THE BRAIDER

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CONTENTS

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for
the braiding artisan

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Solution to the Question in Issue No. 49

Question on pg. 1157.

In Issue No. 33, pg. 755, we saw that for the Asymmetric Regular Nested Cylindrical Braids we obtained for a general left and right cycle the formulae:

$$l_{i+1} = |l_i + 2A_r + x - 2(l_i + r_i)|_{A_l} .$$
$$r_{i+1} = |r_i + 2A_l + x - 2(r_i + l_{i+1})|_{A_r} .$$

Fig. 915 — A general left and right cycle associated with the Asymmetric Regular Nested Cylindrical Braids.

Furthermore we found that the following formulae are associated with these braids:

$$B_l^* = \text{number of periods at left bight-edge} .$$
$$B_r^* = \text{number of periods at right bight-edge} .$$
$$B_{total} = A_l B_l^* = A_r B_r^* = A^{**} B^{**} .$$
$$d = \text{g.c.d.}(A_l \, , \, A_r) .$$
$$A^{**} = \frac{B_{total}}{B^{**}} = \frac{A_l \cdot A_r}{d} .$$
$$B^{**} = \frac{B_{total} \cdot d}{A_l \cdot A_r} = \frac{B_l^* \cdot d}{A_r} = \frac{B_r^* \cdot d}{A_l} .$$
$$\alpha = \text{number of bights in first-return string-run} .$$
$$P_{component} = \frac{\alpha \cdot x + 2\alpha(A_l + A_r) - 2\sum(l_i + r_i)}{A^{**}} .$$
$$P_{total} = \sum P_{component} = A_l + A_r + x - 2 .$$

$$\left.\begin{array}{r}\text{number of}\\ \text{components}\end{array}\right\} = \text{number of first-return string-runs} .$$

$$\left.\begin{array}{r}\text{number of}\\ \text{sub-components}\\ \text{in a component}\end{array}\right\} = \text{g.c.d.}(P_{component} \, , B^{**}) .$$

$$\left.\begin{array}{r}\text{total number of}\\ \text{essential strings}\end{array}\right\} = \sum \text{sub-components} .$$

When $A_l = 1$, the left bight-edge contains only one bight-boundary and hence these formulae transform into:

$$l_{i+1} = |1 + 2A_r + x - 2(1 + r_i)|_1 = 1 .$$
$$r_{i+1} = |r_i + 2 + x - 2(r_i + 1)|_{A_r} = |x - r_i|_{A_r} .$$

Fig. 916 — A general left and right cycle associated with the $A_l = 1$ Asymmetric Regular Nested Cylindrical Braids.

$$B_l^* = B_{total} = \text{number of periods at left bight-edge}.$$
$$B_r^* = \text{number of periods at right bight-edge}.$$
$$B_{total} = B_l^* = A_r B_r^* = A^{**}B^{**}.$$
$$d = \text{g.c.d.}(1\,,\,A_r) = 1\,.$$
$$A^{**} = \frac{B_{total}}{B^{**}} = \frac{A_r}{1} = A_r\,.$$
$$B^{**} = \frac{B_{total}\cdot 1}{1\cdot A_r} = \frac{B_l^*}{A_r} = B_r^*\,.$$
$$\alpha = \text{number of bights in first-return string-run}.$$
$$P_{component} = P_c = \frac{\alpha\cdot x + 2\alpha(1+A_r) - 2\sum(1+r_i)}{A_r}\,.$$
$$P_{total} = \sum P_{component} = A_r + x - 1\,.$$

$$\left.\begin{array}{r}\text{number of}\\ \text{components}\end{array}\right\} = \text{number of first-return string-runs}.$$

$$\left.\begin{array}{r}\text{number of}\\ \text{sub-components}\\ \text{in a component}\end{array}\right\} = \text{g.c.d.}(P_{component}\,,B_r^*)\,.$$

$$\left.\begin{array}{r}\text{total number of}\\ \text{essential strings}\end{array}\right\} = \sum \text{sub-components}\,.$$

Let r_i be k, then the associated first-return string-run becomes:

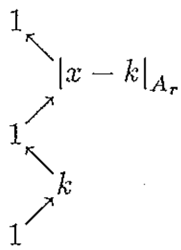
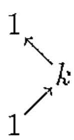


Fig. 917 — A general left and right cycle associated with the $A_l = 1$ Asymmetric Regular Nested Cylindrical Braids.

This first-return string-run reduces to



when $|x-k|_{A_r} = k$, hence when $2k = |x|_{A_r} = even$ and/or $2k = |x|_{A_r} + A_r = even$. Since $A_r \geq 2$, we require for the minimum number of first-return string-runs (the minimum number of components) that such first-return string-runs with $\alpha = 1$ don't exist (hence when $|x-k|_{A_r} \neq k$, that is when $|x|_{A_r} = odd$ and $|x|_{A_r} + A_r = odd$); hence we require $x = odd$ with $A_r = even$. Then $P_c = \frac{2x-2k-2|x-k|_{A_r}}{A_r} + 4$.

The values for k and P_c, when $|x-k|_{A_r} = k$, are:

$x = odd,\ A_r = odd$: $|x|_{A_r} = 0$; $2k = 2A_r \rightarrow k = A_r$; $P_c = \frac{x}{A_r}$.
$|x|_{A_r} = odd$; $2k = |x|_{A_r} + A_r \rightarrow k = \frac{|x|_{A_r}+A_r}{2}$; $P_c = \frac{x-|x|_{A_r}}{A_r} + 1$.
$|x|_{A_r} = even$; $2k = |x|_{A_r} \rightarrow k = \frac{|x|_{A_r}}{2}$; $P_c = \frac{x-|x|_{A_r}}{A_r} + 2$.

$x = odd,\ A_r = even$: $|x|_{A_r} = odd$; No solution for k.

$x = even,\ A_r = odd$: $|x|_{A_r} = 0$; $2k = 2A_r \rightarrow k = A_r$; $P_c = \frac{x}{A_r}$.
$|x|_{A_r} = odd$; $2k = |x|_{A_r} + A_r \rightarrow k = \frac{|x|_{A_r}+A_r}{2}$; $P_c = \frac{x-|x|_{A_r}}{A_r} + 1$.
$|x|_{A_r} = even$; $2k = |x|_{A_r} \rightarrow k = \frac{|x|_{A_r}}{2}$; $P_c = \frac{x-|x|_{A_r}}{A_r} + 2$.

$x = even,\ A_r = even$: $|x|_{A_r} = 0$; $2k = A_r \rightarrow k = \frac{A_r}{2}$; $P_c = \frac{x}{A_r} + 1$.
$2k = 2A_r \rightarrow k = A_r$; $P_c = \frac{x}{A_r}$
$|x|_{A_r} = even$; $2k = |x|_{A_r} \rightarrow k = \frac{|x|_{A_r}}{2}$; $P_c = \frac{x-|x|_{A_r}}{A_r} + 2$.
$2k = |x|_{A_r} + A_r \rightarrow k = \frac{|x|_{A_r}+A_r}{2}$; $P_c = \frac{x-|x|_{A_r}}{A_r} + 1$.

We require the minimum number of essential strings when $|x-k|_{A_r} \neq k$, hence when $x = odd$ with $A_r = even$ and g.c.d.$(P_c, B_r^*) = 1$. This minimum number of essential strings is then $\frac{A_r}{2}$ since $\alpha = 2$ for each first-return string-run.

A Braiding Project — Key-hanger No. 3

The braid forming the eye around the thimble of 25 mm. is a 4-cord under-over Round Braid as shown in Fig. 919, made at the centre of the cord lengths (cords approximately 50 cm. in length). This braid is put tightly around the thimble with both 'ends' being secured with a Double Constrictor Knot† immediately below the thimble.

Immediately below this constrictor knot start braiding the stem. The braid of the stem consists of a sequence of either alternating right Crown Knots or alternating left Crown Knots, one on top the other as shown in Figs. 920, 921, 922.‡ Two opposing parallel strings in a Crown Knot have the colour A, while the other two opposing strings in the same Crown Knot have the colour B. Hence in the first two Crown Knots, colour X is colour V is colour A while colour Y is colour W is colour B; in which case in the sequence of Crown Knots, strings X & V have the same colour and strings Y & W have the same colour, while strings X & W differ in colour and strings Y & V differ in colour. Alternatively, in the first two Crown Knots, colour X is colour W is colour

† See *The Braider*, Issue No. 47, pg. 1100, Fig. 845.

‡ For the sequence of alternating right Crown Knots, the braid of the stem is *Ashley #2936.*

A while colour *Y* is colour *V* is colour *B*; in which case in the sequence of Crown Knots, strings *X* & *W* have the same colour and strings *Y* & *V* have the same colour, while strings *X* & *V* differ in colour and strings *Y* & *W* differ in colour.

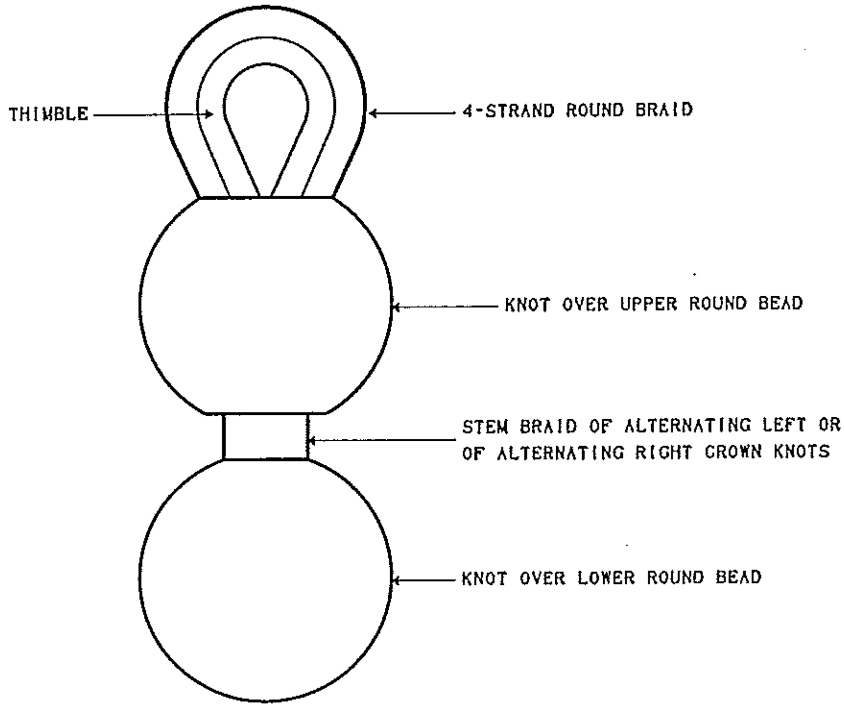


Fig. 918 — Key-hanger No. 3. Cord diameter 2 mm.

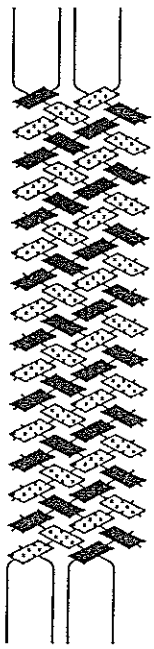


Fig. 919 — The 4-cord under-over Round Braid.

Over the stem-braid we push a 24 mm. round bead whose hole we have enlarged to obtain a tight fit, and through which we have drilled diametrically a small hole through which a small brass nail will fit tightly. This round bead is pushed up to the point of the thimble and secured in place by means of a small brass nail through the diametrically drilled hole in the bead. The ends of the small brass nail are filed flush with the bead.

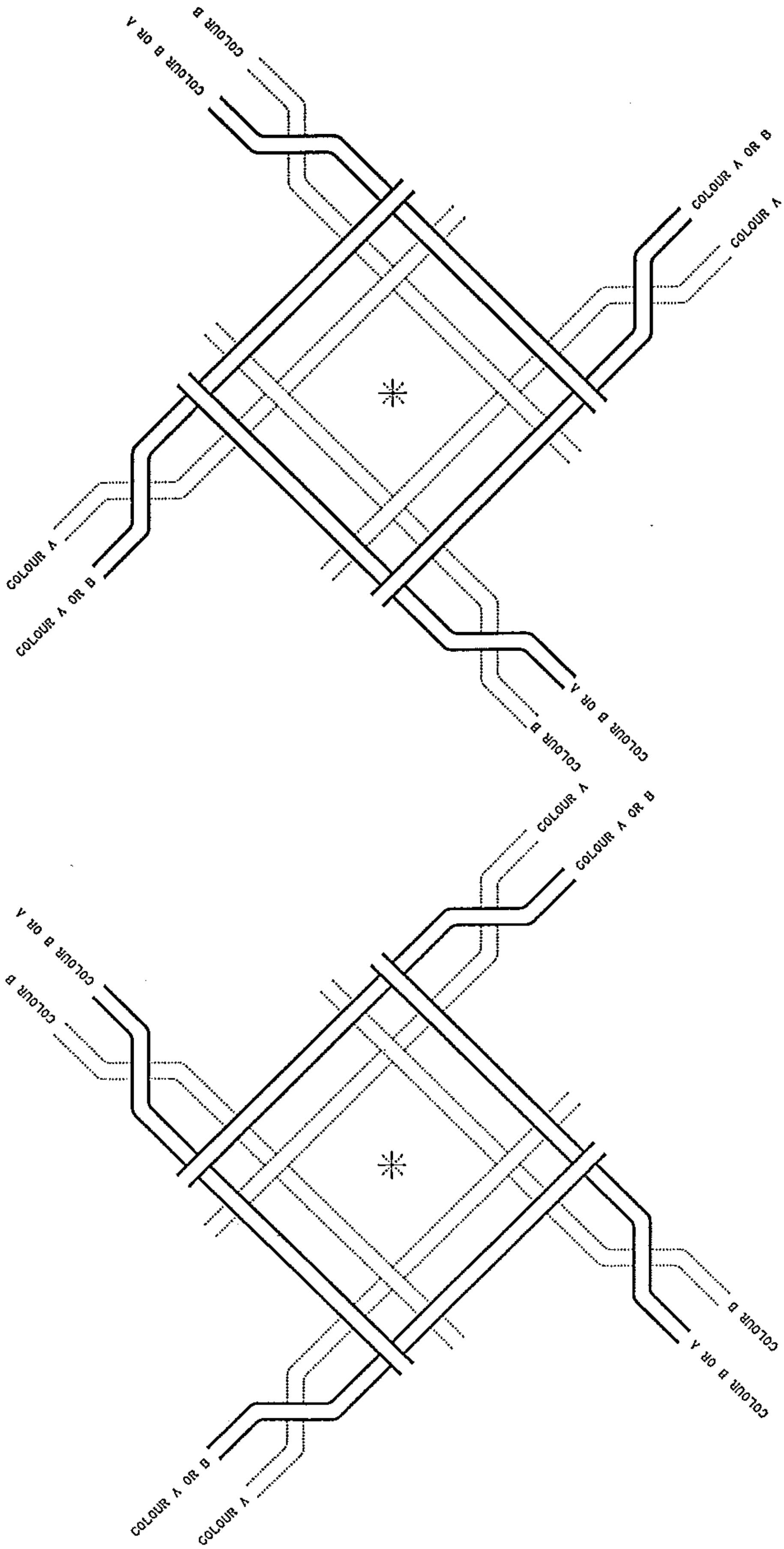
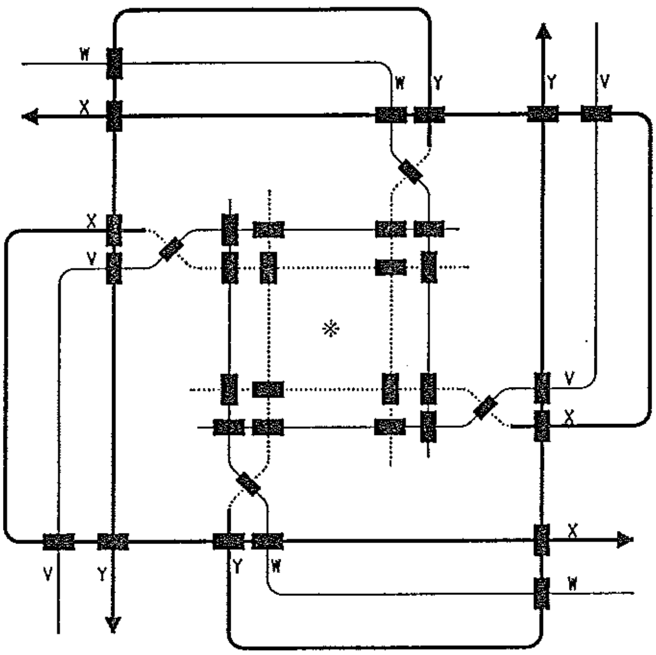


Fig. 920 — top: first two right Crown Knots; bottom: first two left Crown Knots.



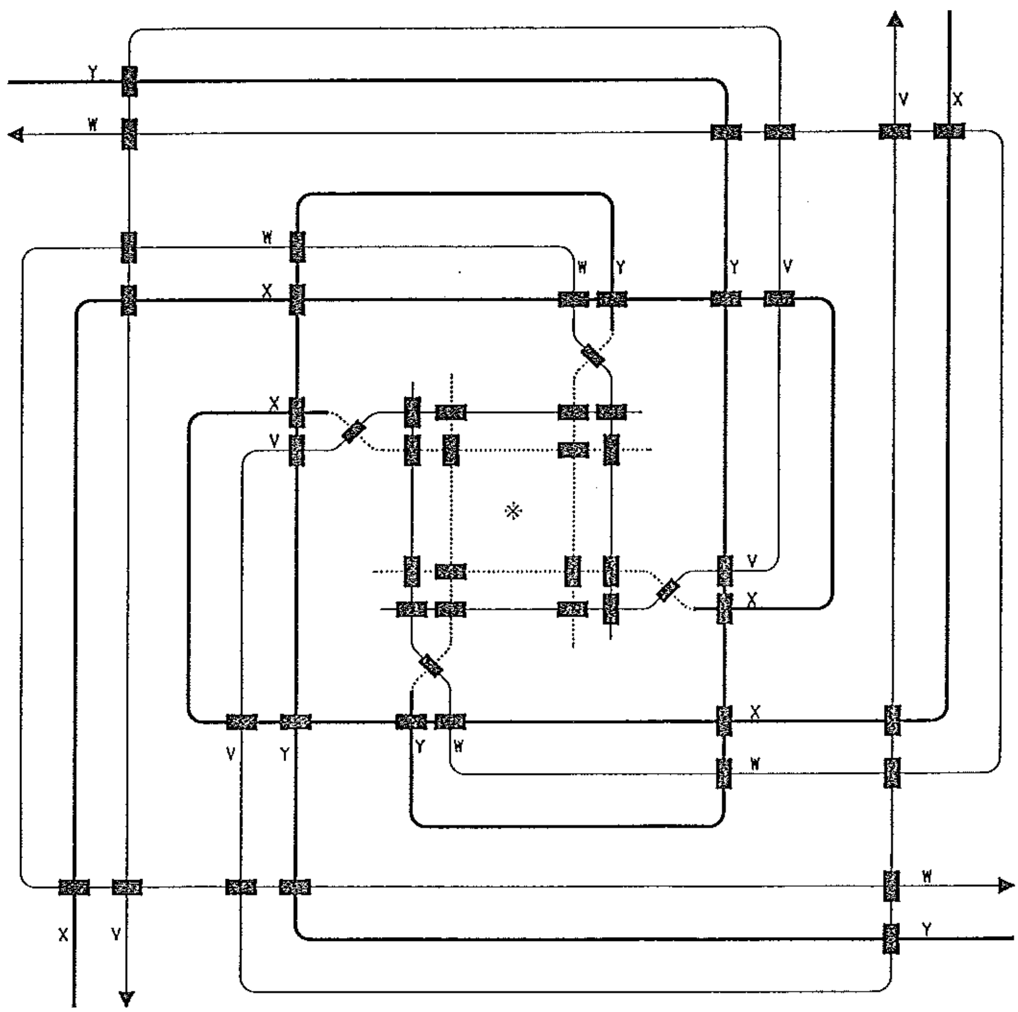


Fig. 921 — Braiding sequence of alternating right Crown Knots.

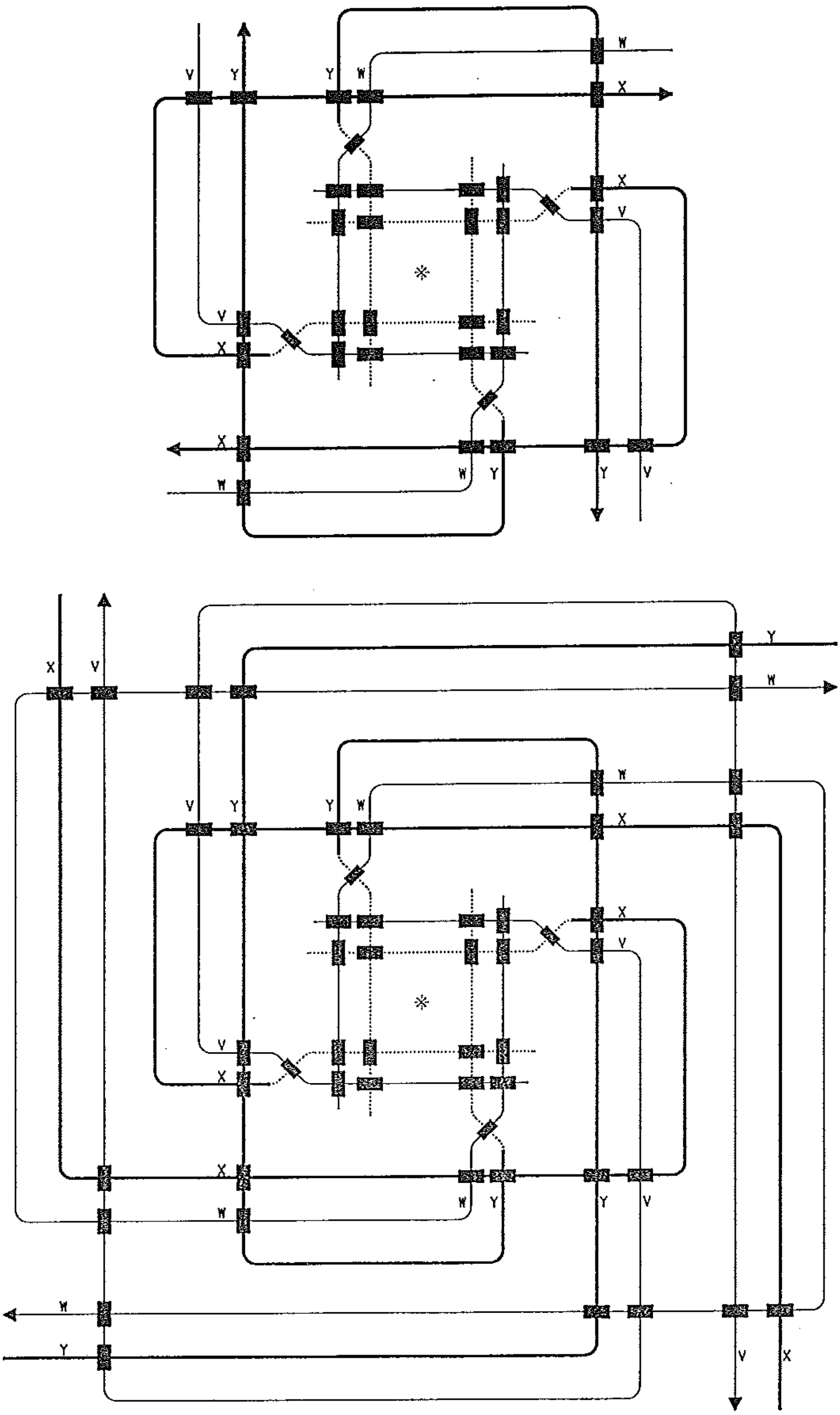


Fig. 922 — Braiding sequence of alternating left Crown Knots.

The stem braid obtained from the sequence of alternating right Crown Knots displays four sets of two adjacent left helixes; the four sets alternate in colour. The stem braid obtained from the sequence of alternating left Crown Knots displays four sets of two adjacent right helixes; the four sets alternate in colour.

The nominal grid-diagram of the knot over the round bead immediately below the thimble is depicted in Fig. 923 (left bight-edge towards thimble).

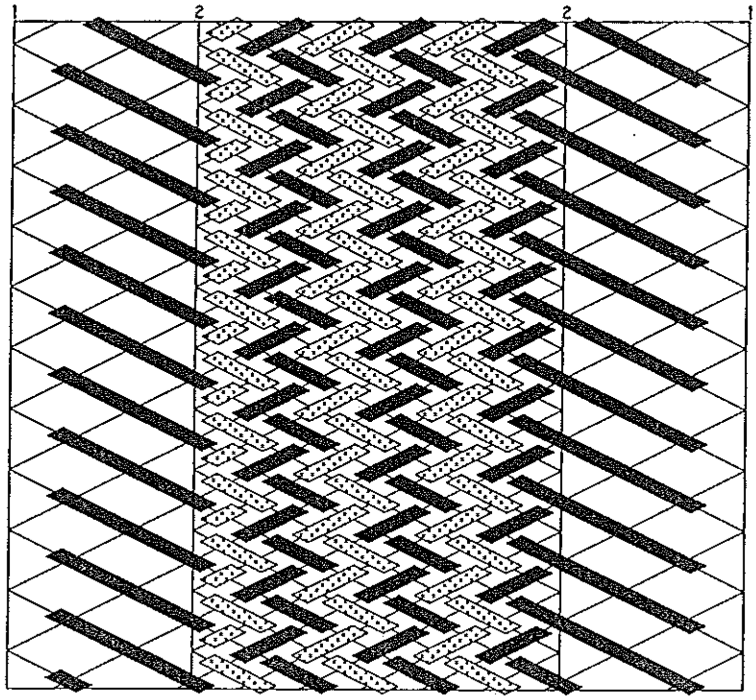


Fig. 923 — Nominal grid-diagram of the knot over round bead adjacent to thimble.

The string-run specification of this Regular Nested Knot is $(6/12/6)\{12/12\}22$. Fig. 924 depicts one of the ways in which this knot may be braided. Note that this knot is an interbraid of a $p/b = 6/11$ under-over coded Regular Knot with a $p/b = 12/11$ column-coded Regular Knot.

First, we braid the column-coded Regular Knot between the bight-boundaries L_1 and R_1 as depicted in Fig. 924. Its half-cycle braiding algorithms are:

half-cycle 1 : $L_1 \longrightarrow R_1$: Free run.
half-cycle 2 : $i = 0$; $R_1 \longrightarrow L_1$: $(s)o$.
half-cycle 3 : $i = 0$; $L_1 \longrightarrow R_1$: u .
half-cycle 4 : $i \leq 1$; $R_1 \longrightarrow L_1$: $(s,1)2o$.
half-cycle 5 : $i \leq 1$; $L_1 \longrightarrow R_1$: $2u$.
half-cycle 6 : $i \leq 2$; $R_1 \longrightarrow L_1$: $(s,2)3o$.
half-cycle 7 : $i \leq 2$; $L_1 \longrightarrow R_1$: $3u$.
half-cycle 8 : $i \leq 3$; $R_1 \longrightarrow L_1$: $(s)u - 3o$.
half-cycle 9 : $i \leq 3$; $L_1 \longrightarrow R_1$: $o - 3u$.
half-cycle 10 : $i \leq 4$; $R_1 \longrightarrow L_1$: $(s)o - u - 3o$.
half-cycle 11 : $i \leq 4$; $L_1 \longrightarrow R_1$: $u - o - 3u$.
half-cycle 12 : $i \leq 5$; $R_1 \longrightarrow L_1$: $(s)u - o - u - 3o$.
half-cycle 13 : $i \leq 5$; $L_1 \longrightarrow R_1$: $o - u - o - 3u$.
half-cycle 14 : $i \leq 6$; $R_1 \longrightarrow L_1$: $(s)o - u - o - u - 3o$.
half-cycle 15 : $i \leq 6$; $L_1 \longrightarrow R_1$: $u - o - u - o - 3u$.

half-cycle 16 : $i \le 7$; $R_1 \longrightarrow L_1$: $(s)u - o - u - o - u - 3o$.
half-cycle 17 : $i \le 7$; $L_1 \longrightarrow R_1$: $o - u - o - u - o - 3u$.
half-cycle 18 : $i \le 8$; $R_1 \longrightarrow L_1$: $(s)o - u - o - u - o - u - 3o$.
half-cycle 19 : $i \le 8$; $L_1 \longrightarrow R_1$: $u - o - u - o - u - o - 3u$.
half-cycle 20 : $i \le 9$; $R_1 \longrightarrow L_1$: $(s,1)2o - u - o - u - o - u - 3o$.
half-cycle 21 : $i \le 9$; $L_1 \longrightarrow R_1$: $2u - o - u - o - u - o - 3u$.
half-cycle 22 : $i \le 10$; $R_1 \longrightarrow L_1$: $(s,2)3o - u - o - u - o - u - 3o$.

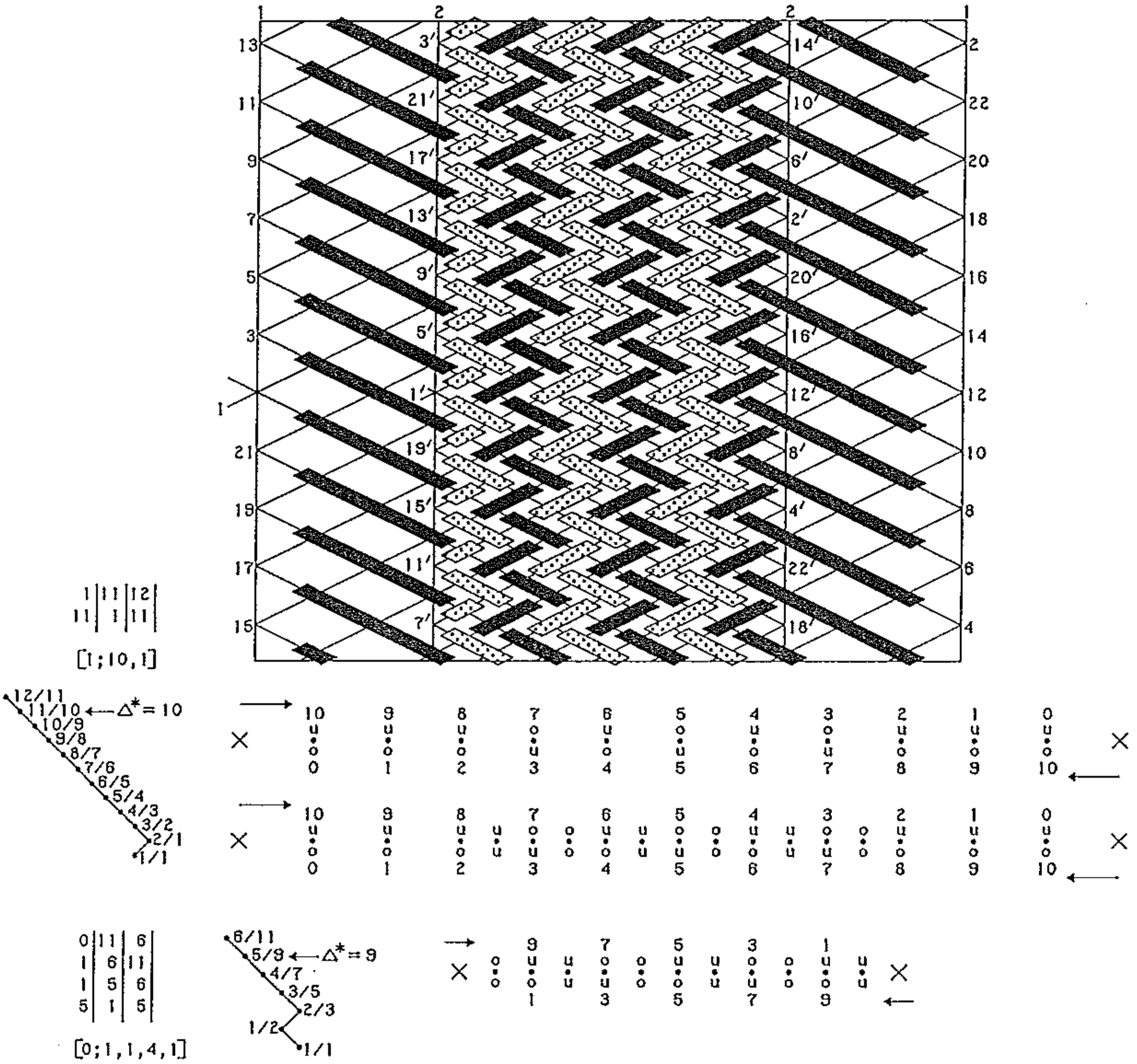


Fig. 924 — Grid-diagram of the knot over round bead adjacent to thimble.

Next we braid the half-cycles 1′ to 21′ of the Regular Knot between the bight-boundaries L_2 and R_2 as depicted in Fig. 924. Its half-cycle braiding algorithms are:

half-cycle 1′ : $L_2 \longrightarrow R_2$: $o - u - o - u - o - u$.
half-cycle 2′ : $i = 0$; $R_2 \longrightarrow L_2$: $u - o - u - o - u - o$.
half-cycle 3′ : $i = 0$; $L_2 \longrightarrow R_2$: $o - u - o - u - o - u$.
half-cycle 4′ : $i \le 1$; $R_2 \longrightarrow L_2$: $u - o - u - o - u - (s,1)2o$.
half-cycle 5′ : $i \le 1$; $L_2 \longrightarrow R_2$: $o - u - o - u - o - 2u$.
half-cycle 6′ : $i \le 2$; $R_2 \longrightarrow L_2$: $u - o - u - o - u - 2o$.
half-cycle 7′ : $i \le 2$; $L_2 \longrightarrow R_2$: $o - u - o - u - o - 2u$.
half-cycle 8′ : $i \le 3$; $R_2 \longrightarrow L_2$: $u - o - u - o - (s,1)2u - 2o$.

half-cycle 9′ : $i \leq 3$; $L_2 \longrightarrow R_2$: $o - u - o - u - 2o - 2u$.
half-cycle 10′ : $i \leq 4$; $R_2 \longrightarrow L_2$: $u - o - u - o - 2u - 2o$.
half-cycle 11′ : $i \leq 4$; $L_2 \longrightarrow R_2$: $o - u - o - u - 2o - 2u$.
half-cycle 12′ : $i \leq 5$; $R_2 \longrightarrow L_2$: $u - o - u - (s,1)2o - 2u - 2o$.
half-cycle 13′ : $i \leq 5$; $L_2 \longrightarrow R_2$: $o - u - o - 2u - 2o - 2u$.
half-cycle 14′ : $i \leq 6$; $R_2 \longrightarrow L_2$: $u - o - u - 2o - 2u - 2o$.
half-cycle 15′ : $i \leq 6$; $L_2 \longrightarrow R_2$: $o - u - o - 2u - 2o - 2u$.
half-cycle 16′ : $i \leq 7$; $R_2 \longrightarrow L_2$: $u - o - (s,1)2u - 2o - 2u - 2o$.
half-cycle 17′ : $i \leq 7$; $L_2 \longrightarrow R_2$: $o - u - 2o - 2u - 2o - 2u$.
half-cycle 18′ : $i \leq 8$; $R_2 \longrightarrow L_2$: $u - o - 2u - 2o - 2u - 2o$.
half-cycle 19′ : $i \leq 8$; $L_2 \longrightarrow R_2$: $o - u - 2o - 2u - 2o - 2u$.
half-cycle 20′ : $i \leq 9$; $R_2 \longrightarrow L_2$: $u - (s,1)2o - 2u - 2o - 2u - 2o$.
half-cycle 21′ : $i \leq 9$; $L_2 \longrightarrow R_2$: $o - 2u - 2o - 2u - 2o - 2u$.

Then we braid half-cycle 22′ as: $u - 2o - 8u$, and the Standing-End of half-cycle 1′ as $2o - 2u - 2o - 5u$ from upper L_2 to lower R .
Next, retract the end of half-cycle 22 over seven crossings and replace these by $4u - 3o$. Then braid the Standing-End of half-cycle 1 as $3o - 2u - 2o - 10u$ from upper L_1 to lower R .

The nominal grid-diagram of the knot over the round bead at the end of the stem is depicted in Fig. 925 (left bight-edge towards thimble).

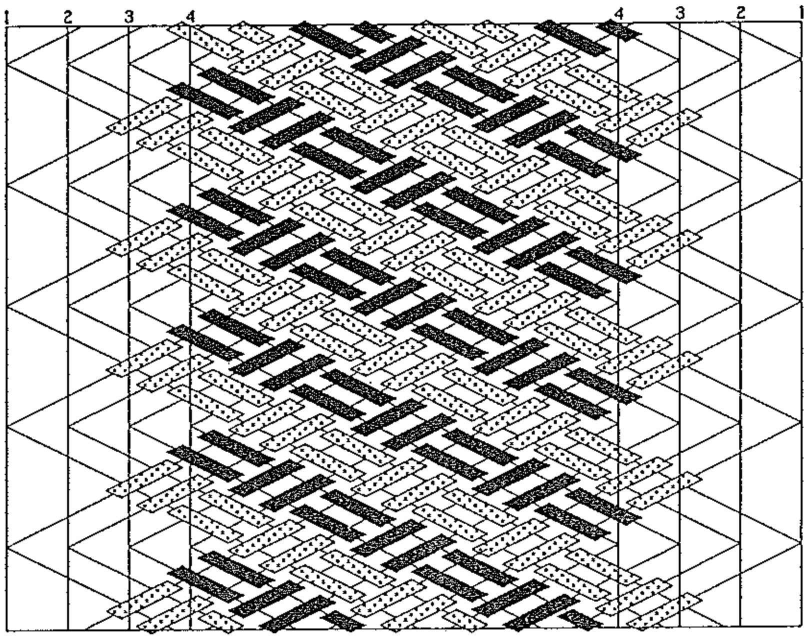
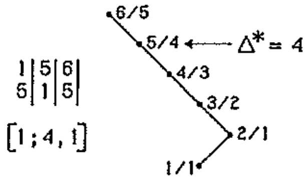
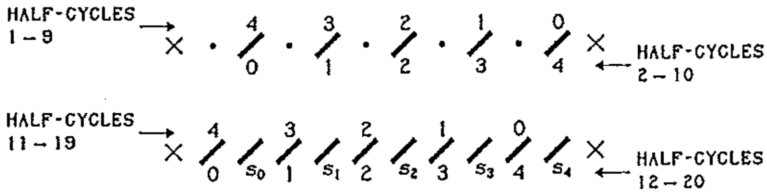


Fig. 925 — Nominal grid-diagram of the knot over round bead at end of stem.

This Regular Nested Knot with string-run specification (222/14/222){1432/2341}20, is an interbraid of a doubled $p/b = 6/5$ Matthew Walker Knot (a Regular Knot in which all columns have an identical coding) with another doubled $p/b = 4/5$ Matthew Walker Knot (same coding orientation in both Matthew Walker Knots). One of the ways in which this knot may be braided is depicted in Fig. 926.

First, we braid the doubled $p/b = 6/5$ Matthew Walker Knot between the bight-boundaries L_1 and L_2 on the left bight-edge and the bight-boundaries R_1 and R_2 on the right bight-edge as depicted in Fig. 926. Its associated two half-cycle algorithm diagrams are:





From these algorithm diagrams we read the following half-cycle braiding algorithms:

half-cycle 1 :		$L_2 \longrightarrow R_1$:	Free run.
half-cycle 2 :	$i = 0$;	$R_1 \longrightarrow L_2$:	$(s)u$.
half-cycle 3 :	$i = 0$;	$L_2 \longrightarrow R_1$:	o .
half-cycle 4 :	$i \leq 1$;	$R_1 \longrightarrow L_2$:	$(s,1)2u$.
half-cycle 5 :	$i \leq 1$;	$L_2 \longrightarrow R_1$:	$2o$.
half-cycle 6 :	$i \leq 2$;	$R_1 \longrightarrow L_2$:	$(s,2)3u$.
half-cycle 7 :	$i \leq 2$;	$L_2 \longrightarrow R_1$:	$3o$.
half-cycle 8 :	$i \leq 3$;	$R_1 \longrightarrow L_2$:	$(s,3)4u$.
half-cycle 9 :	$i \leq 3$;	$L_2 \longrightarrow R_1$:	$4o$.
half-cycle 10 :	$i \leq 4$;	$R_1 \longrightarrow L_1$:	$(s,4)5u$.
half-cycle 11 :		$L_1 \longrightarrow R_2$:	$5o$.
half-cycle 12 :	$i = 0$;	$R_2 \longrightarrow L_1$:	$(4,s,1)6u$.
half-cycle 13 :	$i = 0$;	$L_1 \longrightarrow R_2$:	$6o$.
half-cycle 14 :	$i \leq 1$;	$R_2 \longrightarrow L_1$:	$(3,s,3)7u$.
half-cycle 15 :	$i \leq 1$;	$L_1 \longrightarrow R_2$:	$7o$.
half-cycle 16 :	$i \leq 2$;	$R_2 \longrightarrow L_1$:	$(2,s,5)8u$.
half-cycle 17 :	$i \leq 2$;	$L_1 \longrightarrow R_2$:	$8o$.
half-cycle 18 :	$i \leq 3$;	$R_2 \longrightarrow L_1$:	$(1,s,7)9u$.
half-cycle 19 :	$i \leq 3$;	$L_1 \longrightarrow R_2$:	$9o$.
half-cycle 20 :	$i \leq 4$;	$R_2 \longrightarrow L$:	$(s,9)10u$.

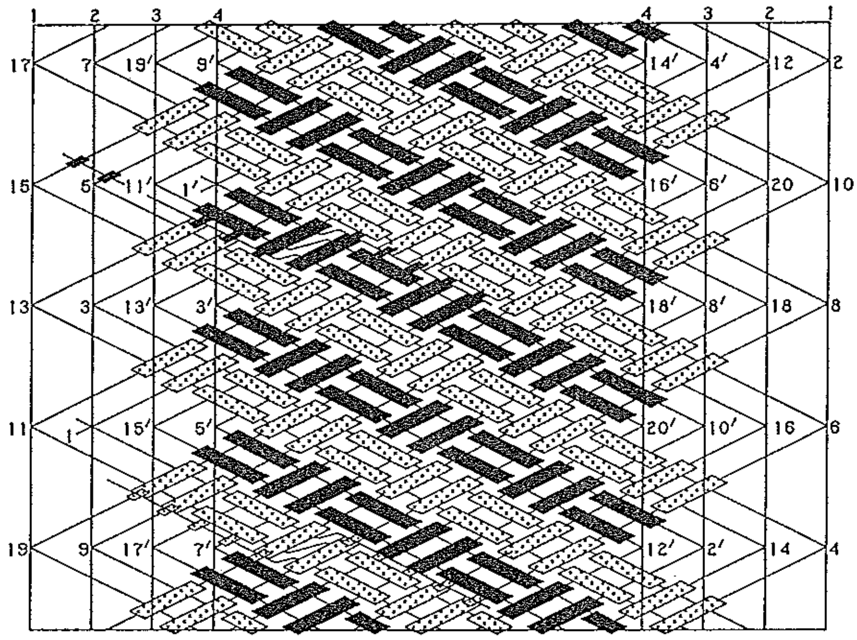
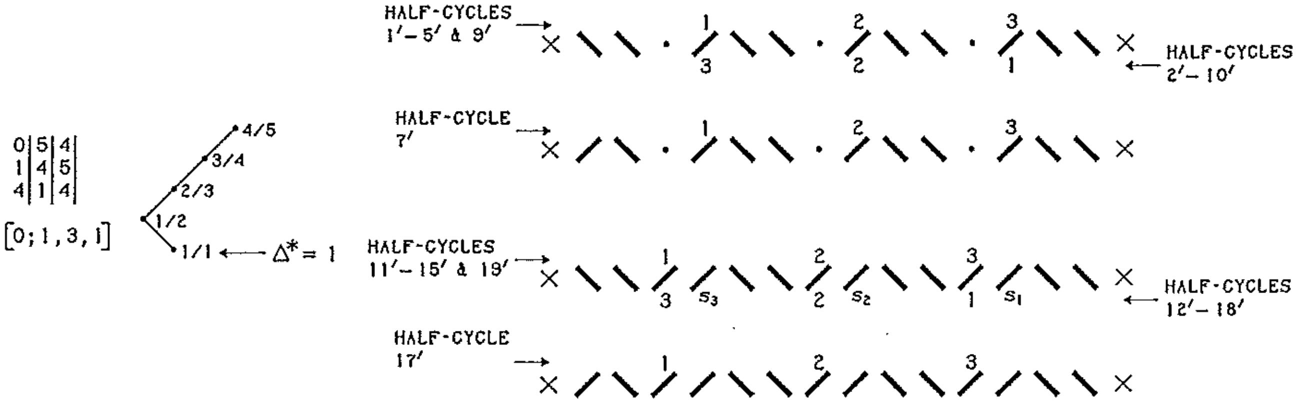


Fig. 926 — Grid-diagram of the knot over round bead at end of stem.

Next, we braid the doubled $p/b = 4/5$ Matthew Walker Knot between the bight-boundaries L_3 and L_4 on the left bight-edge and the bight-boundaries R_3 and R_4 on the right bight-edge as depicted in Fig. 926. Its associated half-cycle algorithm diagrams are:



From these algorithm diagrams we read the following half-cycle braiding algorithms:

half-cycle 1′ : $L_4 \longrightarrow R_3$: $8u$.
half-cycle 2′ : $i = 0$; $R_3 \longrightarrow L_4$: $8o$.
half-cycle 3′ : $i = 0$; $L_4 \longrightarrow R_3$: $8o$.
half-cycle 4′ : $i \leq 1$; $R_3 \longrightarrow L_4$: $2o - (s)u - 6o$.
half-cycle 5′ : $i \leq 1$; $L_4 \longrightarrow R_3$: $2u - o - 6u$.
half-cycle 6′ : $i \leq 2$; $R_3 \longrightarrow L_4$: $2o - u - 2o - (s)u - 4o$.
half-cycle 7′ : $i \leq 2$; $L_4 \longrightarrow R_3$: $o - u - o - 2u - o - 4u$.
half-cycle 8′ : $i \leq 3$; $R_3 \longrightarrow L_4$: $2o - u - 2o - u - 2o - (s)u - 2o$.
half-cycle 9′ : $i \leq 3$; $L_4 \longrightarrow R_3$: $2u - o - 2u - o - 2u - o - 2u$.
half-cycle 10′ : $i \leq 4$; $R_3 \longrightarrow L_3$: $2o - u - 2o - u - 2o - u - 2o$.
half-cycle 11′ : $L_3 \longrightarrow R_4$: $2u - o - 2u - o - 2u - o - 2u$.
half-cycle 12′ : $i = 0$; $R_4 \longrightarrow L_3$: $2o - u - 2o - u - 2o - u - 2o$.
half-cycle 13′ : $i = 0$; $L_3 \longrightarrow R_4$: $2u - o - 2u - o - 2u - o - 2u$.
half-cycle 14′ : $i \leq 1$; $R_4 \longrightarrow L_3$: $2o - (s,1)2u - 2o - u - 2o - u - 2o$.
half-cycle 15′ : $i \leq 1$; $L_3 \longrightarrow R_4$: $2u - 2o - 2u - o - 2u - o - 2u$.
half-cycle 16′ : $i \leq 2$; $R_4 \longrightarrow L_3$: $2o - 2u - 2o - (s,1)2u - 2o - u - 2o$.
half-cycle 17′ : $i \leq 2$; $L_3 \longrightarrow R_4$: $o - u - 2o - 2u - 2o - 2u - o - 2u$.
half-cycle 18′ : $i \leq 3$; $R_4 \longrightarrow L_3$: $2o - 2u - 2o - 2u - 2o - (s,1)2u - 2o$.
half-cycle 19′ : $i \leq 3$; $L_3 \longrightarrow R_4$: $2u - 2o - 2u - 2o - 2u - 2o - 2u$.
half-cycle 20′ : $i \leq 4$; $R_4 \longrightarrow L$: $2o - 2u - 2o - 2u - 2o - (4,s,2)7u$.

Then we braid the Standing-End of half-cycle 1 as $2u - 2o - 6u$ from upper L_2 to lower R, and the Standing-End of half-cycle 1′ as $2o - 6u$ from upper L_4 to lower R.

Braid Design

In *The Braider*, Issue No. 49, we discussed on pp. 1146-1148 Regular Knots with simple interbraided OT bight edges which showed on the outer cylindrical surface as a ring with a one under – one over pattern. Although this pattern has its place in certain applications, often we would require a more handsome pattern. The next step up from a one under – one over pattern is a two under – two over pattern, which is much more handsome. Such interbraided bight-edges are based on the 8-lead rond braid such as the $\rightarrow 2u - 2o|2o - 2u \leftarrow$ round braid (see *The Braider*, Issue No. 7, pg. 152, Fig. 136), or such as the $\rightarrow u - o - 2u|2u - o - u \leftarrow$ round braid. Their respective OT-UT grid-diagrams can be depicted as in Fig. 927.

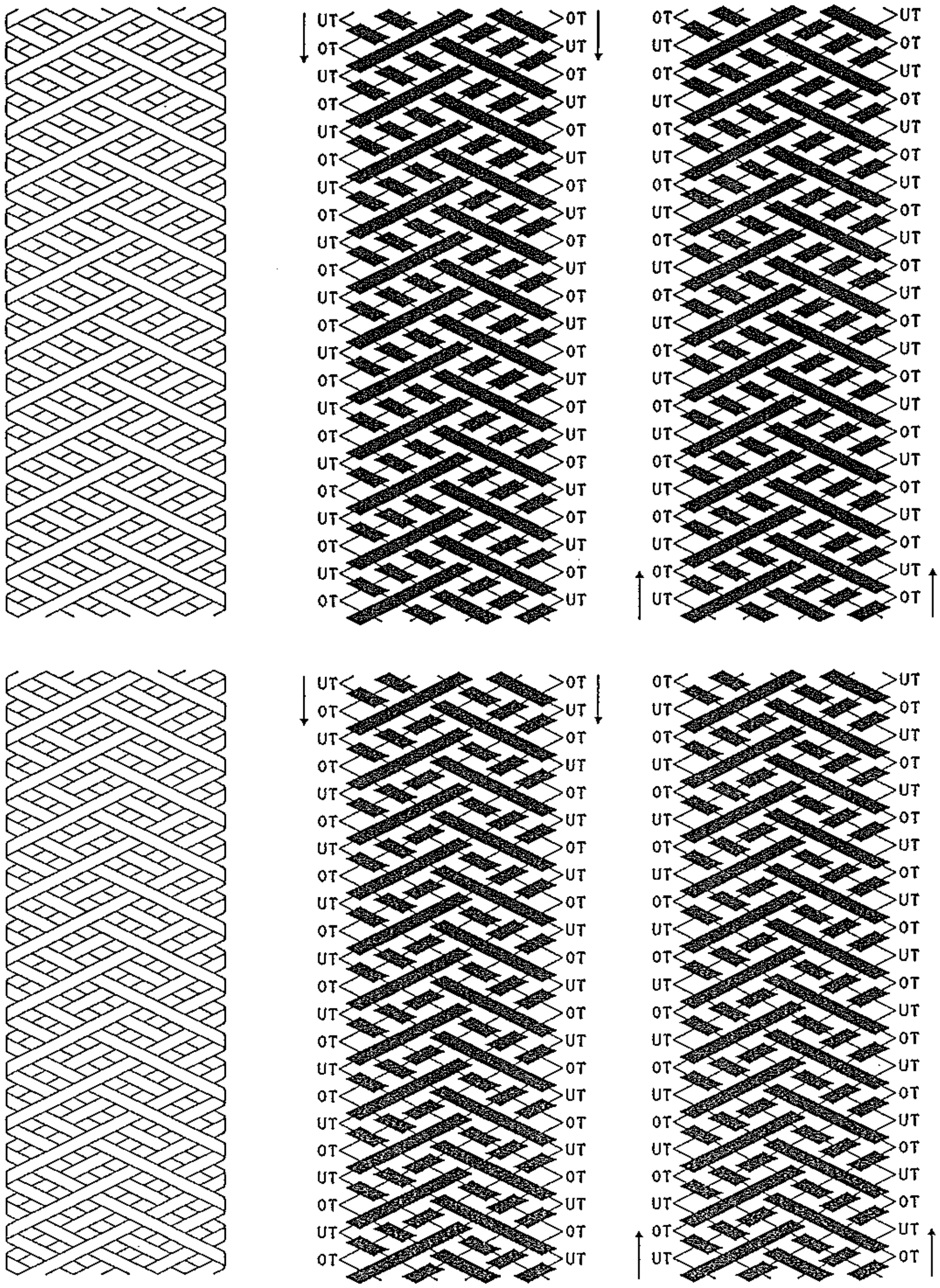


Fig. 927 — Top row: $\rightarrow 2u - 2o|2o - 2u \leftarrow$.
Bottom row: $\rightarrow u - o - 2u|2u - o - u \leftarrow$.

When the right bight-edge of the left Regular Knot is interbraided with the left bight-edge of the right Regular Knot, then each of these Regular Knots should again have an even number of bights as for the reason explained in *The Braider*, Issue No. 49, pg. 1146. A few examples of such two under – two over interbraided bight-edges of Regular Knots are shown in Figs. 928, 929, 930, 931. Their respective braiding algorithm tables are on pp. 1184 - 1188.

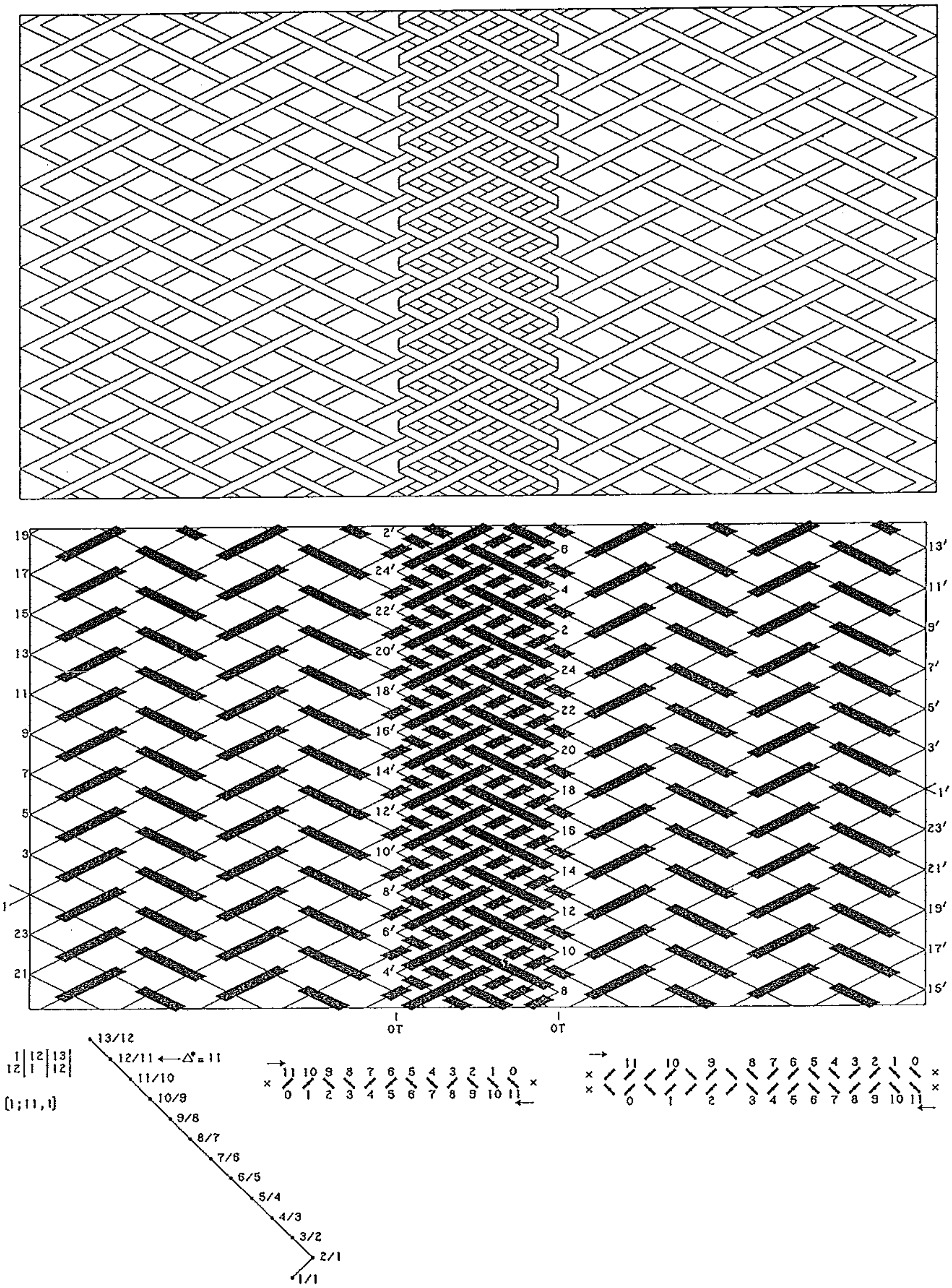


Fig. 928 — Example 1.

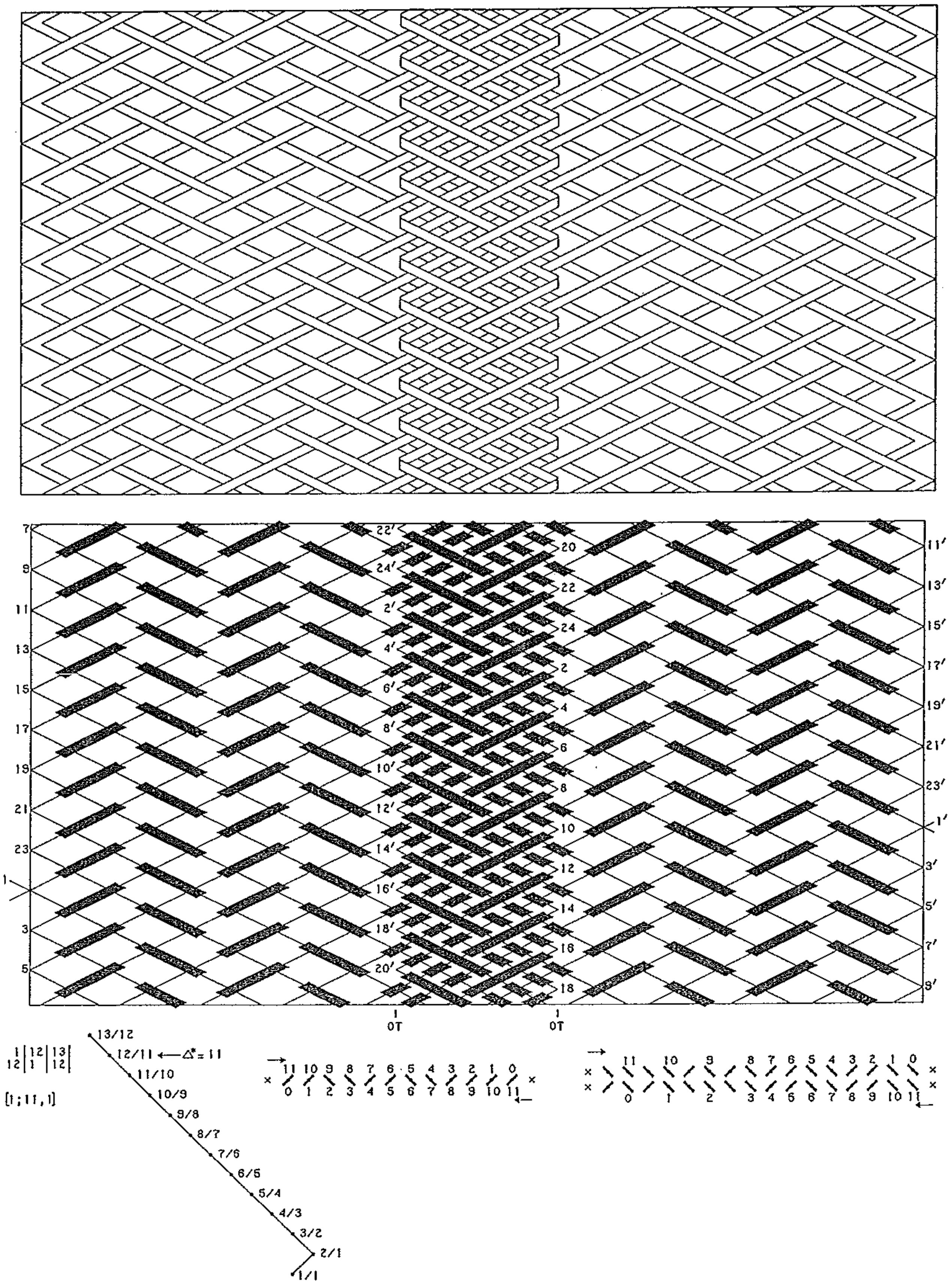


Fig. 929 — Example 2.

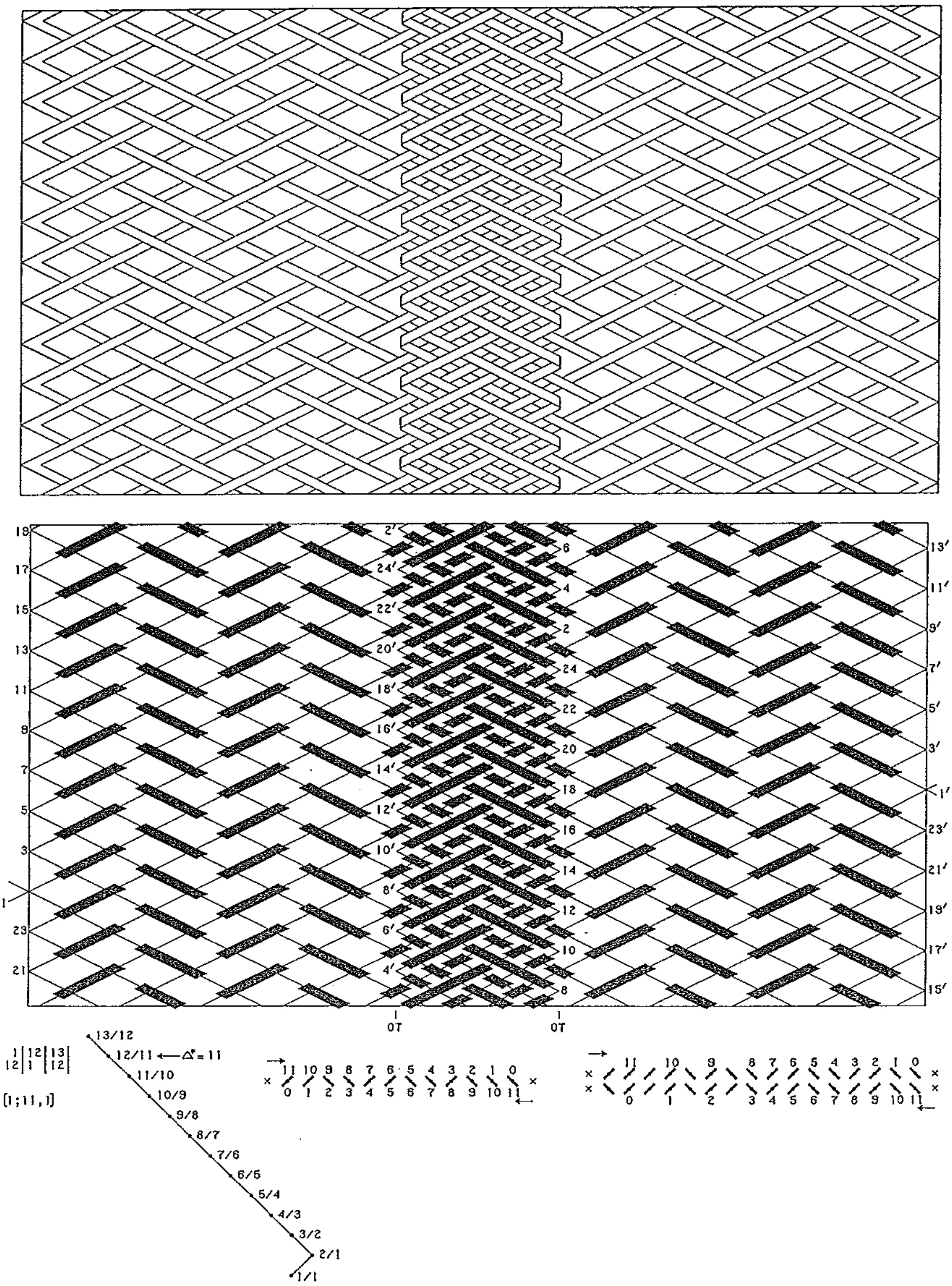


Fig. 930 — Example 3.

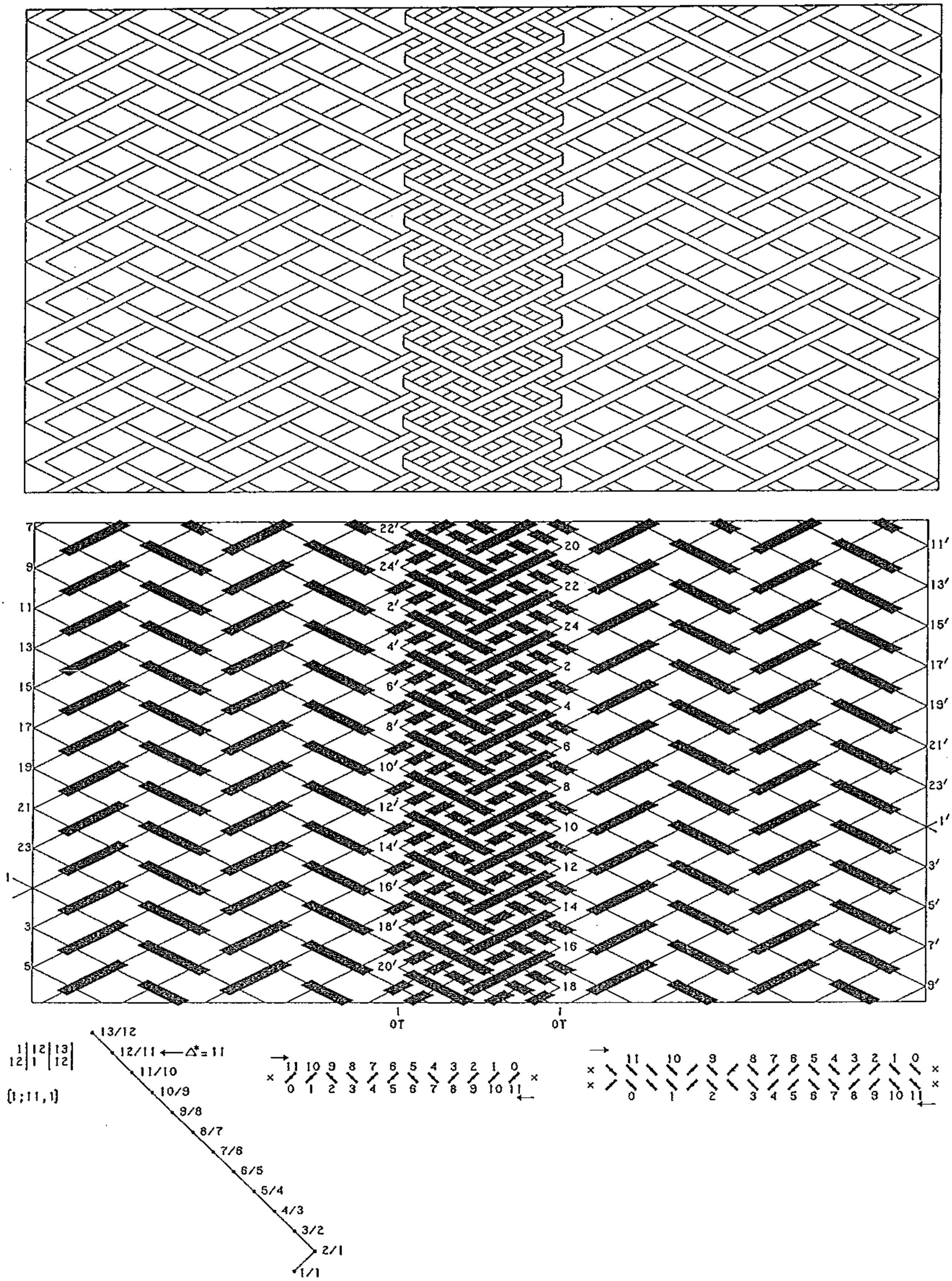


Fig. 931 — Example 4.

Half-cycle braiding algorithms for Example 1 (Fig. 928):

half-cycle 1:			Free run.
half-cycle 2:	$i = 0$	:	OT — $(s)u$.
half-cycle 3:	$i = 0$	:	u .
half-cycle 4:	$i \leq 1$	:	OT — $(s,1)2u$.
half-cycle 5:	$i \leq 1$	:	$2u$.
half-cycle 6:	$i \leq 2$	:	OT — $(s)o - 2u$.
half-cycle 7:	$i \leq 2$	:	$3u$.
half-cycle 8:	$i \leq 3$	:	OT — $(s,1)2o - 2u$.
half-cycle 9:	$i \leq 3$	:	$o - 3u$.
half-cycle 10:	$i \leq 4$	:	OT — $(s)u - 2o - 2u$.
half-cycle 11:	$i \leq 4$	:	$u - o - 3u$.
half-cycle 12:	$i \leq 5$	:	OT — $(s,1)2u - 2o - 2u$.
half-cycle 13:	$i \leq 5$	:	$2u - o - 3u$.
half-cycle 14:	$i \leq 6$	:	OT — $(s)o - 2u - 2o - 2u$.
half-cycle 15:	$i \leq 6$	:	$o - 2u - o - 3u$.
half-cycle 16:	$i \leq 7$	:	OT — $(s,1)2o - 2u - 2o - 2u$.
half-cycle 17:	$i \leq 7$	:	$2o - 2u - o - 3u$.
half-cycle 18:	$i \leq 8$	:	OT — $(s)u - 2o - 2u - 2o - 2u$.
half-cycle 19:	$i \leq 8$	:	$u - 2o - 2u - o - 3u$.
half-cycle 20:	$i \leq 9$	:	OT — $(s)o - u - 2o - 2u - 2o - 2u$.
half-cycle 21:	$i \leq 9$	:	$2u - 2o - 2u - o - 3u$.
half-cycle 22:	$i \leq 10$	:	OT — $(s,1)2o - u - 2o - 2u - 2o - 2u$.
half-cycle 23:	$i \leq 10$	:	$o - 2u - 2o - 2u - o - 3u$.
half-cycle 24:	$i \leq 11$	:	OT — $(s,2)3o - u - 2o - 2u - 2o - 2u$.

half-cycle 1′:			$2u - 2o$.
half-cycle 2′:	$i = 0$	:	OT — $2o - (2,s)3u$.
half-cycle 3′:	$i = 0$	:	$2u - o - u - o$.
half-cycle 4′:	$i \leq 1$	:	OT — $2o - (2,s,1)4u$.
half-cycle 5′:	$i \leq 1$	:	$3u - o - u - o$.
half-cycle 6′:	$i \leq 2$	:	OT — $2o - 2u - (s)o - 2u$.
half-cycle 7′:	$i \leq 2$	:	$4u - o - u - o$.
half-cycle 8′:	$i \leq 3$	:	OT — $2o - 2u - (s,1)2o - 2u$.
half-cycle 9′:	$i \leq 3$	:	$o - 4u - o - u - o$.
half-cycle 10′:	$i \leq 4$	:	OT — $2o - (2,s)3u - 2o - 2u$.
half-cycle 11′:	$i \leq 4$	:	$u - o - 4u - o - u - o$.
half-cycle 12′:	$i \leq 5$	:	OT — $2o - (2,s,1)4u - 2o - 2u$.
half-cycle 13′:	$i \leq 5$	:	$2u - o - 4u - o - u - o$.
half-cycle 14′:	$i \leq 6$	:	OT — $2o - 2u - (s)o - 2u - 2o - 2u$.
half-cycle 15′:	$i \leq 6$	:	$o - 2u - o - 4u - o - u - o$.
half-cycle 16′:	$i \leq 7$	:	OT — $2o - 2u - (s,1)2o - 2u - 2o - 2u$.
half-cycle 17′:	$i \leq 7$	:	$2o - 2u - o - 4u - o - u - o$.
half-cycle 18′:	$i \leq 8$	:	OT — $2o - (2,s)3u - 2o - 2u - 2o - 2u$.
half-cycle 19′:	$i \leq 8$	:	$u - 2o - 2u - o - 4u - o - u - o$.
half-cycle 20′:	$i \leq 9$	:	OT — $2o - u - (s)o - 2u - 2o - 2u - 2o - 2u$.
half-cycle 21′:	$i \leq 9$	:	$2u - 2o - 2u - o - 4u - o - u - o$.
half-cycle 22′:	$i \leq 10$	:	OT — $(2,s)3o - u - o - 2u - 2o - 2u - 2o - 2u$.
half-cycle 23′:	$i \leq 10$	:	$o - 2u - 2o - 2u - o - 4u - o - u - o$.

half-cycle 24′: $i \leq 11$: OT — $(1,s,2)4o - u - o - 2u - 2o - 2u - 2o - 2u$.

Half-cycle braiding algorithms for Example 2 (Fig. 929):

half-cycle 1:			Free run.
half-cycle 2:	$i = 0$	:	OT — $(s)o$.
half-cycle 3:	$i = 0$	:	u .
half-cycle 4:	$i \leq 1$	:	OT — $(s,1)2o$.
half-cycle 5:	$i \leq 1$	:	$2u$.
half-cycle 6:	$i \leq 2$	:	OT — $(s)u - 2o$.
half-cycle 7:	$i \leq 2$	:	$3u$.
half-cycle 8:	$i \leq 3$	:	OT — $(s,1)2u - 2o$.
half-cycle 9:	$i \leq 3$	:	$4u$.
half-cycle 10:	$i \leq 4$	:	OT — $(s)o - 2u - 2o$.
half-cycle 11:	$i \leq 4$	:	$o - 4u$.
half-cycle 12:	$i \leq 5$	:	OT — $(s,1)2o - 2u - 2o$.
half-cycle 13:	$i \leq 5$	:	$2o - 4u$.
half-cycle 14:	$i \leq 6$	:	OT — $(s)u - 2o - 2u - 2o$.
half-cycle 15:	$i \leq 6$	:	$u - 2o - 4u$.
half-cycle 16:	$i \leq 7$	:	OT — $(s,1)2u - 2o - 2u - 2o$.
half-cycle 17:	$i \leq 7$	:	$2u - 2o - 4u$.
half-cycle 18:	$i \leq 8$	:	OT — $(s)o - 2u - 2o - 2u - 2o$.
half-cycle 19:	$i \leq 8$	:	$o - 2u - 2o - 4u$.
half-cycle 20:	$i \leq 9$	:	OT — $(s,1)2o - 2u - 2o - 2u - 2o$.
half-cycle 21:	$i \leq 9$	:	$2o - 2u - 2o - 4u$.
half-cycle 22:	$i \leq 10$	:	OT — $(s,2)3o - 2u - 2o - 2u - 2o$.
half-cycle 23:	$i \leq 10$	:	$u - 2o - 2u - 2o - 4u$.
half-cycle 24:	$i \leq 11$	:	OT — $(s,3)4o - 2u - 2o - 2u - 2o$.

half-cycle 1′:			$2u - 2o$.
half-cycle 2′:	$i = 0$	:	OT — $2o - 2u - (s)o$.
half-cycle 3′:	$i = 0$	:	$2u - o - u - o$.
half-cycle 4′:	$i \leq 1$	:	OT — $2o - 2u - (s,1)2o$.
half-cycle 5′:	$i \leq 1$	:	$3u - o - u - o$.
half-cycle 6′:	$i \leq 2$	:	OT — $2o - (2,s)3u - 2o$.
half-cycle 7′:	$i \leq 2$	:	$4u - o - u - o$.
half-cycle 8′:	$i \leq 3$	:	OT — $2o - (2,s,1)4u - 2o$.
half-cycle 9′:	$i \leq 3$	:	$5u - o - u - o$.
half-cycle 10′:	$i \leq 4$	:	OT — $2o - 2u - (s)o - 2u - 2o$.
half-cycle 11′:	$i \leq 4$	:	$o - 5u - o - u - o$.
half-cycle 12′:	$i \leq 5$	:	OT — $2o - 2u - (s,1)2o - 2u - 2o$.
half-cycle 13′:	$i \leq 5$	:	$2u - 5u - o - u - o$.
half-cycle 14′:	$i \leq 6$	:	OT — $2o - (2,s)3u - 2o - 2u - 2o$.
half-cycle 15′:	$i \leq 6$	:	$u - 2o - 5u - o - u - o$.
half-cycle 16′:	$i \leq 7$	:	OT — $2o - (2,s,1)4u - 2o - 2u - 2o$.
half-cycle 17′:	$i \leq 7$	:	$2u - 2o - 5u - o - u - o$.
half-cycle 18′:	$i \leq 8$	:	OT — $2o - 2u - (s)o - 2u - 2o - 2u - 2o$.
half-cycle 19′:	$i \leq 8$	:	$o - 2u - 2o - 5u - o - u - o$.
half-cycle 20′:	$i \leq 9$	:	OT — $2o - u - (s)o - u - o - 2u - 2o - 2u - 2o$.
half-cycle 21′:	$i \leq 9$	:	$2o - 2u - 2o - 5u - o - u - o$.

half-cycle 22′:	$i \leq 10$	:	OT — $(2,s)3o - u - o - u - o - 2u - 2o - 2u - 2o$.
half-cycle 23′:	$i \leq 10$	:	$u - 2o - 2u - 2o - 5u - o - u - o$.
half-cycle 24′:	$i \leq 11$	:	OT — $(1,s,2)4o - u - o - u - o - 2u - 2o - 2u - 2o$.

Half-cycle braiding algorithms for Example 3 (Fig. 930):

half-cycle 1:			Free run.
half-cycle 2:	$i = 0$	:	OT — $(s)u$.
half-cycle 3:	$i = 0$	:	u.
half-cycle 4:	$i \leq 1$	:	OT — $(s,1)2u$.
half-cycle 5:	$i \leq 1$	:	$2u$.
half-cycle 6:	$i \leq 2$	:	OT — $(s)o - 2u$.
half-cycle 7:	$i \leq 2$	:	$3u$.
half-cycle 8:	$i \leq 3$	:	OT — $(s,1)2o - 2u$.
half-cycle 9:	$i \leq 3$	:	$o - 3u$.
half-cycle 10:	$i \leq 4$	:	OT — $(s)u - 2o - 2u$.
half-cycle 11:	$i \leq 4$	:	$u - o - 3u$.
half-cycle 12:	$i \leq 5$	:	OT — $(s,1)2u - 2o - 2u$.
half-cycle 13:	$i \leq 5$	:	$2u - o - 3u$.
half-cycle 14:	$i \leq 6$	:	OT — $(s)o - 2u - 2o - 2u$.
half-cycle 15:	$i \leq 6$	:	$o - 2u - o - 3u$.
half-cycle 16:	$i \leq 7$	:	OT — $(s,1)2o - 2u - 2o - 2u$.
half-cycle 17:	$i \leq 7$	:	$2o - 2u - o - 3u$.
half-cycle 18:	$i \leq 8$	:	OT — $(s)u - 2o - 2u - 2o - 2u$.
half-cycle 19:	$i \leq 8$	:	$u - 2o - 2u - o - 3u$.
half-cycle 20:	$i \leq 9$	:	OT — $(s)o - u - 2o - 2u - 2o - 2u$.
half-cycle 21:	$i \leq 9$	:	$2u - 2o - 2u - o - 3u$.
half-cycle 22:	$i \leq 10$	:	OT — $(s,1)2o - u - 2o - 2u - 2o - 2u$.
half-cycle 23:	$i \leq 10$	:	$o - 2u - 2o - 2u - o - 3u$.
half-cycle 24:	$i \leq 11$	:	OT — $(s,2)3o - u - 2o - 2u - 2o - 2u$.

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half-cycle 1′:			$u - o - u - o$.
half-cycle 2′:	$i = 0$	:	OT — $2o - (2,s)3u$.
half-cycle 3′:	$i = 0$	:	$u - o - 2u - o$.
half-cycle 4′:	$i \leq 1$	:	OT — $2o - (2,s,1)4u$.
half-cycle 5′:	$i \leq 1$	:	$u - o - 3u - o$.
half-cycle 6′:	$i \leq 2$	:	OT — $2o - 2u - (s)o - 2u$.
half-cycle 7′:	$i \leq 2$	:	$2u - o - 3u - o$.
half-cycle 8′:	$i \leq 3$	:	OT — $2o - 2u - (s,1)2o - 2u$.
half-cycle 9′:	$i \leq 3$	:	$o - 2u - o - 3u - o$.
half-cycle 10′:	$i \leq 4$	:	OT — $2o - (2,s)3u - 2o - 2u$.
half-cycle 11′:	$i \leq 4$	:	$u - o - 2u - o - 3u - o$.
half-cycle 12′:	$i \leq 5$	:	OT — $2o - (2,s,1)4u - 2o - 2u$.
half-cycle 13′:	$i \leq 5$	:	$2u - o - 2u - o - 3u - o$.
half-cycle 14′:	$i \leq 6$	:	OT — $2o - 2u - (s)o - 2u - 2o - 2u$.
half-cycle 15′:	$i \leq 6$	:	$o - 2u - o - 2u - o - 3u - o$.
half-cycle 16′:	$i \leq 7$	:	OT — $2o - 2u - (s,1)2o - 2u - 2o - 2u$.
half-cycle 17′:	$i \leq 7$	:	$2o - 2u - o - 2u - o - 3u - o$.
half-cycle 18′:	$i \leq 8$	:	OT — $2o - (2,s)3u - 2o - 2u - 2o - 2u$.
half-cycle 19′:	$i \leq 8$	:	$u - 2o - 2u - o - 2u - o - 3u - o$.

half-cycle 20′:	$i \leq 9$	: OT — $2o - u - (s)o - 2u - 2o - 2u - 2o - 2u$.
half-cycle 21′:	$i \leq 9$	: $2u - 2o - 2u - o - 2u - o - 3u - o$.
half-cycle 22′:	$i \leq 10$	: OT — $(2,s)3o - u - o - 2u - 2o - 2u - 2o - 2u$.
half-cycle 23′:	$i \leq 10$	: $o - 2u - 2o - 2u - o - 2u - o - 3u - o$.
half-cycle 24′:	$i \leq 11$	: OT — $(1,s,2)4o - u - o - 2u - 2o - 2u - 2o - 2u$.

Half-cycle braiding algorithms for Example 4 (Fig. 931):

half-cycle 1:		Free run.
half-cycle 2:	$i = 0$	: OT — $(s)o$.
half-cycle 3:	$i = 0$	: u.
half-cycle 4:	$i \leq 1$	: OT — $(s,1)2o$.
half-cycle 5:	$i \leq 1$	: $2u$.
half-cycle 6:	$i \leq 2$	: OT — $(s)u - 2o$.
half-cycle 7:	$i \leq 2$	: $3u$.
half-cycle 8:	$i \leq 3$	: OT — $(s,1)2u - 2o$.
half-cycle 9:	$i \leq 3$	: $4u$.
half-cycle 10:	$i \leq 4$	: OT — $(s)o - 2u - 2o$.
half-cycle 11:	$i \leq 4$	: $o - 4u$.
half-cycle 12:	$i \leq 5$	: OT — $(s,1)2o - 2u - 2o$.
half-cycle 13:	$i \leq 5$	: $2o - 4u$.
half-cycle 14:	$i \leq 6$	: OT — $(s)u - 2o - 2u - 2o$.
half-cycle 15:	$i \leq 6$	: $u - 2o - 4u$.
half-cycle 16:	$i \leq 7$	: OT — $(s,1)2u - 2o - 2u - 2o$.
half-cycle 17:	$i \leq 7$	: $2u - 2o - 4u$.
half-cycle 18:	$i \leq 8$	: OT — $(s)o - 2u - 2o - 2u - 2o$.
half-cycle 19:	$i \leq 8$	: $o - 2u - 2o - 4u$.
half-cycle 20:	$i \leq 9$	: OT — $(s,1)2o - 2u - 2o - 2u - 2o$.
half-cycle 21:	$i \leq 9$	: $2o - 2u - 2o - 4u$.
half-cycle 22:	$i \leq 10$	: OT — $(s,2)3o - 2u - 2o - 2u - 2o$.
half-cycle 23:	$i \leq 10$	: $u - 2o - 2u - 2o - 4u$.
half-cycle 24:	$i \leq 11$	: OT — $(s,3)4o - 2u - 2o - 2u - 2o$.

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half-cycle 1′:		$u - o - u - o$.
half-cycle 2′:	$i = 0$	: OT — $2o - 2u - (s)o$.
half-cycle 3′:	$i = 0$	: $u - o - 2u - o$.
half-cycle 4′:	$i \leq 1$	: OT — $2o - 2u - (s,1)2o$.
half-cycle 5′:	$i \leq 1$	: $u - o - 3u - o$.
half-cycle 6′:	$i \leq 2$	: OT — $2o - (2,s)3u - 2o$.
half-cycle 7′:	$i \leq 2$	: $2u - o - 3u - o$.
half-cycle 8′:	$i \leq 3$	: OT — $2o - (2,s,1)4u - 2o$.
half-cycle 9′:	$i \leq 3$	: $3u - o - 3u - o$.
half-cycle 10′:	$i \leq 4$	: OT — $2o - 2u - (s)o - 2u - 2o$.
half-cycle 11′:	$i \leq 4$	: $o - 3u - o - 3u - o$.
half-cycle 12′:	$i \leq 5$	: OT — $2o - 2u - (s,1)2o - 2u - 2o$.
half-cycle 13′:	$i \leq 5$	: $2u - 3u - o - 3u - o$.
half-cycle 14′:	$i \leq 6$	: OT — $2o - (2,s)3u - 2o - 2u - 2o$.
half-cycle 15′:	$i \leq 6$	: $u - 2o - 3u - o - 3u - o$.
half-cycle 16′:	$i \leq 7$	: OT — $2o - (2,s,1)4u - 2o - 2u - 2o$.
half-cycle 17′:	$i \leq 7$	: $2u - 2o - 3u - o - 3u - o$.

half-cycle 18′: $i \leq 8$: OT — $2o - 2u - (s)o - 2u - 2o - 2u - 2o$.
half-cycle 19′: $i \leq 8$: $o - 2u - 2o - 3u - o - 3u - o$.
half-cycle 20′: $i \leq 9$: OT — $2o - u - (s)o - u - o - 2u - 2o - 2u - 2o$.
half-cycle 21′: $i \leq 9$: $2o - 2u - 2o - 3u - o - 3u - o$.
half-cycle 22′: $i \leq 10$: OT — $(2,s)3o - u - o - u - o - 2u - 2o - 2u - 2o$.
half-cycle 23′: $i \leq 10$: $u - 2o - 2u - 2o - 3u - o - 3u - o$.
half-cycle 24′: $i \leq 11$: OT — $(1,s,2)4o - u - o - u - o - 2u - 2o - 2u - 2o$.

The reader will have noticed that in the simple Hour-glass Knot described in *The Braider*, Issue No. 49, pp. 1160-1163, Fig. 910, the interbraided knots in the leftmost and rightmost bight-edges of the $p/b = 9/10$ under-over coded knots required two essential strings each since their $p'/b = 2/10$ (g.c.d.$(p', b) = 2$). In practice we would, of course, prefer one essntial string for a knot which interbraids a bight-edge. Since $b =$ even, we then require $p' =$ odd, with g.c.d.$(p', b) = 1$. If we base these bight-edge interbraids on the 6-lead $\rightarrow u - 2o|2o - u \leftarrow$ round braid (See *The Braider*, Issue No. 7, pg. 150, Fig. 132), then the interbraided knot $p'/10$ in the bight-edge of the $p/b = p/10$ knot will require one essential string only when its $p' = 3$ while $p = 11$ say. Such an improved simple Hour-glass Knot is shown in Fig. 933. Its half-cycle braiding algorithms are then as follows:

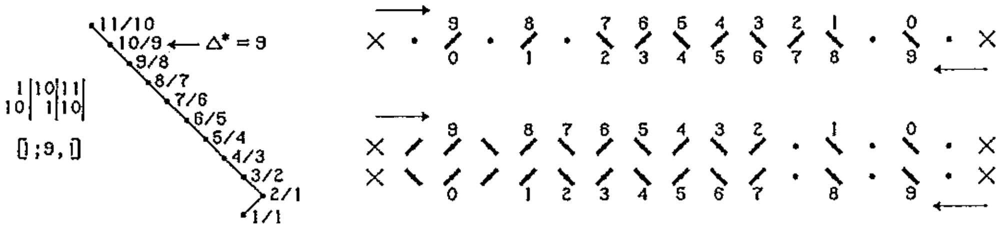

Fig. 932 — Upper algorithm diagram for the half-cycles 1 - 20.
Lower algorithm diagram for the half-cycles 1″ - 20″.

half-cycle 1 : Free run.
half-cycle 2 : $i = 0$: OT — $(s)u$.
half-cycle 3 : $i = 0$: OT — u.
half-cycle 4 : $i \leq 1$: OT — $(s,1)2u$.
half-cycle 5 : $i \leq 1$: OT — $2u$.
half-cycle 6 : $i \leq 2$: OT — $(s)o - 2u$.
half-cycle 7 : $i \leq 2$: OT — $o - 2u$.
half-cycle 8 : $i \leq 3$: OT — $(s)u - o - 2u$.
half-cycle 9 : $i \leq 3$: OT — $u - o - 2u$.
half-cycle 10 : $i \leq 4$: OT — $(s)o - u - o - 2u$.
half-cycle 11 : $i \leq 4$: OT — $o - u - o - 2u$.
half-cycle 12 : $i \leq 5$: OT — $(s)u - o - u - o - 2u$.
half-cycle 13 : $i \leq 5$: OT — $u - o - u - o - 2u$.
half-cycle 14 : $i \leq 6$: OT — $(s)o - u - o - u - o - 2u$.
half-cycle 15 : $i \leq 6$: OT — $o - u - o - u - o - 2u$.
half-cycle 16 : $i \leq 7$: OT — $(s)u - o - u - o - u - o - 2u$.
half-cycle 17 : $i \leq 7$: OT — $u - o - u - o - u - o - 2u$.
half-cycle 18 : $i \leq 8$: OT — $(s)o - u - o - u - o - u - o - 2u$.
half-cycle 19 : $i \leq 8$: OT — $o - u - o - u - o - u - o - 2u$.
half-cycle 20 : $i \leq 9$: OT — $(s,1)2o - u - o - u - o - u - o - 2u$.

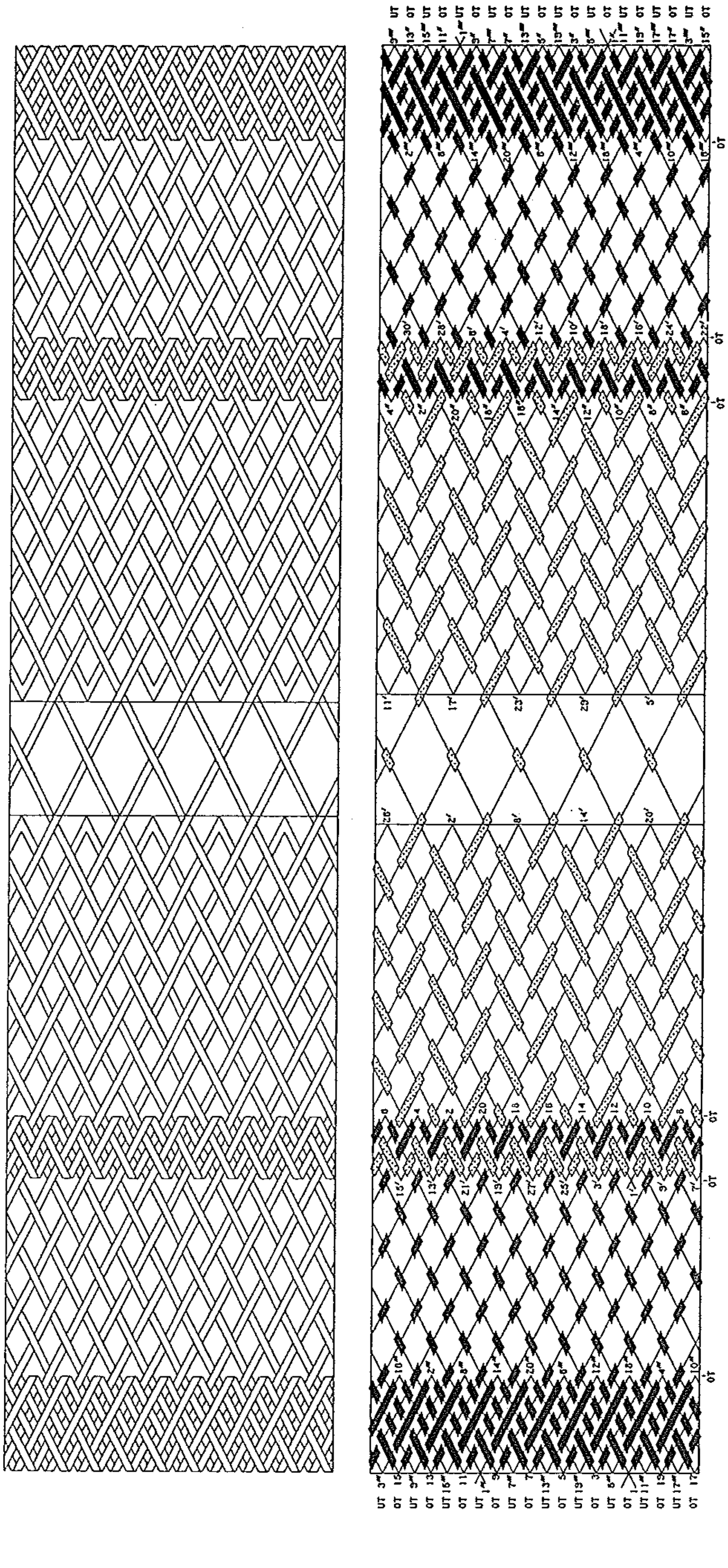

Fig. 933 — The modified simple Hour-glass Knot.

Half-cycles $1'$ - $30'$ as in *The Braider*, Issue No. 49, pp. 1160 - 1161.

half-cycle $1''$:		$u - o$.
half-cycle $2''$:	$i = 0$:	OT — $o - (1,s)2u$.
half-cycle $3''$:	$i = 0$:	OT — $2u - o$.
half-cycle $4''$:	$i \le 1$:	OT — $o - (1,s,1)3u$.
half-cycle $5''$:	$i \le 1$:	OT — $3u - o$.
half-cycle $6''$:	$i \le 2$:	OT — $o - u - (s)o - 2u$.
half-cycle $7''$:	$i \le 2$:	OT — $o - 3u - o$.
half-cycle $8''$:	$i \le 3$:	OT — $o - (1,s)2u - o - 2u$.
half-cycle $9''$:	$i \le 3$:	OT — $u - o - 3u - o$.
half-cycle $10''$:	$i \le 4$:	OT — $o - u - (s)o - u - o - 2u$.
half-cycle $11''$:	$i \le 4$:	OT — $o - u - o - 3u - o$.
half-cycle $12''$:	$i \le 5$:	OT — $o - (1,s)2u - o - u - o - 2u$.
half-cycle $13''$:	$i \le 5$:	OT — $u - o - u - o - 3u - o$.
half-cycle $14''$:	$i \le 6$:	OT — $o - u - (s)o - u - o - u - o - 2u$.
half-cycle $15''$:	$i \le 6$:	OT — $o - u - o - u - o - 3u - o$.
half-cycle $16''$:	$i \le 7$:	OT — $o - (1,s)2u - o - u - o - u - o - 2u$.
half-cycle $17''$:	$i \le 7$:	OT — $u - o - u - o - u - o - 3u - o$.
half-cycle $18''$:	$i \le 8$:	OT — $o - u - (s)o - u - o - u - o - u - o - 2u$.
half-cycle $19''$:	$i \le 8$:	OT — $o - u - o - u - o - u - o - 3u - o$.
half-cycle $20''$:	$i \le 9$:	OT — $(1,s)2o - u - o - u - o - u - o - u - o - 2u$.

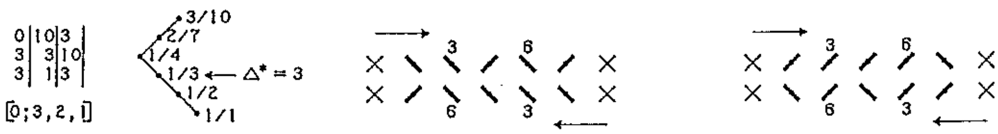

Fig. 934 — Left algorithm diagram for the half-cycles $1'''$ - $20'''$.
Right algorithm diagram for the half-cycles $1''''$ - $20''''$.

half-cycle $1'''$:	$u - 2o$.	half-cycle $11'''$:	UT — $2u - 2o$.
half-cycle $2'''$:	OT — $2o - u$.	half-cycle $12'''$:	OT — $3o - u$.
half-cycle $3'''$:	UT — $u - 2o$.	half-cycle $13'''$:	UT — $2u - 2o$.
half-cycle $4'''$:	OT — $2o - u$.	half-cycle $14'''$:	OT — $(3,s)4o - u$.
half-cycle $5'''$:	UT — $u - 2o$.	half-cycle $15'''$:	UT — $2u - o - u - o$.
half-cycle $6'''$:	OT — $2o - u$.	half-cycle $16'''$:	OT — $4o - u$.
half-cycle $7'''$:	UT — $u - 2o$.	half-cycle $17'''$:	UT — $2u - o - u - o$.
half-cycle $8'''$:	OT — $(1,s,1)3o - u$.	half-cycle $18'''$:	OT — $4o - u$.
half-cycle $9'''$:	UT — $2u - 2o$.	half-cycle $19'''$:	UT — $2u - o - u - o$.
half-cycle $10'''$:	OT — $3o - u$.	half-cycle $20'''$:	OT — $4o - u$.

The half-cycle braiding algorithms for the $p'/b = 3/10$ rightmost edge interbraid (the half-cycles $1''''$ - $20''''$) are identical to the half-cycle braiding algorithms for the $p'/b = 3/10$ leftmost edge interbraid (the half-cycles $1'''$ - $20'''$).

Not only do these leftmost and rightmost edge interbraids require one string each only, but the resulting edges are aesthetically much superior.