THE BRAIDER

APPENDIX 1997

CONTENTS

A quarterly publication
for
the braiding artisan

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Some comments we received

Besides some positive comments as regards the contents of *The Braider*, we received a negative comment from Tom Hall with reference to Issue No. 10, pp. 209 – 215 as follows: *'The piece on the 3 ply 3 part/4 bight knots was good. It might help some people with the dropping of the end. I know I do not always do it in the best way. I did think you were a little hard on all of the whipmakers. Even though what you said was true it made the article sound tacky. It does not make you or "The Braider" look very professional. You could of got the same point across without all the name calling.'*

We also received some comments from Pieter Van de Griend. He also was critical about some remarks relating to some references in this article, but unfortunately he seems to have missed the gist of the discussion. Furthermore he seems to be quite allergic to the comments about the value or purpose of mathematics as well as to the adverse comments about some fashionable, but nevertheless fallacious trends in mathematics (he is a mathematician by the way). No doubt, he is of course not the only mathematician who very much dislikes the comments about their 'holy' subject. It is interesting though that to date none of their fraternity has submitted a solution to any of the questions posed. Since their 'holy' subject plays an important role in nearly all these questions, one can only speculate as to why not.

It is to be expected that some may dislike certain references in *The Braider* to the relevant published material under discussion and their author(s) as well as to fashionable acceptances and practices. Although we limit our references to published cases which need a critical evaluation or have a direct connection with the subject matter under discussion, hence often a detailed or specific reference is not only fair but is also essential to the reader in order to obtain a full understanding of the matter, this may not be appreciated by those who worship fashionable acceptances and/or believe in political toadyism. For these people it seems that detailed referencing constitutes name-calling; they obviously don't like to correct misleading or incorrect information.

Braiding has suffered and still suffers from accepted fashionable nonsense and secrecy. It is therefore high time to expose myths and fallacies, and hence it is one of the prime purposes of *The Braider* to do so. Since *The Braider* is committed to a high technical standard, it will therefore not hesitate to give critical comments in areas where such comments are not only more than justified, but are in fact much overdue. Those who can't hack the course should get off the horse.

We like to thank Doug Van Tassel for a most justified comment concerning the lack of specific subject matter indication in the listings under the *Contents* on the front-cover of each issue. We should of course have addressed this item much earlier, and explained the reason for the form of this list and its purpose. The **form** of the *Contents* list is to enable us to keep each entry on one line as much as possible. The **purpose** of the *Contents* list is to indicate only the *number* of articles in the issue concerned, hence not to indicate any specific subject matter dealt with. Consequently the *Contents* list is of little or no real reference value and hence the front-cover carries no page-numbers.

In order to find the relevant pages concerning a specific subject, one needs at least a reasonably comprehensive **index**. However, *The Braider* is a continuing series of quarterly issues, and hence an up-to-date index cannot be provided. The best solution therefore is for those who would like to possess a more detailed contents-list to compile their own index and keep it up-to-date.

Ed's Algorithm

The English philosopher, and essayist Francis Bacon said in his *Essayes*, 1597 : *"Some bookes are to bee tasted, others to bee swallowed, and some few to bee chewed and digested"*. The same may be said for subjects, and braiding is one which certainly can do with a fair amount of chewing and digesting. Even seemingly 'simple' braidforms such as Regular Knots require a lot of chewing and digesting before one can say that he or she got it all under his or her belt. It appears that only a very few people do appreciate this (certainly none in the academic world) and, in stark contrast to most braiders, realise that there is much more to those seemingly 'simple' Regular Knots than meets the eye. One of those rare 'birds' who does realise that there is much more to those 'simple' Regular Knots is Ed Pass from Florence, Arizona, U.S.A., who derived an alternative algorithm diagram to the one we have used so far. In recognition to his realisation and effort, we shall call his algorithm diagram: **Ed's Algorithm**. Although Ed's Algorithm may be obtained in different ways, we shall here derive it from our conventional algorithm diagram. The conventional algorithm diagram can readily be written down with the aid of the value for Δ^*, where Δ^* is the increase in bights when the Regular Knot p/b gets enlarged by a fundamental enlargement step in accordance with Method II (this is clearly indicated by the formula for Δ^* in the question on pg. 115 of *The Braider*, Issue No. 6). In the same Issue on pg. 117 it was mentioned that the sum of any two vertically aligned i-values is equal to $b-1$. By making use of this fact and of Δ^*, we obtain the uppermost algorithm diagram in Fig. 1. Then in *The Braider*, Issue No. 6, pg. 115, the formula for Δ indicates that its value is equal to the increase in bights when the Regular Knot p/b gets enlarged by a fundamental enlargement step in accordance with Method I, and on pg. 133 of *The Braider*, Issue No. 7 we noted that $\Delta + \Delta^* = b$. With these relationships, the uppermost algorithm diagram in Fig. 1 readily transforms via the second algorithm diagram from the top into the third algorithm diagram from the top. This third algorithm diagram from the top can be written as the fourth algorithm diagram from the top. When we now add 1 to every i-value in this fourth algorithm diagram from the top, we obtain the lowermost algorithm, which is **Ed's Algorithm**.

In our conventional algorithm diagram we have the relationships:

for an **even** numbered half-cycle h_e: $$i = \frac{h_e - 2}{2}\,.$$

for an **odd** numbered half-cycle h_o: $$i = \frac{h_o - 3}{2}\,.$$

Lets call the values associated with the intersection columns in Ed's Algorithm the ι-values (pronounced: iota-values) in order to distinguish them from the i-values in the conventional algorithm diagram. Since $\iota = i + 1$ we thus obtain:†

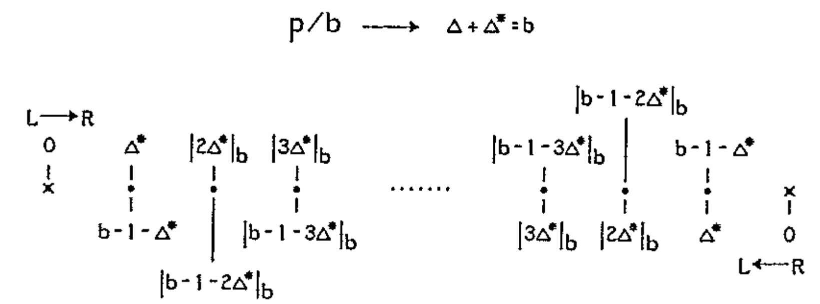
for an **even** numbered half-cycle h_e: $$\iota = \frac{h_e}{2} = \left\lfloor \frac{h}{2} \right\rfloor.$$

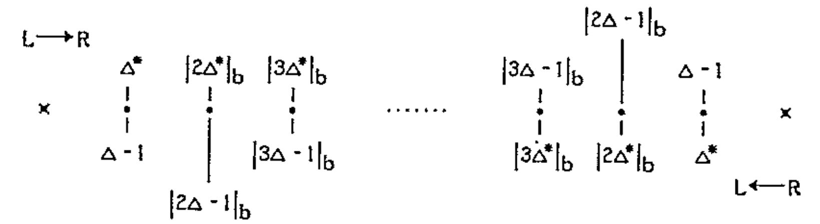
for an **odd** numbered half-cycle h_o: $$\iota = \frac{h_o - 1}{2} = \left\lfloor \frac{h}{2} \right\rfloor.$$

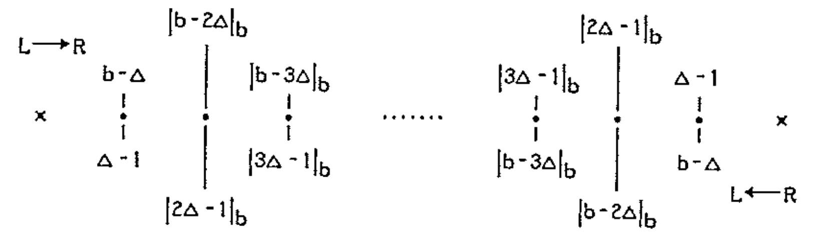
Thus in Ed's Algorithm we have to read for half-cycle h the ι-values which are:

$$\leq \left\lfloor \frac{h}{2} \right\rfloor.$$

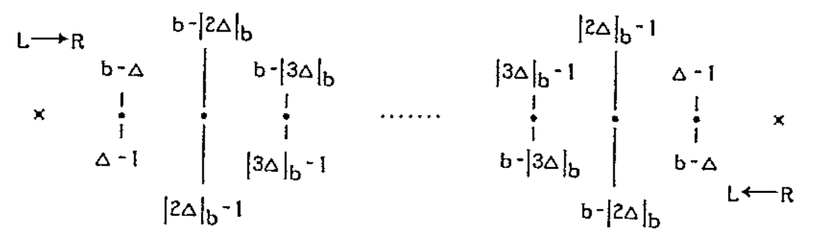
† $\lfloor x \rfloor$ denotes the greatest whole number equal to or smaller than x.







ONLY WHEN $\triangle = 1$ ARE THERE n-VALUES FOR WHICH $|n\triangle|_b = 0$, WHERE n IS A NATURAL NUMBER. WHEN WE THEN TAKE INSTEAD OF 0 THE VALUE b, WE OBTAIN



WHEN WE ADD 1 TO EACH ι-VALUE WE OBTAIN ED'S ALGORITHM SHOWN BELOW

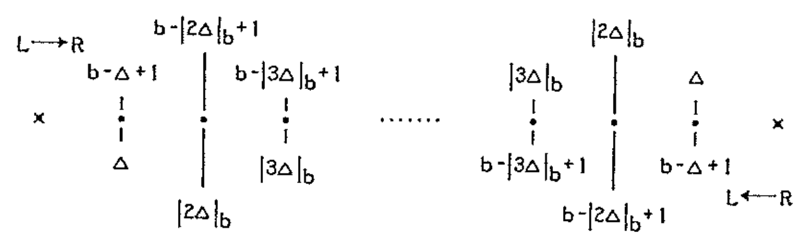


Fig. 1 — The derivation of Ed's Algorithm from the algorithm diagram.

Of the examples Ed Pass sent us, three are shown in Fig. 2, and one in Fig. 3.

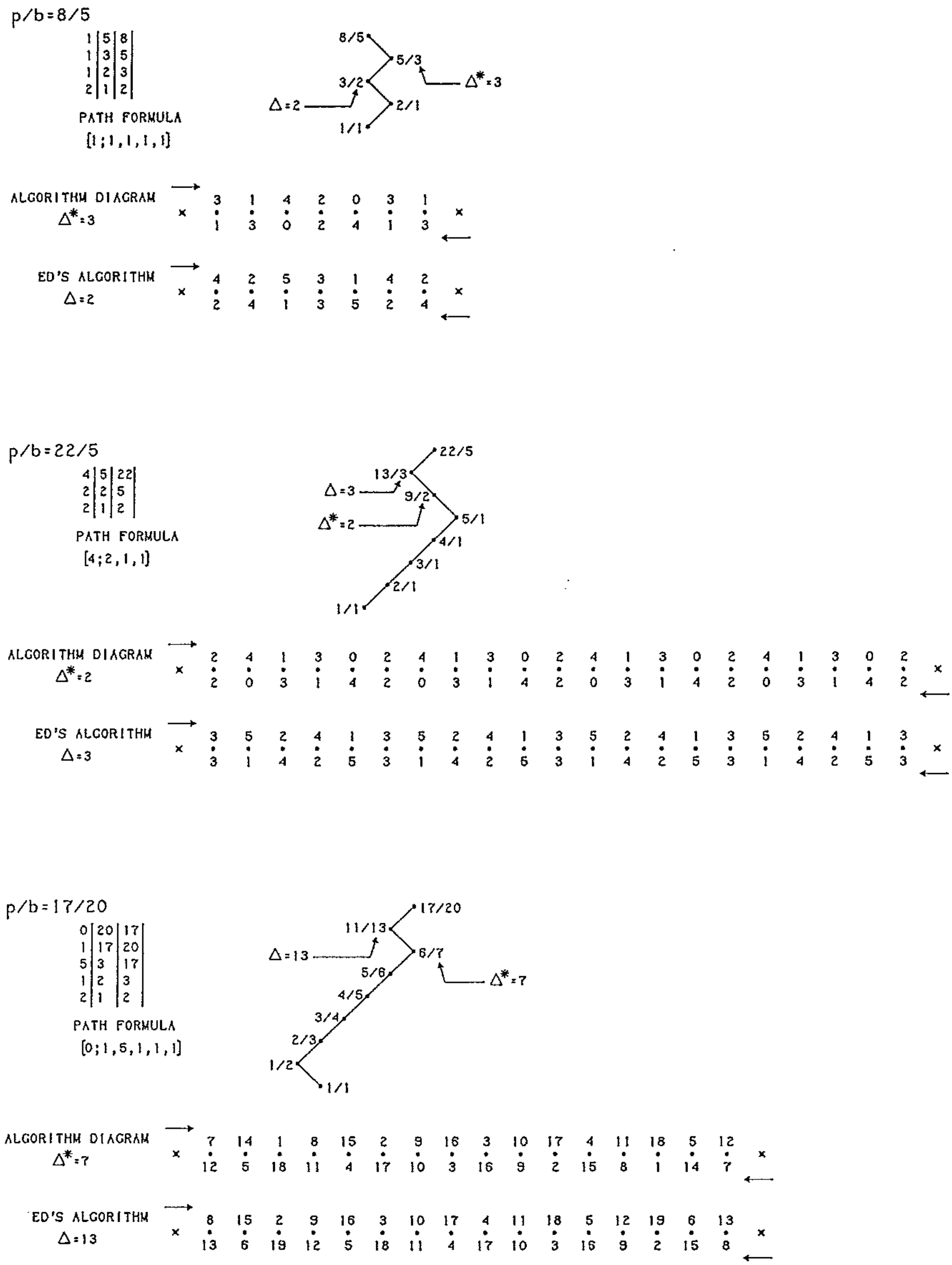
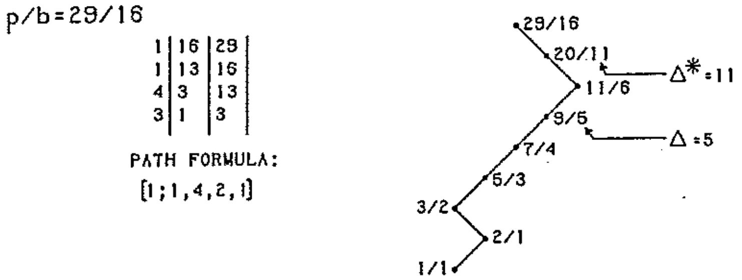


Fig. 2 — Ed's Algorithm and the algorithm diagram (codings have been omitted).

With the aid of Euclid's algorithm (refer to *The Braider*, Issue No. 7, pg. 135) we determine the path-formula of the Regular knot, which gives us its path in the RKT. From this path we obtain its Δ-value and Δ*-value. With the Δ*-value we construct the algorithm diagram, and with the Δ-value we construct Ed's algorithm.

Fig. 3 shows an example of a Regular Knot which is neither column nor row coded.



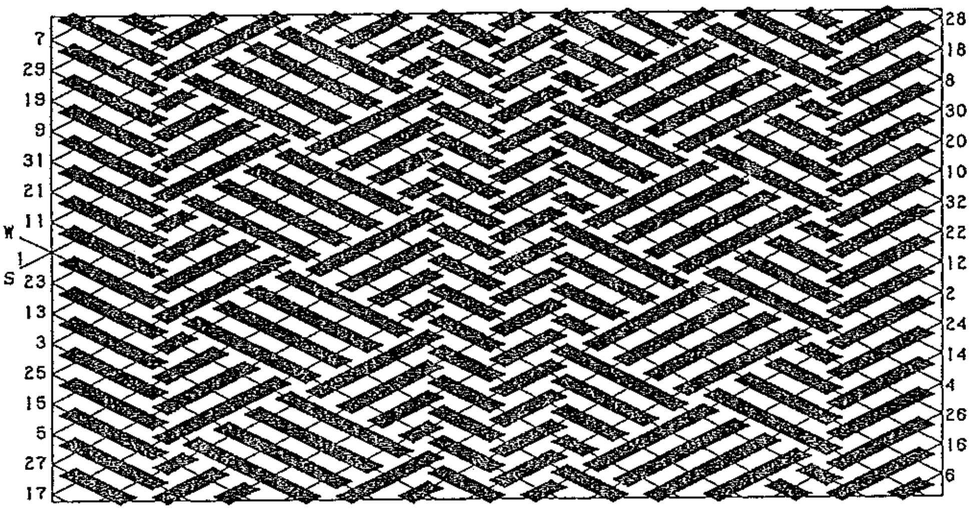


Fig. 3 — A Pampas-style knot with $p/b = 29/16$.

Since there are four different coded half-cycles from lower-left to upper-right we need an algorithm diagram for each type, and since there are four different coded half-cycles from lower-right to upper-left, none of which can be coupled with any of the four types from lower-left to upper-right, we also need an algorithm diagram for each of them. Hence we require a total of eight algorithm diagrams.

L ⟶ R

11	6	1	12	7	2	13	8	3	14	9	4	15	10	5	0	11	6	1	12	7	2	13	8	3	14	9	4	HALF-CYCLE			
u	u	u	o	o	o	o	u	u	u	u	o	u	u	o	o	u	o	o	o	o	u	u	u	u	o	o	o	1	9	17	25
u	u	u	o	o	o	u	u	u	u	o	o	u	u	o	o	u	u	u	u	o	o	o	o	u	o	o	o	3	11	19	27
u	u	u	o	o	u	u	u	u	o	o	o	u	u	o	o	u	u	u	o	o	o	o	u	u	o	o	o	5	13	21	29
u	u	u	o	u	u	u	u	o	o	o	o	u	u	o	o	u	u	o	o	o	o	u	u	u	o	o	o	7	15	23	31

R ⟶ L

11	6	1	12	7	2	13	8	3	14	9	4	15	10	5	0	11	6	1	12	7	2	13	8	3	14	9	4	HALF-CYCLE			
u	u	u	o	u	u	u	u	o	o	o	o	u	u	o	o	u	u	u	o	o	o	o	u	u	o	o	o	2	10	18	26
u	u	u	o	o	o	o	u	u	u	u	o	u	u	o	o	u	u	o	o	o	o	u	u	u	o	o	o	4	12	20	28
u	u	u	o	o	o	u	u	u	u	o	o	u	u	o	o	u	o	o	o	o	u	u	u	u	o	o	o	6	14	22	30
u	u	u	o	o	u	u	u	u	o	o	o	u	u	o	o	u	u	u	u	o	o	o	o	u	o	o	o	8	16	24	32

For convenience sake we have arranged the algorithm diagrams for the lower-right to upper-left half-cycles so that we can read them from left to right. The conventional algorithm diagrams with their i-values are shown above on pg. v; the half-cycles associated with each one are indicated to the right of the thick vertical line.

Similarly the eight diagrams for Ed's algorithms with their ι-values are shown below.

L ⟶ R

12	7	2	13	8	3	14	9	4	15	10	5	16	11	6	1	12	7	2	13	8	3	14	9	4	15	10	5	HALF-CYCLE			
u	u	u	o	o	o	o	u	u	u	u	o	u	u	o	o	u	o	o	o	o	u	u	u	u	o	o	o	1	9	17	25
u	u	u	o	o	o	u	u	u	u	o	o	u	u	o	o	u	u	u	u	o	o	o	o	u	o	o	o	3	11	19	27
u	u	u	o	o	u	u	u	u	o	o	o	u	u	o	o	u	u	u	o	o	o	o	u	u	o	o	o	5	13	21	29
u	u	u	o	u	u	u	u	o	o	o	o	u	u	o	o	u	u	o	o	o	o	u	u	u	o	o	o	7	15	23	31

R ⟶ L

12	7	2	13	8	3	14	9	4	15	10	5	16	11	6	1	12	7	2	13	8	3	14	9	4	15	10	5	HALF-CYCLE			
u	u	u	o	u	u	u	u	o	o	o	o	u	u	o	o	u	u	u	o	o	o	o	u	u	o	o	o	2	10	18	26
u	u	u	o	o	o	o	u	u	u	u	o	u	u	o	o	u	u	o	o	o	o	u	u	u	o	o	o	4	12	20	28
u	u	u	o	o	o	u	u	u	u	o	o	u	u	o	o	u	o	o	o	o	u	u	u	u	o	o	o	6	14	22	30
u	u	u	o	o	u	u	u	u	o	o	o	u	u	o	o	u	u	u	u	o	o	o	o	u	o	o	o	8	16	24	32

The half-cycle algorithms are as follows:

1. Free Run.
2. o.
3. o.
4. $u - 2o$.
5. $u - o - u$.
6. $u - 3o - u$.
7. $2u - 3o$.
8. $3u - o - u - o - u$.
9. $u - o - u - 2o - 2u$.
10. $2u - 3o - u - o - u - o$.
11. $u - o - u - 2o - u - o - u - o$.
12. $u - o - u - 5o - u - o$.
13. $3u - 3o - u - o - u - o$.
14. $2u - o - u - 5o - 2u - o$.
15. $3u - 4o - u - 2o - u - o$.
16. $2u - o - 2u - 3o - 2u - 2o - u - o$.
17. $2u - 2o - u - 6o - 2u - o$.
18. $5u - 4o - 2u - 2o - 2u - o$.
19. $2u - 2o - 2u - 3o - 2u - 3o - u - o$.
20. $2u - 2o - 3u - 3o - u - 3o - 2u - 2o$.
21. $2u - o - 3u - 4o - 2u - 2o - 2u - 2o$.
22. $2u - 2o - 2u - 2o - u - 5o - 3u - 2o$.
23. $5u - 3o - u - 2o - u - 3o - 2u - 2o$.
24. $3u - o - 3u - 2o - u - 2o - 3u - 3o - u - 2o$.
25. $3u - 2o - 3u - o - u - 2o - u - 3o - 3u - 2o$.
26. $3u - o - 3u - 3o - u - 2o - 3u - 3o - 2u - 2o$.
27. $3u - 3o - 2u - 2o - u - 2o - 4u - 3o - u - 2o$.
28. $3u - 4o - 3u - o - u - 2o - 2u - 4o - 3u - 2o$.

29. $3u - 2o - 4u - 2o - u - 2o - 3u - 4o - 2u - 2o$.
30. $3u - 3o - 4u - 2o - u - 2o - u - 4o - 4u - 3o$.
31. $3u - o - 4u - 4o - u - 2o - 2u - 4o - 3u - 3o$.
32. $3u - 2o - 4u - 3o - 2u - 2o - 4u - 4o - u - 3o$.

It is important to check whether or not the half-cycle algorithms for a Regular Knot are possibly correct. A simple check is offered by the number of crossings in a half-cycle.

(1). The first half-cycle is always a free run, hence no crossings.

(2). The half-cycles $2n$ and $2n+1$ have each $\left\lfloor \frac{np}{b} \right\rfloor$ crossings, where $1 \leq n \leq b-1$.

(3). The half-cycle $2b$ has $p-1$ crossings.

(4). The sum of the crossings in the half-cycles m and $2b+1-m$ is equal to $p-1$, where $1 \leq m \leq 2b$.

Then there is a further check for Regular Knots with $p < b$. When $p < b$ the overall number of half-cycles of the string-run consist of p sets of half-cycles, where all the half-cycles of a set have each the same number of crossings. The number of half-cycles in the first set (the free-run half-cycles, the half-cycles each of which intersects zero other half-cycles) is equal to:

$$2\left\lfloor \frac{b}{p} \right\rfloor + 1 .$$

The number of half-cycles in the subsequent consecutive sets greater equal 2 and less than p, hence excepting the last set (the p^{th} set), is equal to:

$$2\left(\left\lfloor \frac{(n+1)b}{p} \right\rfloor - \left\lfloor \frac{nb}{p} \right\rfloor\right), \qquad \text{where} \quad n = 1, 2, 3, \cdots, (p-2).$$

The number of half-cycles in the last set (the p^{th} set) is equal to:

$$2\left(b - \left\lfloor \frac{(p-1)b}{p} \right\rfloor\right) - 1 = 2\left\lfloor \frac{b}{p} \right\rfloor + 1 .$$

With these formulae it is easy to prove that the sequence of the number of half-cycles in the sequential sets is palindromic†. Once again, **Ed Pass** has to be **congratulated** with discovering by himself these relationships, the more so since only recently in the Dutch publication "Het Knoopeknauwertje" (The Unraveller of Knot-mysteries), Issue No.7, its writer/editor (who is a mathematician) is obviously unaware of these half-cycle properties as otherwise he would not have written the following half-cycle algorithms for the well-known $p/b = 5/6$ Spanish Ring Knot:

1.	$L \longrightarrow R$:	Free Run.	7.	$L \longrightarrow R$:	$2o$.
2.	$R \longrightarrow L$:	Free Run.	8.	$R \longrightarrow L$:	$2o - u$.
3.	$L \longrightarrow R$:	o.	9.	$L \longrightarrow R$:	$2o - u$.
4.	$R \longrightarrow L$:	o.	10.	$R \longrightarrow L$:	$2o - 2u$.
5.	$L \longrightarrow R$:	$2o$.	11.	$L \longrightarrow R$:	$2o - 2u$.
6.	$R \longrightarrow L$:	$2o$.	12.	$R \longrightarrow L$:	$2o - 2u$.

It will immediately be seen that the sequence of the number of half-cycles in the sequential sets is $2, 2, 3, 2, 3$, which is not palindromic and hence the table of half-cycle algorithms must be incorrect. The sum of the crossings in the half-cycles 3 and 10 should be $p - 1 = 4$ and not 5. Furthermore, the sum of the crossings in the half-cycles

† A palindromic sequence of numbers is a sequence of numbers which, when taken in reverse order, gives the same sequence of numbers. For example: 5, 4, 6, 4, 6, 4, 5.

5 and 8 should be $p-1=4$ and not 5. Apart from all this, it should be well known that the half-cycles $2n$ and $2n+1$, where $1 \leq n \leq b-1$, each have the same number of crossings always, and hence in the above case there is an error in the half-cycles 2 and/or 3, and in the half-cycles 4 and/or 5. It is obvious that we are here not dealing with a typing error, but rather with a case which shows that the nature of Regular Knots is not understood at all.

We hope that other braiders will follow the example set by Ed Pass, and hence will discover by themselves relationships which rule the world of braids. They will then obtain the satisfaction which undoubtedly Ed Pass obtains from braiding as a craft.

Knotters, Nutters and Conferences

Conferences are the ideal venues for people with limited capabilities who seek the limelight. This statement should only be seen as a general one of course since there are always innocent nonlimelight seeking participants who, with respect to conferences, don't know the ropes yet. Those novices believe that at these venues they will hear the experts in the field and learn a great deal from them, not realising yet that the participating experts are in general ex-spurts (ex = have been; spurts = drips under pressure). The conference organisers are, consciously or subconsciously, well aware of this and hence normally give each speaker roughly half an hour in which to perform his act. This ensures that a speaker doesn't get the time to either present anything properly (hence of real value to the audience) or make a fool of himself. Nevertheless, conferences are great venues at which to underline one's importance and to rub shoulders, even if it is only for acquiring the smell of a well established ex-spurt.

Was the IGKT-North American Branch Conference in New Bedford, Massachusetts, commemorating the 50$^{\text{th}}$ aniversary of Ashley's death, such an event???

Going by the various reports, it certainly looks very much like it as far as the subject knot or braid is concerned. Of course, newspaper reports can be very misleading, but the reports in the *Boston Sunday Globe* of 3/8/1997, *The Standard-Times* of 7/8/1997, the *New Bedford Standard Times* of 10/8/1997 are in agreement with the Conference Report by the offical-unofficial chronicler of the event, Robert M. Wolfe, M.D.

The reader should not get the impression that the 50$^{\text{th}}$ aniversary of Ashley's death should not have been commemorated, to the contrary it should have been commemorated in a way which, in a technical sense, did not degrade the achievements of Ashley. Then what was so degrading???

It is the so-called **Ashley bend** #1452 which the ex-spurts like to see on a commemorative postage stamp. Those who read *The Braider* properly, and can even faintly remember the general gist of some discussions, will recall that we did discuss the "Ashley bend" in some previous issue (Issue No. 5) and showed that this bend was nothing more and nothing less than the two string 3-part/2-bight over-under coded Regular Cylindrical Braid, often referred to as the two string 3-part/2-bight over-under coded lanyard knot, the two string 3-part/2-bight Turk's Head lanyard knot, the two string walled crown knot, or the Footrope knot #783. It is a two string **crown knot** with a **wall knot** under it, the working ends of which are fed through the eye of the **crown knot**. It may be used as a bend when the string-ends through the eye of the crown are kept free of any load. In order to obtain then the maximum strength it is important to tie and tighten this bend as a lanyard knot before using it as a bend as otherwise the lay of the strings is normally not as good as it can and should be. Since Ashley and apparently all "experts" missed the real nature of this bend it was a shame that two readers of *The Braider*, one being a speaker at this Conference and editor of the knotting journal *Het Knoopeknauwertje* in which was published (Issue No. 9) a letter of the other concerning this bend in connection with, among other, the Ashley commemorative postage stamp, either could not remember the general gist of our discussion concerning the "Ashley bend" or preferred to keep the other ex-spurts in the dark. Whatever the case may be, Ashley surely deserved to be commemorated for the book he wrote or by one of the knots he did discover, rather than by an already existing and ancient one he apparently didn't recognise the nature of. It is of course understandable that mistakes will be made and that oversights will take place, but there is no excuse for propagating them by those who should know better.

There was in the past, and still is at the present, a passionate discussion going on in the IGKT about **new knots** (see *Knotting Matters*, Issue No. 57, pp. 57–61). They seem to be the self-appointed franchise holders for approving the quality "**new**". This not only shows their inflated ego, but also their ignorance as far as knots are concerned. Not only is it rather irrelevant whether a knot is "new" or not, but we shall never know whether or not this is the case, because for the rather irrelevant determination of "new" or "not new" we need to be able to speak all the present languages and dialects in the world, be able to read all the written languages and dialects of the present and the past in the world, and have access to the knotting information associated with them. Seeing that the ex-spurts in the IGKT apparently don't know and seem to be unable to "discover" that **Ashley's bend** #1452 and the **Footrope knot** #783 are the same (both written down in Ashley's book in the English language), one can only wonder about their self-conferred expertise in knotting matters.

We have mentioned in the past that knots and braids are heavily infested with a good deal of nonsense from a practical as well as from a theoretical angle. There was with respect to this an interesting statement in the report (prepared by Robert Wolfe, M.D.) of the Conference as follows:
Vaughan Jones, professor of mathematics at the University of California, Berkeley, and Hon. Vice President of the IGKT [International Guild of Knot Tyers], gave a surprisingly understandable introduction to knots from the mathematician's perspective. He explained that, if the standing end and free end aren't fused together, you have mathematically, no-knot at all, and that only what we call closed loops (with their various twists, crossings, and other permutations) are considered knots.

Hence from the mathematician's perspective the fusing of the ends must be considered an essential part of knotting — no fusing, no knot. But also when one starts with a string of which the ends are fused, whatever is produced is from a mathematicians perspective no-knot at all. In real, hence physical, knots, however, the ends are very rarely fused and if they are fused this fusing has no effect on the physical knot since it does not form a part of the knotting process. Thus mathematical knots are not physical knots and hence whatever the mathematician's theory states about their knots cannot be considered to be of value to physical knots; if there is at times a correlation, then that is obviously purely coincidental. The mathematician's knots are not real, hence physical, knots, but are instead hypothetical fantasy knots, and consequently so is their associated theory with respect to the real physical world around us. We have stressed this several times before and it is prudent to appreciate the inevitable consequences —

the introduction of a great deal of hairy-fairy nonsense derived from hairy-fairy hypothetical theories.

A braider or knotter should be aware that Conferences as well as Publications can be, and often are, the propagation beds for nonsense and confusion, originating from both the practical and theoretical angle. Hence it is very important to evaluate the presented material in a critical way and to ask questions (the more the better) where obscurity lingers.

It is of some interest to note that roughly over the last decade or so there is a conspicuous infiltration of topological knot theorists (they belong to the fraternity of the theoretical mathematicians) into the realms of the practical knotters and braiders. It is fair to say that these mathematicians have no genuine interest in real, hence physical, knots and braids, which is of course understandable. One therefore wonders why they like to be associated with people whose field of interest is really quite different, and vice versa one wonders why practical knotting and braiding organisations are apparently more than delighted to have them as members or office holders. Wouldn't the most likely reason be the acquisition of the aromatic odour of each other, which from the mathematician's point of view would give them some practical credibility, and which from the knotter's and braider's point of view would give them some academic status. It certainly is all a world of pretence.

Errata — *The Braider*

Some typing errors were noted in at least some copies of the following Issues of *The Braider*. Our grateful thanks again to Doug Van Tassel who detected them. The corrections required are indicated below in bold:

No. 9

none

No. 10

pg. 213, line 2 — **choose**

No. 11

pg. 232, line 17 — **general**
pg. 245, line 8 — **general**

No. 12

pg. 257, line 7 from bottom — delete **thinspace**