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Notes on Nested Grids (1)
Vanishing Equatorial Grids

Pieter van de Griend

Prologue

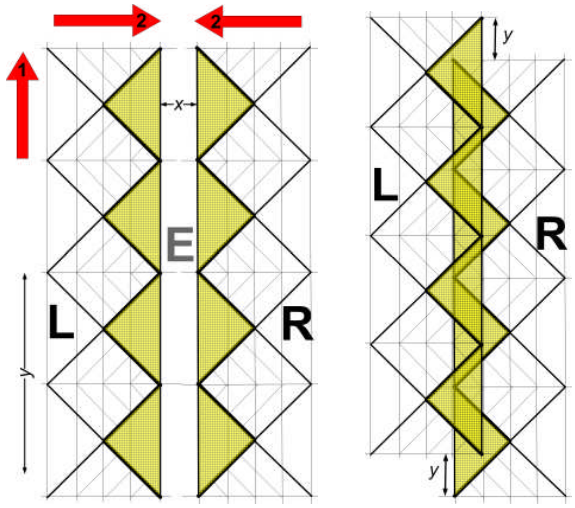
In "Aspects of Sphere Covering Knots" [KN#57] we flew over Nested Grids and sold them as composites of Hemispherical Grids linked by a chunk of Equatorial Grid [1, p2]. During the flight we mentioned "bizarre" negative-valued Equatorial Grids, but left it as a challenge to the *Knot News* readership to come up with a sample specimen. So far response stayed out and the sound of silence made me decide to write about this subclass of Nested Grids. While thinking about the article format, I felt challenged to extend it to a series of Notes on Nested Grids (**NONG**).

In the papers, which are to follow, we mainly address issues from *Symmetrical* Nested Grids, denoted by (*B,A,x,y*). Whenever relevant we shall extend the ideas into the Asymmetrical Nested Grids arena. There are many venerable Nested Grids aspects, which are worthy writing about, but our first NONG-topic will concern Vanishing Equators.

Setting the Stage

To facilitate our discussion of Nested Grids, we need some definitions. One of the hardest aspects to visualize of Nested Grids seems to be the rotation, which the left-hand side rim can make relative to the right-hand side rim. In the following we shall call these rim sections **Hemispherical Grids** and denote the rotation by *y* (measured in parts). As we are discussing Symmetrical Nested Grids these Hemispherical grids are identical. In the illustration below a generic Nested Grid has been decomposed into three components. For our purposes the Equatorial Grid (*E*) is invisible and the Left Hemispherical Grid (*L*) and Right Hemispherical Grid (*R*) are shown.

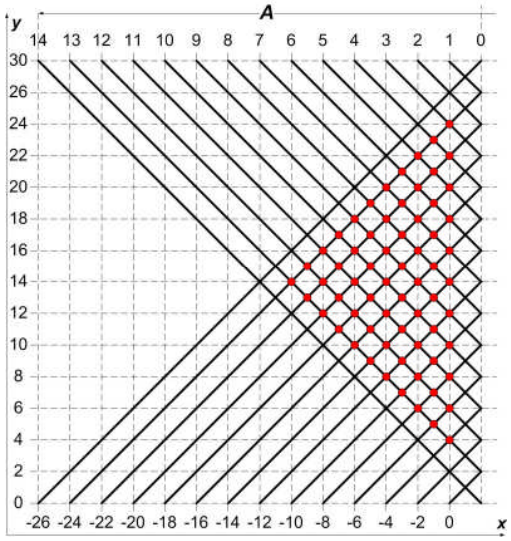
These components can rotate freely relative to each other, this is indicated by the arrow marked 1. The rotation of *L* relative to *R* is our *y*. Flipping the sign of *y* signifies rotation in the other direction. Rotational ability is only one aspect of Hemispherical Grids. You can also move the *L* and *R* sections in the directions of the arrow marked 2. As the grids happen to match, you may squash them into each other. After the Equatorial Grid has vanished, the Hemispherical Grids can be viewed as gears. The crossings populate the hatched sections. They can overlap and bite into each other, causing a subzero Equatorial Grid Section to emerge. The result is shown to the right below.



The *L*-rim can grip into the *R*-rim, but there is an obvious maximum. It occurs when the "*L*-peaks" and "*R*-valleys" coincide. The distance between the innermost nests is our Equatorial Width (*x*), which is now negative.

Some Theoretical Considerations

Clearly the *L*- and *R*-sections only allow negative *x*-values if and only they can interlock. Interlocking conditions are driven by the *A*- and *y*-values. Note that when *y*=0, like in the situation of the left image above, the smallest possible non-positive *x*-value is *x*=0. Also note that rotating *L* relative to *R* brings you back to the starting situation after 2*A* clicks. Hence 0<=*y*<=2*A*. Observe that we have *x*>=(2-A) and how *y* places restrictions on *x* and vice versa. As *x* drops below zero, the grid restricts *y* in its possible value range.

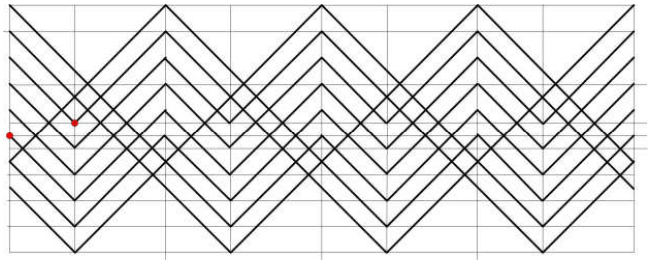


Let us study an illuminating example. Consider the left-handed side Hemispherical Grid *L* of (1,14,*x*,*y*) given above. The bold red dots indicate where in the grid an "*R*-peak" may be positioned in this "*L*-valley", without the grid "falling apart". Verify that in the case *x*>=(2-*A*)=(2-14)=-12 (parts), then 0<=*y*<=14 (bights).

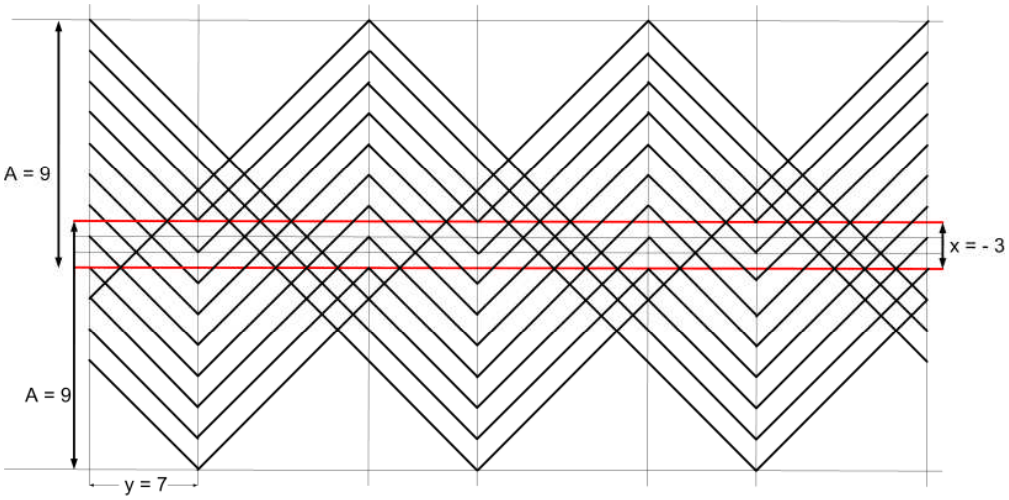
Three Examples

Let us consider a few subzero equatorial gridders. For all forth coming NONG-articles we have the default presentation-mode in which top and bottom grid-points transition into each other. We shall occasionally deviate from the normal grid-representation by rotating all grids 90 degrees clockwise. This is done (1) because most of our examples will be narrow grids in ABOK-parlance and (2) we save page space.

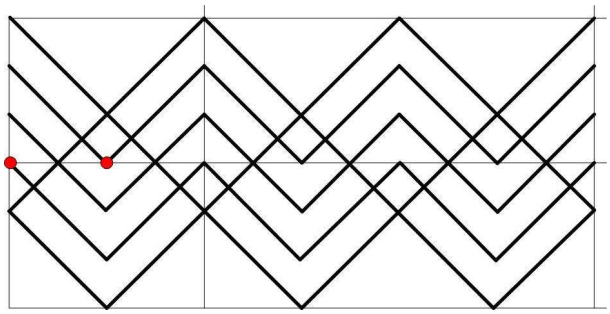
Example 1: Case (4,6,-1,5). Check that we hold co-prime pairs (*P*,*B*) and (*A*,*y*) satisfying both conditions of the Symmetrical Nested Grids Common Divisor Law [2, p4]. Verify that *P*=2(*A*-1) +*x* = 2.5+1 = 11. Condition I is satisfied as *gcd*(*P*,*B*) =*gcd*(11,4) = 1. Condition II is satisfied as *gcd*(*A*,*Y*) =*gcd*(6,-1) =1. Hence Nested Grid (4,6, -1,5) consists of one single component.



Example 2: Case (3,9,-3,7). P=2(A-1)+x= 16-3=13. Condition I yields *gcd*(P,B) = *gcd*(13,3) = 1 and Condition II yields *gcd*(A,y) = *gcd*(9,7) =1. This Nested Grid consists of one single component and is shown below.



Example 3: Case (3,4,0,4). $P = 2(A-1)+x = 2.3+0 = 6$. Condition I yields $gcd(P,B)=gcd(6,3)=3$. Condition II yields $gcd(A,y) = (4,4)=4$. It follows that this Nested Grid will not consist of one single component.



Asymmetric Nested Grids

We have discussed the subzero Equatorial Grid elements residing among the set of Symmetric Nested Grids. What about our gear model when it comes to Asymmetrical Nested Grids? It can still be used, but has to comply with stricter conditions. Foremost, both gears must allow interlocking along the entire length of the Equatorial Grid. Secondly the *x*-values will be less negative than in the Symmetrical Nested Grid case. Try and determine what an asymmetric version may look like.

Sources

As far as I know no publications exist, in terms of braiding or knotting monographs, showing negative Equatorial Grid samples. Schaake (*et al.*) merely state that, "*The value of* x *has to be specified by the braider, before the grid-diagram of the braid can be drawn"*, but leave it at the reader's discretion to discover the range over which *x* may vary [3, p15].

Epilogue

Generally these subzero Nested Grids do not strike me as nice knotties. That, of course, represents a very subjective statement. In the next NONG-article we shall look at Nested Grid Components.

References

1. P.v.d. **Griend**, "Aspects of Sphere Covering Knots", *Knot News*, ISSN 1554-1843, no.57, pp1-6, September 2006.
2. P.v.d. **Griend**, "On Gridtype and Codingform Interplay", *Knot News*, ISSN 1554-1843, no.66, pp1-8, March 2008.
3. G.A **Schaake**, J.C. **Turner** & D.A. **Sedgwick**, BRAIDING – *Standard Herringbone Pineapple Knots*, Book 4/1, ISSN 1170-6937, Department of Mathematics and Statistics, University of Waikato, 1991.

A Secure Ring Hitch

James H. "Jimbo" Long

For What is a Knot, Really, But a Clever Kink in a Cord?

The Starting Point

The Ring Hitch, Strap Hitch, Bale Sling Hitch, Lark's Head or Tag Knot – ABOK #'s 59, 1694, 1699, 1700, 1858, 1861, 1868, 1890, etc, etc. Known by many names, it is a HITCH by definition – by whatever name, it doesn't lock in place when pressure is removed from the Standing Part, the Ring Hitch slacks off.

Ring Hitch

I wanted to improve this Hitch to use with a key fob. It would make a nice Hitch for a permanent lanyard too. It had to be attractive enough to take out in public, yet easy to tie through a ring without involving entangling ends as some key fobs end in Eye Splices. I think you'll see it can be used on a lot of semi-permanent fastenings, but you be the judge.

"Jimbo's Turtleneck Hitch" (singled and doubled – you can triple it or more if you have the nerve) is a silly name, not to be countenanced, so I'm hoping for suggestions or hopefully it's already documented? Whatever you call it, I think it's a pretty knot with a double bearing on the ring or rail, and a nice matching "collar" that seems to me to resemble a two-strand Matthew Walker.
Assume the rail in the pictures is an endless rail or a ring or tool or becket or anything else where you want to fasten a loop in a cord without access to the ends of the "hitchee".

Evolution Begins

Tuck the Standing Part through the Bight or Eye just like you do for the Ring Hitch. This time, leave the Bight or Eye loose and tuck the Standing Part

again, around the same arm in the same direction. At this point, you'll want to consider the "handedness" of your cordage. You can use either side of the Eye when tucking, but one way may cause hockles. If so, make your wraps on the other Arm.

Through and through makes two

When you pull the Standing Part to tighten the knot, you'll notice the wrap spills into the Eye. The Standing Part will straighten out, each of the bearing Turns around the ring will wrap up the Standing Part from its own side. Keep it fair as you tighten.

Standing part straight

Work it into shape

Finished Hitch

That's all there really is to this trick. The rest is all incremental. You'll notice that the first evolution leaves the effect of a single turn on one side and two on the other. If you're okay with that, you're done, go outside and play.

Moving Up

If you're into symmetry and balance, this is the important part. Tuck as before, but add another tuck.

Three tucks (third time is the charm)

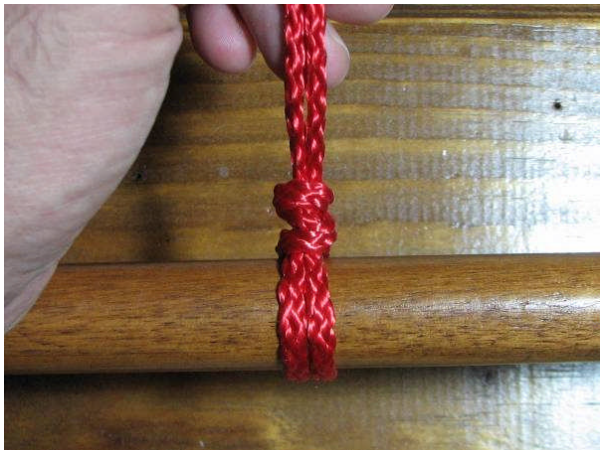
Resist the urge to keep tucking, but this is where you would do that, if you really wanted to. The more you tuck, the harder it is to spill and fair, but it'll all go.

Begin to spill wraps

Use fingers to adjust

One crosses in front, one in back

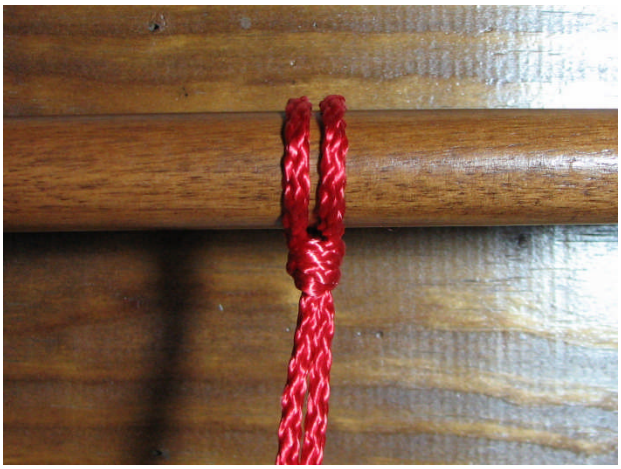
You can repeat for as many tucks as you like, but I am content with this. This way I have a double bearing on the ring and a fair double wrap holding the Standing part. It's balanced.



Tighten carefully

It takes a bit of fiddling to get the wraps to spill over into the eye. Then it's even more fiddly to get the eye laid around the Standing part properly, so it crosses fairly once in the front, once in the back.

Making the "far" bight (the end of the eye, up there along the Standing Part) ride over the "inside" crossing takes some doing, especially if you got tuck-happy. Once the riding turns "stack up", and you fair them and tighten the whole thing, one of the bearing turns around the ring will wrap around the outside from the bottom up, and the other will wrap up through the inside. None of it should "reach" or appear awkward or inefficient. It's very tight and compact when faired up right.



Double Wrap finished knot

This "Wrapped Ring Hitch" (you can Single, Double or Triple it or more, if you have the nerve), whatever you call it, I think is a pretty knot with a double bearing on the ring or rail, and a nice matching "collar" that seems to me to resemble a two-stranded Matthew Walker.

I just made up a loop with a Matthew Walker to show you this Hitch, not 'just' to show how much this Hitch resembles a MW! But there's a method to this madness! If you're planning on doing one of these in an Eye, this will let you *measure* it before you put it in. Once you know how big of a loop you need, you know how big to make your Eye Splice. The Eye will make up the "collar" (of however many turns you have the nerve to fair), plus it will need to reach all the way around the "hitchee" with each Arm to get the double bearing there. Make sure you keep it tight, fair and straight. Make a mark where you want the Crotch of the Eye to be, untie this Hitch but not the MW and Bob's yer Uncle. If you arrange the Eye size so the Crotch is between these "Turtleneck" Turns and the ring, the single cord coming out as the Standing Part makes the double-double purchase interesting – it looks like two parts around the ring and two parts around the <gasp> ONE part! Okay, I'm easily amused…

Finished with the Matthew Walker Knot

I hope you enjoy it too!

Wine Caddy by José Hernández-Juviel

Fancy knotting by Pieter van de Griend

More badge lanyards

Brion Toss Roy Chapman

Some bellropes

So you want to sell some knots?!!!

Roy Chapman

When I was gainfully employed there was never a question of selling my knotwork. There was never time to make my pet projects let alone make and sell knots at retail. Now I attend a local Farmer's Market every Saturday. Each week I load my sea chests, racks and tables into the Ol' Ford and roll down the hill to the market field. You might well wonder, "Why a farmer's market?" And I'll tell you.

- Because over the course of the season almost every one of our island's 70,000 residents will walk past my table.
- Because the cost is so low that any sale covers the overhead.
- Because in the first 7 weeks we have grossed $53,788.10 (who spent the 10 cents? ...why all of them!) These lovely folks will drop 200K by the end of the season. They come to spend money.
- Because yacht owners, interior decorators, boat builders, housewives and batmen all come to buy asparagus but leave having seen some knots. Some folks even buy knots!
- Because this market atmosphere is one of quality and handcrafted excellence. There is no canned art or imported junk. Everything is made or grown here.
- Because unlike a boat show or Expo, where folks come to visit and be entertained, our market is all about small retail sales.

Ahh, small retail sales: there's the rub. Tying knots is nothing like selling knots. Here is what I've learned:

- You must have a banner or sign telling what you sell. Folks will stare at a key fob and not know what it is. This is not true if you sell asparagus.
- You must greet each visitor with a smile, eye contact and a cheery vocal greeting. They must understand that a human being made this knot. This is not true if you sell asparagus.
- You must not eat or sit down. Visitors will not interrupt you at your rest or repast. This is not true if you sell asparagus.
- You can make inventory (in fact you must make inventory) all day. Do not make it look easy. Fortunately this will not be a problem if you are selling hard. This is not true if you sell asparagus.
- You should display as much inventory up on racks as possible. Mats look good flat but they get visually lost. TINTIYSA.
- You should have a signature item of apparel or knotwork. Be recognizable on the street because of it. You see each of these folks away from your market. Knotting conversations will spring up when folks recognize you. TINTIYSA.
- You should negotiate with your market manager for a choice location. People cut the corners while they tour and ignore the first setups when they come in from parking. TINTIYSA.
- You should consider price sheets rather than wee price tags. The tags add clutter and a laminated sheet does not invite 'dickering". Our market does not encourage dickering. The fish is $15 per pound and the popcorn is $5 a bag. This is true even if you sell asparagus.
- You should try to keep a sense of humor. Your favorite style and color may not sell at all while something you consider silly may sell like hotcakes. TINTIYSA.
- You should be prepared to have fun. TINTIYSA.

Each week Force Five has a “featured item”.

Fifty vendors will share $200,000 this year.

Being easily recognized can be good for business

This young lady has a Force Five dragonfly hair pin. Every customer is a walking advertisement, so make sure they have some of your cards to hand out.