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Interbraided Cylindrical Braids

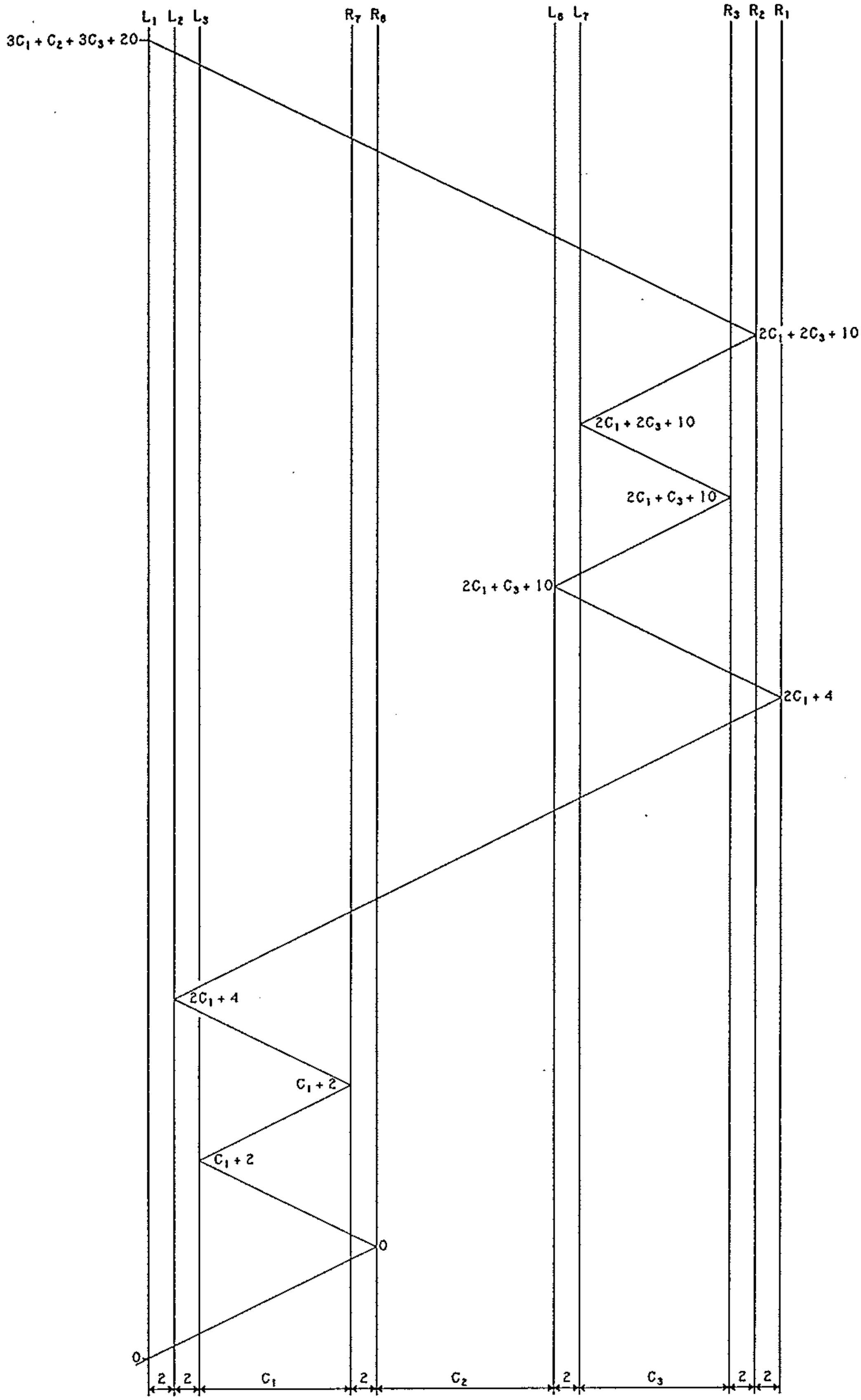

Fig. 1063 — The first-return string-run of the foundation knot.

As mentioned at the bottom of pg. 1322, we shall present here an Example of a "new" type Interbraided Cylindrical Braid in which the string-run parameters of the foundation knot are intimately associated with the coding of the Interbraided Cylindrical Braid.

Let Fig. 1063 depict the first-return string-run in the foundation knot. Let the bight-edge formed by the bight-boundaries L_1, L_2 and L_3 consist of regular nested bights and let its coding be a pineapple coding (see Fig. 1064). Similarly let the bight-edge formed by the bight-boundaries R_1, R_2 and R_3 consist of regular nested bights and let its coding be a pineapple coding (see Fig. 1064). Let the bights on the bight-edge formed by the bight-boundaries R_6 and R_7 form regular nests and let their associated coding be as shown in Fig. 1064. Similarly let the bights on the bight-edge formed by the bight-boundaries L_6 and L_7 form regular nests and let their associated coding be as shown in Fig. 1064. Let the apexes of the nests on bight-edge L_4, L_5 of the central interbraid be central to the apexes of the nests on bight-edge R_4, R_5 of the central interbraid (see Fig. 1064). Let in Fig. 1064 the crossings with the round dots depict the same crossing; hence the crossings with the square dots depict the same crossing. The upper diagram sections, in which the interbraid is shown, are thus the lower diagram sections in which the foundation knot is shown.

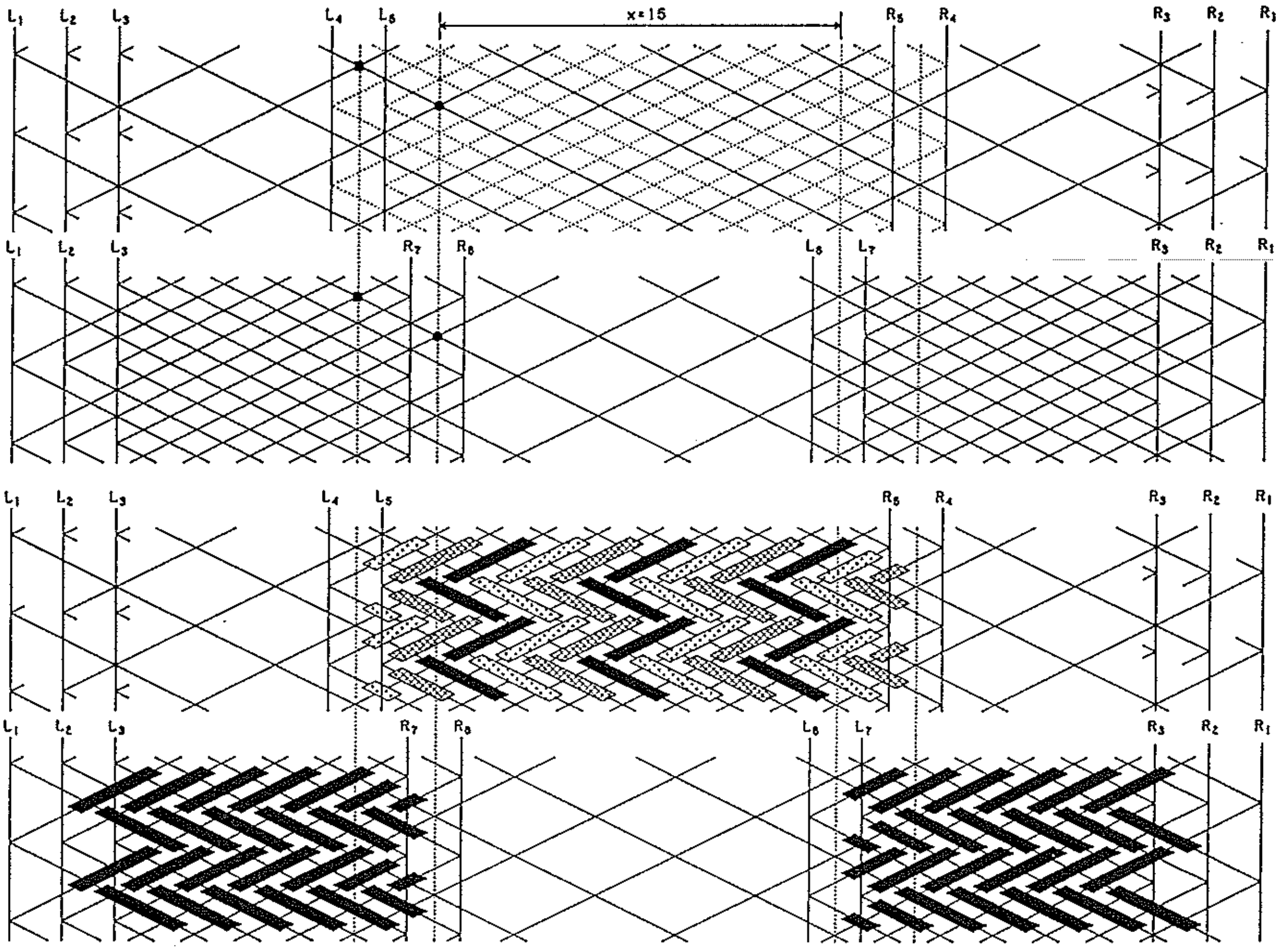

Fig. 1064 — Designing the Interbraided Cylindrical Braid.

Let the central interbraid have a left bight-edge formed by the bight-boundaries L_4 and L_5 and let the bights on this bight-edge form regular nests; let their associated coding be as shown in Fig. 1064. Similarly let the right bight-edge of the central interbraid be formed by the bight-boundaries R_4 and R_5 and let the bights on this bight-edge form regular nests; let their associated coding be as shown in Fig. 1064.

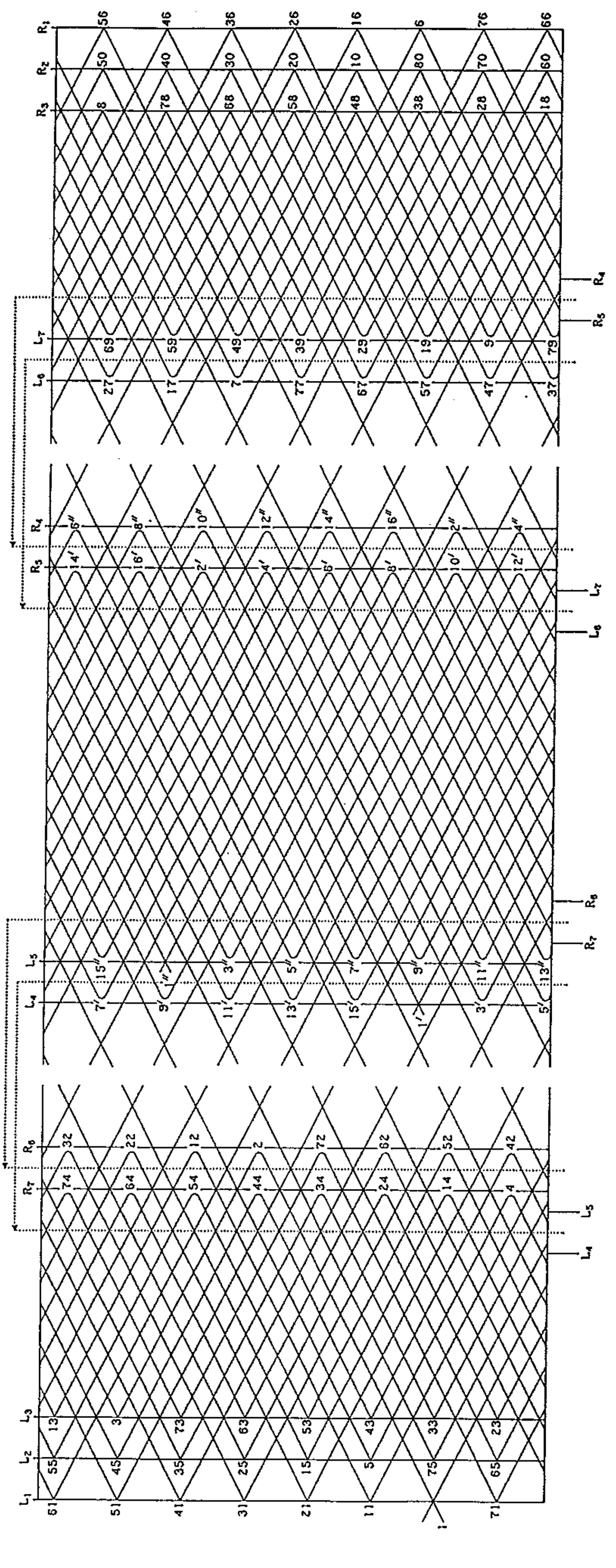

Fig. 1065 — The string-run of the Interbraided Cylindrical Braid.

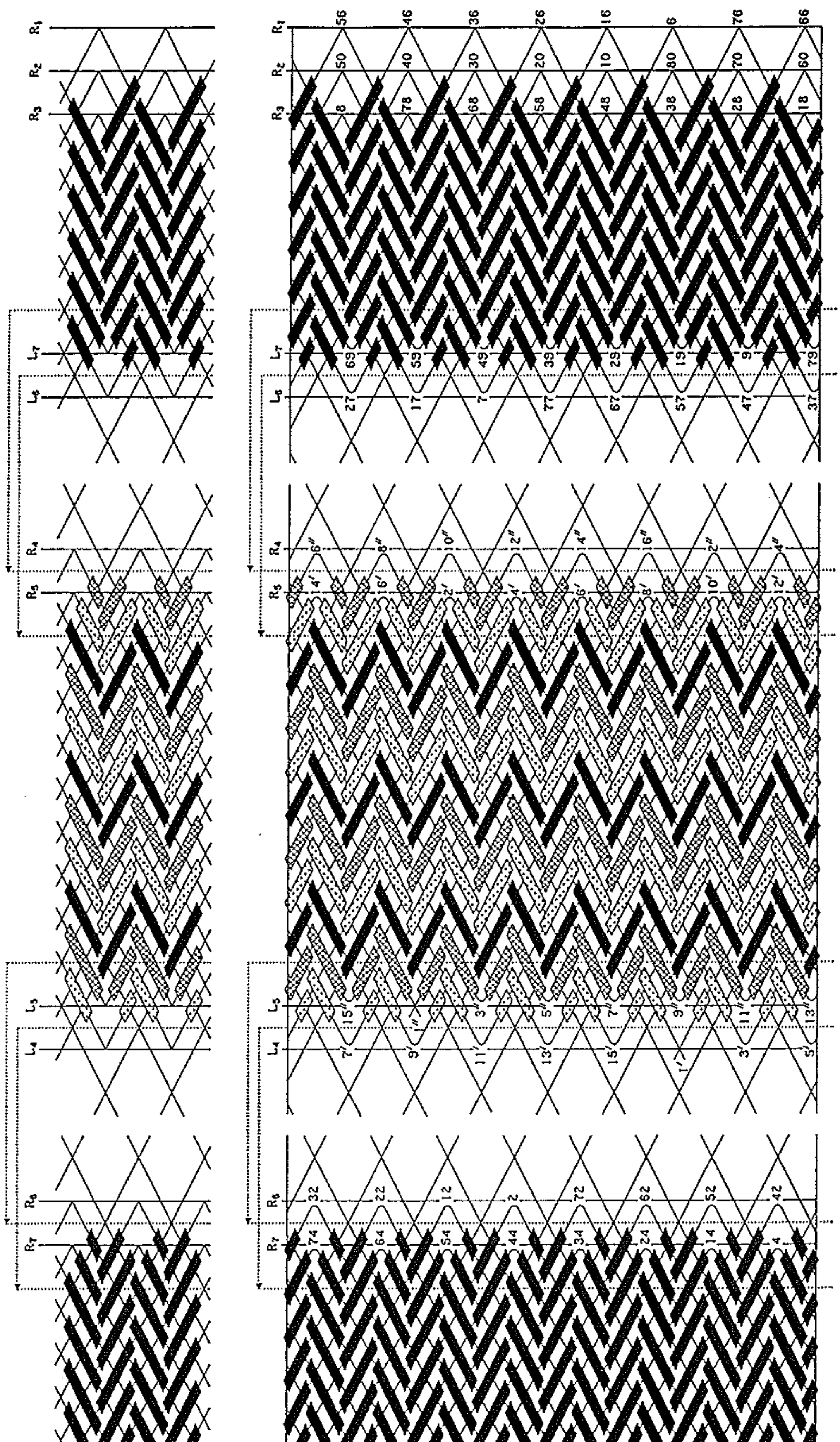

Fig. 1066 — The superimposed coding.

Note that the nests on the bight-edge formed by the bight-boundaries L_4, L_5 slot in between the nests on the bight-edge formed by the bight-boundaries R_6, R_7 so that bight-boundary L_4 lies 5 columns to the left of bight-boundary R_6, and similarly that the nests on the bight-edge formed by the bight-boundaries R_4, R_5 slot in between the nests on the bight-edge formed by the bight-boundaries L_6, L_7 so that bight-boundary R_4 lies 5 columns to the right of bight-boundary L_6.

Note that the codings associated with the bights on the bight-edges L_4, L_5 — R_6, R_7 and R_4, R_5 — L_6, L_7 cover the weave at these bight-edges.

We have now designed a small section of grid-diagram which contains the above listed requirements (see the upper grid-diagram section in Fig. 1066). From this section of grid-diagram (or from Fig. 1064) we see that $C_1 = C_3 = 11$ (column distance between L_3 and R_7, respectively between L_7 and R_3) and $C_2 = 13$ (column distance between R_6 and L_6) (see Fig. 1064 and Fig. 1065).

Hence $3C_1 + C_2 + 3C_3 + 20 = 33 + 13 + 33 + 20 = 99 = \beta'$ associated with the circumferencial bight-boundaries L_1, L_2, L_3 and hence with $\alpha' = 3$. $\beta = \dfrac{\beta' \cdot \alpha}{\alpha'}$, hence with $\alpha = 5$ and $\alpha' = 3$, we obtain $\beta = \dfrac{99 \times 5}{3} = 165$. We thus obtain for $\dfrac{\beta}{\alpha} = \dfrac{\beta'}{\alpha'}$ the value $\dfrac{165}{5} = \dfrac{99}{3} = 33$. Thus for $\lambda = 1$, $\dfrac{B_c{}'}{\alpha'} = \dfrac{B_c{}'}{3}$ on bight-boundaries L_1, L_2, L_3 must be coprime with 33. $\dfrac{B_c{}'}{3} = 8$ and hence $B_c{}' = 3 \times 8 = 24$ on bight-boundaries L_1, L_2, L_3 fulfils this condition.

Note that this foundation knot has $B_c = 8 \times \alpha = 8 \times 5 = 40$ bights.

The central section between the bight-edges L_4, L_5 and R_4, R_5 has thus a string-run similar to that of a Standard Regular Nested Cylindrical Braid with $A = 3$ and $x = C_2 + 2 = 13 + 2 = 15$. Consequently $2A + x - 2 = 6 + 15 - 2 = 19 = 2 \times 7 + 5$. Thus the interbraids between the bight-boundaries L_4 and R_5 respectively between the bight-boundaries L_5 and R_4 are Regular Knots with $p/b = 7/8$.

The half-cycle braiding algorithms for the foundation knot can be read from the tables in Fig. 1067 and Fig. 1068 as follows:

1. $L_1 \longrightarrow R_6$: Free run.
2. $R_6 \longrightarrow L_3$: Free run.
3. $L_3 \longrightarrow R_7$: Free run.
4. $R_7 \longrightarrow L_2$: u.
5. $L_2 \longrightarrow R_1$: u.
6. $R_1 \longrightarrow L_6$: Free run.
7. $L_6 \longrightarrow R_3$: Free run.
8. $R_3 \longrightarrow L_7$: u.
9. $L_7 \longrightarrow R_2$: u.
10. $R_2 \longrightarrow L_1$: $4u$.
11. $L_1 \longrightarrow R_6$: u.
12. $R_6 \longrightarrow L_3$: u.
13. $L_3 \longrightarrow R_7$: $2u$.
14. $R_7 \longrightarrow L_2$: $o - 2u$.
15. $L_2 \longrightarrow R_1$: $o - 4u$.
16. $R_1 \longrightarrow L_6$: u.

17. $L_6 \longrightarrow R_3$: u.
18. $R_3 \longrightarrow L_7$: $o - 2u$.
19. $L_7 \longrightarrow R_2$: $o - 2u$.
20. $R_2 \longrightarrow L_1$: $o - u - o - 2u - 2o - u$.

HALF-CYCLE													
1	11	5	43	21	15	53	31	25	63	41	35	73	51
11	21	15	53	31	25	63	41	35	73	51	45	3	61
21	31	25	63	41	35	73	51	45	3	61	55	13	71
31	41	35	73	51	45	3	61	55	13	71	65	23	X
41	51	45	3	61	55	13	71	65	23	X	75	33	11
51	61	55	13	71	65	23	X	75	33	11	5	43	21
61	71	65	23	X	75	33	11	5	43	21	15	53	31
71	X	75	33	11	5	43	21	15	53	31	25	63	41
	O	O	O	U	U	U	O	O	O	U	U	U	O

HALF-CYCLE										
3	61	55	13	71	65	23	X	75	33	11
13	71	65	23	X	75	33	11	5	43	21
23	X	75	33	11	5	43	21	15	53	31
33	11	5	43	21	15	53	31	25	63	41
43	21	15	53	31	25	63	41	35	73	51
53	31	25	63	41	35	73	51	45	3	61
63	41	35	73	51	45	3	61	55	13	71
73	51	45	3	61	55	13	71	65	23	X
	U	U	O	O	O	U	U	U	O	O

HALF-CYCLE											
7	11	17	59	21	27	69	31	37	79	41	47
17	21	27	69	31	37	79	41	47	9	51	57
27	31	37	79	41	47	9	51	57	19	61	67
37	41	47	9	51	57	19	61	67	29	71	77
47	51	57	19	61	67	29	71	77	39	X	7
57	61	67	29	71	77	39	X	7	49	11	17
67	71	77	39	X	7	49	11	17	59	21	27
77	X	7	49	11	17	59	21	27	69	31	37
	O	O	U	U	U	O	O	O	U	U	U

HALF-CYCLE											
9	51	57	19	61	67	29	71	77	39	X	7
19	61	67	29	71	77	39	X	7	49	11	17
29	71	77	39	X	7	49	11	17	59	21	27
39	X	7	49	11	17	59	21	27	69	31	37
49	11	17	59	21	27	69	31	37	79	41	47
59	21	27	69	31	37	79	41	47	9	51	57
69	31	37	79	41	47	9	51	57	19	61	67
79	41	47	9	51	57	19	61	67	29	71	77
	O	O	O	U	U	U	O	O	O	U	U

HALF-CYCLE																															
5	21	15	53	31	25	63	41	35	73	51	45	3	61	71	X	11	21	31	37	79	41	47	9	51	57	19	61	67	29	71	77
15	31	25	63	41	35	73	51	45	3	61	55	13	71	X	11	21	31	41	47	9	51	57	19	61	67	29	71	77	39	X	7
25	41	35	73	51	45	3	61	55	13	71	65	23	X	11	21	31	41	51	67	19	61	67	29	71	77	39	X	7	49	11	17
35	51	45	3	61	55	13	71	65	23	X	75	33	11	21	31	41	51	61	67	29	71	77	39	X	7	49	11	17	59	21	27
45	61	55	13	71	65	23	X	75	33	11	5	43	21	31	41	51	61	71	77	39	X	7	49	11	17	59	21	27	69	31	37
55	71	65	23	X	75	33	11	5	43	21	15	53	31	41	51	61	71	X	7	49	11	17	59	21	27	69	31	37	79	41	47
65	X	75	33	11	5	43	21	15	53	31	25	63	41	51	61	71	X	11	17	59	21	27	69	31	37	79	41	47	9	51	57
75	11	5	43	21	15	53	31	25	63	41	35	73	51	61	71	X	11	21	27	69	31	37	79	41	47	9	51	57	19	61	67
	U	O	O	O	U	U	U	O	O	O	U	U	U	O	U	O	U	O	U	O	U	U	U	O	O	O	U	U	U	O	O	O	U

Fig. 1067 — Tables for the odd-numbered half-cycles.

21. $L_1 \longrightarrow R_6$: $o - u$.
22. $R_6 \longrightarrow L_3$: $o - u$.
23. $L_3 \longrightarrow R_7$: $2o - 2u$.
24. $R_7 \longrightarrow L_2$: $u - 2o - 2u$.
25. $L_2 \longrightarrow R_1$: $u - o - u - o - 2u - 2o - u$.
26. $R_1 \longrightarrow L_6$: $o - u$.
27. $L_6 \longrightarrow R_3$: $o - u$.
28. $R_3 \longrightarrow L_7$: $u - 2o - 2u$.
29. $L_7 \longrightarrow R_2$: $u - 2o - 2u$.
30. $R_2 \longrightarrow L_1$: $u - o - 2u - o - 4u - 2o - u$.
31. $L_1 \longrightarrow R_6$: $u - o - u$.
32. $R_6 \longrightarrow L_3$: $u - o - u$.
33. $L_3 \longrightarrow R_7$: $2u - 2o - 2u$.

34. $R_7 \longrightarrow L_2$: $o - 2u - 2o - 2u$.
35. $L_2 \longrightarrow R_1$: $o - u - o - 2u - o - 4u - 2o - u$.
36. $R_1 \longrightarrow L_6$: $u - o - u - o$.
37. $L_6 \longrightarrow R_3$: $u - o - u$.
38. $R_3 \longrightarrow L_7$: $2u - 2o - 2u$.
39. $L_7 \longrightarrow R_2$: $o - 2u - 2o - 2u$.
40. $R_2 \longrightarrow L_1$: $o - u - 2o - 2u - o - 2u - 2o - 2u - 2o - u$.

HALF-CYCLE											
2	6	12	54	16	22	64	26	32	74	36	42
12	16	22	64	26	32	74	36	42	4	46	52
22	26	32	74	36	42	4	46	52	14	56	62
32	36	42	4	46	52	14	56	62	24	66	72
42	46	52	14	56	62	24	66	72	34	76	2
52	56	62	24	66	72	34	76	2	44	6	12
62	66	72	34	76	2	44	6	12	54	16	22
72	76	2	44	6	12	54	16	22	64	26	32
	O	O	U	U	U	O	O	O	U	U	U

HALF-CYCLE											
4	46	52	14	56	62	24	66	72	34	76	2
14	56	62	24	66	72	34	76	2	44	6	12
24	66	72	34	76	2	44	6	12	54	16	22
34	76	2	44	6	12	54	16	22	64	26	32
44	6	12	54	16	22	64	26	32	74	36	42
54	16	22	64	26	32	74	36	42	4	46	52
64	26	32	74	36	42	4	46	52	14	56	62
74	36	42	4	46	52	14	56	62	24	66	72
	O	O	O	U	U	U	O	O	O	U	U

HALF-CYCLE													
6	16	10	48	26	20	58	36	30	68	46	40	78	56
16	26	20	58	36	30	68	46	40	78	56	50	8	66
26	36	30	68	46	40	78	56	50	8	66	60	18	76
36	46	40	78	56	50	8	66	60	18	76	70	28	6
46	56	50	8	66	60	18	76	70	28	6	80	38	16
56	66	60	18	76	70	28	6	80	38	16	10	48	26
66	76	70	28	6	80	38	16	10	48	26	20	58	36
76	6	80	38	16	10	48	26	20	58	36	30	68	46
	O	O	O	U	U	U	O	O	O	U	U	U	O

HALF-CYCLE										
8	66	60	18	76	70	28	6	80	38	16
18	76	70	28	6	80	38	16	10	48	26
28	6	80	38	16	10	48	26	20	58	36
38	16	10	48	26	20	58	36	30	68	46
48	26	20	58	36	30	68	46	40	78	56
58	36	30	68	46	40	78	56	50	8	66
68	46	40	78	56	50	8	66	60	18	76
78	56	50	8	66	60	18	76	70	28	6
	U	U	O	O	O	U	U	U	O	O

HALF-CYCLE																															
10	26	20	58	36	30	68	46	40	78	56	50	8	66	76	6	16	26	36	42	4	46	52	14	56	62	24	66	72	34	76	2
20	36	30	68	46	40	78	56	50	8	66	60	18	76	6	16	26	36	46	52	14	56	62	24	66	72	34	76	2	44	6	12
30	46	40	78	56	50	8	66	60	18	76	70	28	6	16	26	36	46	56	62	24	66	72	34	76	2	44	6	12	54	16	22
40	56	50	8	66	60	18	76	70	28	6	80	38	16	26	36	46	56	66	72	34	76	2	44	6	12	54	16	22	64	26	32
50	66	60	18	76	70	28	6	80	38	16	10	48	26	36	46	56	66	76	2	44	6	12	54	16	22	64	26	32	74	36	42
60	76	70	28	6	80	38	16	10	48	26	20	58	36	46	56	66	76	6	12	54	16	22	64	26	32	74	36	42	4	46	52
70	6	80	38	16	10	48	26	20	58	36	30	68	46	56	66	76	6	16	22	64	26	32	74	36	42	4	46	52	14	56	62
80	16	10	48	26	20	58	36	30	68	46	40	78	56	66	76	6	16	26	32	74	36	42	4	46	52	14	56	62	24	66	72
	U	O	O	O	U	U	U	O	O	O	U	U	U	O	U	O	U	O	U	U	U	O	O	O	U	U	U	O	O	O	U

Fig. 1068 — Tables for the even-numbered half-cycles.

41. $L_1 \longrightarrow R_6$: $o - u - o - u - o$.
42. $R_6 \longrightarrow L_3$: $u - o - 2u$.
43. $L_3 \longrightarrow R_7$: $2u - 2o - 2u$.
44. $R_7 \longrightarrow L_2$: $2o - 2u - 2o - 2u$.
45. $L_2 \longrightarrow R_1$: $o - u - 2o - 3u - o - 2u - 2o - 2u - 2o - u$.
46. $R_1 \longrightarrow L_6$: $o - u - o - 2u - o$.
47. $L_6 \longrightarrow R_3$: $u - o - 2u$.
48. $R_3 \longrightarrow L_7$: $2u - 2o - 2u$.
49. $L_7 \longrightarrow R_2$: $2o - 2u - 2o - 2u$.
50. $R_2 \longrightarrow L_1$: $o - 2u - 2o - 3u - o - 4u - 2o - 2u - 2o - u$.

51. $L_1 \longrightarrow R_6$: $o - u - o - 3u - o$.
52. $R_6 \longrightarrow L_3$: $u - 2o - 3u$.
53. $L_3 \longrightarrow R_7$: $2u - 2o - 2u - o$.
54. $R_7 \longrightarrow L_2$: $2o - 2u - 3o - 2u$.
55. $L_2 \longrightarrow R_1$: $o - 2u - 3o - 3u - o - 4u - 2o - 2u - 2o - u$.
56. $R_1 \longrightarrow L_6$: $o - u - 2o - 3u - o$.
57. $L_6 \longrightarrow R_3$: $u - 2o - 3u$.
58. $R_3 \longrightarrow L_7$: $2u - 2o - 2u - o$.
59. $L_7 \longrightarrow R_2$: $2o - 2u - 3o - 2u$.
60. $R_2 \longrightarrow L_1$: $2o - 2u - 3o - 3u - o - u - o - 3u - 2o - 2u - 3o - u$.
61. $L_1 \longrightarrow R_6$: $o - u - 3o - 3u - o$.
62. $R_6 \longrightarrow L_3$: $2u - 3o - 3u$.
63. $L_3 \longrightarrow R_7$: $2u - 2o - 3u - o$.
64. $R_7 \longrightarrow L_2$: $2o - 3u - 3o - 2u$.
65. $L_2 \longrightarrow R_1$: $2o - 3u - 3o - 3u - o - u - o - 3u - 2o - 2u - 3o - u$.
66. $R_1 \longrightarrow L_6$: $o - 2u - 3o - 3u - o$.
67. $L_6 \longrightarrow R_3$: $2u - 3o - 3u$.
68. $R_3 \longrightarrow L_7$: $2u - 2o - 3u - o$.
69. $L_7 \longrightarrow R_2$: $2o - 3u - 3o - 2u$.
70. $R_2 \longrightarrow L_1$: $u - 2o - 3u - 3o - 3u - o - 2u - o - 3u - 2o - 3u - 3o - u$.
71. $L_1 \longrightarrow R_6$: $o - 3u - 3o - 3u - o$.
72. $R_6 \longrightarrow L_3$: $o - 3u - 3o - 3u$.
73. $L_3 \longrightarrow R_7$: $2u - 3o - 3u - o$.
74. $R_7 \longrightarrow L_2$: $3o - 3u - 3o - 2u$.
75. $L_2 \longrightarrow R_1$: $u - 3o - 3u - 3o - 3u - o - 2u - o - 3u - 2o - 3u - 3o - u$.
76. $R_1 \longrightarrow L_6$: $2o - 3u - 3o - 3u - o$.
77. $L_6 \longrightarrow R_3$: $o - 3u - 3o - 3u$.
78. $R_3 \longrightarrow L_7$: $2u - 3o - 3u - 2o$.
79. $L_7 \longrightarrow R_2$: $3o - 3u - 3o - 2u$.
80. $R_2 \longrightarrow L_1$: $u - 3o - 3u - 3o - 3u - o - u - o - u - o - 3u - 3o - 3u - 3o - u$.

Euclid's algorithm, the path formula, the path in the RKT and the algorithm diagram for the interbraided Regular Knot $p/b = 7/8$ between the bight-boundaries L_4 and R_5 and for the interbraided Regular Knot $p/b = 7/8$ between the bight-boundaries L_5 and R_4 are shown in Fig. 1069.

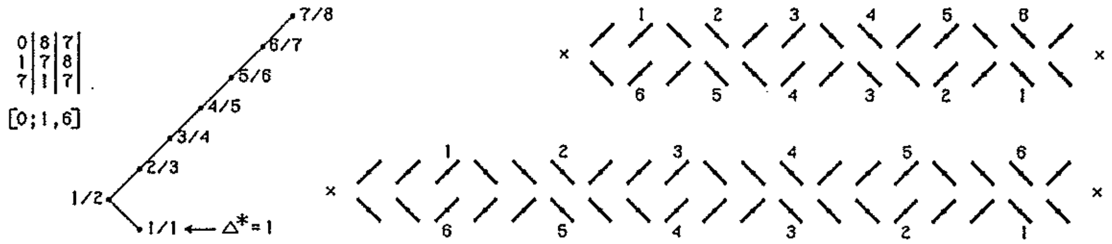

Fig. 1069 — Euclid's algorithm, path formula, path in RKT and algorithm diagrams for interbraided Regular Knots.

For the half-cycles 1′-16′ of the interbraided Regular Knot $p/b = 7/8$ between the bight-boundaries L_4 and R_5 we read the following half-cycle braiding algorithms from its algorithm diagram:

1′.		:	$o - u - o - u - o - u - o$.
2′.	$(i = 0)$	:	$o - u - o - u - o - u - o$.
3′.	$(i = 0)$	:	$o - u - o - u - o - u - o$.
4′.	$(i \leq 1)$	:	$2o - u - o - u - o - u - o$.
5′.	$(i \leq 1)$	:	$2o - u - o - u - o - u - o$.
6′.	$(i \leq 2)$	:	$2o - 2u - o - u - o - u - o$.
7′.	$(i \leq 2)$	:	$2o - 2u - o - u - o - u - o$.
8′.	$(i \leq 3)$	:	$2o - 2u - 2o - u - o - u - o$.
9′.	$(i \leq 3)$	:	$2o - 2u - 2o - u - o - u - o$.
10′.	$(i \leq 4)$	:	$2o - 2u - 2o - 2u - o - u - o$.
11′.	$(i \leq 4)$	:	$2o - 2u - 2o - 2u - o - u - o$.
12′.	$(i \leq 5)$	:	$2o - 2u - 2o - 2u - 2o - u - o$.
13′.	$(i \leq 5)$	:	$2o - 2u - 2o - 2u - 2o - u - o$.
14′.	$(i \leq 6)$	:	$2o - 2u - 2o - 2u - 2o - 2u - o$.
15′.	$(i \leq 6)$	:	$2o - 2u - 2o - 2u - 2o - 2u - o$.
16′.	$(i \leq 7)$	:	$2o - 2u - 2o - 2u - 2o - 2u - o$.

For the half-cycles 1″-16″ of the interbraided Regular Knot $p/b = 7/8$ between the bight-boundaries L_5 and R_4 we read the following half-cycle braiding algorithms from its algorithm diagram:

1″.		:	$2o - 2u - 2o - 2u - 2o - 2u - o$.
2″.	$(i = 0)$	:	$o - 2u - 2o - 2u - 2o - 2u - 2o$.
3″.	$(i = 0)$	:	$2o - 2u - 2o - 2u - 2o - 2u - o$.
4″.	$(i \leq 1)$	:	$2o - 2u - 2o - 2u - 2o - 2u - 2o$.
5″.	$(i \leq 1)$	:	$3o - 2u - 2o - 2u - 2o - 2u - o$.
6″.	$(i \leq 2)$	:	$2o - 3u - 2o - 2u - 2o - 2u - 2o$.
7″.	$(i \leq 2)$	:	$3o - 3u - 2o - 2u - 2o - 2u - o$.
8″.	$(i \leq 3)$	:	$2o - 3u - 3o - 2u - 2o - 2u - 2o$.
9″.	$(i \leq 3)$	:	$3o - 3u - 3o - 2u - 2o - 2u - o$.
10″.	$(i \leq 4)$	:	$2o - 3u - 3o - 3u - 2o - 2u - 2o$.
11″.	$(i \leq 4)$	:	$3o - 3u - 3o - 3u - 2o - 2u - o$.
12″.	$(i \leq 5)$	:	$2o - 3u - 3o - 3u - 3o - 2u - 2o$.
13″.	$(i \leq 5)$	:	$3o - 3u - 3o - 3u - 3o - 2u - o$.
14″.	$(i \leq 6)$	:	$2o - 3u - 3o - 3u - 3o - 3u - 2o$.
15″.	$(i \leq 6)$	:	$3o - 3u - 3o - 3u - 3o - 3u - o$.
16″.	$(i \leq 7)$	:	$2o - 3u - 3o - 3u - 3o - 3u - 2o$.

As mentioned in Issue No. 55, pg. 1322, of *The Braider*, the foundation knots in these "new" type of Interbraided Cylindrical Braids contain in general a considerable length of string and hence we would normally braid them by starting at the centre of the required string-length. Thus in the above Example we would braid the first forty half-cycles in the upwards direction (odd numbered half-cycles from lower-left to upper-right; even numbered half-cycles from lower-right to upper-left), and the last forty half-cycles we would braid in the downwards direction (odd numbered half-cycles from upper-left to lower-right; even numbered half-cycles from upper-right to lower-left). The associated string-run diagram is then as shown in Fig. 1070 and the associated grid-diagram as shown in Fig. 1071. The first forty half-cycle braiding algorithms can be read from the tables in Figs. 1072 & 1073; they are identical to the half-cycle braiding algorithms 1-40 on pp. 1327-1329.

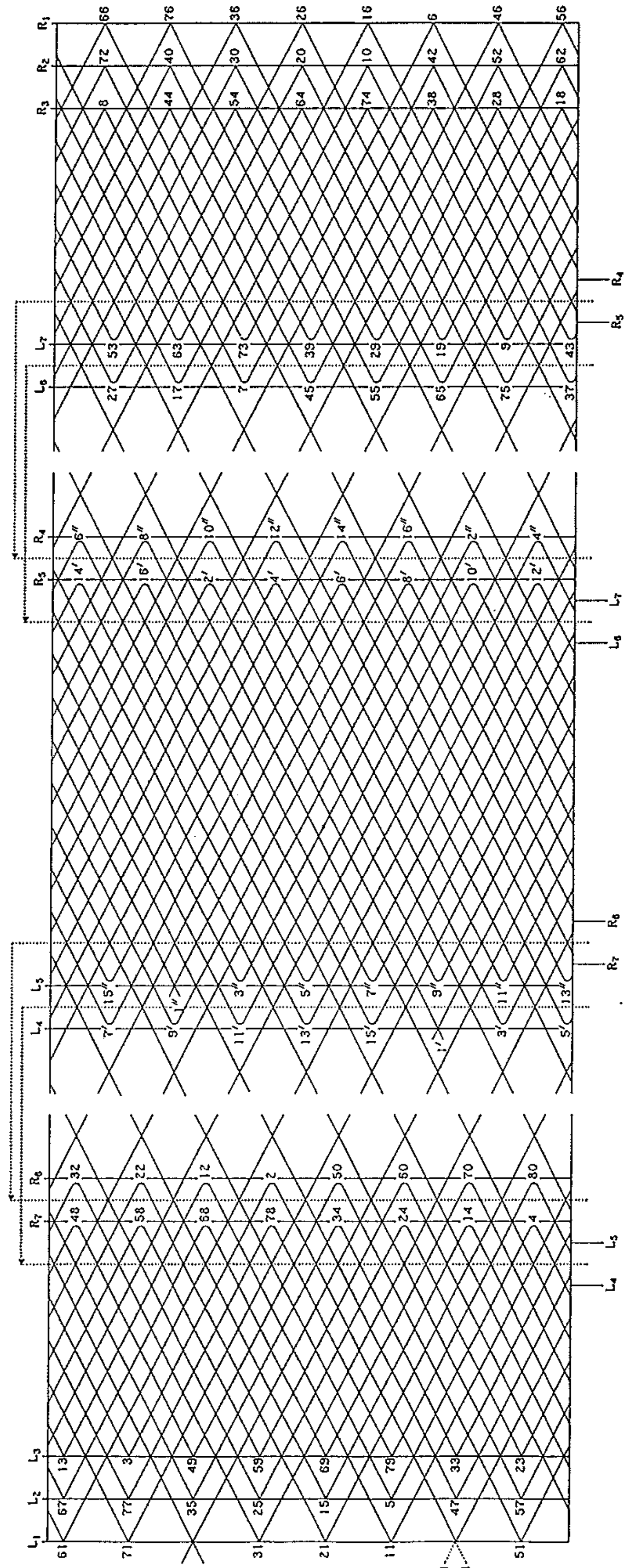

Fig. 1070 — The string-run of the Interbraided Cylindrical Braid.

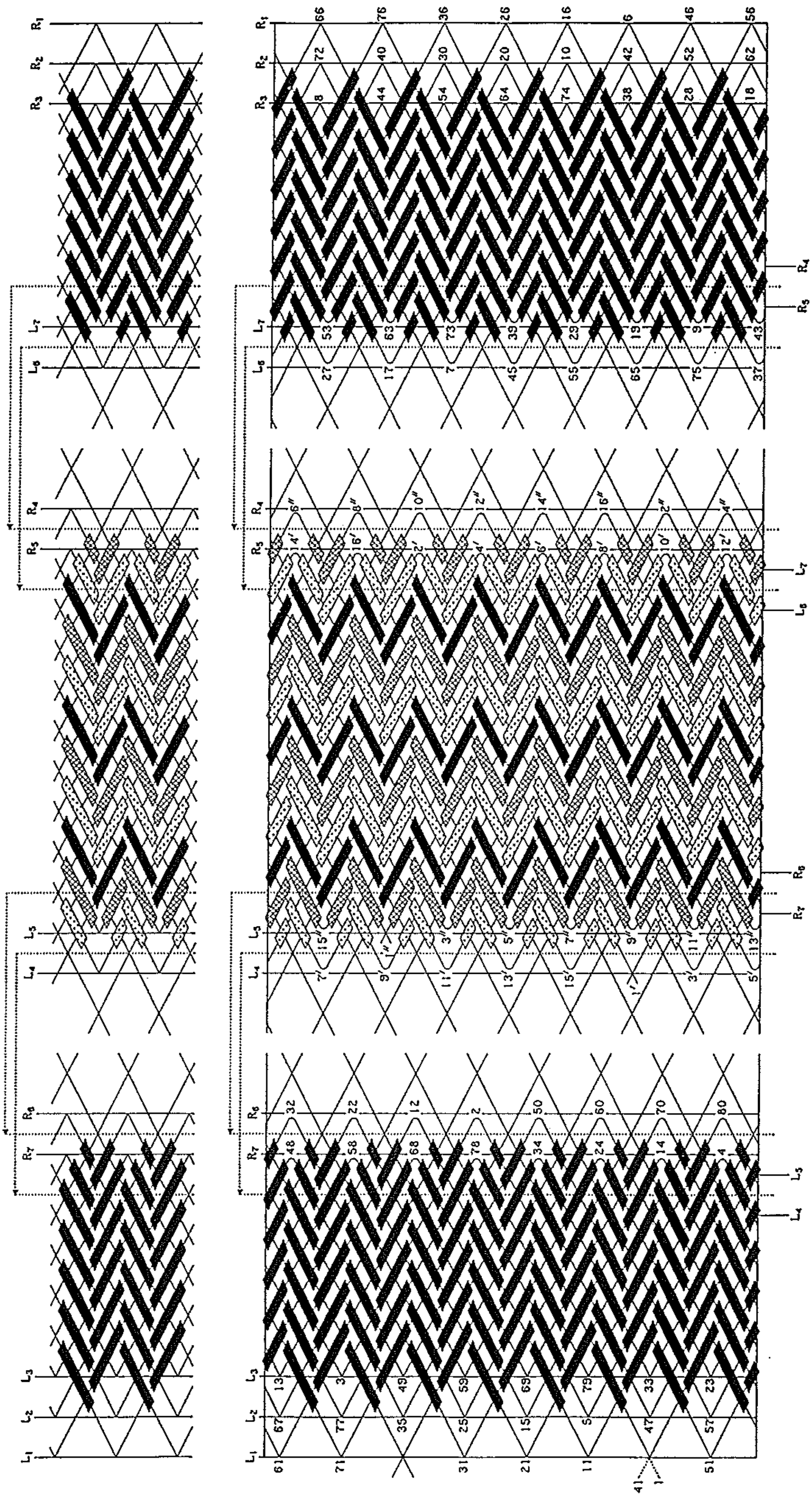

Fig. 1071 — The superimposed coding.

The first forty half-cycles are:

1. $L_1 \longrightarrow R_6$: Free run.
2. $R_6 \longrightarrow L_3$: Free run.
3. $L_3 \longrightarrow R_7$: Free run.
4. $R_7 \longrightarrow L_2$: u.
5. $L_2 \longrightarrow R_1$: u.
6. $R_1 \longrightarrow L_6$: Free run.
7. $L_6 \longrightarrow R_3$: Free run.
8. $R_3 \longrightarrow L_7$: u.
9. $L_7 \longrightarrow R_2$: u.
10. $R_2 \longrightarrow L_1$: $4u$.

HALF-CYCLE													
1	11	5	X	21	15	X	31	25	X	X	35	X	X
11	21	15	X	31	25	X	X	35	X	X	X	3	X
21	31	25	X	X	35	X	X	X	3	X	X	13	X
31	X	35	X	X	X	3	X	X	13	X	X	23	~~1~~
	O	O	O	U	U	U	O	O	O	U	U	U	O

HALF-CYCLE										
3	X	X	13	X	X	23	~~1~~	X	33	11
13	X	X	23	~~1~~	X	33	11	5	X	21
23	~~1~~	X	33	11	5	X	21	15	X	31
33	11	5	X	21	15	X	31	25	X	X
	U	U	O	O	O	U	U	U	O	O

HALF-CYCLE											
7	11	17	X	21	27	X	31	37	X	X	X
17	21	27	X	31	37	X	X	X	9	X	X
27	31	37	X	X	X	9	X	X	19	X	X
37	X	X	9	X	X	19	X	X	29	X	X
	O	O	U	U	U	O	O	O	U	U	U

HALF-CYCLE											
9	X	X	19	X	X	29	X	X	39	~~1~~	7
19	X	X	29	X	X	39	~~1~~	7	X	11	17
29	X	X	39	~~1~~	7	X	11	17	X	21	27
39	~~1~~	7	X	11	17	X	21	27	X	31	37
	O	O	O	U	U	U	O	O	O	U	U

HALF-CYCLE																															
5	21	15	X	31	25	X	X	35	X	X	X	3	X	X	~~1~~	11	21	31	37	X	X	X	9	X	X	19	X	X	29	X	X
15	31	25	X	X	35	X	X	X	3	X	X	13	X	~~1~~	11	21	31	X	X	9	X	X	19	X	X	29	X	X	39	~~1~~	7
25	X	35	X	X	X	3	X	X	13	X	X	23	~~1~~	11	21	31	X	X	X	19	X	X	29	X	X	39	~~1~~	7	X	11	17
35	X	X	3	X	X	13	X	X	23	~~1~~	X	33	11	21	31	X	X	X	X	29	X	X	39	~~1~~	7	49	11	17	X	21	27
	U	O	O	O	U	U	U	O	O	O	U	U	U	O	U	O	U	O	U	U	U	O	O	O	U	U	U	O	O	O	U

Fig. 1072 — Tables for the first twenty odd-numbered half-cycles.

11. $L_1 \longrightarrow R_6$: u.
12. $R_6 \longrightarrow L_3$: u.
13. $L_3 \longrightarrow R_7$: $2u$.
14. $R_7 \longrightarrow L_2$: $o - 2u$.
15. $L_2 \longrightarrow R_1$: $o - 4u$.
16. $R_1 \longrightarrow L_6$: u.
17. $L_6 \longrightarrow R_3$: u.
18. $R_3 \longrightarrow L_7$: $o - 2u$.
19. $L_7 \longrightarrow R_2$: $o - 2u$.
20. $R_2 \longrightarrow L_1$: $o - u - o - 2u - 2o - u$.
21. $L_1 \longrightarrow R_6$: $o - u$.
22. $R_6 \longrightarrow L_3$: $o - u$.
23. $L_3 \longrightarrow R_7$: $2o - 2u$.
24. $R_7 \longrightarrow L_2$: $u - 2o - 2u$.
25. $L_2 \longrightarrow R_1$: $u - o - u - o - 2u - 2o - u$.
26. $R_1 \longrightarrow L_6$: $o - u$.
27. $L_6 \longrightarrow R_3$: $o - u$.

28. $R_3 \longrightarrow L_7$: $u - 2o - 2u$.
29. $L_7 \longrightarrow R_2$: $u - 2o - 2u$.
30. $R_2 \longrightarrow L_1$: $u - o - 2u - o - 4u - 2o - u$.

HALF-CYCLE											
2	6	12	X	16	22	X	26	32	X	36	X
12	16	22	X	26	32	X	36	X	4	X	X
22	26	32	X	36	X	4	X	X	14	X	X
32	36	X	4	X	X	14	X	X	24	X	X
	O	O	U	U	U	O	O	O	U	U	U

HALF-CYCLE											
4	X	X	14	X	X	24	X	X	34	X	2
14	X	X	24	X	X	34	X	2	X	6	12
24	X	X	34	X	2	X	6	12	X	16	22
34	X	2	X	6	12	X	16	22	X	26	32
	O	O	O	U	U	U	O	O	O	U	U

HALF-CYCLE													
6	16	10	X	26	20	X	36	30	X	X	40	X	X
16	26	20	X	36	30	X	X	40	X	X	X	8	X
26	36	30	X	X	40	X	X	X	8	X	X	18	X
36	X	40	X	X	X	8	X	X	18	X	X	28	6
	O	O	O	U	U	U	O	O	O	U	U	U	O

HALF-CYCLE										
8	X	X	18	X	X	28	6	X	38	16
18	X	X	28	6	X	38	16	10	X	26
28	6	X	38	16	10	X	26	20	X	36
38	16	10	X	26	20	X	36	30	X	X
	U	U	O	O	O	U	U	U	O	O

HALF-CYCLE																															
10	26	20	X	36	30	X	X	40	X	X	X	8	X	X	6	16	26	36	X	4	X	X	14	X	X	24	X	X	34	X	2
20	36	30	X	X	40	X	X	X	8	X	X	18	X	6	16	26	36	X	X	14	X	X	24	X	X	34	X	2	X	6	12
30	X	40	X	X	X	8	X	X	18	X	X	28	6	16	26	36	X	X	X	24	X	X	34	X	2	X	6	12	X	16	22
40	X	X	8	X	X	18	X	X	28	6	X	38	16	26	36	X	X	X	X	34	X	2	X	6	12	X	16	22	X	26	32
	U	O	O	O	U	U	U	O	O	O	U	U	U	O	U	O	U	O	U	U	U	O	O	O	U	U	U	O	O	O	U

Fig. 1073 — Tables for the first twenty even-numbered half-cycles.

31. $L_1 \longrightarrow R_6$: $u - o - u$.
32. $R_6 \longrightarrow L_3$: $u - o - u$.
33. $L_3 \longrightarrow R_7$: $2u - 2o - 2u$.
34. $R_7 \longrightarrow L_2$: $o - 2u - 2o - 2u$.
35. $L_2 \longrightarrow R_1$: $o - u - o - 2u - o - 4u - 2o - u$.
36. $R_1 \longrightarrow L_6$: $u - o - u - o$.
37. $L_6 \longrightarrow R_3$: $u - o - u$.
38. $R_3 \longrightarrow L_7$: $2u - 2o - 2u$.
39. $L_7 \longrightarrow R_2$: $o - 2u - 2o - 2u$.
40. $R_2 \longrightarrow L_1$: $o - u - 2o - 2u - o - 2u - 2o - 2u - 2o - u$.

Since the braiding directions for the odd-numbered and even-numbered half-cycles of the last forty half-cycles are opposite to the braiding directions for the odd-numbered and even-numbered half-cycle of the first forty half-cycles, we require for the first forty half-cycles and for the last forty half-cycles a separate set of tables. In the tables for the first forty half-cycles (Figs. 1072 and 1073) we have for convenience restricted the intersection cell entries to the first forty half-cycles.

It will have been noted that in tables associated with braiding all odd-numbered half-cycles and all even-numbered half-cycles in their same respective direction, the consecutive vertically aligned lower entry is $|a + f|_b$, where a equals the vertically aligned upper entry, f equals the number of half-cycles in the first-return string-run, b equals the number of bights of the (sub)component associated with the first-return string-run. Hence the simplest way to set up the odd-numbered and even-numbered half-cycle tables for the last forty half-cycles is to take for the Standing End of the total string-run (the eighty half-cycles) the end-point of half-cycle forty. From these tables read only for the half-cycles 41-80 the half-cycle braiding algorithms.†

41. $L_1 \longrightarrow R_2$: $o - u - o - 2u - o - u - o - u - o - 2u - 2o - u$.
42. $R_2 \longrightarrow L_7$: $o - u - 2o$.
43. $L_7 \longrightarrow R_3$: $2o - u - o$.
44. $R_3 \longrightarrow L_6$: $2u - 2o - 2u - 2o$.
45. $L_6 \longrightarrow R_1$: $2u - 2o - 2u - 3o$.

HALF-CYCLE																															
1	11	17	59	21	27	69	31	37	79	41	47	9	51	57	67	77	7	17	27	5	43	37	15	53	47	25	63	57	35	73	67
11	21	27	69	31	37	79	41	47	9	51	57	19	61	67	77	7	17	27	37	15	53	47	25	63	57	35	73	67	45	3	77
21	31	37	79	41	47	9	51	57	19	61	67	29	71	77	7	17	27	37	47	25	63	57	35	73	67	45	3	77	55	13	7
31	41	47	9	51	57	19	61	67	29	71	77	39	X	7	17	27	37	47	57	35	73	67	45	3	77	55	13	7	65	23	17
41	51	57	19	61	67	29	71	77	39	X	7	49	11	17	27	37	47	57	67	45	3	77	55	13	7	65	23	17	75	33	27
51	61	67	29	71	77	39	X	7	49	11	17	59	21	27	37	47	57	67	77	55	13	7	65	23	17	75	33	27	5	43	37
61	71	77	39	X	7	49	11	17	59	21	27	69	31	37	47	57	67	77	7	65	23	17	75	33	27	5	43	37	15	53	47
71	X	7	49	11	17	59	21	27	69	31	37	79	41	47	57	67	77	7	17	75	33	27	5	43	37	15	53	47	25	63	57
	U	O	O	O	U	U	U	O	O	O	U	U	U	O	U	O	U	O	U	U	U	O	O	O	U	U	U	O	O	O	U

HALF-CYCLE										
3	77	55	13	7	65	23	17	75	33	27
13	7	65	23	17	75	33	27	5	43	37
23	17	75	33	27	5	43	37	15	53	47
33	27	5	43	37	15	53	47	25	63	57
43	37	15	53	47	25	63	57	35	73	67
53	47	25	63	57	35	73	67	45	3	77
63	57	35	73	67	45	3	77	55	13	7
73	67	45	3	77	55	13	7	65	23	17
	O	O	U	U	U	O	O	O	U	U

HALF-CYCLE													
5	37	15	53	47	25	63	57	35	73	67	45	3	77
15	47	25	63	57	35	73	67	45	3	77	55	13	7
25	57	35	73	67	45	3	77	55	13	7	65	23	17
35	67	45	3	77	55	13	7	65	23	17	75	33	27
45	77	55	13	7	65	23	17	75	33	27	5	43	37
55	7	65	23	17	75	33	27	5	43	37	15	53	47
65	17	75	33	27	5	43	37	15	53	47	25	63	57
75	27	5	43	37	15	53	47	25	63	57	35	73	67
	O	U	U	U	O	O	O	U	U	U	O	O	O

HALF-CYCLE											
7	11	17	59	21	27	69	31	37	79	41	47
17	21	27	69	31	37	79	41	47	9	51	57
27	31	37	79	41	47	9	51	57	19	61	67
37	41	47	9	51	57	19	61	67	29	71	77
47	51	57	19	61	67	29	71	77	39	X	7
57	61	67	29	71	77	39	X	7	49	11	17
67	71	77	39	X	7	49	11	17	59	21	27
77	X	7	49	11	17	59	21	27	69	31	37
	U	U	O	O	O	U	U	U	O	O	O

HALF-CYCLE											
9	51	57	19	61	67	29	71	77	39	X	7
19	61	67	29	71	77	39	X	7	49	11	17
29	71	77	39	X	7	49	11	17	59	21	27
39	X	7	49	11	17	59	21	27	69	31	37
49	11	17	59	21	27	69	31	37	79	41	47
59	21	27	69	31	37	79	41	47	9	51	57
69	31	37	79	41	47	9	51	57	19	61	67
79	41	47	9	51	57	19	61	67	29	71	77
	U	U	U	O	O	O	U	U	U	O	O

Fig. 1074 — Tables for the odd-numbered half-cycles > 40.

46. $R_1 \longrightarrow L_2$: $o - u - 3o - 2u - o - u - o - u - 2o - 2u - 2o - u$.
47. $L_2 \longrightarrow R_7$: $o - u - 2o$.
48. $R_7 \longrightarrow L_3$: $2o - u - o$.
49. $L_3 \longrightarrow R_6$: $2u - 2o - 2u - 2o$.
50. $R_6 \longrightarrow L_1$: $o - 2u - 2o - 2u - 3o$.
51. $L_1 \longrightarrow R_2$: $o - u - 3o - 2u - o - u - o - u - 2o - 2u - 3o - u$.
52. $R_2 \longrightarrow L_7$: $o - 2u - 3o$.

† Note that for half-cycle n, where $n > 40$ the intersection cells with numbers $\leq n$ are the correct intersection cells although those with numbers ≤ 40 do not carry their actual number. These tables can therefore only be used for the half-cycles 41-80.

53. $L_7 \longrightarrow R_3 : \; 2o - u - o - u \, .$
54. $R_3 \longrightarrow L_6 : \; 2u - 2o - 3u - 2o \, .$
55. $L_6 \longrightarrow R_1 : \; o - 2u - 2o - 3u - 3o \, .$
56. $R_1 \longrightarrow R_2 : \; o - 3u - 3o - 2u - o - u - o - 2u - 2o - 2u - 3o - u \, .$
57. $R_2 \longrightarrow R_7 : \; o - 2u - 3o \, .$
58. $R_7 \longrightarrow L_3 : \; 2o - u - o - 2u \, .$
59. $L_3 \longrightarrow R_6 : \; 2u - 2o - 3u - 2o \, .$

HALF-CYCLE											
2	6	12	54	16	22	64	26	32	74	36	42
12	16	22	64	26	32	74	36	42	4	46	52
22	26	32	74	36	42	4	46	52	14	56	62
32	36	42	4	46	52	14	56	62	24	66	72
42	46	52	14	56	62	24	66	72	34	76	2
52	56	62	24	66	72	34	76	2	44	6	12
62	66	72	34	76	2	44	6	12	54	16	22
72	76	2	44	6	12	54	16	22	64	26	32
	U	U	0	0	0	U	U	U	0	0	0

HALF-CYCLE											
4	46	52	14	56	62	24	66	72	34	76	2
14	56	62	24	66	72	34	76	2	44	6	12
24	66	72	34	76	2	44	6	12	54	16	22
34	76	2	44	6	12	54	16	22	64	26	32
44	6	12	54	16	22	64	26	32	74	36	42
54	16	22	64	26	32	74	36	42	4	46	52
64	26	32	74	36	42	4	46	52	14	56	62
74	36	42	4	46	52	14	56	62	24	66	72
	U	U	U	0	0	0	U	U	U	0	0

HALF-CYCLE																															
6	16	22	64	26	32	74	36	42	4	46	52	14	56	62	72	2	12	22	32	10	48	42	20	58	52	30	68	62	40	78	72
16	26	32	74	36	42	4	46	52	14	56	62	24	66	72	2	12	22	32	42	20	58	52	30	68	62	40	78	72	50	8	2
26	36	42	4	46	52	14	56	62	24	66	72	34	76	2	12	22	32	42	52	30	68	62	40	78	72	50	8	2	60	18	12
36	46	52	14	56	62	24	66	72	34	76	2	44	6	12	22	32	42	52	62	40	78	72	50	8	2	60	18	12	70	28	22
46	56	62	24	66	72	34	76	2	44	6	12	54	16	22	32	42	52	62	72	50	8	2	60	18	12	70	28	22	80	38	32
56	66	72	34	76	2	44	6	12	54	16	22	64	26	32	42	52	62	72	2	60	18	12	70	28	22	80	38	32	10	48	42
66	76	2	44	6	12	54	16	22	64	26	32	74	36	42	52	62	72	2	12	70	28	22	80	38	32	10	48	42	20	58	52
76	6	12	54	16	22	64	26	32	74	36	42	4	46	62	62	72	2	12	22	80	38	32	10	48	42	20	58	52	30	68	62
	U	0	0	0	U	U	U	0	0	0	U	U	U	0	U	0	U	0	U	U	U	0	0	0	U	U	U	0	0	0	U

HALF-CYCLE										
8	2	60	18	12	70	28	22	80	38	32
18	12	70	28	22	80	38	32	10	48	42
28	22	80	38	32	10	48	42	20	58	52
38	32	10	48	42	20	58	52	30	68	62
48	42	20	58	52	30	68	62	40	78	72
58	52	30	68	62	40	78	72	50	8	2
68	62	40	78	72	50	8	2	60	18	12
78	72	50	8	2	60	18	12	70	28	22
	0	0	U	U	U	0	0	0	U	U

HALF-CYCLE													
10	42	20	58	52	30	68	62	40	78	72	50	8	2
20	52	30	68	62	40	78	72	50	8	2	60	18	12
30	62	40	78	72	50	8	2	60	18	12	70	28	22
40	72	50	8	2	60	18	12	70	28	22	80	38	32
50	2	60	18	12	70	28	22	80	38	32	10	48	42
60	12	70	28	22	80	38	32	10	48	42	20	58	52
70	22	80	38	32	10	48	42	20	58	52	30	68	62
80	32	10	48	42	20	58	52	30	68	62	40	78	72
	0	U	U	U	0	0	0	U	U	U	0	0	0

Fig. 1075 — Tables for the even-numbered half-cycles > 40.

60. $R_6 \longrightarrow L_1 : \; o - 2u - 2o - 3u - 3o \, .$
61. $L_1 \longrightarrow R_2 : \; o - 3u - 3o - 2u - o - u - o - 2u - 2o - 3u - 3o - u \, .$
62. $R_2 \longrightarrow L_7 : \; 2o - 3u - 3o \, .$
63. $L_7 \longrightarrow R_3 : \; 2o - u - 2o - 2u \, .$
64. $R_3 \longrightarrow L_6 6 : \; 2u - 3o - 3u - 2o \, .$
65. $L_6 \longrightarrow R_1 : \; o - 2u - 3o - 3u - 3o \, .$
66. $R_1 \longrightarrow L_2 : \; 3o - 3u - 3o - 2u - o - u - 2o - 2u - 2o - 3u - 3o - u \, .$
67. $L_2 \longrightarrow R_7 : \; 2o - 3u - 3o \, .$
68. $R_7 \longrightarrow L_3 : \; 2o - u - 3o - 2u \, .$
69. $L_3 \longrightarrow R_6 : \; 2u - 3o - 3u - 2o \, .$

70. $R_6 \longrightarrow L_1$: $o - 2u - 3o - 3u - 3o$.
71. $L_1 \longrightarrow R_2$: $3o - 3u - 3o - 2u - o - u - 2o - 2u - 3o - 3u - 3o - u$.
72. $R_2 \longrightarrow L_7$: $u - 3o - 3u - 3o$.
73. $L_7 \longrightarrow R_3$: $2o - 2u - 3o - 2u$.
74. $R_3 \longrightarrow L_6$: $3u - 3o - 3u - 2o$.
75. $L_6 \longrightarrow R_1$: $o - 3u - 3o - 3u - 3o$.
76. $R_1 \longrightarrow L_2$: $u - 3o - 3u - 3o - 3u - o - u - o - u - o - 2u - 3o - 3u - 3o - u$.
77. $L_2 \longrightarrow R_7$: $u - 3o - 3u - 3o$.
78. $R_7 \longrightarrow L_3$: $2o - 3u - 3o - 2u$.
79. $L_3 \longrightarrow R_6$: $3u - 3o - 3u - 2o$.
80. $R_6 \longrightarrow L_1$: $o - 3u - 3o - 3u - 3o$.

In our grid-diagram on pg. 1326, Fig. 1066, the values of C_1 and C_3 are both 11 and the associated first-return string-run of the foundation knot was depicted in Fig. 1063, pg. 1323. The same first-return string-run form will be obtained when $C_1 = 5 + 6n$ and $C_3 = 5 + 6m$, where n and m are whole numbers.

In the upper grid-diagram of Fig. 1076 the C_1 and C_3 values are both increased by 2 and the associated first-return string-run of the foundation knot is depicted in Fig. 1077. This first-return string-run form will be associated with foundation knots wherein $C_1 = 7 + 6n$ and $C_3 = 7 + 6m$, where n and m are whole numbers.

In the lower grid-diagram of Fig. 1076 the C_1 and C_3 values are both increased by 4 and the associated first-return string-run of the foundation knot is depicted in Fig. 1078. This first-return string-run form will be associated with foundation knots wherein $C_1 = 3 + 6n$ and $C_3 = 3 + 6m$, where n and m are whole numbers.

In the upper grid-diagram of Fig. 1079 the C_3 value is increased by 2 and the associated first-return string-run of the foundation knot is depicted in Fig. 1080. This first-return string-run form will be associated with foundation knots wherein $C_1 = 5 + 6n$ and $C_3 = 7 + 6m$, where n and m are whole numbers.

In the lower grid-diagram of Fig. 1079 the C_3 value is increased by 4 and the associated first-return string-run of the foundation knot is depicted in Fig. 1081. This first-return string-run form will be associated with foundation knots wherein $C_1 = 5 + 6n$ and $C_3 = 3 + 6m$, where n and m are whole numbers.

In the upper grid-diagram of Fig. 1082 the C_1 value is increased by 2 and the associated first-return string-run of the foundation knot is depicted in Fig. 1083. This first-return string-run form will be associated with foundation knots wherein $C_1 = 7 + 6n$ and $C_3 = 5 + 6m$, where n and m are whole numbers.

In the lower grid-diagram of Fig. 1082 the C_1 value is increased by 4 and the associated first-return string-run of the foundation knot is depicted in Fig. 1084. This first-return string-run form will be associated with foundation knots wherein $C_1 = 3 + 6n$ and $C_3 = 5 + 6m$, where n and m are whole numbers.

In the upper grid-diagram of Fig. 1085 the C_1 value is increased by 2 and the C_3 value by 4. The associated first-return string-run of the foundation knot is depicted in Fig. 1086. This first-return string-run form will be associated with foundation knots wherein $C_1 = 7 + 6n$ and $C_3 = 3 + 6m$, where n and m are whole numbers.

In the lower grid-diagram of Fig. 1085 the C_1 value is increased by 4 and the C_3 value by 2. The associated first-return string-run of the foundation knot is depicted in Fig. 1087. This first-return string-run form will be associated with foundation knots wherein $C_1 = 3 + 6n$ and $C_3 = 7 + 6m$, where n and m are whole numbers.

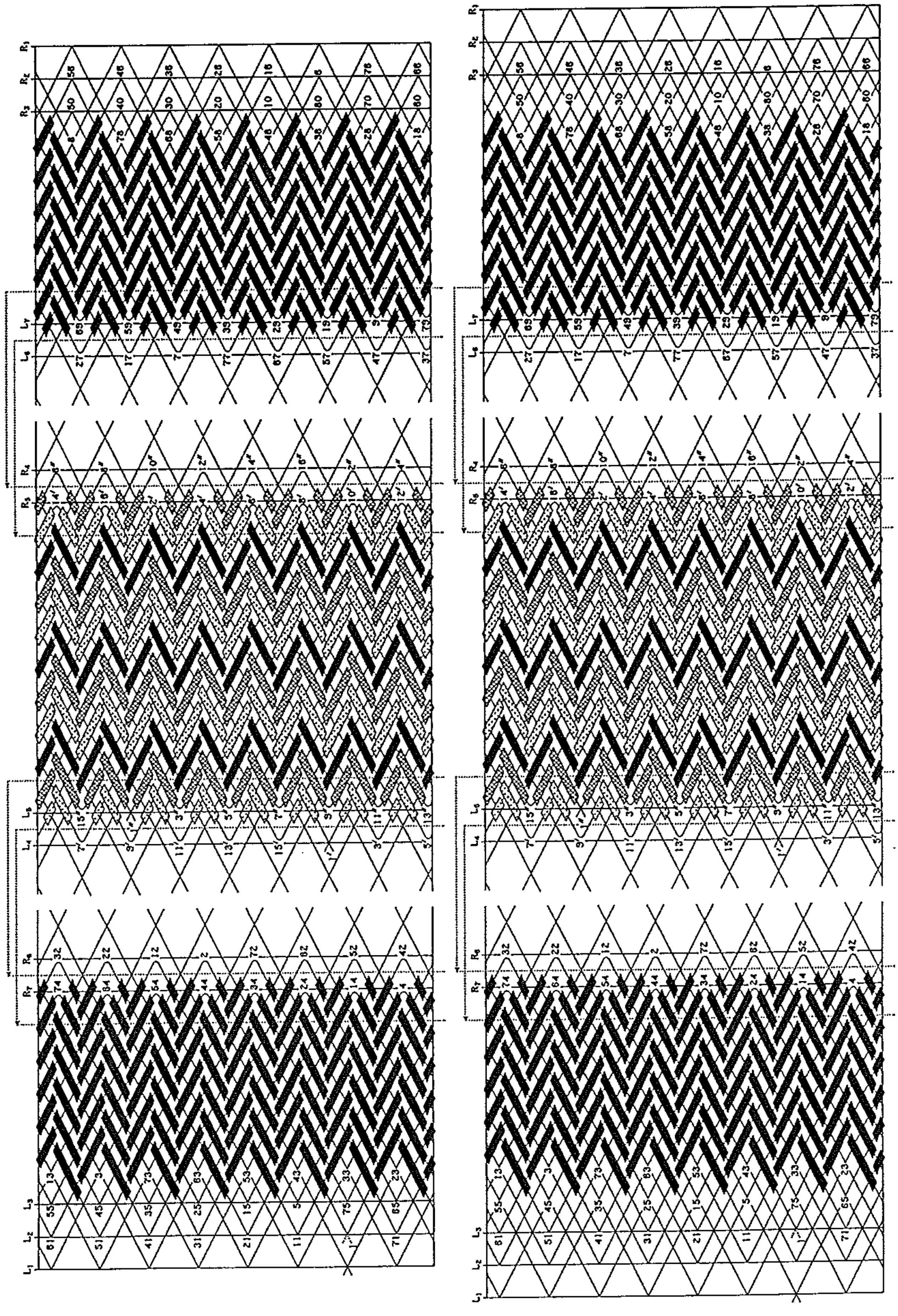

Fig. 1076 — See text pg. 1338.

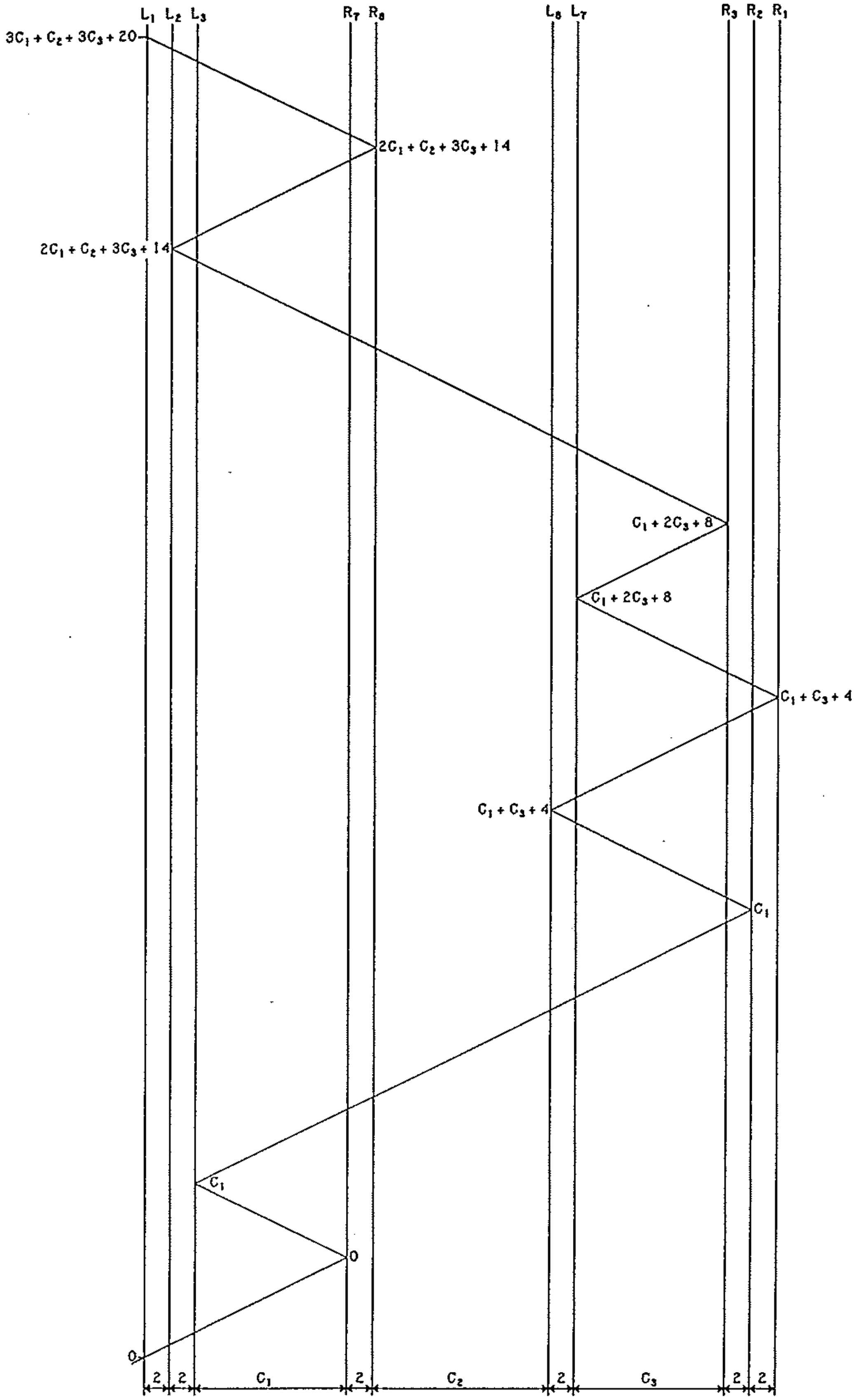

Fig. 1077 — The first-return string-run of the foundation knot.

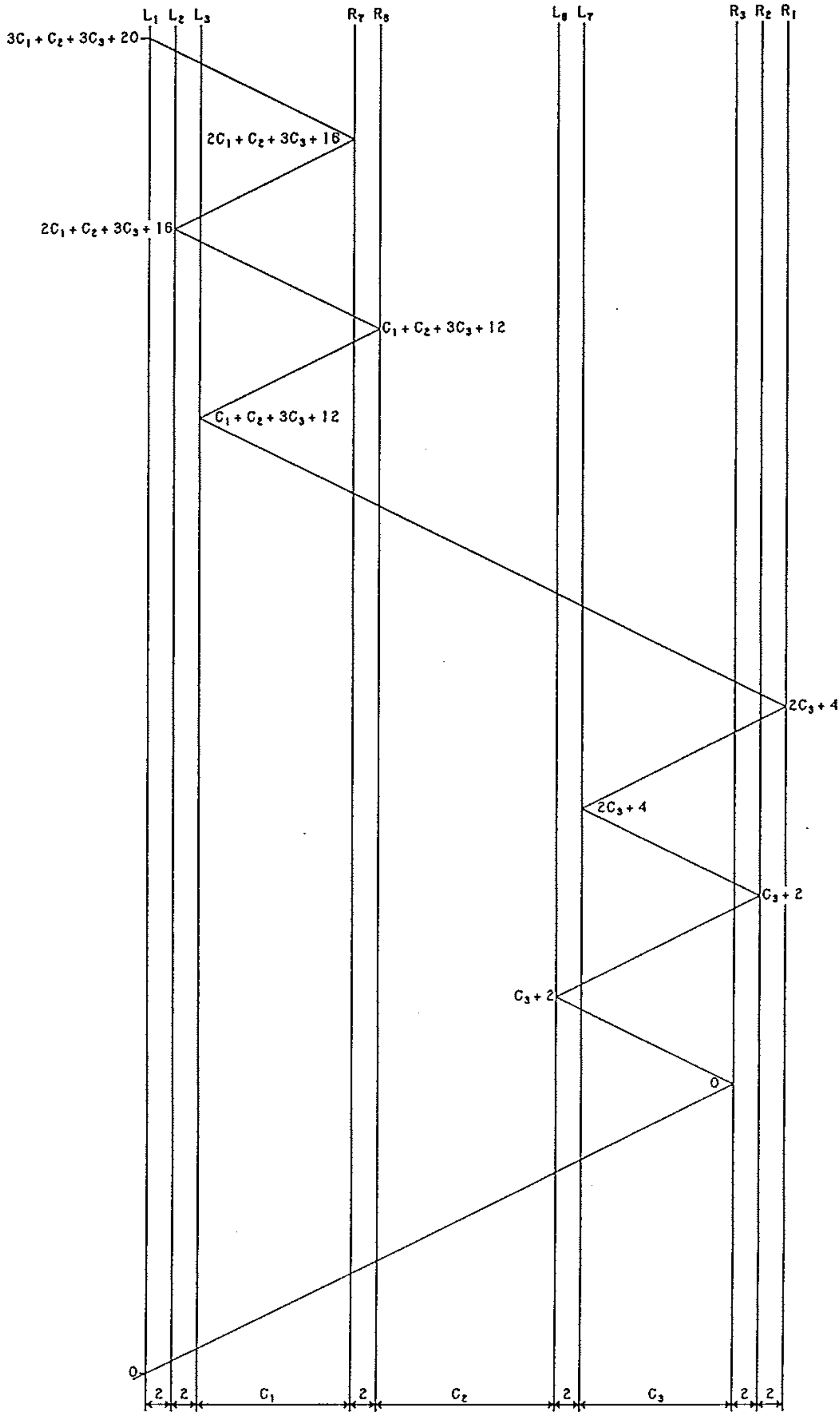

Fig. 1078 — The first-return string-run of the foundation knot.

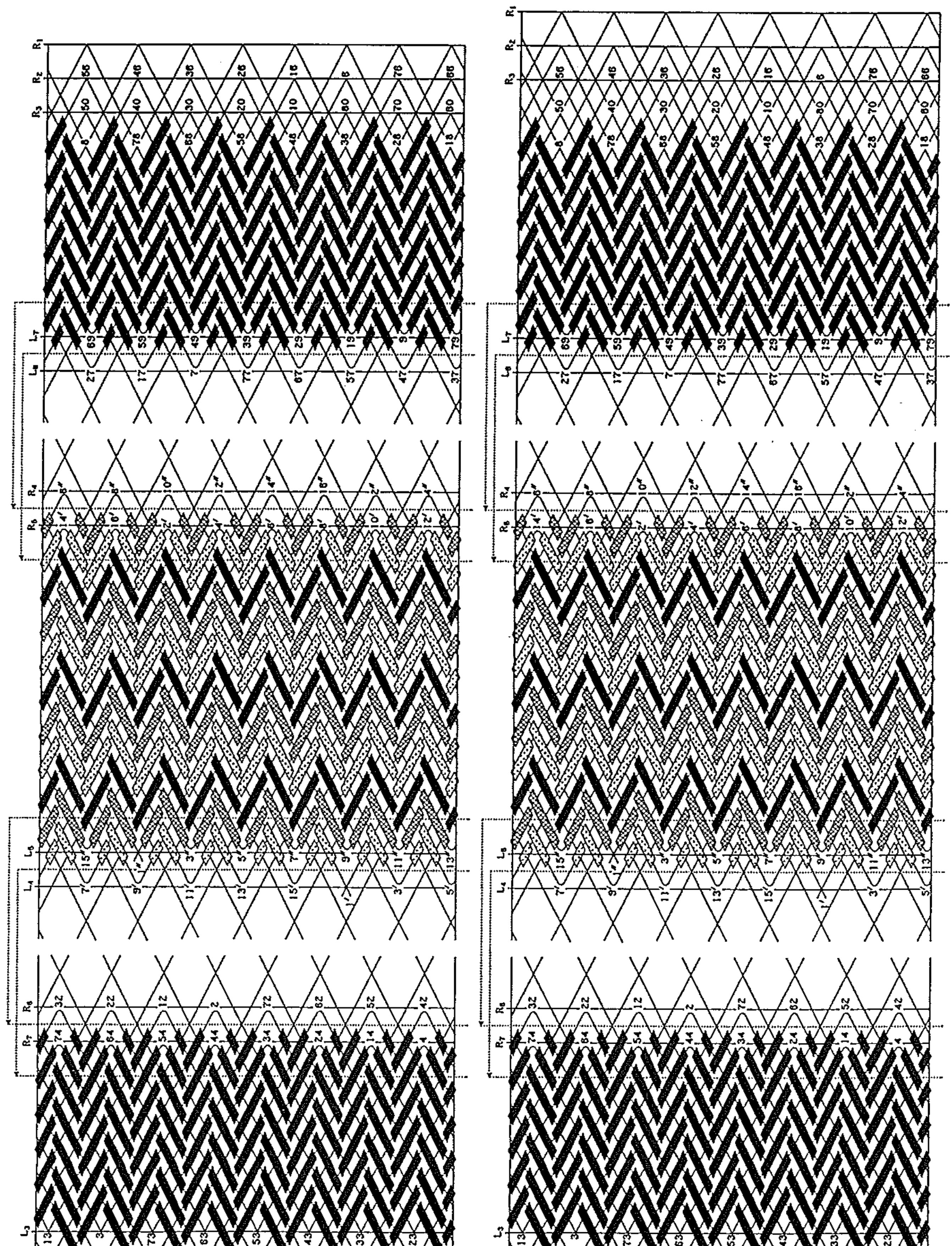

Fig. 1079 — See text pg. 1338.

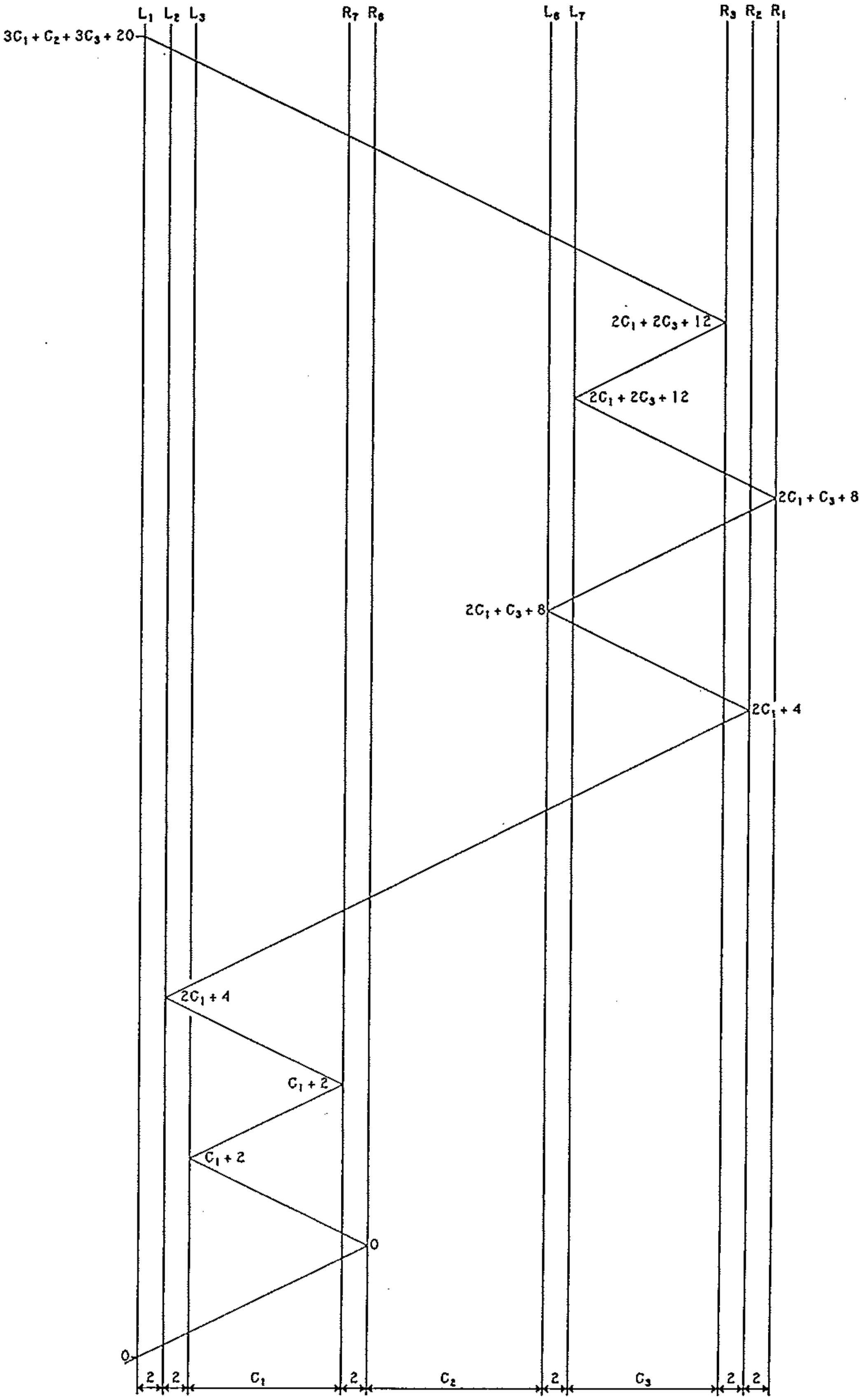

Fig. 1080 — The first-return string-run of the foundation knot.

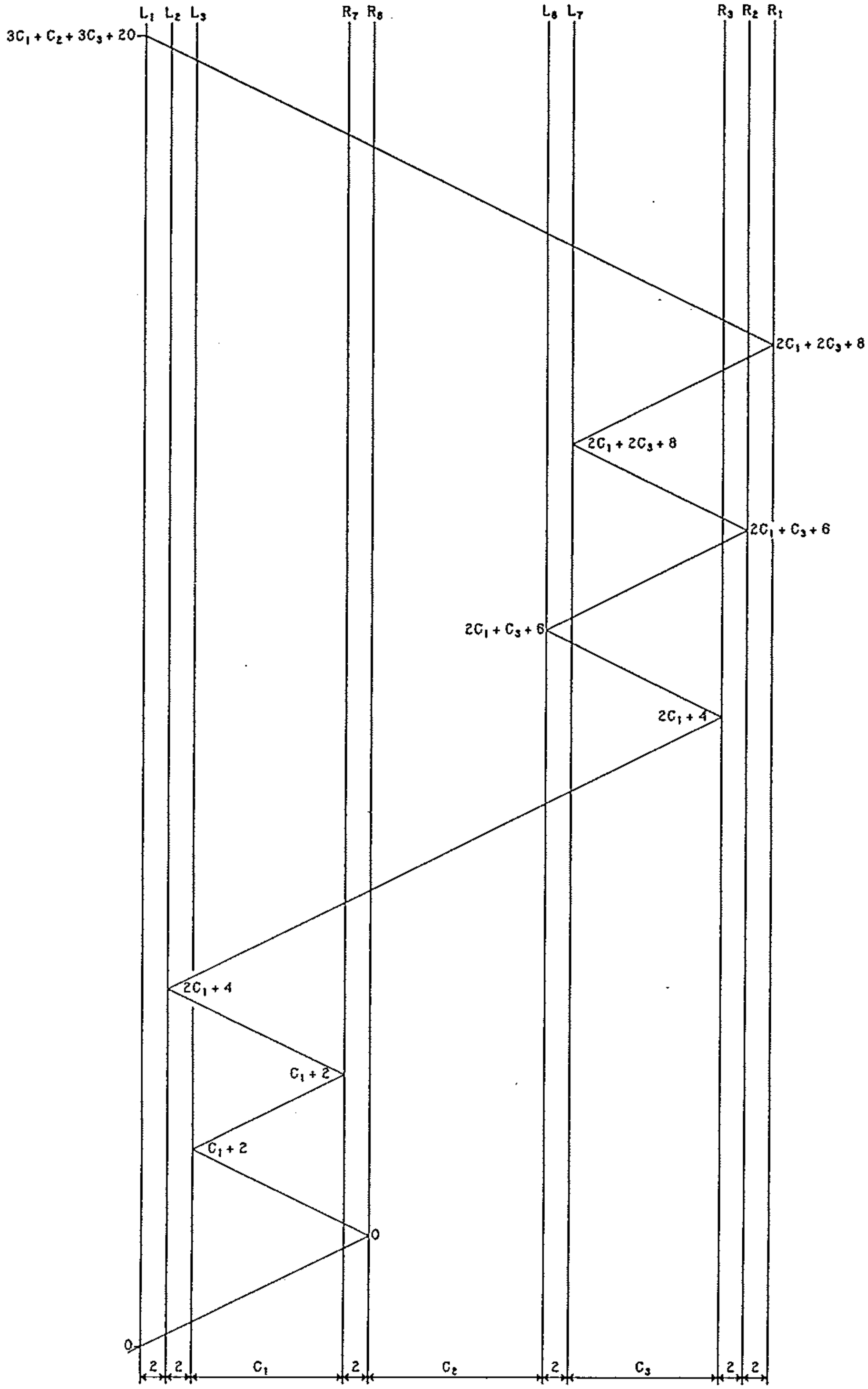

Fig. 1081 — The first-return string-run of the foundation knot.

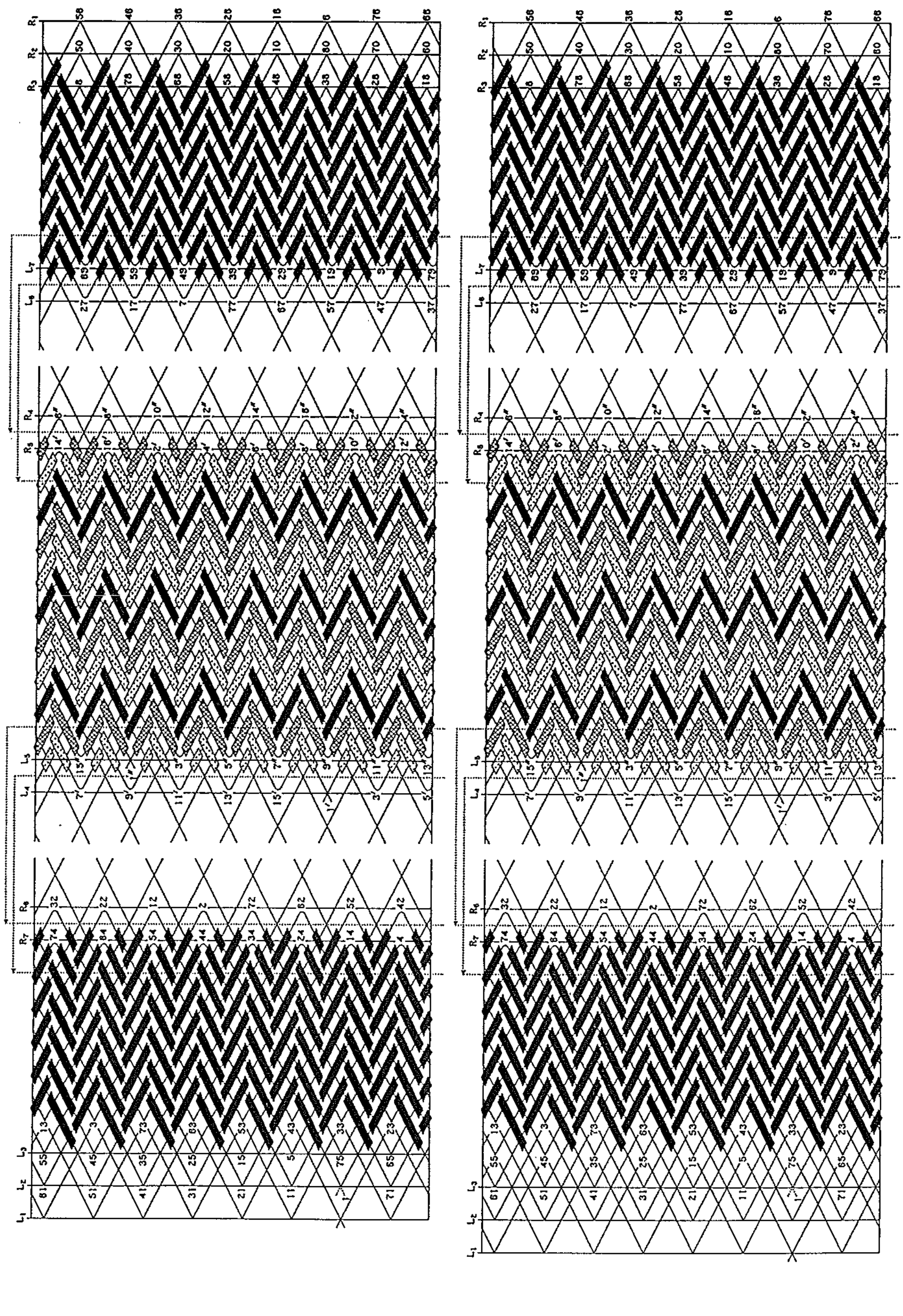

Fig. 1082 — See text pg. 1338.

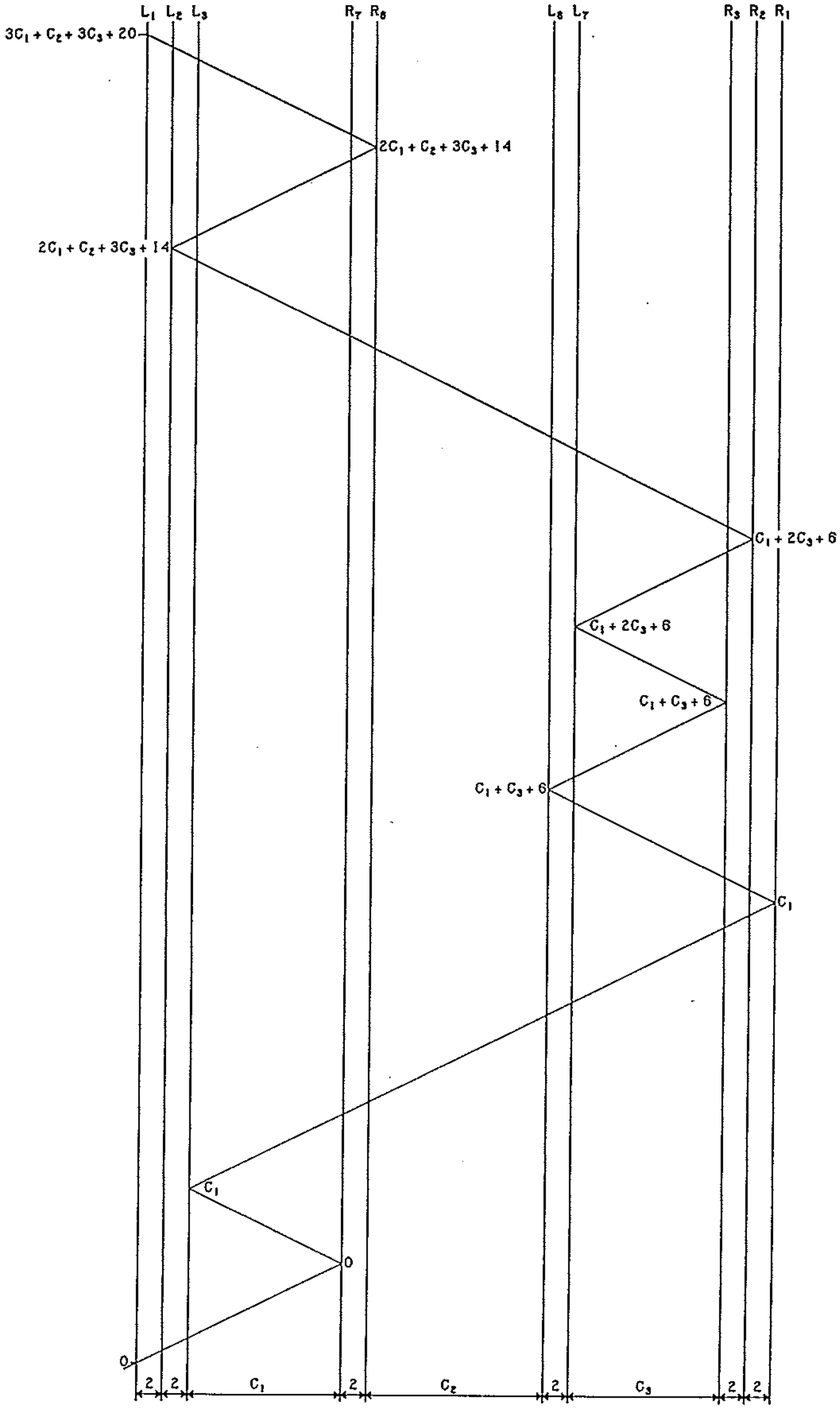

Fig. 1083 — The first-return string-run of the foundation knot.

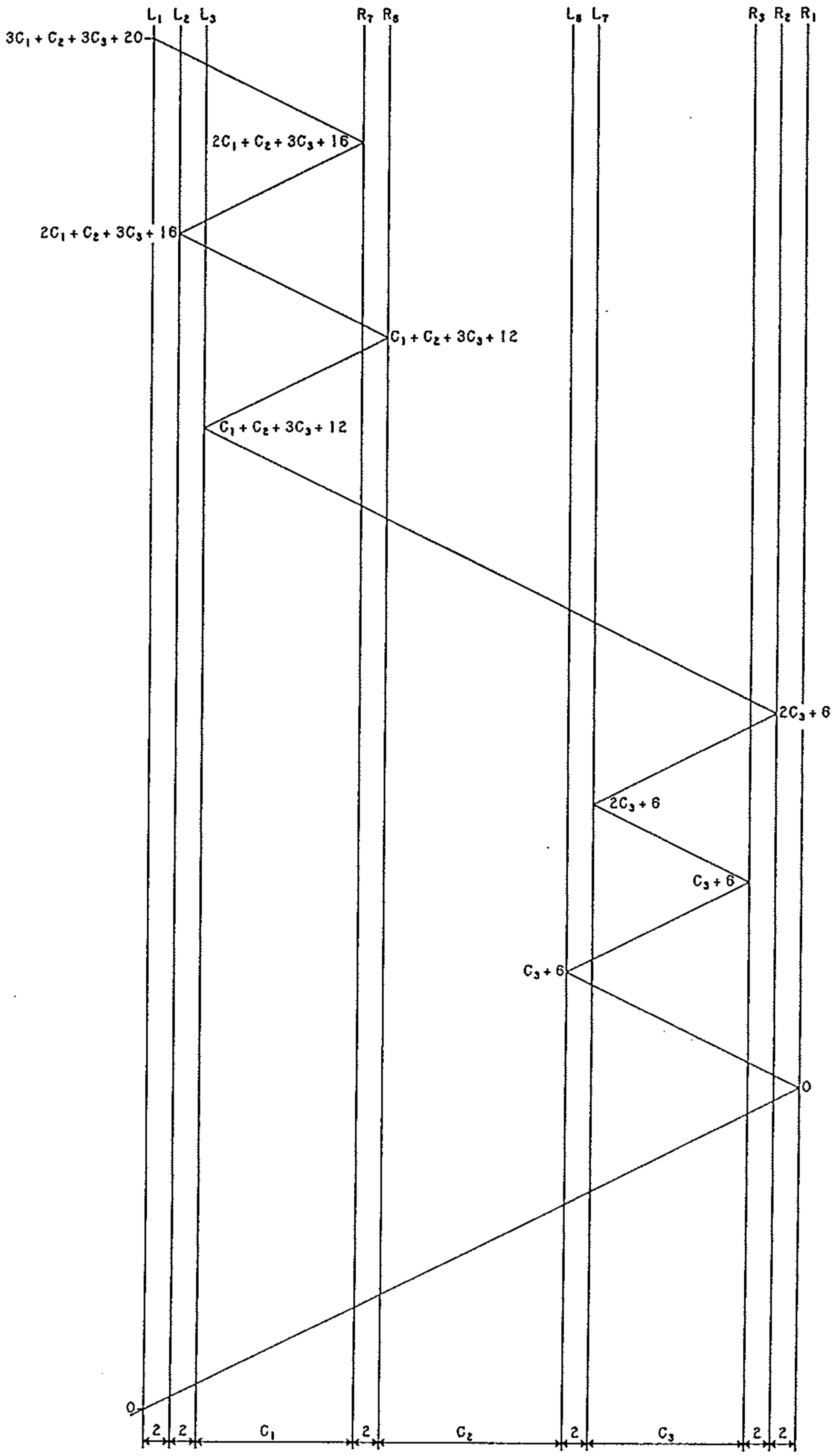

Fig. 1084 — The first-return string-run of the foundation knot.

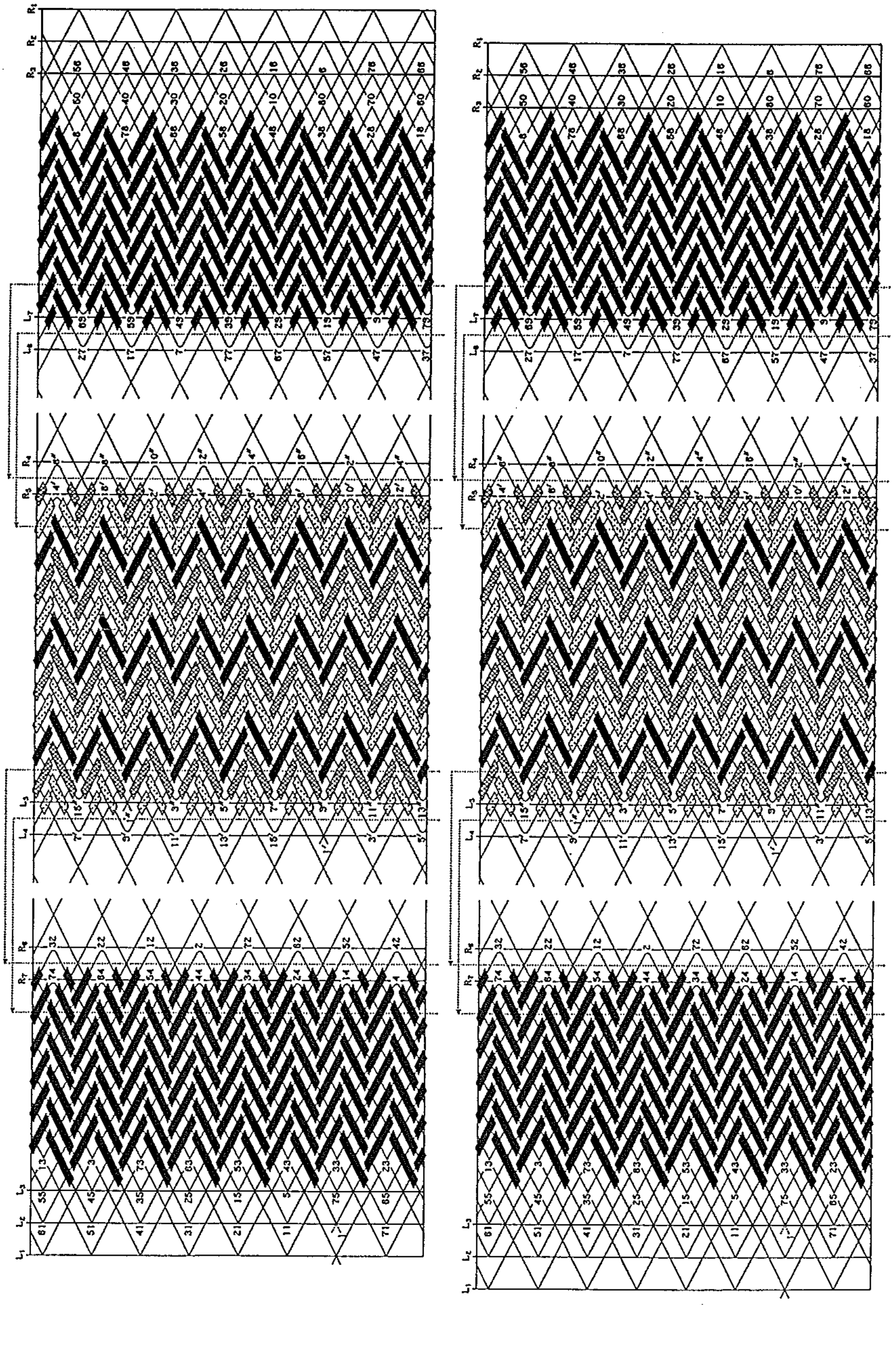

Fig. 1085 — See text pg. 1338.

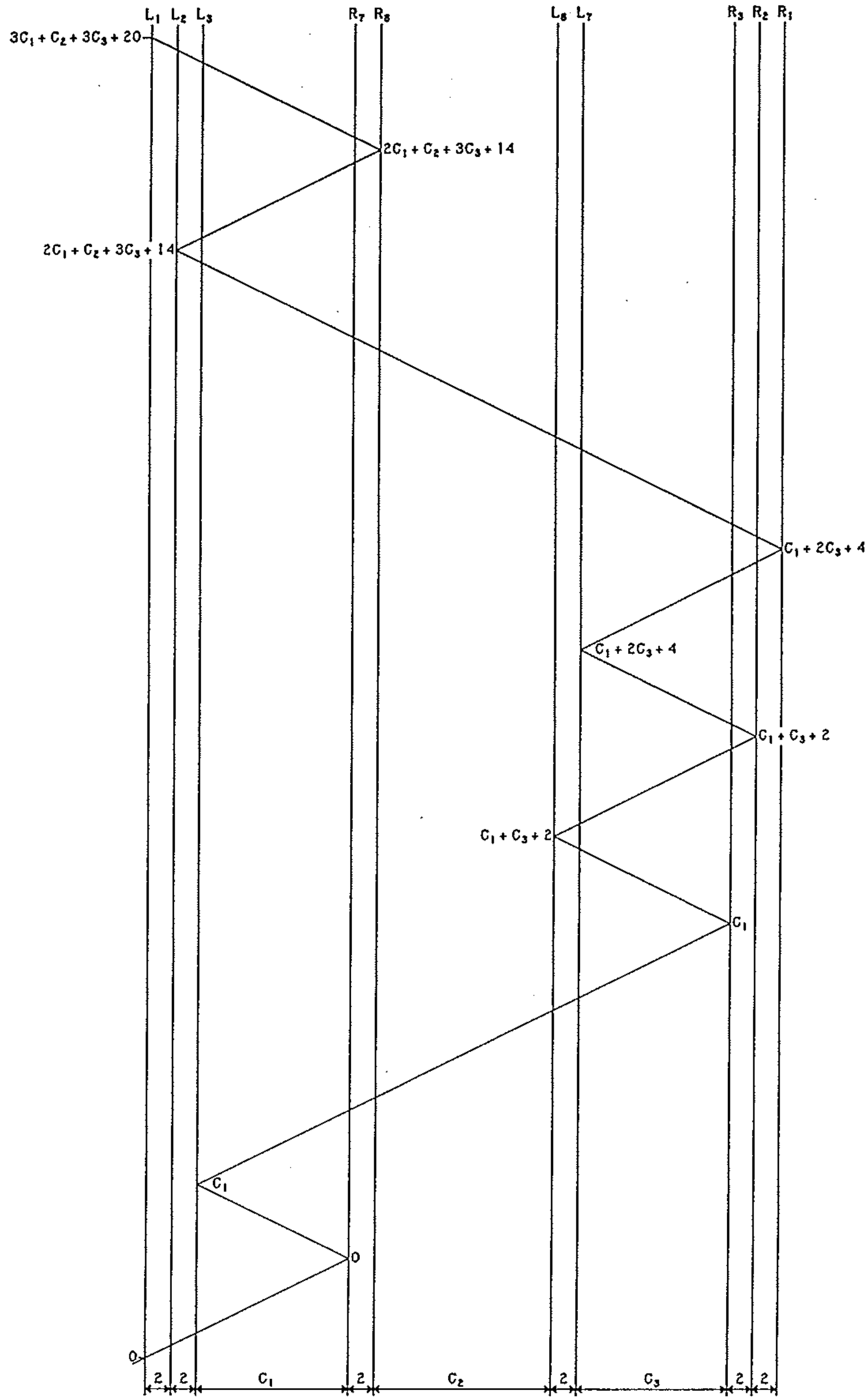

Fig. 1086 — The first-return string-run of the foundation knot.

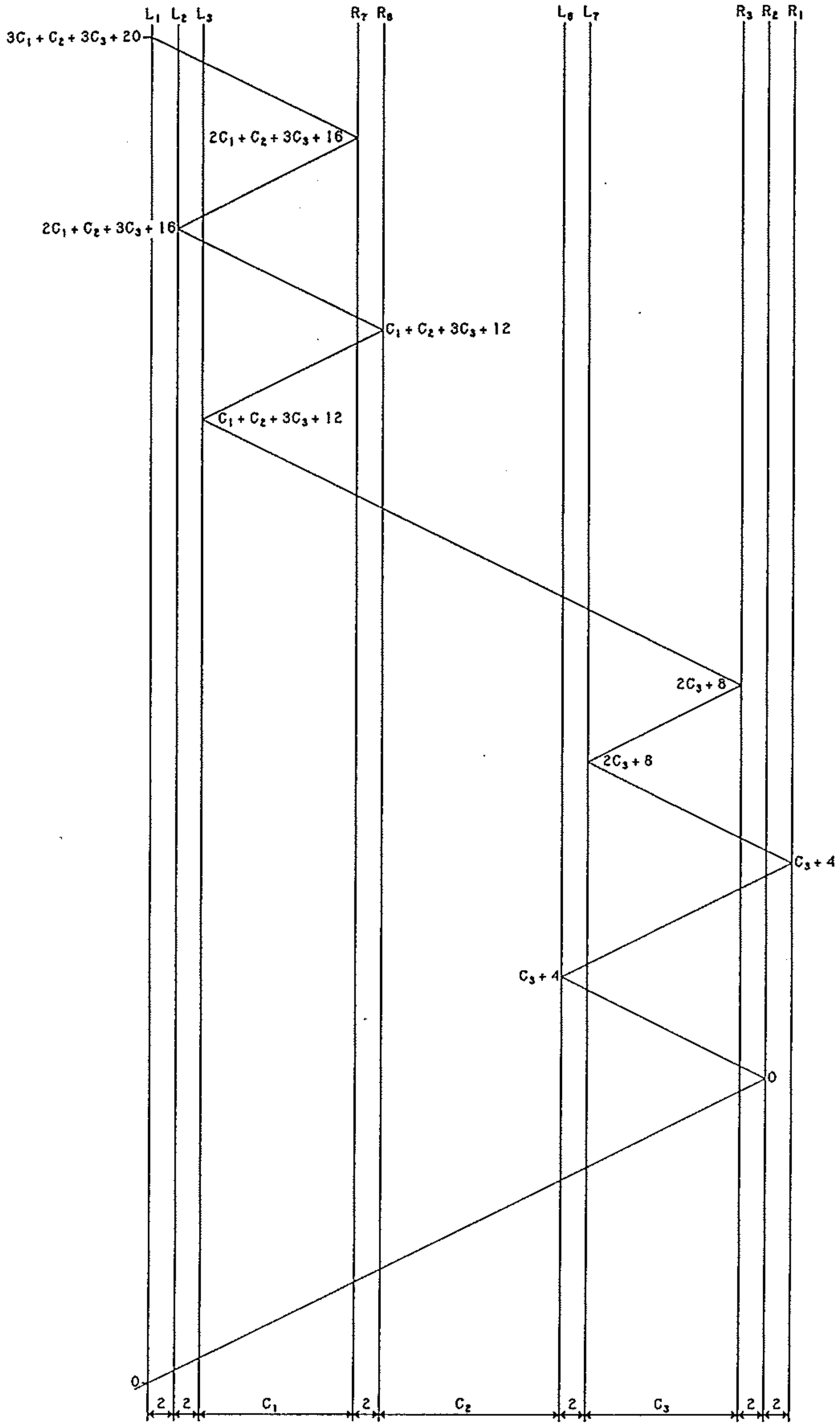

Fig. 1087 — The first-return string-run of the foundation knot.