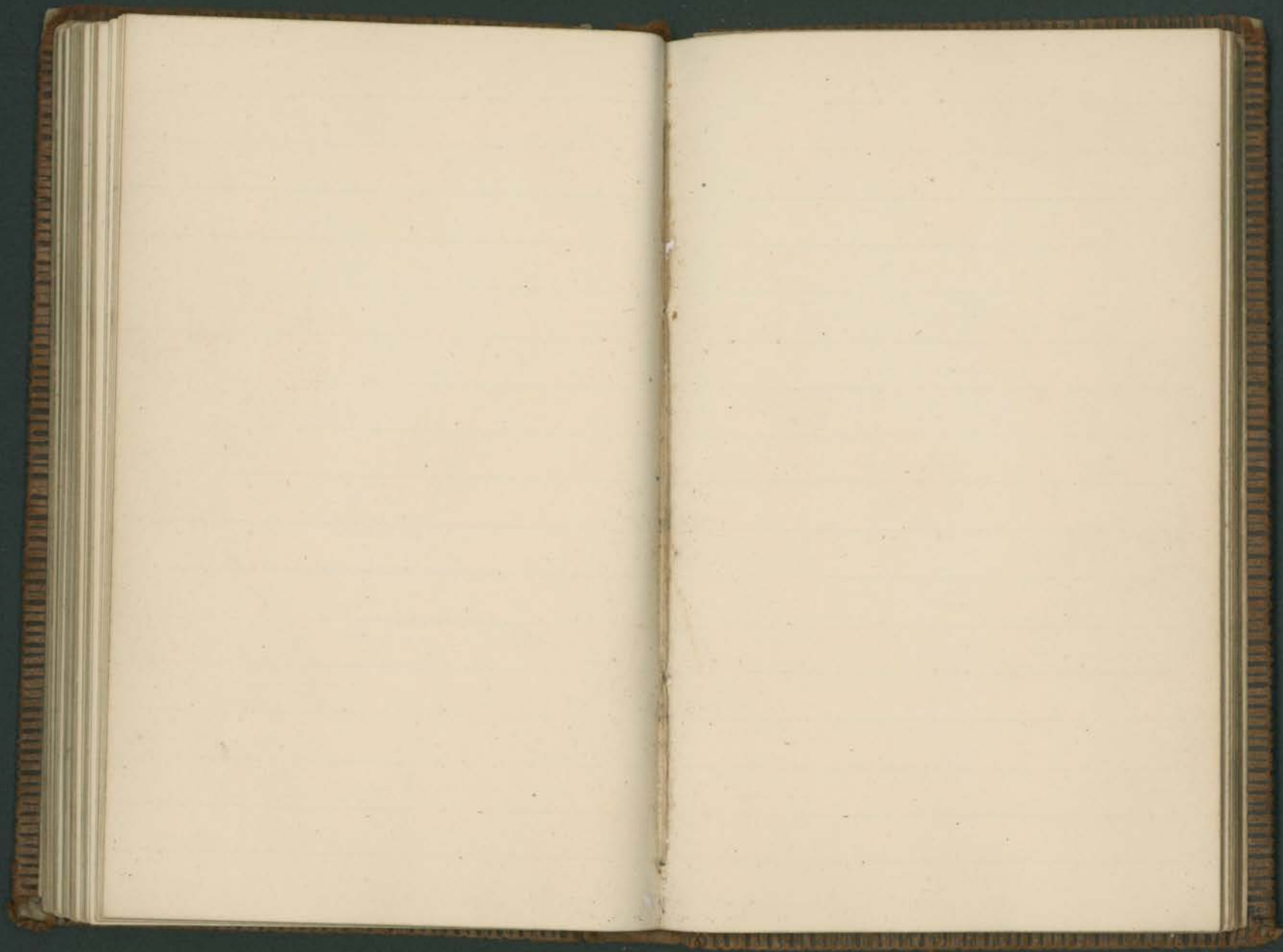


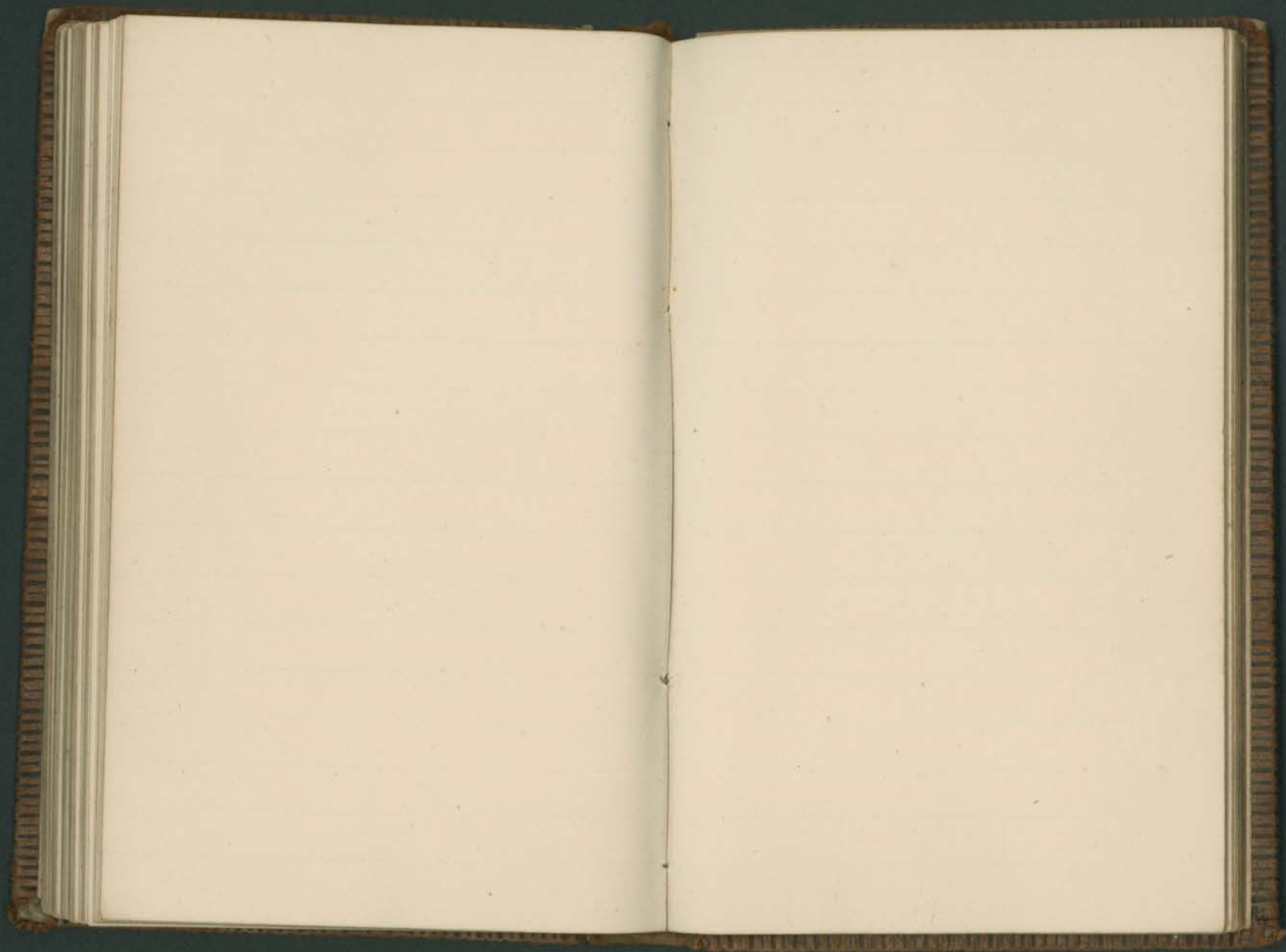


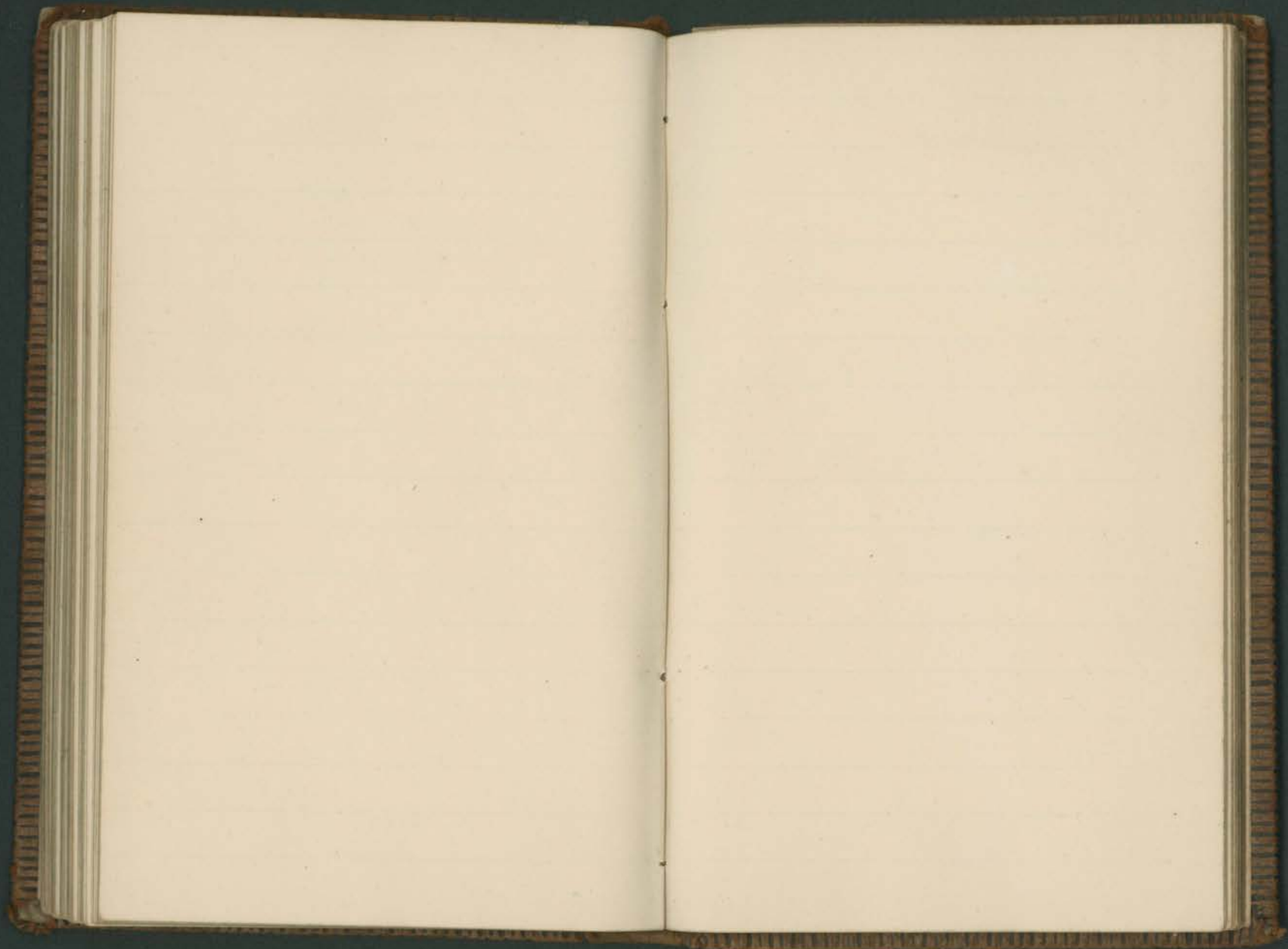


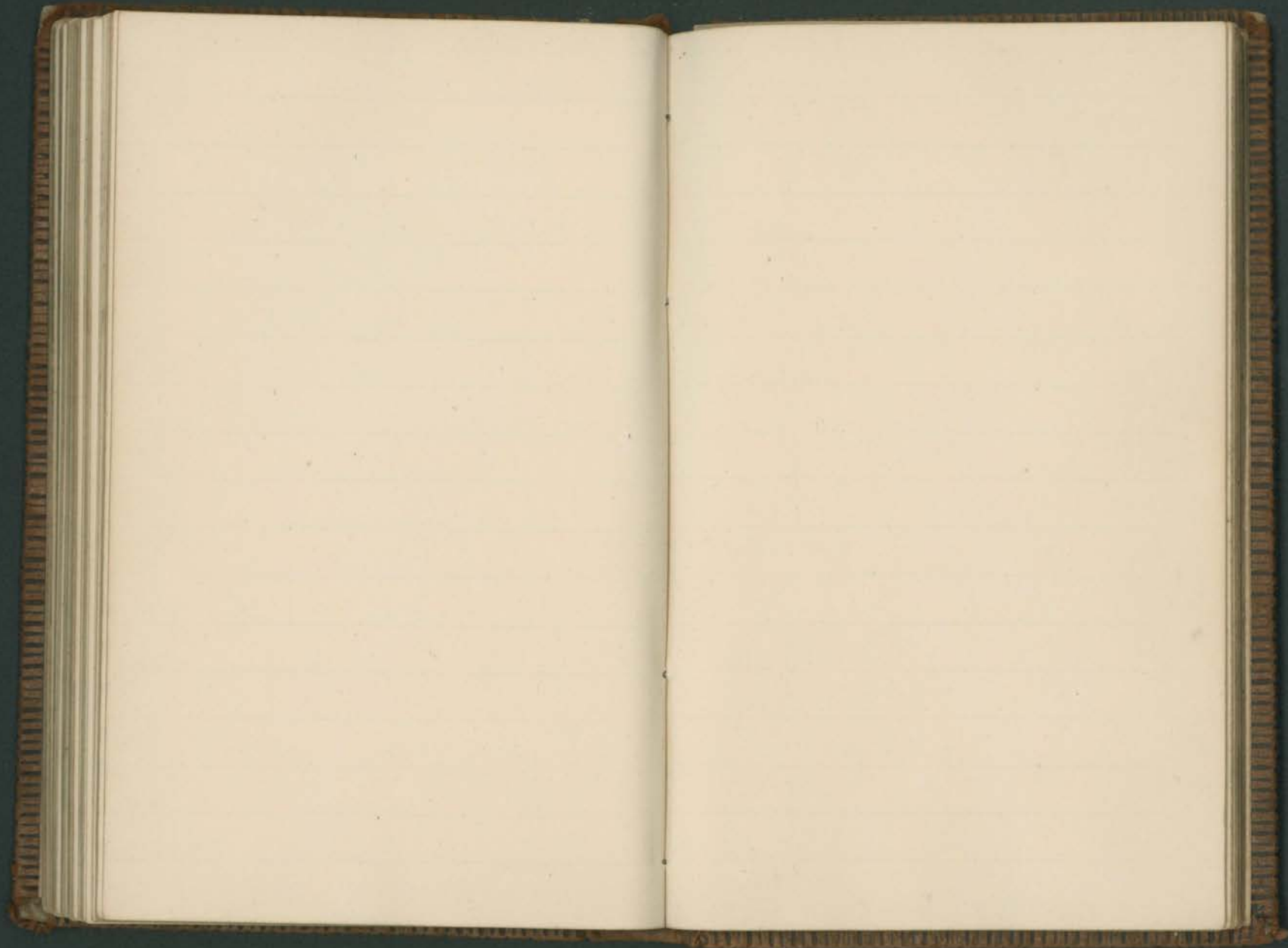


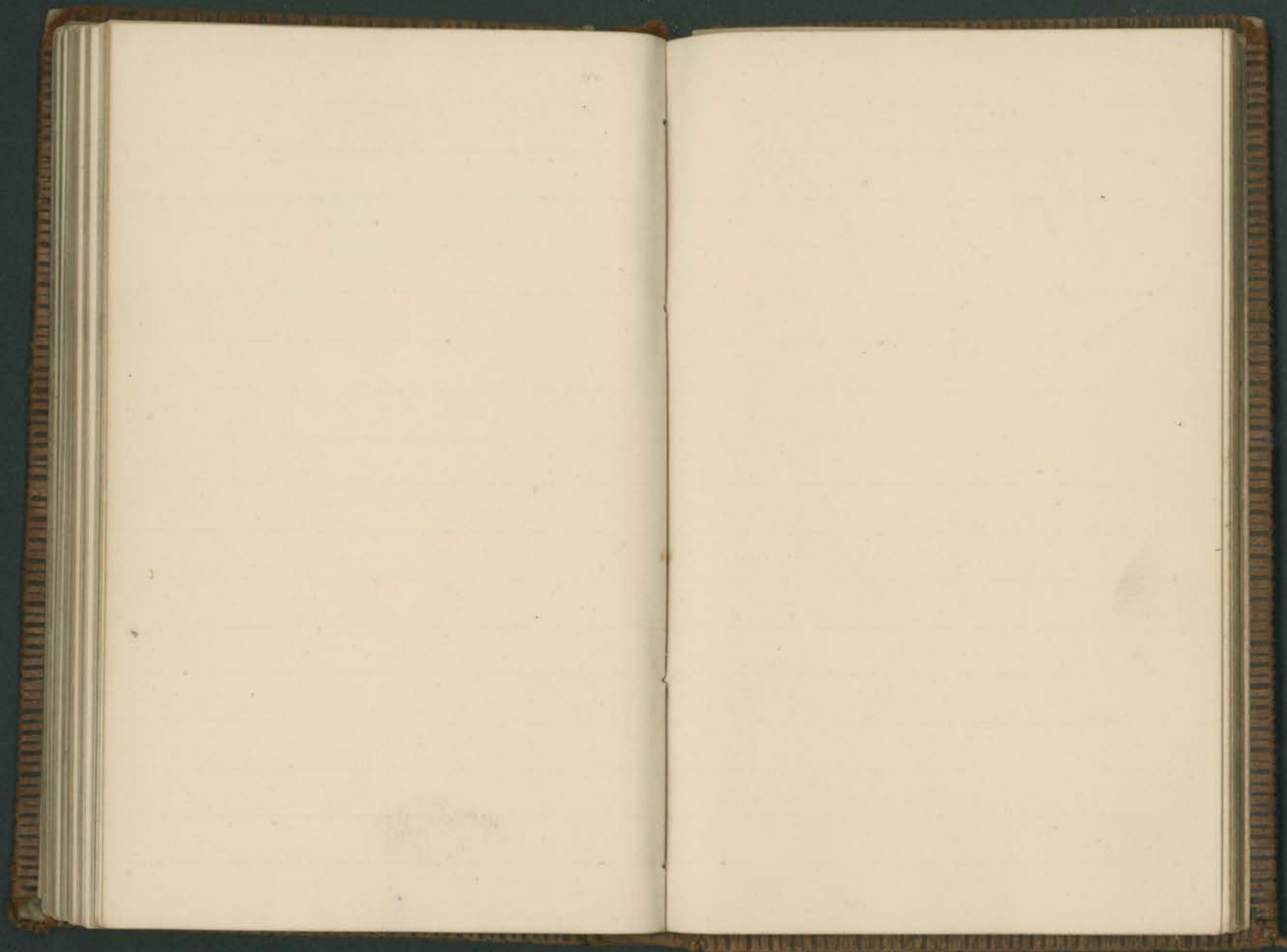


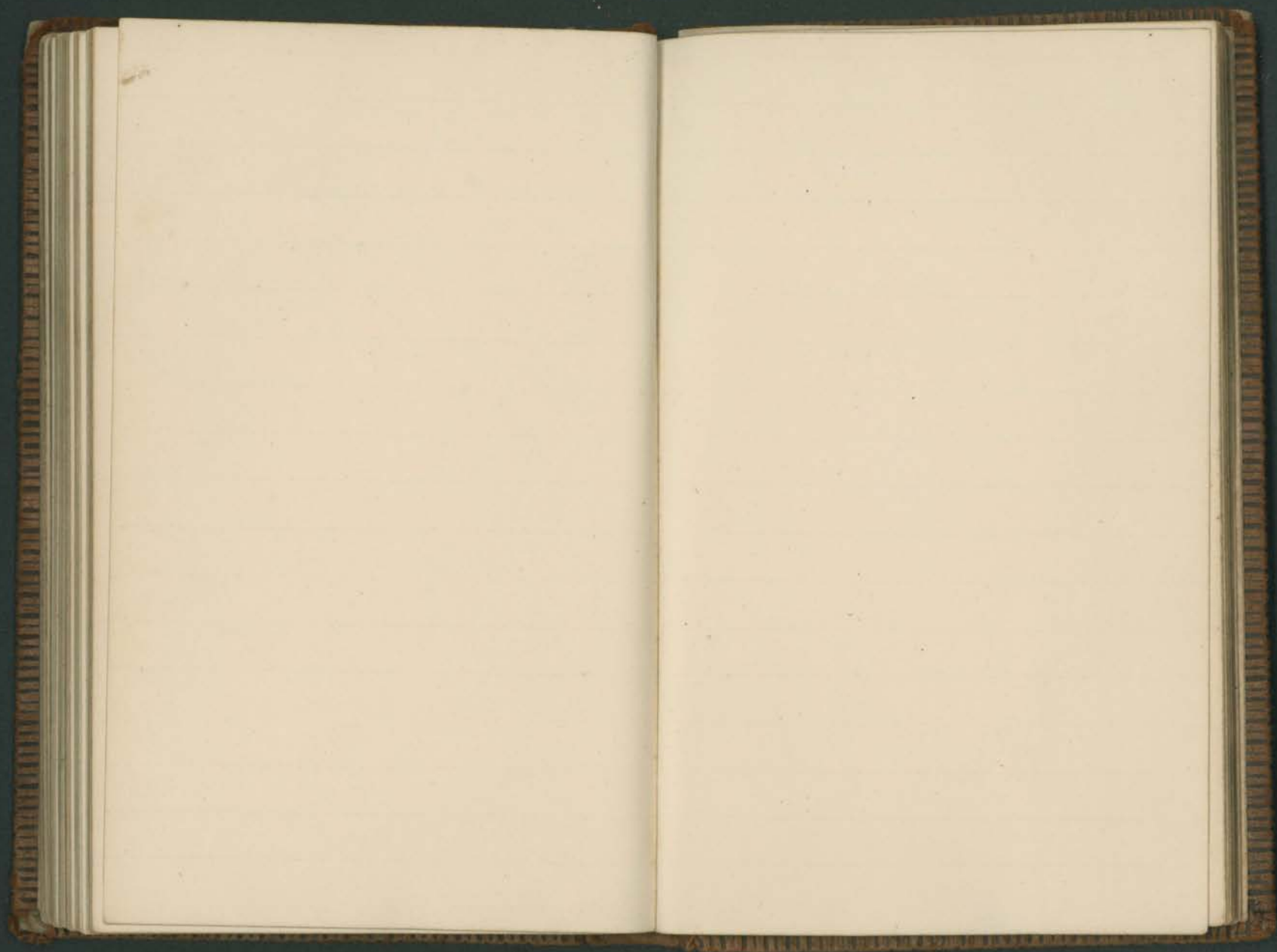


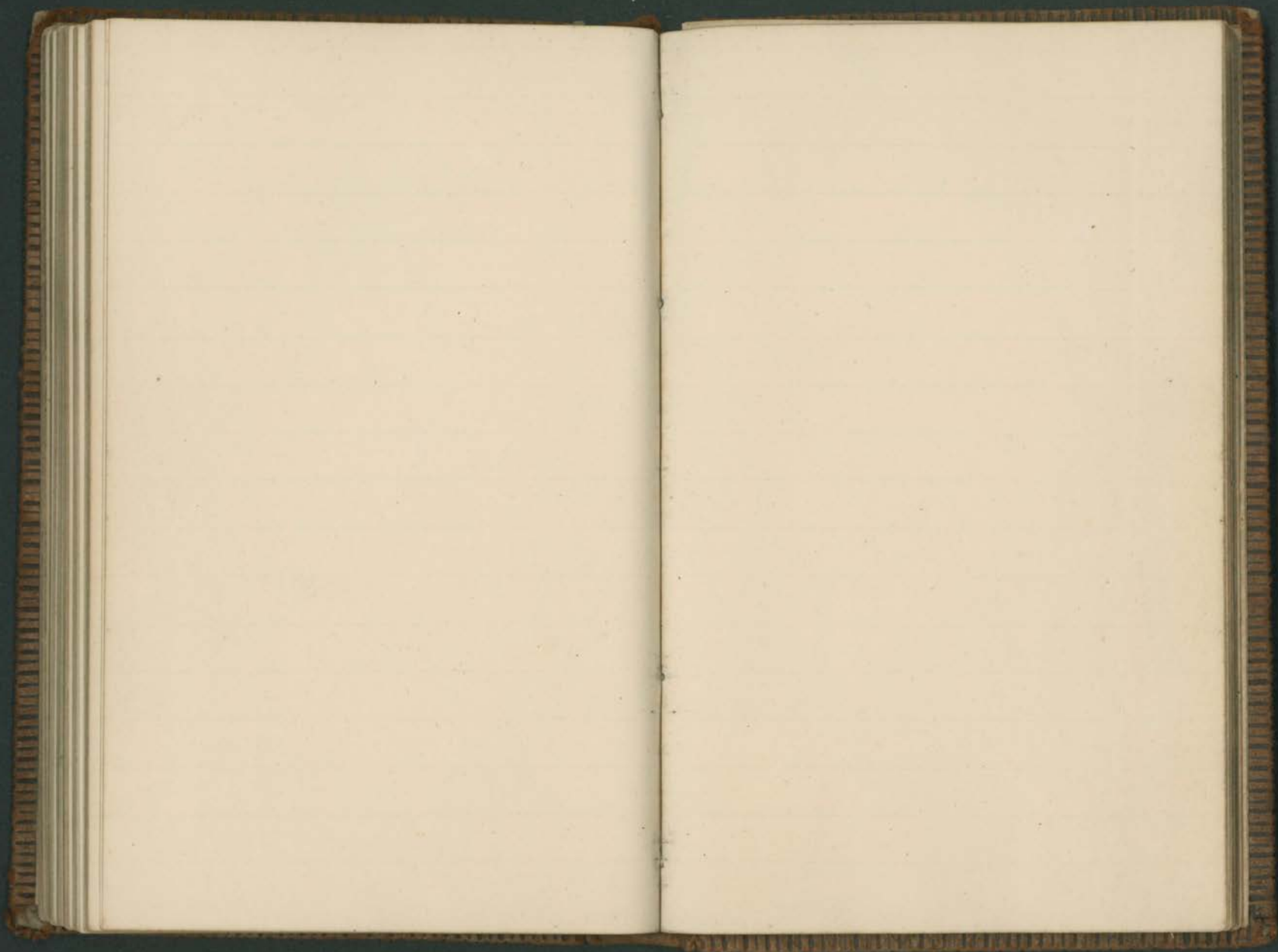


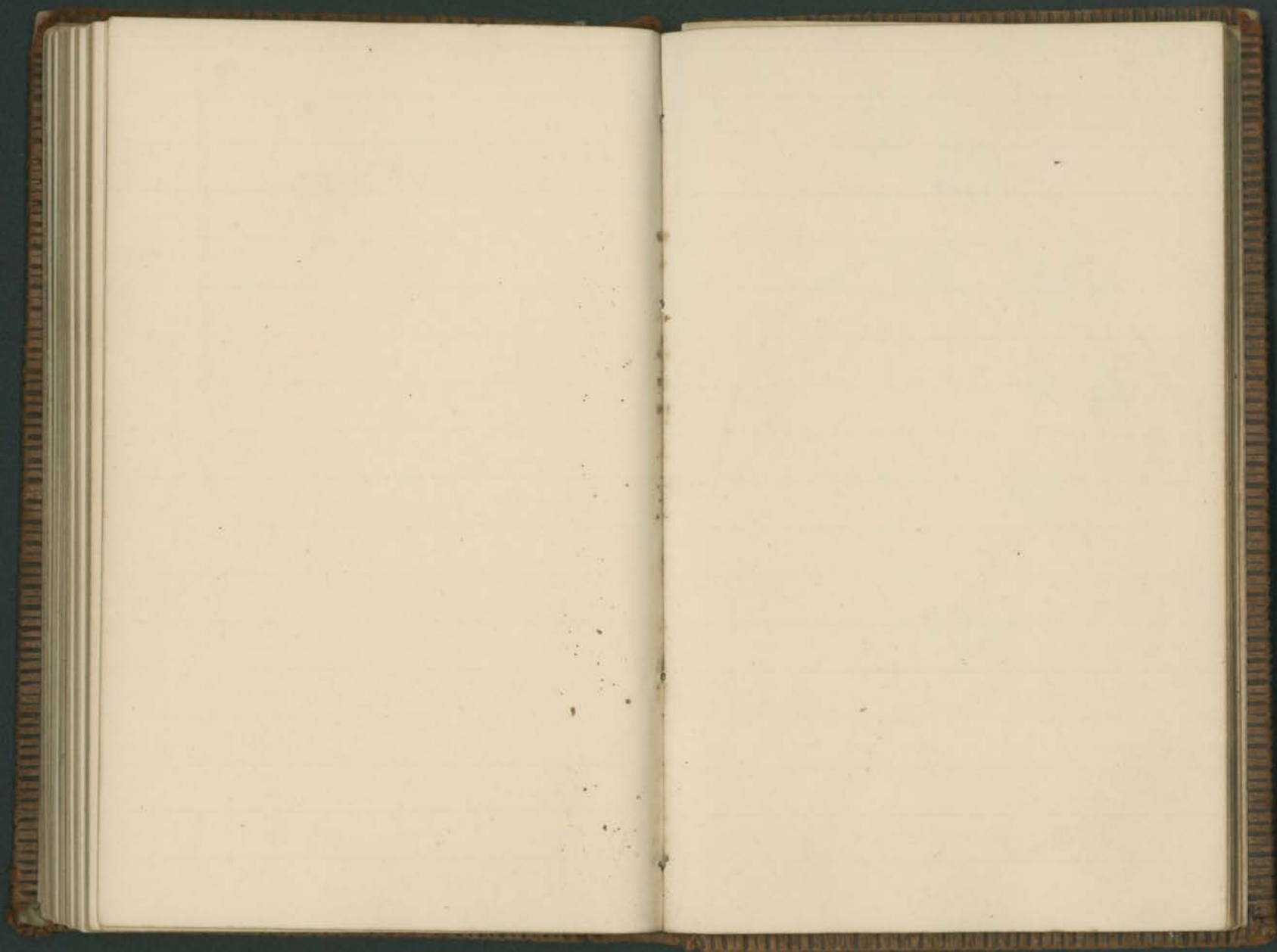


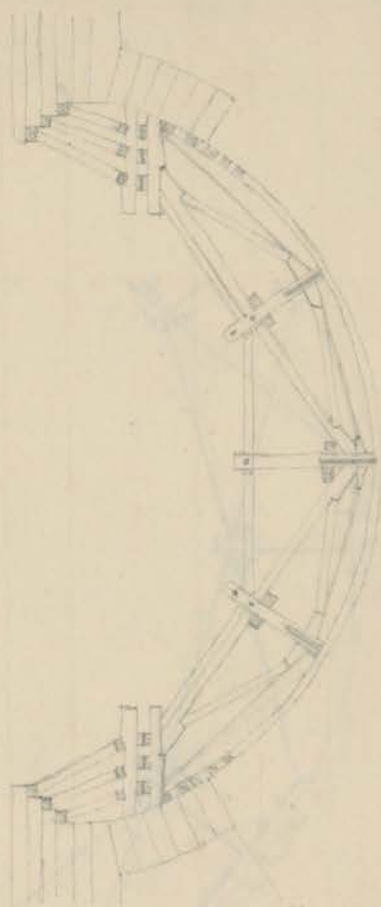
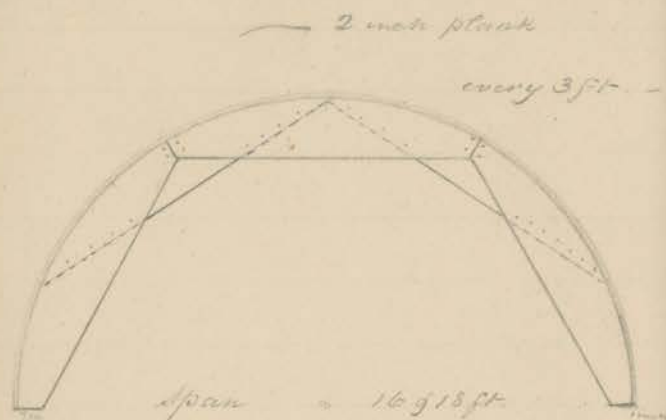




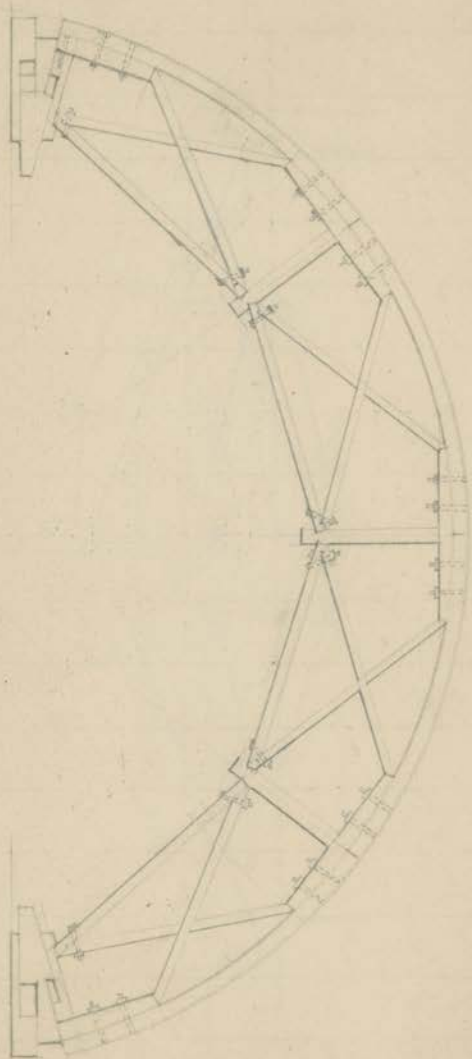


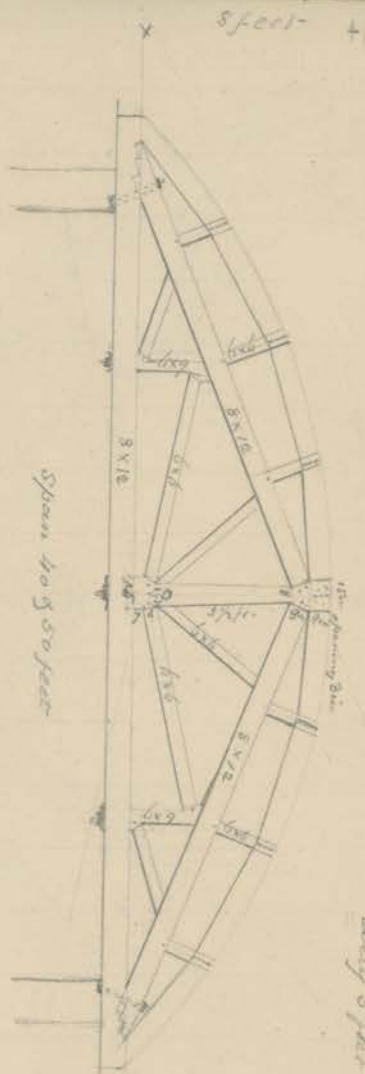






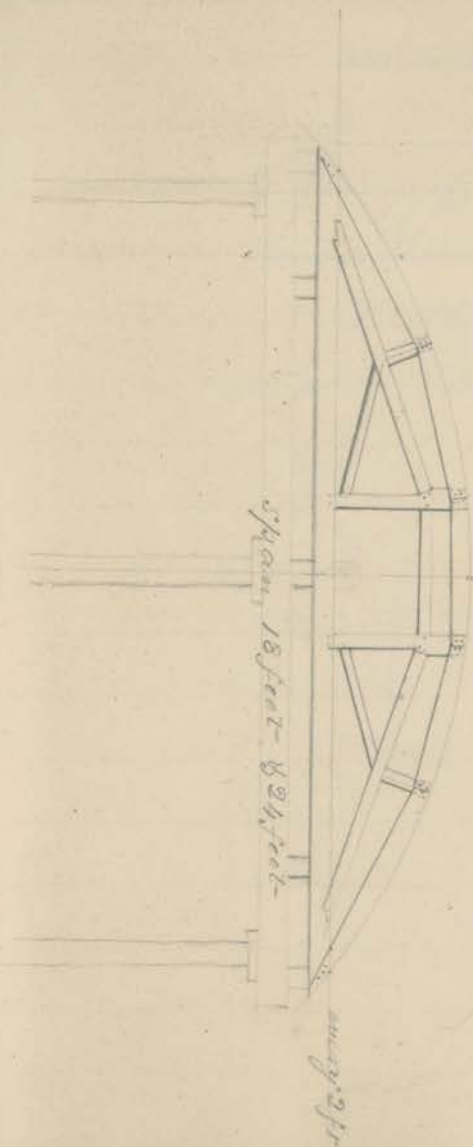
Span = 16.5 ft





Span to 50 feet

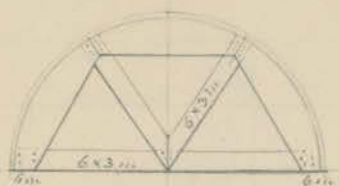
Boat 1/2 diameter
Width 6 in square
boat 3 in square
away 5 ft



Span 18 feet - 8 3/4 feet

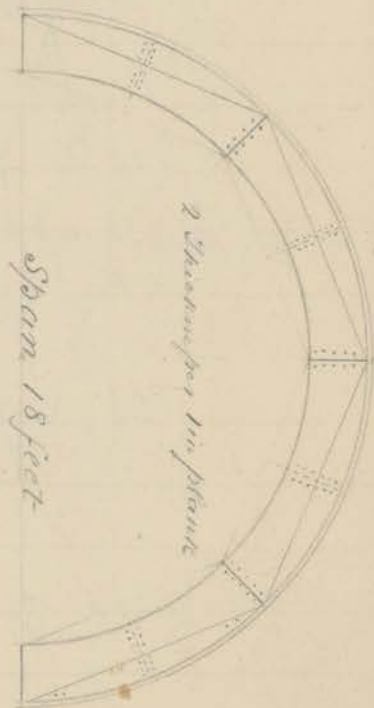
away 2 1/2 ft

Centres.

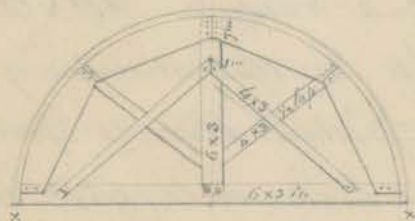
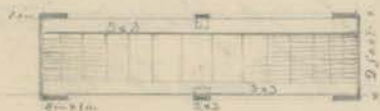


1 in plank
every 2 ft

Span 8 feet

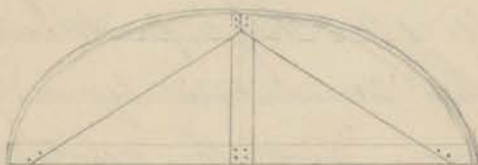


every 2 feet



every 2 feet

Span 10 feet



Span 12 feet

To calculate the power of a
Steam Engine - (Baumton)

Multiply the area of piston
by the effective pressure per
square inch of piston - the
product is the weight the
Engine can raise. - Multiply
this weight by the number of
feet the piston travels per
minute which will give the
Momentum or weight the Engine
can lift 1 foot high per minute;
divide this Momentum by a
horse power and the quotient
will give the horse power of
the Engine. -

262
Rule 2^d. 25 inches of the area
of Cylinder is equal to one
horse power the velocity
of the Engine being constantly
220 feet per minute. -

To find the power to lift
a weight at any velocity -
Multiply the weight in lbs by
the velocity in feet, and divide
by the horse power, the quotient
will be the number of Horse
power Required - (it) 2

When the effective
pressure in each inch
of piston is

The area
equal to one
horse power will be

53 ^{lb} —
48 —
43 —
38 —
33 —
28 —
23 —
18 —
13 —
8 —

3.7 inches
4.17
4.65
5.25
6.06
7.14
8.70
11.11
15.46
25.00

proportions - The length of the
stroke being 1. The length of
beam to centre will be 2. The
length crank .5 the length of
connecting rod 3. -

Fly wheel - Rule for its weight.
Multiply the number of horse
power of the engine by 2000.
and divide by the square

of the velocity of circum: of
the wheel per second the
quotient will be the weight
in Cwts. -

Force of Compressed air (Hutton)
a = whole length of tube or
volume of air in natural state
b = pressure of air in natural state
d = space occupied by compressed air
n = distance the air is compressed
x = force exerted to compress the
air or the pressure of the air confined

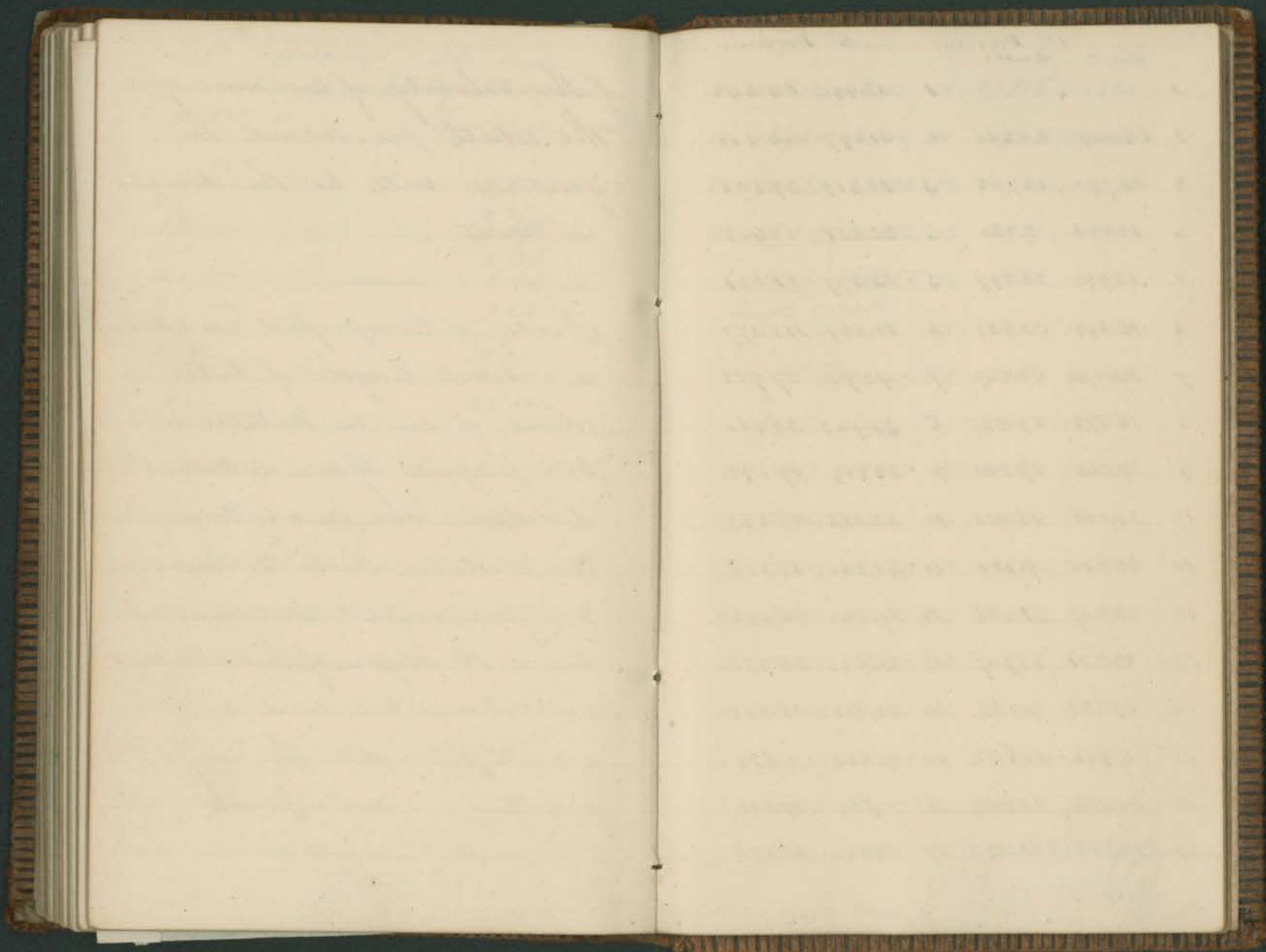
$$b + x : b :: a : d$$

$$a = \frac{(b+x)d}{b} \quad d = \frac{ab}{b+x}$$

$$b = \frac{x d}{a-d} \quad x = \frac{ab}{d} - b$$

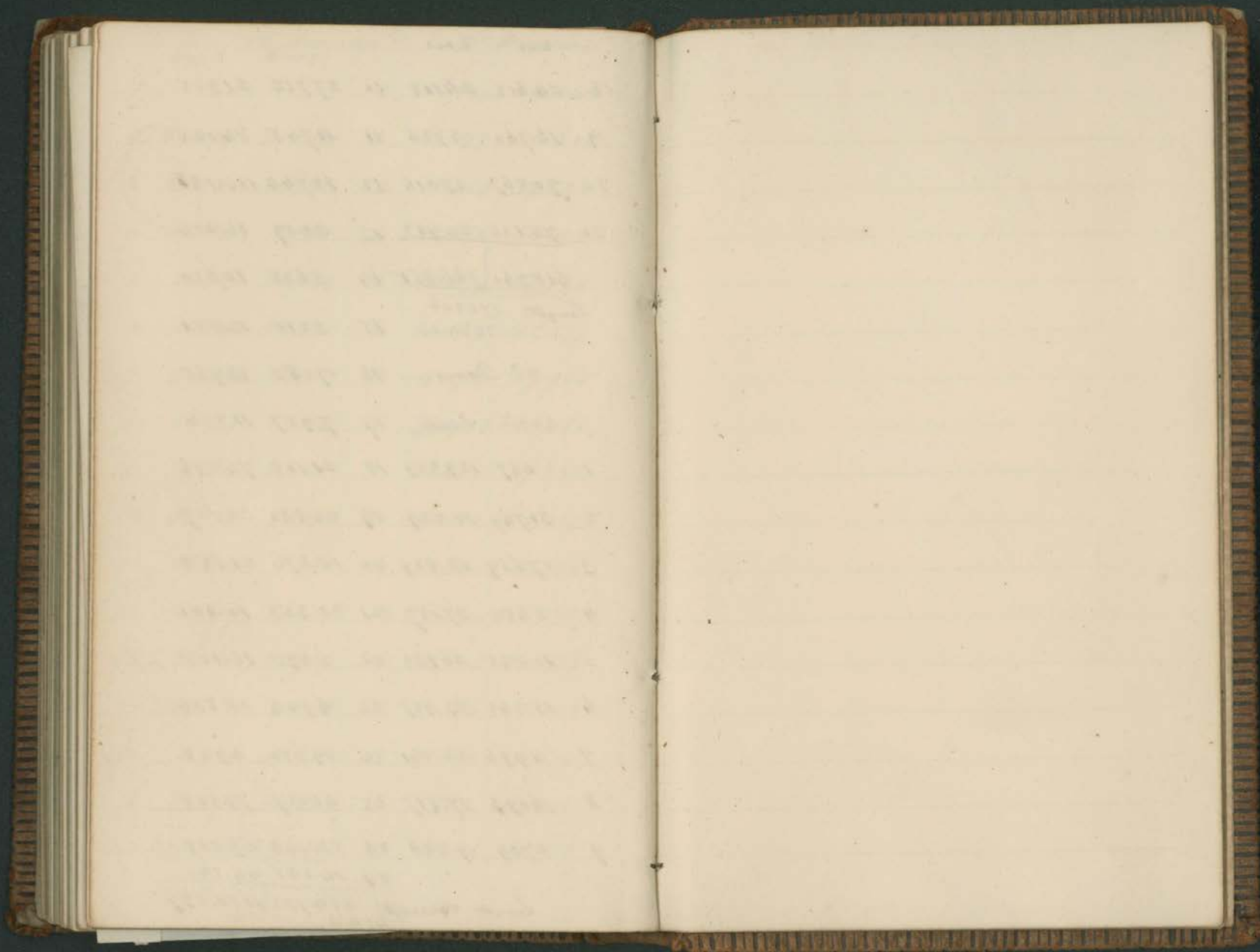
$$n = a - d$$

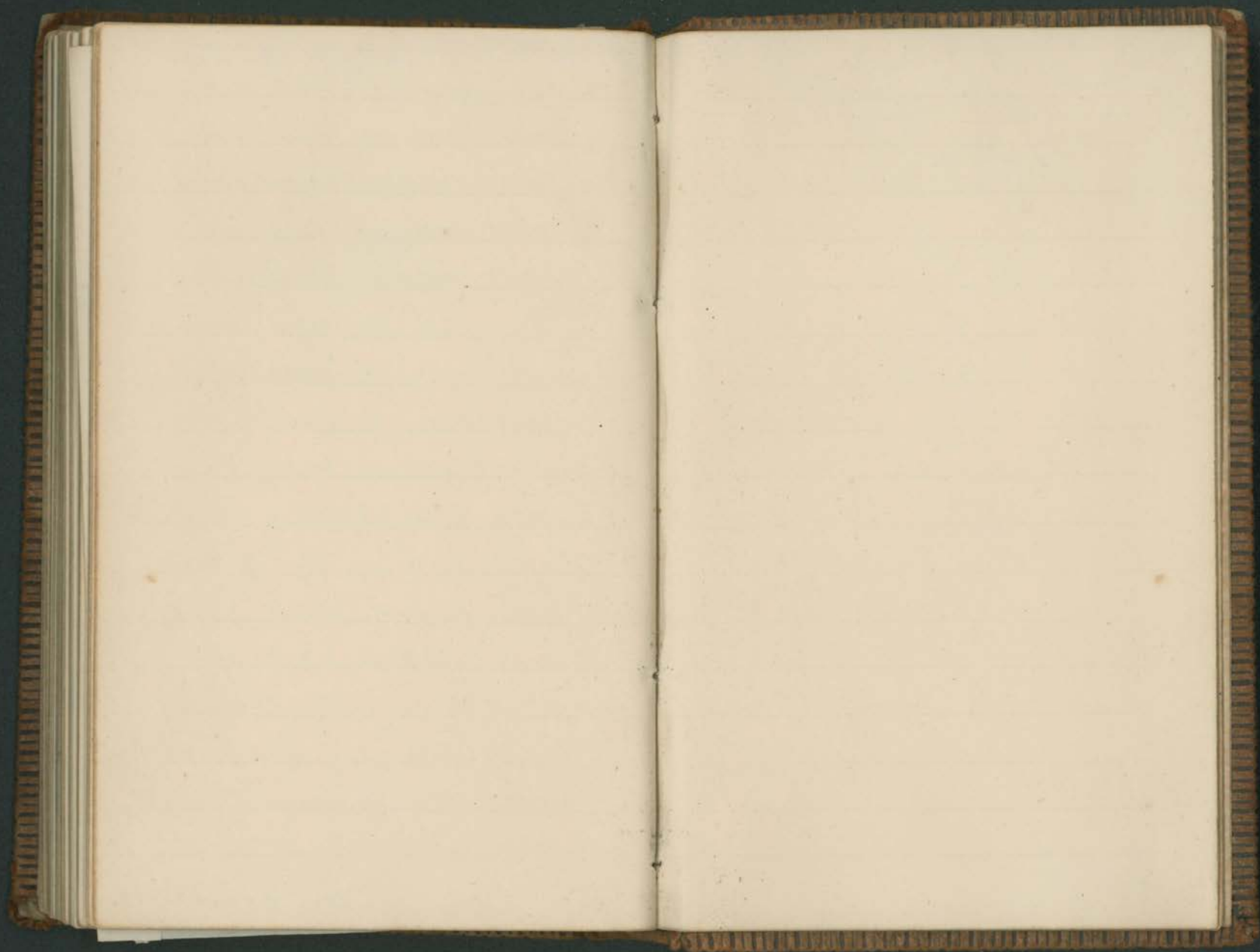


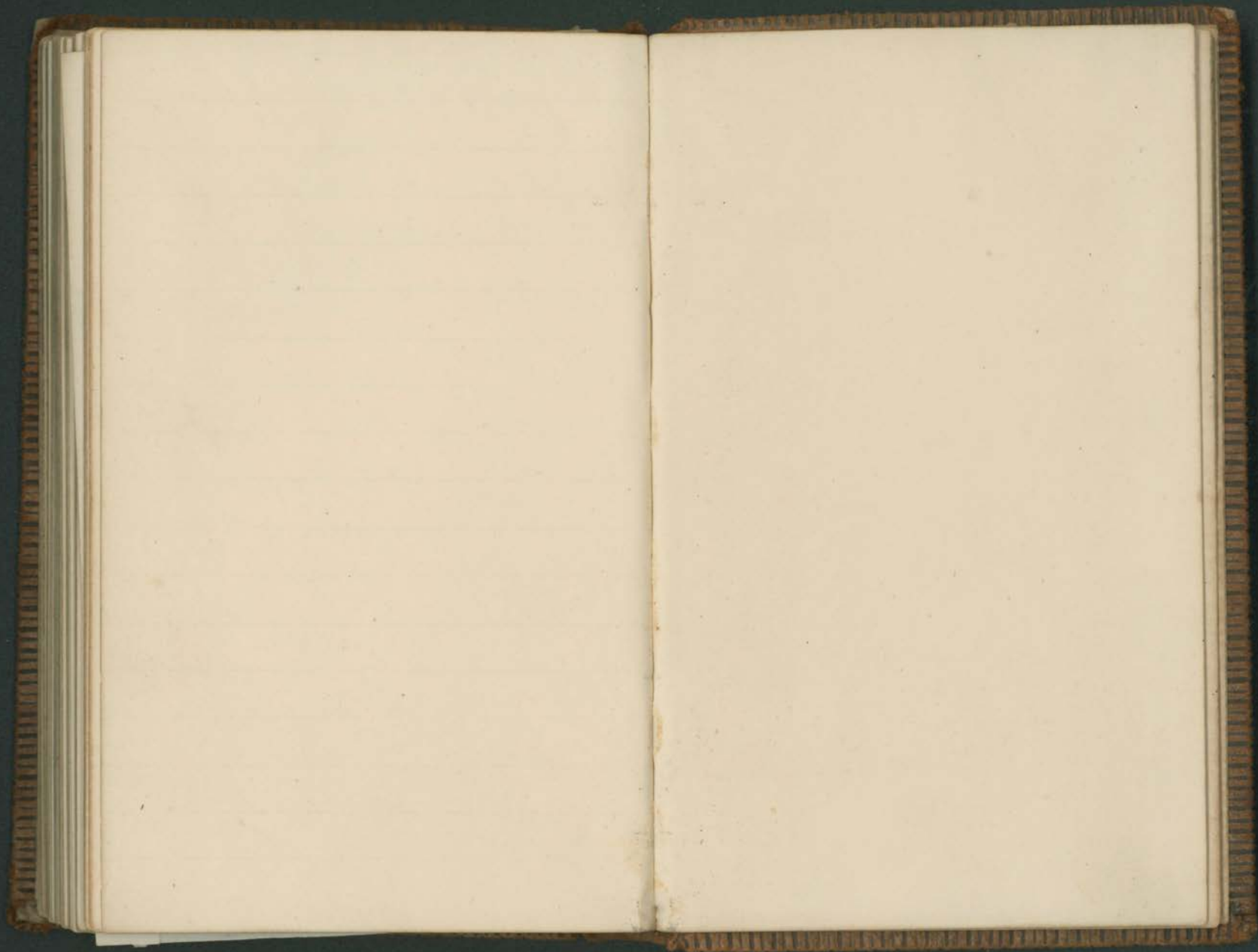


1 st Division		2 nd Division	
Exc	Emb		
1		1	55.994 64.442
2	64.029 20.360	2	41.097 44.601
3	20.790 16.728	3	18.419 37.508
4	42.026 2.060	4	32.851 58.405
5	15.934 22.299	5	12.477 51.031
6	12.698 32.985	6	10.569 115.377
7	25.240 68.347	7	9.295 27.955
8	16.573 29.975	8	35.943 34.460
9	7.863 27.340	9	23.809 17.592
10	30.008 15.420	10	51.666 25.863
11	23.255 9.121	11	48.361 15.884
12	22.347 31.266	12	50.540 26.496
13	33.231 25.947	13	32.285 38.336
14	19.335 9.953	14	26.813 18.518
15	8.901 50.232	15	7.646 5.678
16	50.558 22.902	16	782 17.806
Total	392.788 285.135	17	24340 65.076
Length 95800			
18 miles			

Exc	Emb		
18	24.412 26.118	10	27.754 21.325
19	16.760 5.736	11	11.745 84.025
20	20.867 43.016	12	12.744 113.185
21	74.136 24.953	13	2289 15.604
618.260 766.851		14	5638 10.620
Length 172800			
33 miles		15	5211 13.551
3 rd Division		16	17055 33.956
Exc	Emb	17	7.957 11.834
1	667 129.209	18	21.108 74.296
2	31769 12.239	19	24.860 34.757
3	17.259 12.809	20	18.874 21.154
4	3.688 27.157	21	20.353 10.101
5	10.448 66.930	22	5.895 12.108
6	15.849 73.457	23	6.703 18.804
7	4.996 52.041	24	19.250 6.728
8	4.093 17.517	25	48.127 73.508
9	8.709 9.326	26	55.446 49.518
		27	14.265 44.540
Length 242100 ft			
42 miles			
424.752 1050.299			











Chim

Ames

Hill

11.460

8200

2.560

A

1 to 1

25	192.90
26	208.63
27	224.97
28	241.92
29	259.48
30	277.65
31	296.43
32	315.82
33	335.82
34	356.43
35	377.65
36	399.48
37	421.92
38	444.97
39	468.63
40	492.90

1 1/2 to 1

25	289.32
26	312.91
27	337.42
28	362.85
29	389.20
30	416.47
31	444.66
32	473.77
33	503.80
34	534.75
35	566.62
36	599.41
37	633.12
38	667.75
39	703.30
40	739.77

To Adjust the Cross Web to the Line of Collimation of the Telescope, is simply to see that when the instrument is placed on a straight line, the telescope, by reversing, will cut directly the extremities.

After the inner tubes have been moved to the focus both for the web and the object, let an assistant plant a staff at a convenient distance, (say 500 feet) and a second about half way, and directly in a line with the first; now, leaving a third staff where the compass is placed, remove the instrument to the middle, and direct the telescope to one of the extreme staffs; reverse the telescope to see if it cuts the opposite; if it does not, half of the difference is the error, which is corrected by the capstan head screws.

The bronzed face has the advantage over the white, or silvered face, of not injuring the eyes by the reflection of the sun; while the white narrow ring shews the points of the needle equally as well as those of the usual kind.

By the circular, or universal level, which is a concave glass fitted on the brass, and filled with spirits of wine, the instrument can be more readily levelled than by two of the ordinary kind; and the glass being thicker, is not so readily broken.

11/11/11

11/11/11

6.6

3

1

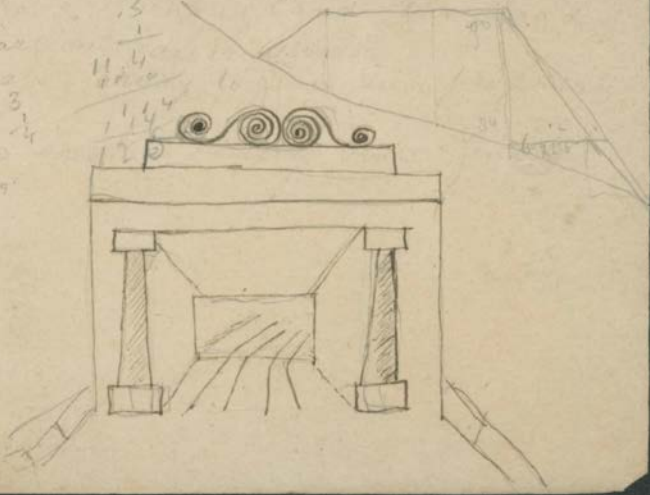
11 4
4 10

11 4
1 14

12 2

3
1/4

29



2.4467
 11.4661
 1.5112
 9.9472
 96.97

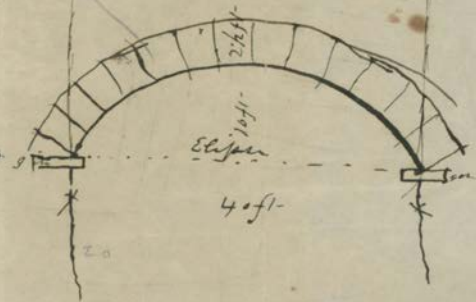
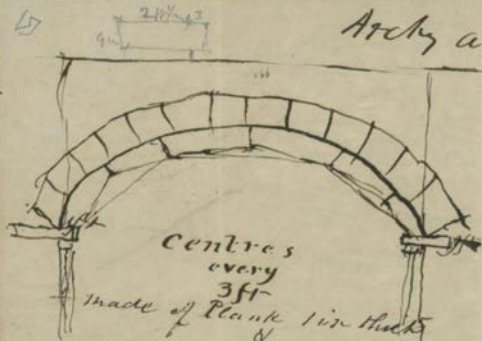
33
 11
 6
 79.2
 11.5
 12.5

17.8
 17.94
 17.12
 17.458
 17.3
 17.375
 17.335

11.8195
 182193
 $6.181 = 1.99$
 $19.4661 = .06$
 $19.4661 = .93$



Arch at End of Potomac Aqueduct



3 thicknesses.
The centre and breaking joints
with the other two.

