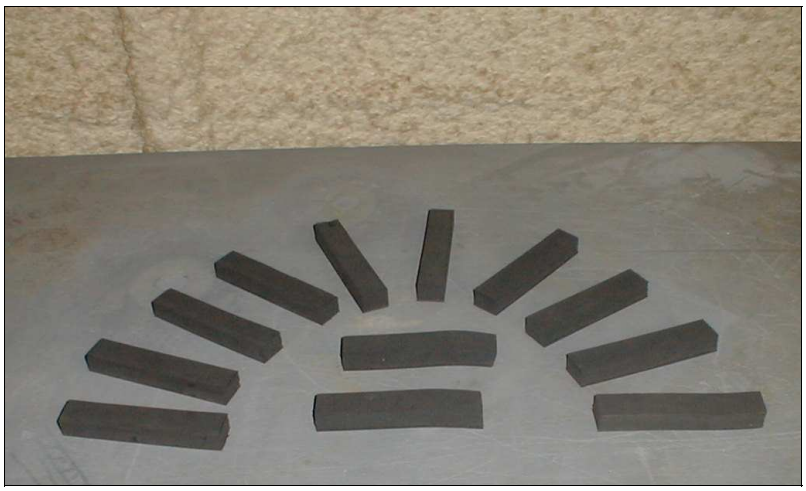
- - MAGNETIC SEED DAMS - -

4 ... inches long x 3/4 inches Wide

High Density Closed Cell Foam
Glued to 1/8 inch Rubberized Magnet



SEED DAMS (BLOCKERS)

SEED DAMS are simply anything that will .....

Block the Flow of the *“ Reject material “* that has .....
“ Reached to much Speed on the Spiral Flighting “

When to use them ... Where to put them and ... How many to use ... will be what we are trying to answer here.

We’ll Start by : Reading ... page 2
In 1970 an article was published in
(Mississippi Farm Research - Vol. 33, No. 4, April 1970) on the use of SEED DAMS to improve the action of the spiral separator.

3 - 6 gives an overview of ... Disadvantages & Advantages of Dams

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Determining .... When to use Dams
Read ... page 7

Where to put them .... Depends on whether you have an Open Spiral or Enclosed Spiral :

For an Open units ... See pages : 9 - 14

For an Enclosed Core units ... See pages : 15 - 19

INTRODUCTION TO SEED DAMS

The problem of removing foreign material and imperfect soybean seed from good soybean seed has existed since soybeans have been grown as a crop. As this problem was recognized, the spiral separator was adapted for processing soybean seed.

The spiral separator is a machine used to process agricultural seed. It was originally designed to remove vetch seed from wheat seed. The machine is currently being used to process soybean seed. The machine separates whole soybean seed from contaminants such as corn, split soybean seed, moldy soybeans and impurities that do not roll as freely as whole soybeans. The machine separates seeds based on shape, density, and degree of roundness or ability to roll.

The spiral separator consists of one or more inner sheet metal flights spirally wound around a central axis. Seed is discharged onto the upper end of these flights. Nearly spherical seeds travels at a faster rate than less round seed. Seed momentum increases until the round seeds roll off the edge of the inner spirals and are caught (in the outer spiral) The good seed in the outer spiral and the contaminants which remain on the inner spirals are discharged separately from the machine.) The rate of incline in the spirals and the banking angle of the flights are predetermined and fixed by the manufacturer.

The only adjustment on commercially existing spiral separators is rate of feed of the seed into the machine. (This has been improved upon with the addition of a Fine Tuning Gate at the bottom of the spiral)

The two major disadvantages of the spiral separator are lack of flexibility in adjustment and low capacities. The lack of adjustment prevents fine-tuning the machine in order to make precise separations. Separations may be made only between good seed and contaminants with gross differences in shape, density, and roundness.

In 1970 an article was published in (Mississippi Farm Research - Vol. 33, No. 4, April 1970) on the use of SEED DAMS to improve the action of the spiral separator. This device used wooden strips fastened to the inner flights with clothes pins. It was reported that, without seed dams, 1% - 3% of the seed of purple moon flower (a contaminant) remained in the good seed. With the seed dams, 99.9% of the purple moon flower seed were removed. Loss of good seed was 3% with the strips 1.9% without the strips.

(EXAMPLE ONLY)

DISADVANTAGES OF THE SPIRAL SEPARATOR "WITHOUT SEED DAMS"

FIG. 1 ILLUSTRATES A SINGLE SPIRAL FLIGHT WITH "FIXED" DESCENT AND BANKING ANGLES.
FIG. 2 ILLUSTRATES A TOP DOWN VIEW OF SAME FLIGHTING IN WHICH A SEED MASS HAS BEEN DROPPED.
FIG. 3 ILLUSTRATES SAME SEED MASS AFTER TRAVELING 1 REVOLUTION AROUND AND DOWN SPIRAL FLIGHTING.

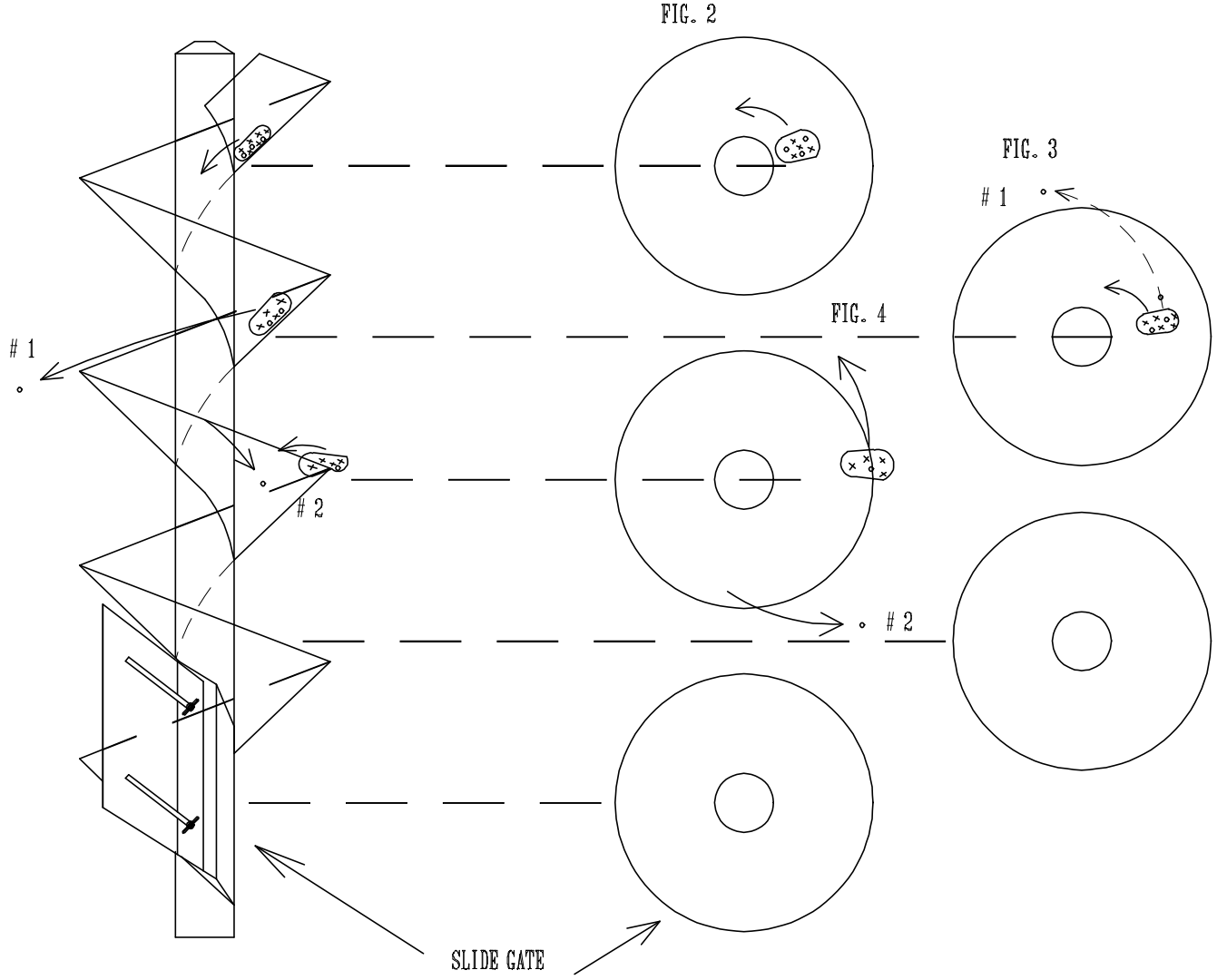
YOU WILL NOTICE SEED MASS HAS MOVED OUTWARD AND UP BANKING SOMEWHAT, AND ONE ROUND SEED HAS ESCAPED MASS AND WILL PICK UP SEED VERY RAPIDLY AT THIS POINT, AND ROLL OVER EDGE OF FLIGHTING.

THE OTHER "TWO" ROUND SEED HASN'T ESCAPED SEED MASS AS OF YET AND ARE BEING SWEPT LONG WITH SEED MASS "THUS IMPENDING OR PREVENTING THEM FROM REACHING ESCAPE VELOCITY MORE QUICKLY."
FIG. 4 ILLUSTRATES THE SEED MASS HAVING ENOUGH MOMENTUM TO ESCAPE SPIRAL FLIGHTING, AND UNFORTUNATELY IT IS SWEEPING THE GOOD ROUND SEED OVER THE EDGE WITH IT. AT THE FIG. 4 POINT, A CONTINUATION OF THE SPIRAL FLIGHTING (IN THIS CASE ANYTHING OVER 2 REVOLUTIONS) WOULD BE USELESS.

SUMMARY

SPIRAL ONLY GOOD FOR 2 REVOLUTIONS
PROBABILITY OF "ROUNDS" ENDING UP WITH "FLATS" GREATER

FIG.1 " WITHOUT SEED DAMS "



(THIS IS AN EXAMPLE ONLY - Our Manual gives a general explanation of how to place the dams, but your specific needs may vary from the illustrations on the following pages. For example, if there are too many good seed mixing with the rejects then some or all of the seed dams may need to be removed from the unit. On the other hand, too much bad seed and contaminants in with your good seed may mean there is a need for seed dams in the separator. In either case the operator of the spiral separator should determine how many, if any, should be used in the unit by running tests.)

"ADVANTAGES, OF THE SPIRAL SEPARATOR USING "SEED DAMS" AS FINE TUNING SYSTEM"

DEFINITION OF A SEED DAM:

A SEED DAM CAN BE A WOODEN STRIP, MAGNETIC STRIP, METAL, FIBERGLASS STRIP, ETC. ANYTHING THAT IMPEDES THE SEED MASS FLOW DOWN THE SPIRAL FLIGHTING. THE STRIPS SHOULD BE SUFFICIENTLY LONG ENOUGH SO THAT WHEN AT A TANGENTIAL ANGLE OF 45 DEGREES TO THE OUTER EDGE OF THE SPIRAL FLIGHT, 3 TO 4 INCHES (76.2 TO 152.4 MM) OF THE STRIP CAN OPERATE AS A SEED DAM.
SEE FIG. 11

FIG. 5 ILLUSTRATES THE SAME SINGLE SPIRAL FLIGHT WITH SEED DAMS IN PLACE. PLACEMENT #1 STARTS 3/4 REVOLUTIONS DOWN AND AROUND FROM TOP AT THE ANGLE SHOWN IN FIG. 11.
FIG. 6 IS THE TOP DOWN VIEW OF FIG. 5 SHOWING SEED MASS JUST STARTING IT'S JOURNEY DOWN THE SPIRAL FLIGHTING.
FIG. 7 SHOWS SEED MASS AT SAME POINT AS FIG. 3 ONLY THIS TIME, SEED MASS AND THE #1 ROUND SEED WHICH HAS JUST ESCAPED SEED MASS HAVE COME INTO CONTACT WITH A SEED DAM.

BOTH #1 ROUND SEED AND SEED MASS ARE DEFLECTED DOWNWARD WITH SEED MASS LOSING MORE MOMENTUM THAN ESCAPED #1 ROUND SEED.

BEFORE FIG. 8 #1 ROUND SEED HAS ALREADY ROLLED OVER EDGE OF FLIGHTING ALSO #2 ROUND SEED HAS ESCAPED SEED MASS, GAINED SPEED QUICKLY AND ROLLED OVER EDGE OF FLIGHTING.

BY THE TIME SEED MASS REACHES FIG. 8, THE MASS HAS GAINED ENOUGH MOMENTUM TO COME IN CONTACT WITH FIG. 8 SEED DAM AND IS DEFLECTED DOWN AGAIN ALONG WITH REMAINING #3 ROUND SEED.

BEFORE FIG. 9 SEED DAM #3 ROUND SEED HAS ESCAPED SEED MASS PICKED UP SPEED AND ROLLED OVER EDGE OF FLIGHTING.

BY THE TIME FIG. 9 SEED DAM MASS HAS AGAIN GAINED SPEED, CLIMBED EMBANKMENT, AND CONTACTS SEED DAM, ONLY TO BE DEFLECTED INTO REJECT SPOUT.

FIG.5 " WITH SEED DAMS "

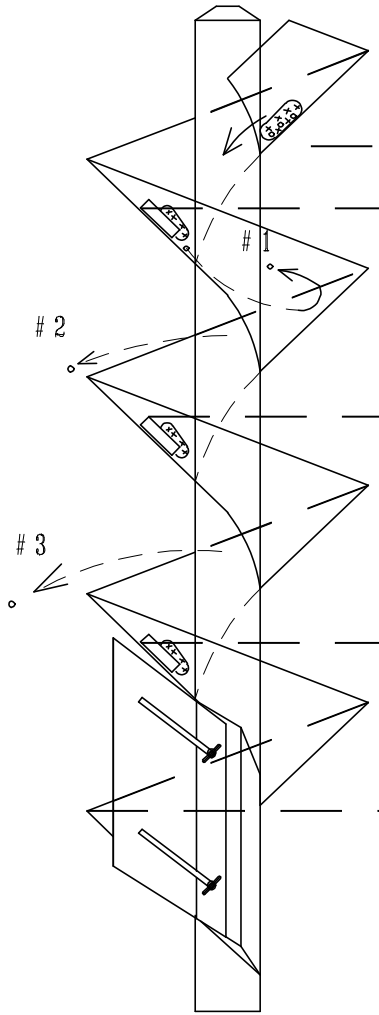


FIG.6

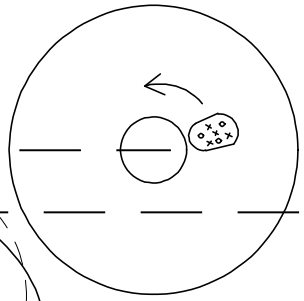


FIG.7

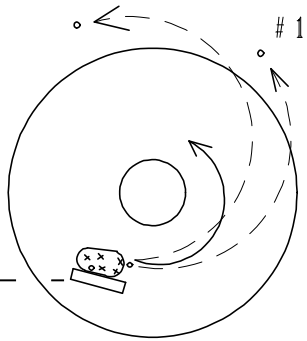


FIG.8

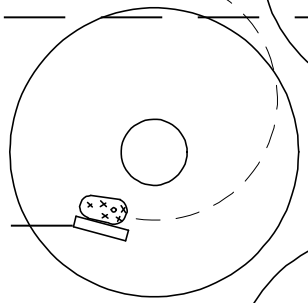
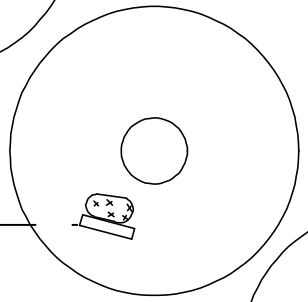
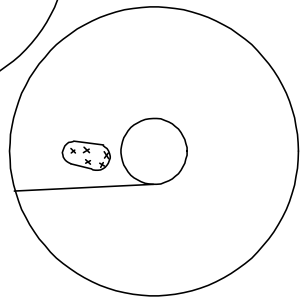


FIG.9





TROUBLESHOOTING - *“ PRINT THIS PAGE ”*

IF TO MANY ROUNDS GOING INTO REJECTS ... BACK GATE DOWN A BIT

STILL ..TO MANY ROUNDS GOING INTO REJECTS ... SLOW FEED FLOW DOWN

STILL ..TO MANY ROUNDS GOING INTO REJECTS ... *** TWIST SEED DAMS OUT A BIT AWAY FROM PIPE - ALL (8) OF THEM

STILL ..TO MANY ROUNDS GOING INTO REJECTS ... REMOVE ALL (8) SEED DAMS

MIGHT WANT TO CONSIDER A SMALLER DIAMETER CORE — PAGE 26
(ORBIT HEIGHT OF THE REJECT MATERIAL SHOULD DETERMINE DIAMETER OF THE CORE)

MIGHT WANT TO CONSIDER A ** MORE ENERGETIC CORE (See bottom of page)

IF TO MANY REJECTS GOING INTO ROUNDS ... PULL GATE UP A BIT

STILL .. TO MANY REJECTS GOING INTO ROUNDS ... INCREASE FEED FLOW “ SLIGHTLY “ (OVERFEEDING = TO MANY ROUNDS IN REJECTS)

STILL .. TO MANY REJECTS GOING INTO ROUNDS ... ADD SEED DAMS NOT FULL ANGLE - ALL (8) OF THEM

STILL .. TO MANY REJECTS GOING INTO ROUNDS ... *** APPLY FULL ANGLE ON - ALL (8) SEED DAMS

STILL .. TO MANY REJECTS GOING INTO ROUNDS ... ADD (8) MORE SEED DAMS “ NOT FULL ANGLE “ — VERTICALLY UNDER — FIRST SET OF 8 DAMS

STILL .. TO MANY REJECTS GOING INTO ROUNDS :

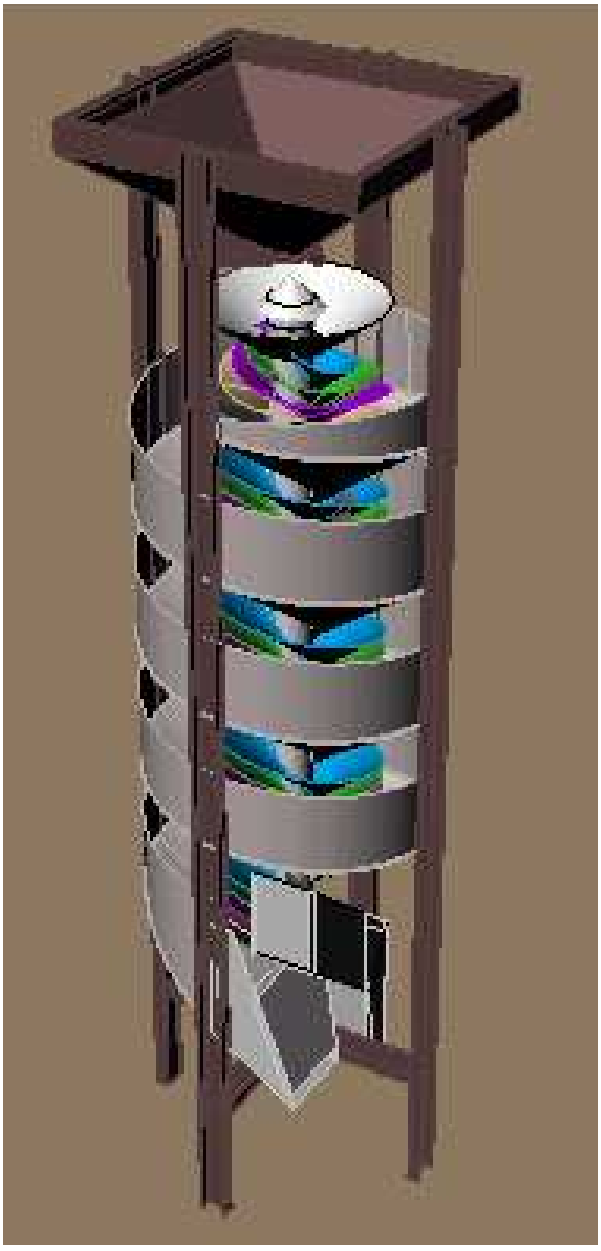
- BIGGER DIAMETER CORE CAN HELP IF PRODUCT IS NOT .. TO ENERGETIC -
“ *PRODUCT BEING TO ENERGETIC MEANS IT HAS A ...* **LARGE ORBIT** *AROUND THE CENTER STEM PIPE SUCH AS .. LARGE ROUND SEEDS OR STEEL SHOT WOULD HAVE - IN THIS CASE - A CORE LARGE ENOUGH TO HAVE A POSITIVE EFFECT COULD EXCEED THE LIMITATION SIZE OF THE CABINET ENCLOSURE “*

IF DUST & SMALLER REJECT MATERIAL WILL ALLOW “ WITHOUT STOPPING UP THE CORE .... MIGHT WANT TO CONSIDER A **LESS ENERGETIC CORE
**** LESS ENERGETIC CORE = DECREASED DOWNWARD ANGLE ... THAT THE SPIRAL IS WRAPPED AROUND THE STEM PIPE**
(***Standard variations of Downward Angle is (3) degree increments - See Page 34*** **)**

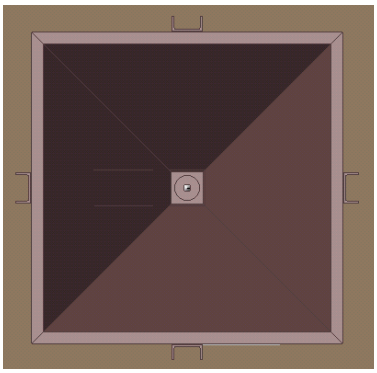
****** FULL MAXIUM ANGLE OF SEED DAMS SHOW ON .. PAGE 19 (Top Picture)***
(MAX ANGLE = SEED DAM POINTING TO OUTER EDGE OF PIPE - ON LOWER SIDE)

PLACEMENT OF SEED DAMS FOR THE HT25 SINGLE OPEN SPIRAL SEPARATOR

(Also works for the HT50 OPEN unit)

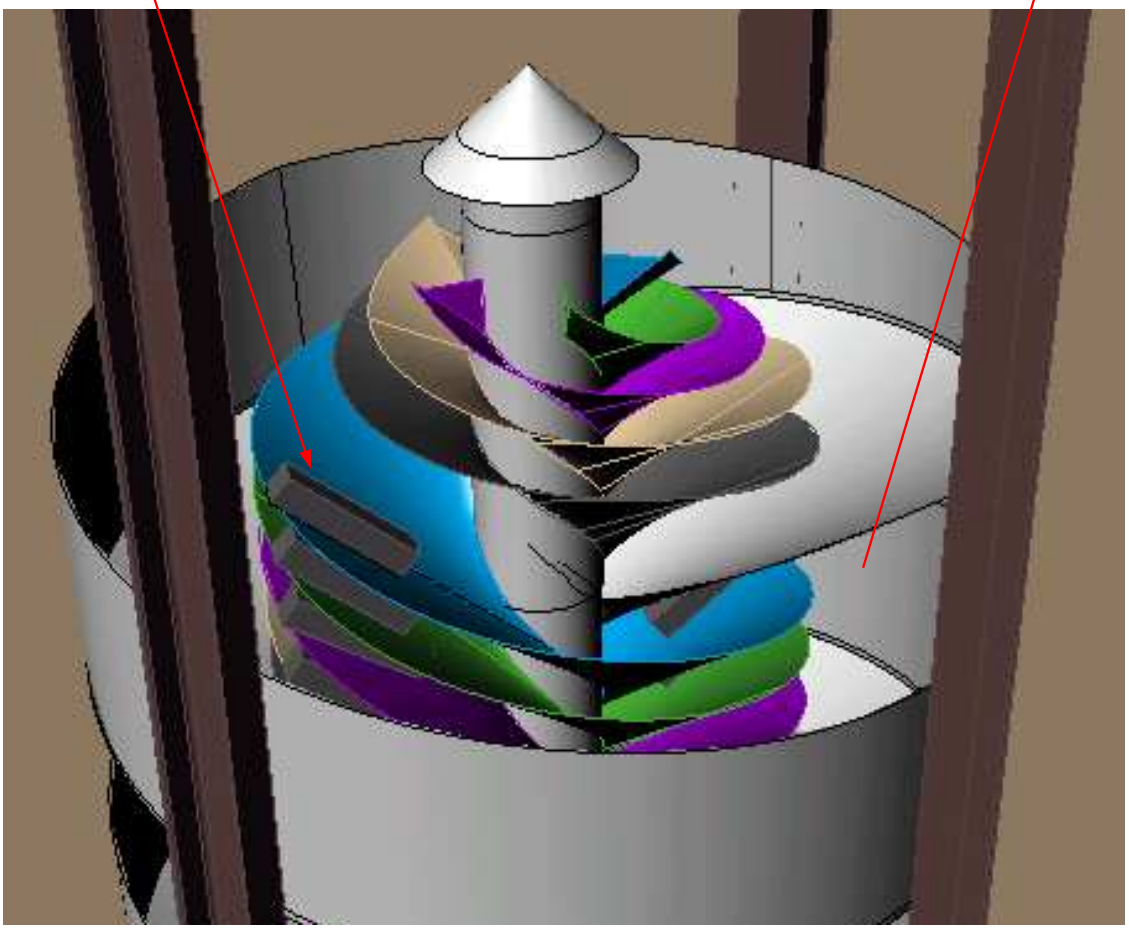


TOP DOWN VIEW of HT25



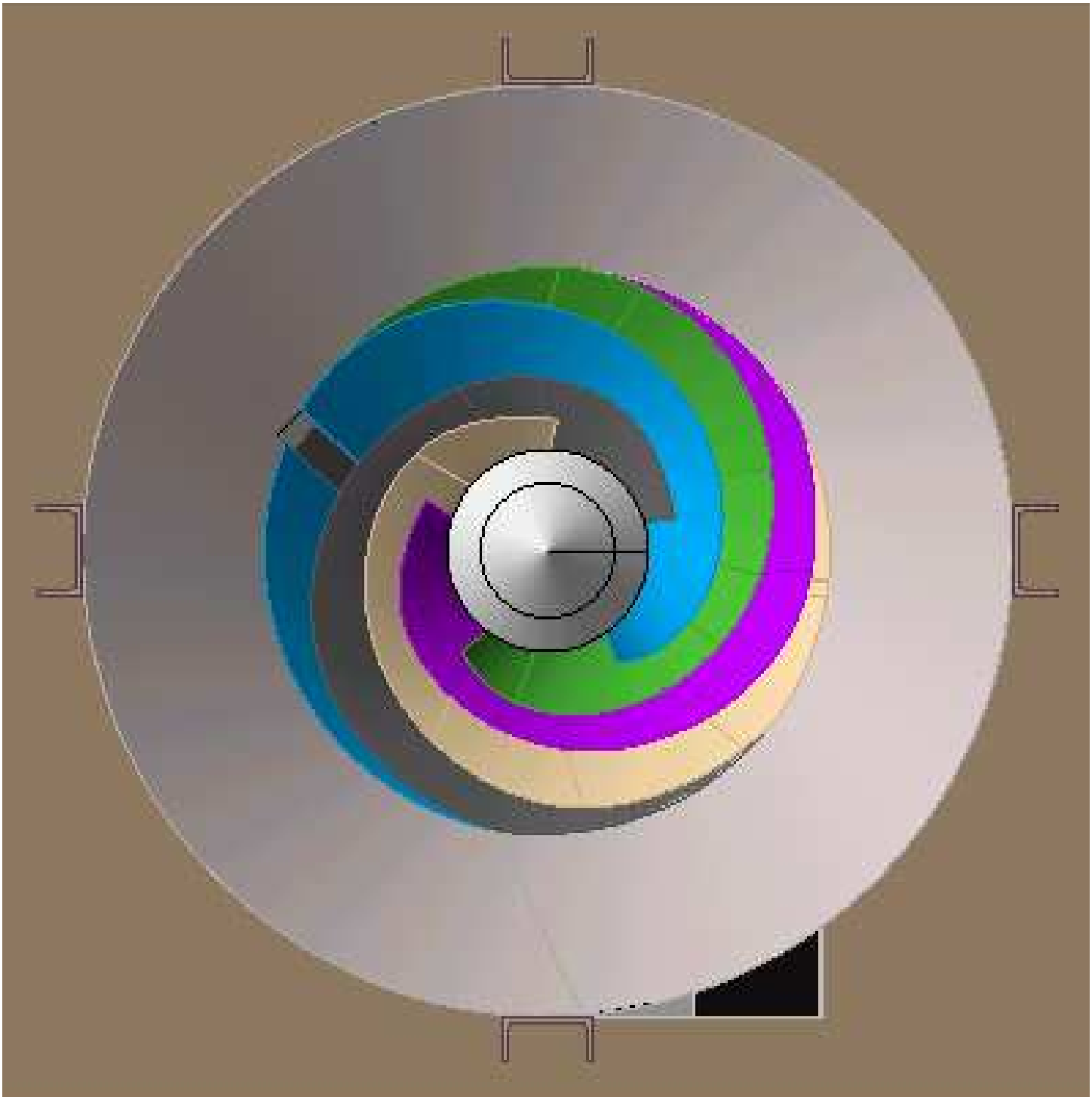
Blue Flight is the Top Flight
Each Flight is Color coded for simplicity.

Notice the Seed Dams placed on the Blue Flight
There is the First Dam then ... 180 degs around and down the Blue flight there is ... another.
The other flights have dams also ... Directly under where the Dams are placed on the Blue Flight.



Notice! **# 1 Flight = BLUE** # 2 Flight = Green
#3 Flight = Purple # 4 Flight = Tan # 5 Flight = Gray

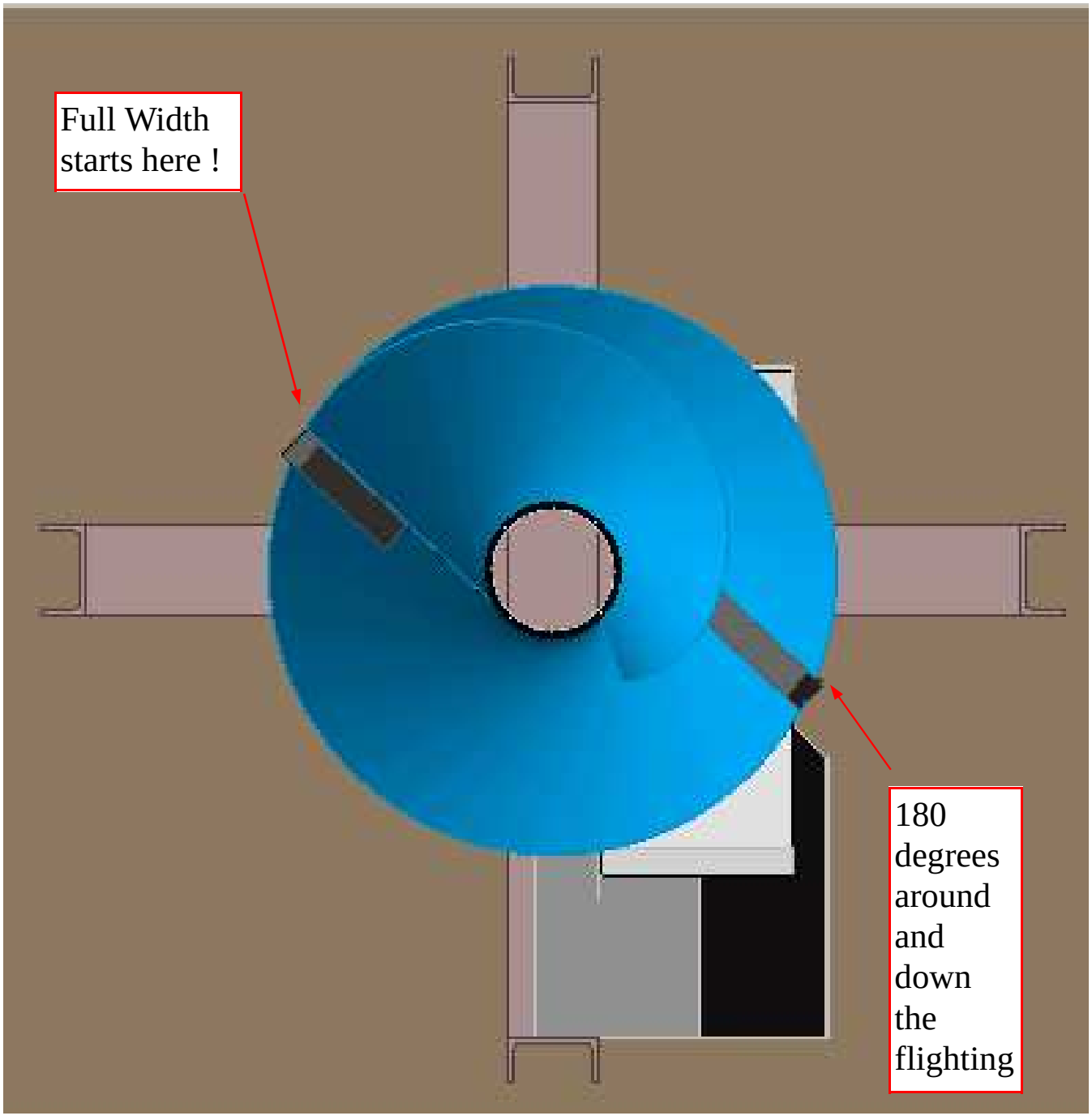
Notice 1st Seed Dam Located on **# 1 Flight** (Black thing)
Can't see the other one in this picture.
Following pictures should show where they go to be effective.



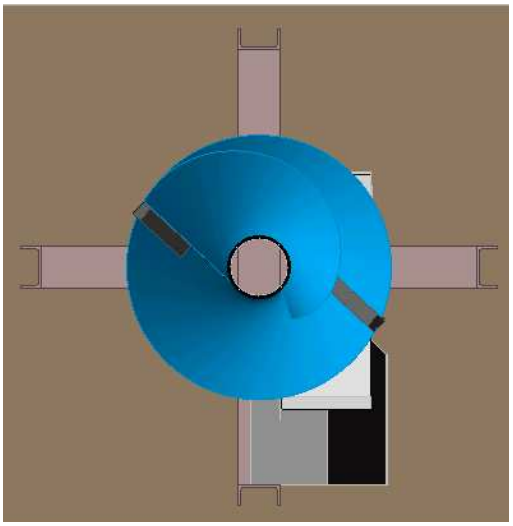
In this picture .... every flighting except the #1 flighting has been stripped away .. including the Big Catcher pan Spiral flighting ... and the cut off china cap. Notice where the 1st ... #1 flighting seed dam starts! Flights starts off at tab connected to pipe (A) at its narrowest width ... then increases in width until it reaches its full width.

That's where the .. 1st Seed dam is placed. Also the "Angle that it is placed". It's top edge is aimed directly toward the ... Outside edge of the Stem pipe ! All dams are to be placed this way.

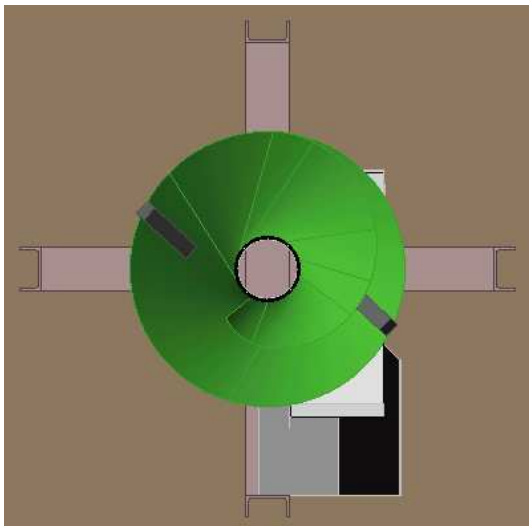
2th dam is put 180 degrees down & around from .. 1st dam !



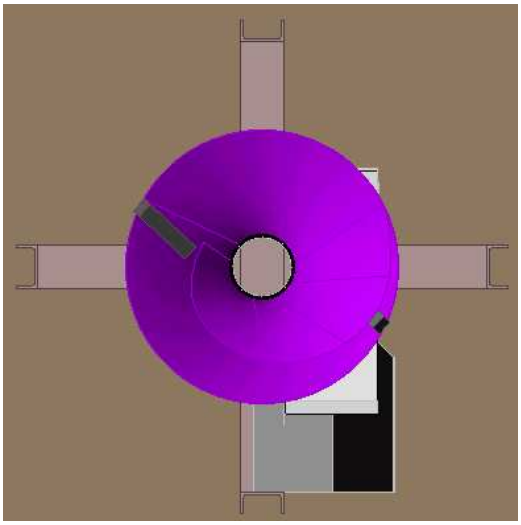
#1 Flight



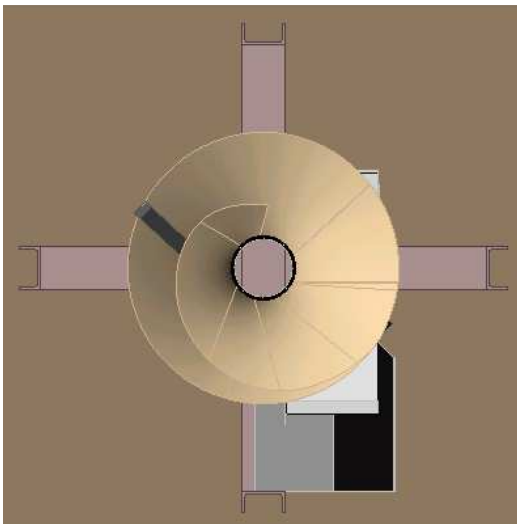
#2 Flight

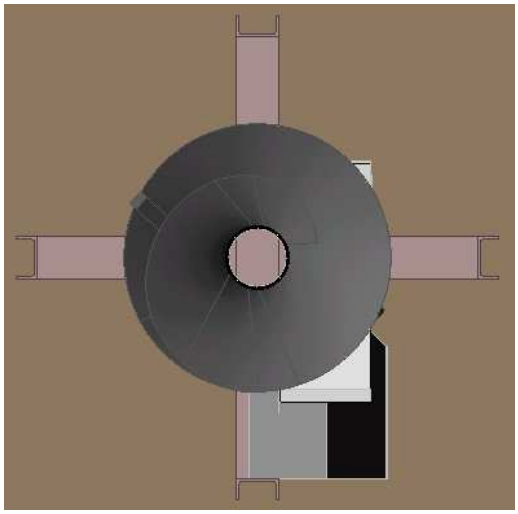


#3 Flight



#4 Flight





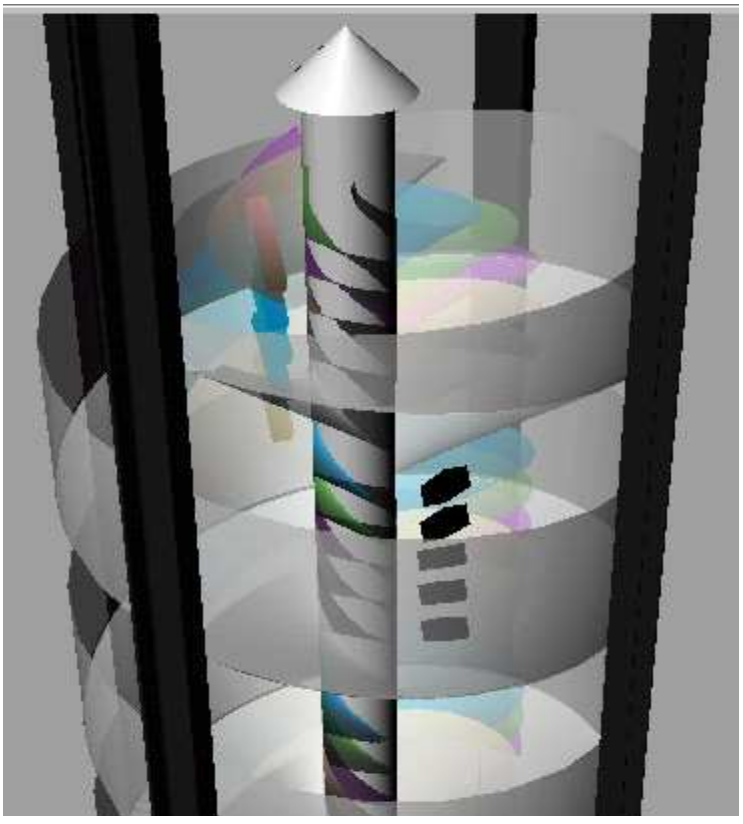
#5 Flight

Note!
All dams 1st set & 2th set placed .. directly " **UNDER** "
Dams on ... **Blue #1 Flighting**

Now ... below is another picture showing 1st & 2th set of dams.

Ok .... here's the thing .... *You may not need the 2th set of dams*
" Lets say splits are staying in the flights and .. *not jumping out*"
Let's say you DON"T need them
.. You probally **WILL** need .. to put "extra dams" (Before)
the .. 1st set ... 1/2 way between where Tab is soldered to the stem pipe and the .. 1st set of dams.
——- on the Gray, Tan, Purple, Green & Blue (Maybe ?)
—- May even need (2) on the GRAY & TAN (very long)
in order to **keep splits from jumping out "Before" reaching 1st set of dams**

This should cover placement of dams on HT25 unit

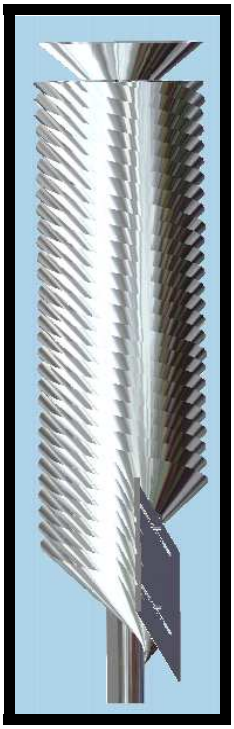


THE FOLLOWING PAGES

(16 - 19)

COVERS

ENCLOSED SPIRAL UNITS



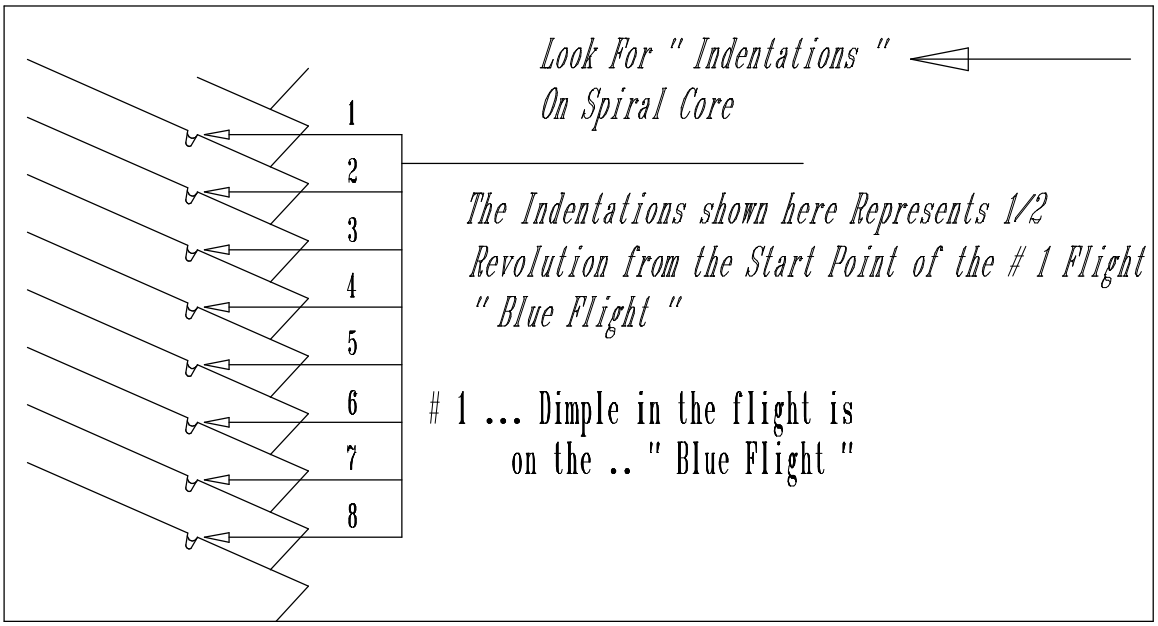
The following pages contains pictures to give operator instructions of where to ... Place your magnetic " Seed Dams "

<u>The first thing operator needs to do is locate the (8) "Indentations" that have been stamped into your - spiral flighting to make ... Placement of your dams easier</u>

To get a better understanding of the purpose of seed dams
***page 21 - 31**

Also ... the factory installed steel dams - page 35 (Energy Equilizers)

See Picture Below ....

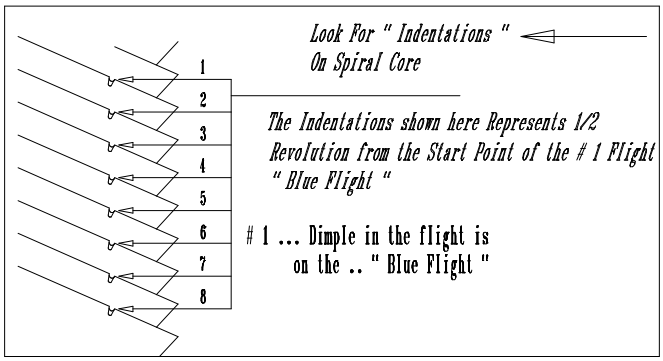


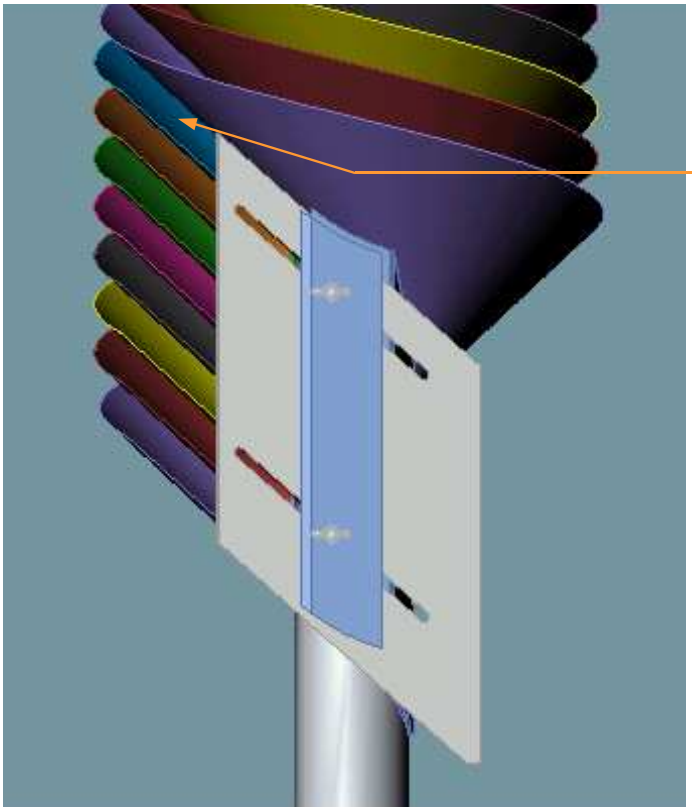
Factory
Installed
“ EQUALIZER”

(8) Magnetic Seed Blockers should go approx 180 degs around & down from Equalizer

Notice ... 1st dam is placed on the Blue .. # 1 Flight

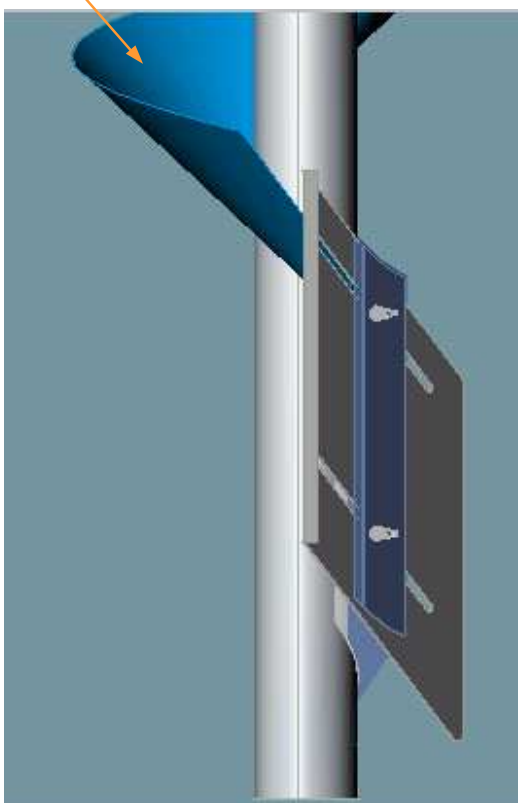
Other 7 dams go directly underneath vertically on 2,3,4,5,6,7,8 flights

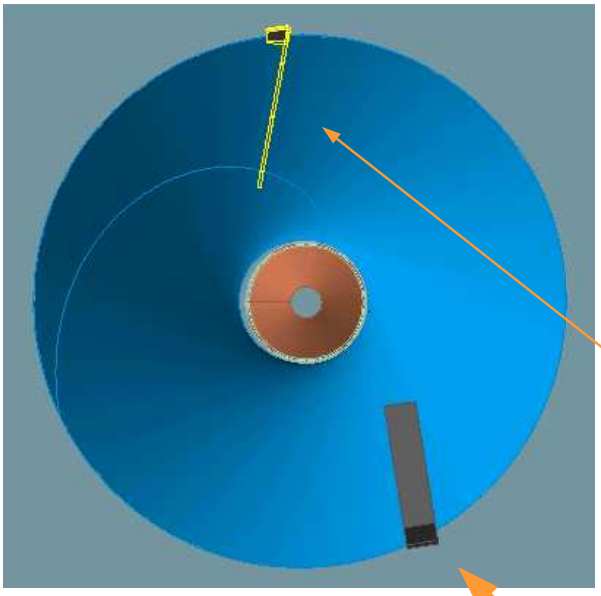




1 Flight
is the “ Blue “
flighting
located at top
of the .. Gate

This picture shows
1 .. Blue flighting
only
and its location
at top of the
Gate !

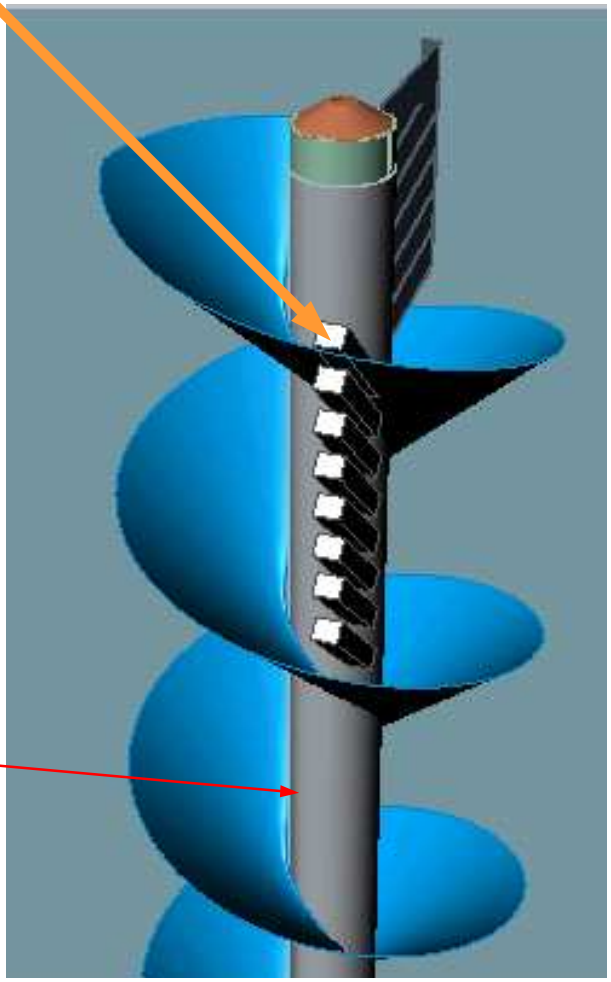




Top down view of the # 1
“ Blue Flight “ and the
placement of the 1st
Magnetic seed dam in
relation to the
“ Factory installed “
— Equalizer —
Approx 180 degs
around & down

The other
- 7 dams -
are placed
vertically
down from this
dam

If “More are needed”
They will go
directly ... Under
these dams !



SPIRAL SEPARATORS - A Close Look At How They Work

A - What type of products can be run on a Spiral Separator ?

Spiral separators will ..... SEPARATE
If set up Properly - ROUND ... from... UNROUND products

Question? What would we expect to separate from .... Soybeans
Dust & small foreign material
Unround Seed (shrivels ... etc)
Split Seed

Question? What about Steel Shot
Steel dust & small pieces of steel or foreign material
Unround Shot

Question? What about something like Alfalfa
Will separate Alfalfa from ... Round grass seeds etc

WHERE DO WE START

The very first thing we need is a clear understanding of how a Round object acts ... or ... The Path it Draws ... so to speak when the round object ... Rolls Down a Spiral Flighting

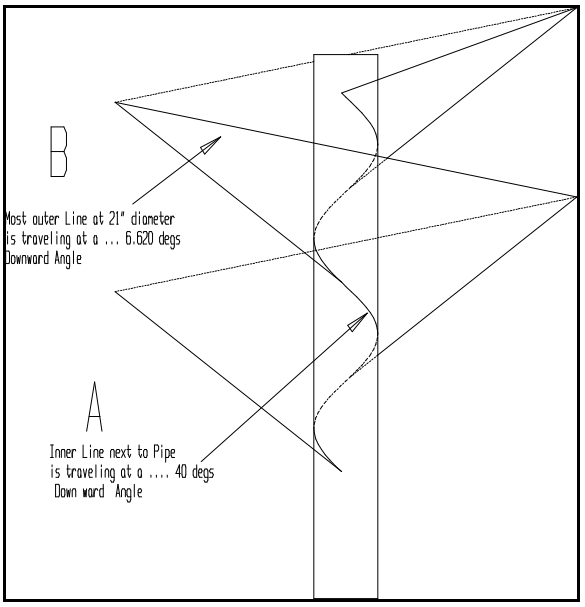


FIG 1

Look very carefully at a side profile of a Single Spiral Flight wrapped around a Stem Pipe

The Spiral Flighting has a (1) Fixed - Banking Angle and " Here is the catch " a ***Large Variety*** of Downward Angles

Why a Large variety of Downward Angles?

Because Angle ... A (Path traveled next to Pipe) is a 40 deg
Down Angle

Angle ... B (Outside Edge of the Flighting) is a 6.620 deg Down Angle

Stem Pipe Diameter = 2.9045 inches
Total over all Diameter of Spiral = 21 inches
Drop per Revolution = 7.656 inches

What Does This All Mean ... Or Better Yet How Does This Angle Change Affect A Rolling Round Object When Dropped At The Top Of The Flighting Up Next To The Stem Pipe

It means ..... as the Spiral Flighting Diameter Increases
(with all things remaining the same)

The Downward Angle Decreases

Now we all know that as the Downward Angle Decreases the rolling object will ..... **SLOW DOWN**

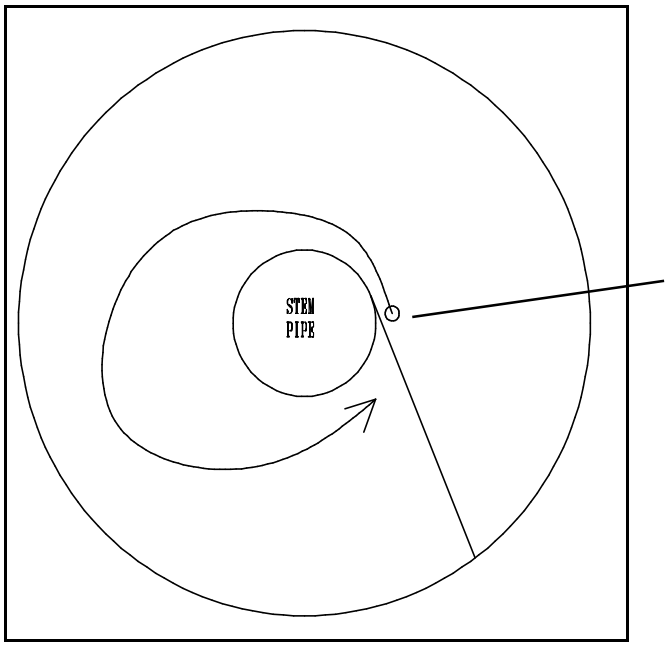


FIG 2

Now look at the Top Down view Fig.2 A Single flight Spiral Separator
The round object represents the Starting Point (SP) at the Top of the flighting & up next to the Stem Pipe

The line coming off the round object with an arrow at the end represents an example path the round object will make.
What happens is that as the round object travels out to a larger diameter " it slows down" because ... the Downward Angle Decreases ... the round object looses energy and tries to fall back to the center of the stem pipe. Although it will not actually hit the stem pipe as other forces are working to prevent this.
It (round) will reach a Low Point @ 1 revolution down from the SP = (perigee point 1)

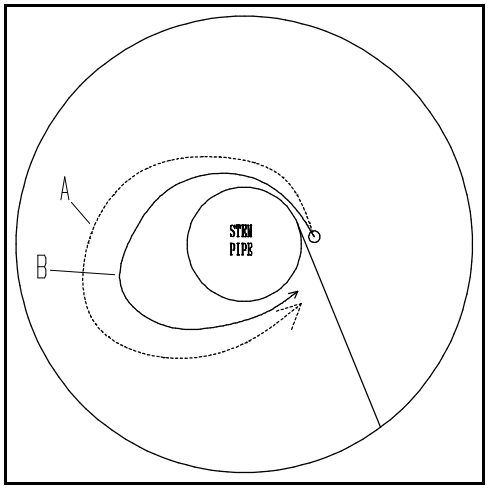


FIG 3

Now let's look at the path of an object that is Less Round - Path B Fig 3

Will look similar to path ... A except ... won't travel as far out

Unround is ... less energetic

Ok .... the Paths will look similar on the next level .. Down ...on the spiral flighting .... But will ... travel out to a Larger Diameter (UP TO A POINT)

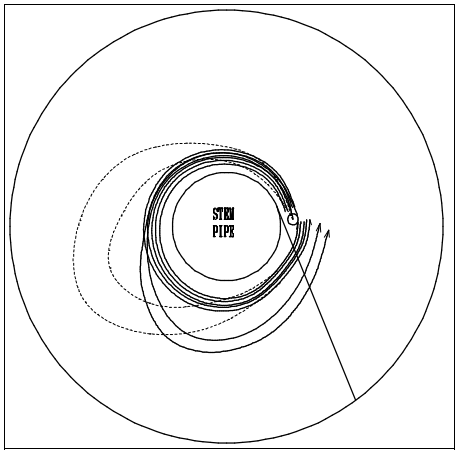
IMPORTANT!

All the paths ... High points & Low points will ... Stay close to the same locations relative to the .... SP (starting point) no matter how many levels or revolutions the spiral has.

OK ! NOW THAT WE KNOW WHY THIS PATH IS FORMED BY .. ROUND & LESS ROUND OBJECTS

LETS GET TO THE ... TEST /// " NOT SO FAST "

Let's look at a bunch of ... Rounds, Not so Round and plain old Unround stuff going down the flighting at the same time - FIG 4



It will take a little longer for the Rounds to gain speed enough to break
free of the .. Main Mass .. & when it does Rounds will ..Swing Out .. Less

Notice Previous Paths - dotted lines

OH YES! THE QUESTION HAS TO COME UP HOW MUCH YOU FEED IN THE FLIGHTING AT ANY MOMENT IS VERY ..... IMPORTANT!

If you feed to much ... called **Overfeeding ..** the Rounds might NEVER break Free and if it breaks free the Swing Out will be Very Small - " In other Words - No Separation "
THE KEY WORD HERE IS ..... " **S E P A R A T I O N "**

In other words we need room for the Material we are running to get up to their Natural speed .. Unhindered by other material rubbing up against each other ..... *with the exception of dust etc* Sliding up ... or almost next to the stem pipe.
This fast running ..... Track .... so to speak will allow Rounds to build up speed & separate from Unrounds to the Maximum.

We have to .....Have ... SEPARATION ..... as we have to set a ..... **DIAMETER** ..... For the Spiral Flighting.

The diameter is ..... DETERMINED ..... by what the User is trying to remove from the Round Product or VICE VERSA
SOMETIMES THE ROUND PRODUCT = BAD
& UNROUND = GOOD PRODUCT
In Fig 5 the (2) Rounds that have made Swing Outs ... Leave the Main part of the Mass at a certain Diameter. If the User wants to keep .... This - (2) Rounds a Diameter will be set at the .....
... DOTTED CIRCLE ...
You - Tester - wants to make sure you are determining this Diameter on a ... Second or Third Level down from .. **S**tart **P**oint

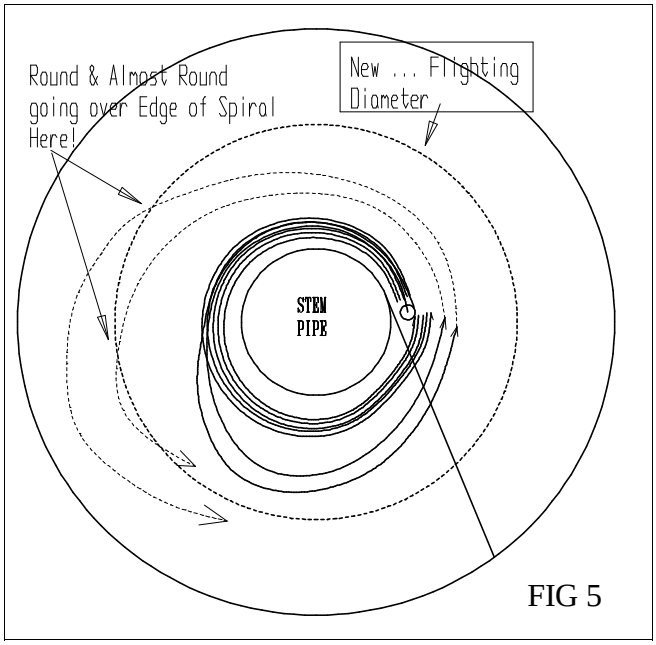


FIG 5

Although .... Very Unrounds tend to .... Not keep Gaining Altitude up the Spiral Flighting. (Very small unrounds can't get up enough speed) In other words ... Dust etc sort of reaches a Terminal Velocity

The **LENGTH** of the Spiral flighting needs to be enough so all the Rounds have a chance to break free of the Unrounds & Swing Out over the Edge of the *Set Diameter* we have worked out ..... It's a question of Feed Flow Amount

OK - GOING BACK OVER THIS INFORMATION

1 - Banking Angle - Derivative of Downward Angle as defined going around the Stem Pipe
2 - Downward Angle .....Decreases as diameter gets Larger
3 - Feed Flow very Important - Material has to have Separation
4 - Diameter of Spiral is determined by Swing out of Rounds
5 - Length of spiral flighting is determined - after everything else by Feed Flow Amount

Now on to the ..... Test

Now we need the right ..... Tester to run our sample down & a Feed system that will deliver just the ... Right amount of Feed & we run our Test

H & T uses a variety of Single Flight cores 24 inches in Diameter along with a Seed Splitter system
(for getting the feed flow right)
We take Samples at different Diameters & Levels at *Swing out point* of the Product
By taking Samples this will more closely tell us where to
“ Set the Diameter of the Flighting “
We make observations of the terminal altitude of the unrounds & this will let us determine length.
ONCE ..... DIAMETER & LENGTH ARE DECIDED UPON A ..... WORKING CORE CAN BE MADE
Note!
We can not take a sample with the above 24 inch diameter Testers to send to a customer
These testers only give the information (Tester Sample)we need to make a working Spiral Separator.

However .... we do have Premade test spirals for this purpose !

MAKING THE CORE

Once the information we need to make a core is derived from our testers **we can figure also how many flights that can be attached to the stem pipe.**

After the core is built we have to take into account that ... Each Flight is of different ...**Lengths**

Being of different lengths makes all the ... Starting Points (SP) different. This if you remember will make all of the flights have different points where the Rounds ..... Swing Out (Apogee)

This problem is solved with placing ... *Factory installed equalizer Dams* at the shortest flights Starting Point (SP)

As more flights are added they are in effect no longer than the Shortest #1 Flight

These Equalizers not only cause all flights to have the same Apogee points but will also let the .... Slide gate at the bottom of the core for Fine Tuning work like it should.

The following page shows a diagram of an - 8 flight core and how # 2 - # 8 flight is .... Longer than the #1 flight

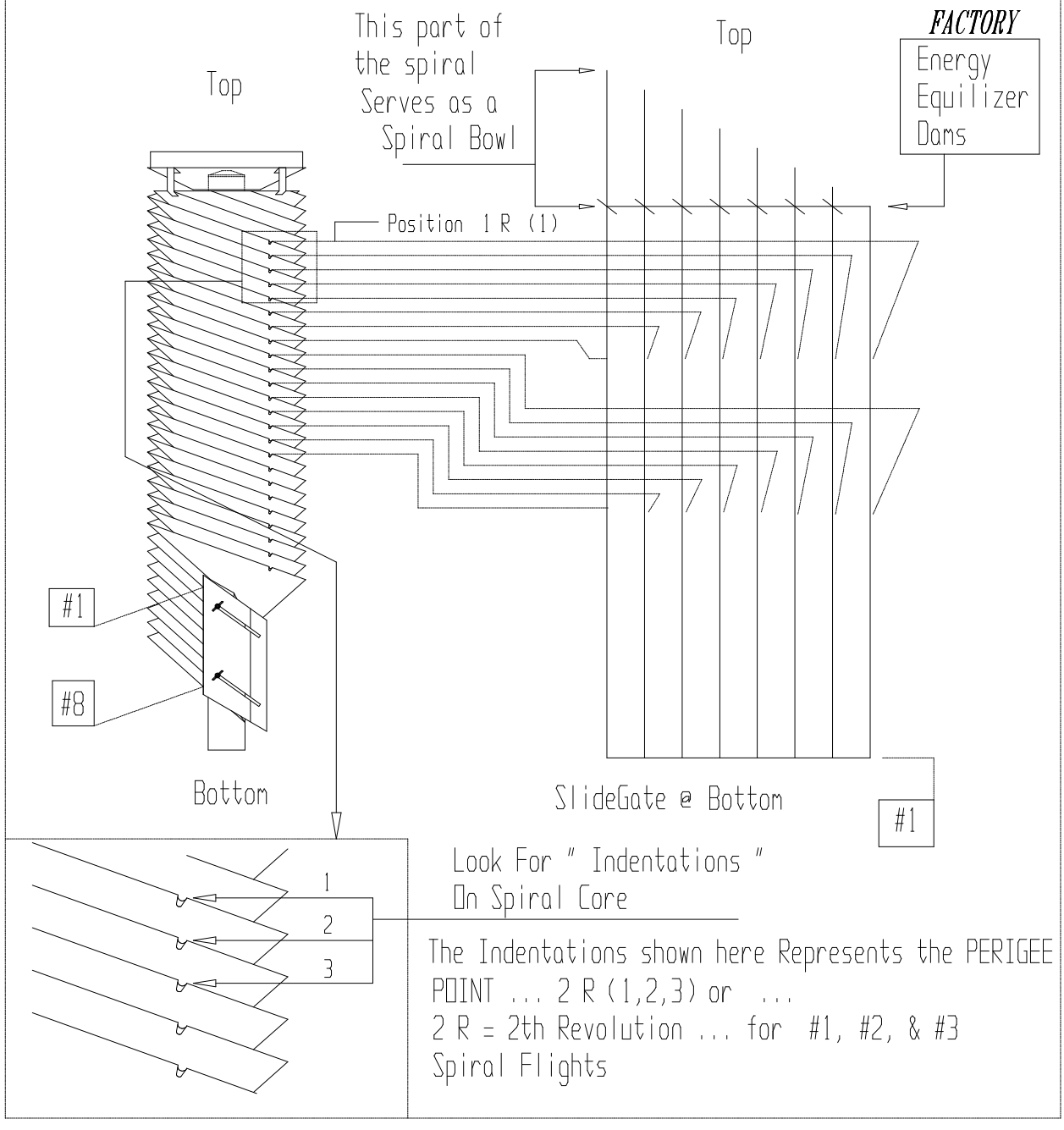
You can see how this problem is solved with "Factory Installed Equalizers"

These simply block the flow on flights 2-8 and make every thing start all over again giving these 7 flights the same energy as #1.

The Indentation marks are simply "Reference Marks" so user can know where he is so to speak ..... Energy wise

These are placed at the "Swing in " points (Perigee) for all flights

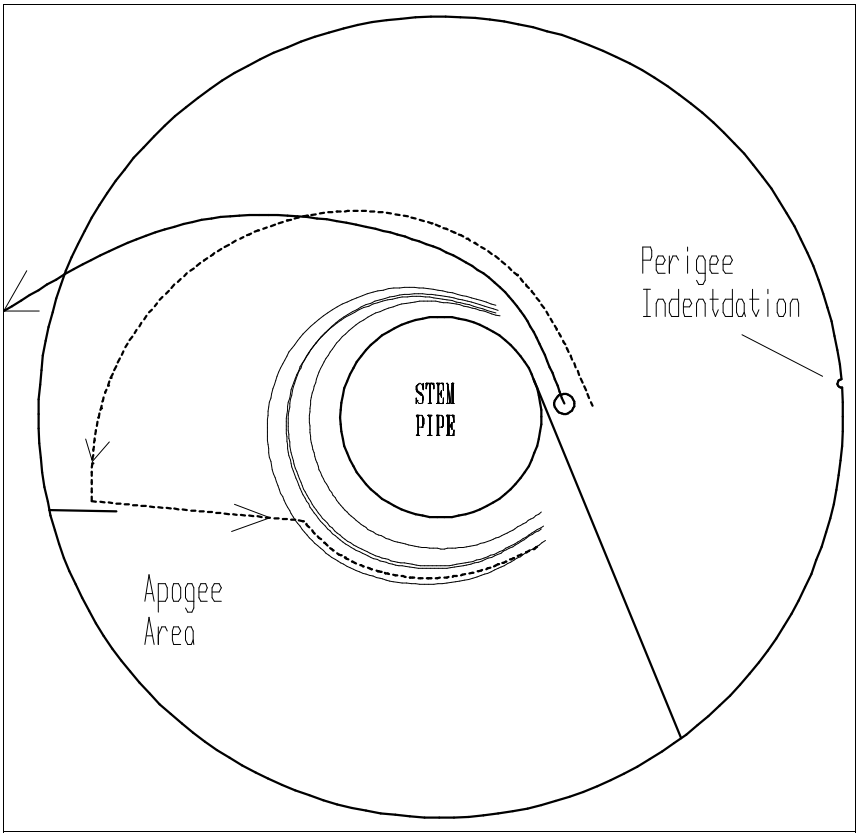
Explanation of Energy Levels
Use as Guide for Placement of " STEEL " Seed Dams



" I N D E N T A T I O N S " ARE USED AS ... ENERGY REFERENCE POINTS

REMOVABLE or MOVEABLE - SEED DAMS

Sometimes the user of the spiral separators might not want some of the stuff that is going over the edge of the separator.
In other words user needs the spiral to be ..... Bigger in Diameter
That is sometimes not reasonable so the next best thing we can do is to use ..... Blockers or ..... SEED DAMS



A seed Dam used here to deflect an almost Round back down into Main Mass.
This object is not wanted with the Rounds

Notice that the location of the Dam will be located ... up hill and Left of the Perigee Indentation notch.
Remember ..... once you have found the Location for one flight you have found it for ..... ALL

The following pictures shows ..... 14 ga. Black Iron Metal Seed Blockers (Seed Dams) being clamped down at the Perigee Point - 2 revolutions down from the SP of # 1 flight. *These .... Metal dams are made especially for H & T Spiral Cores* ..... But can be .... **Custom made** for any Core Cartridge This Dam set has (8) Fingers all held in place at the correct deflection Angle by ... 2 Wing Nuts. This placement is an Example Location Placement. *A more realistic placement would be right after the ... Apogee (Swing out) of the ... Round Product.* In other words ..... To the ..... Left of Perigee Point

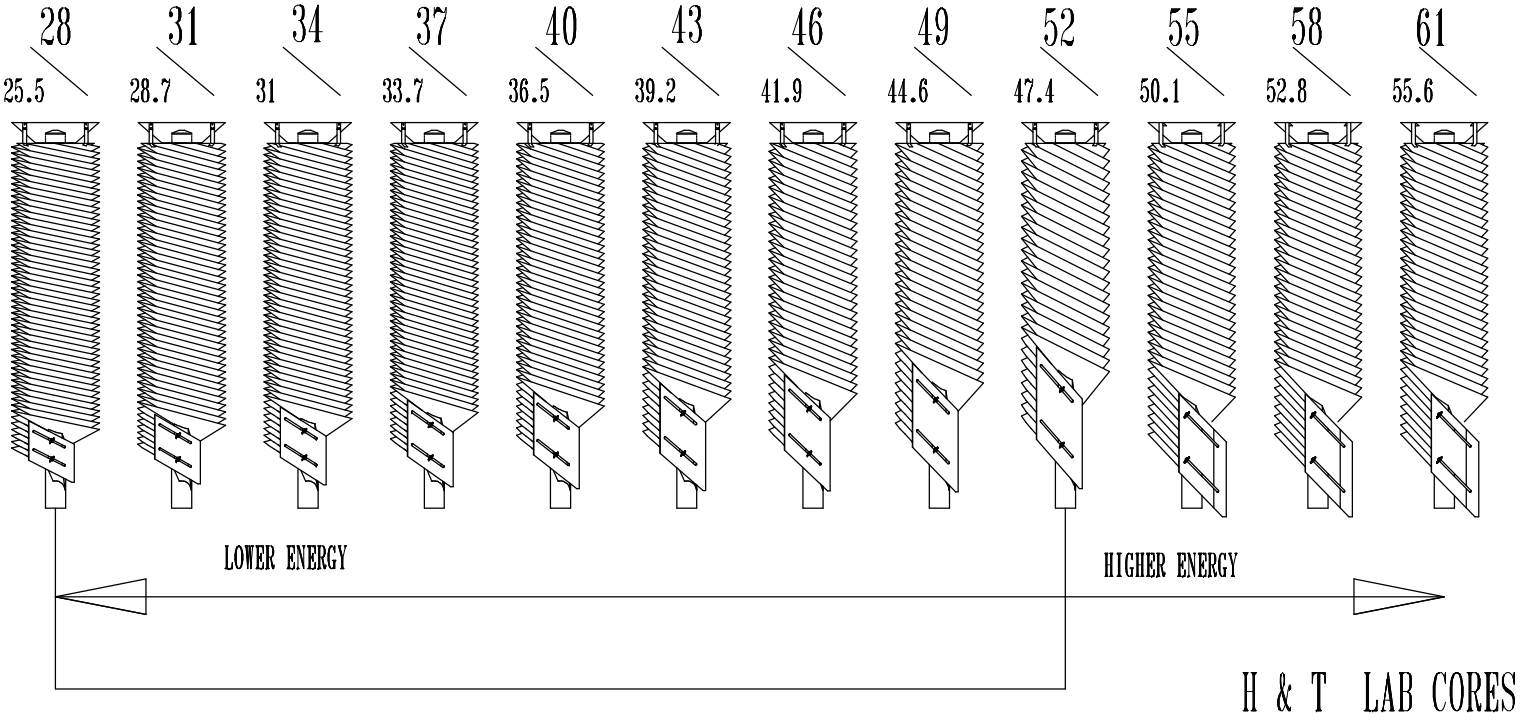
TIGHTING THE WING NUTS

Movable Steel Seed Dams being Installed

PROFILES OF STANDARDIZED ENCLOSED SPIRAL CORES

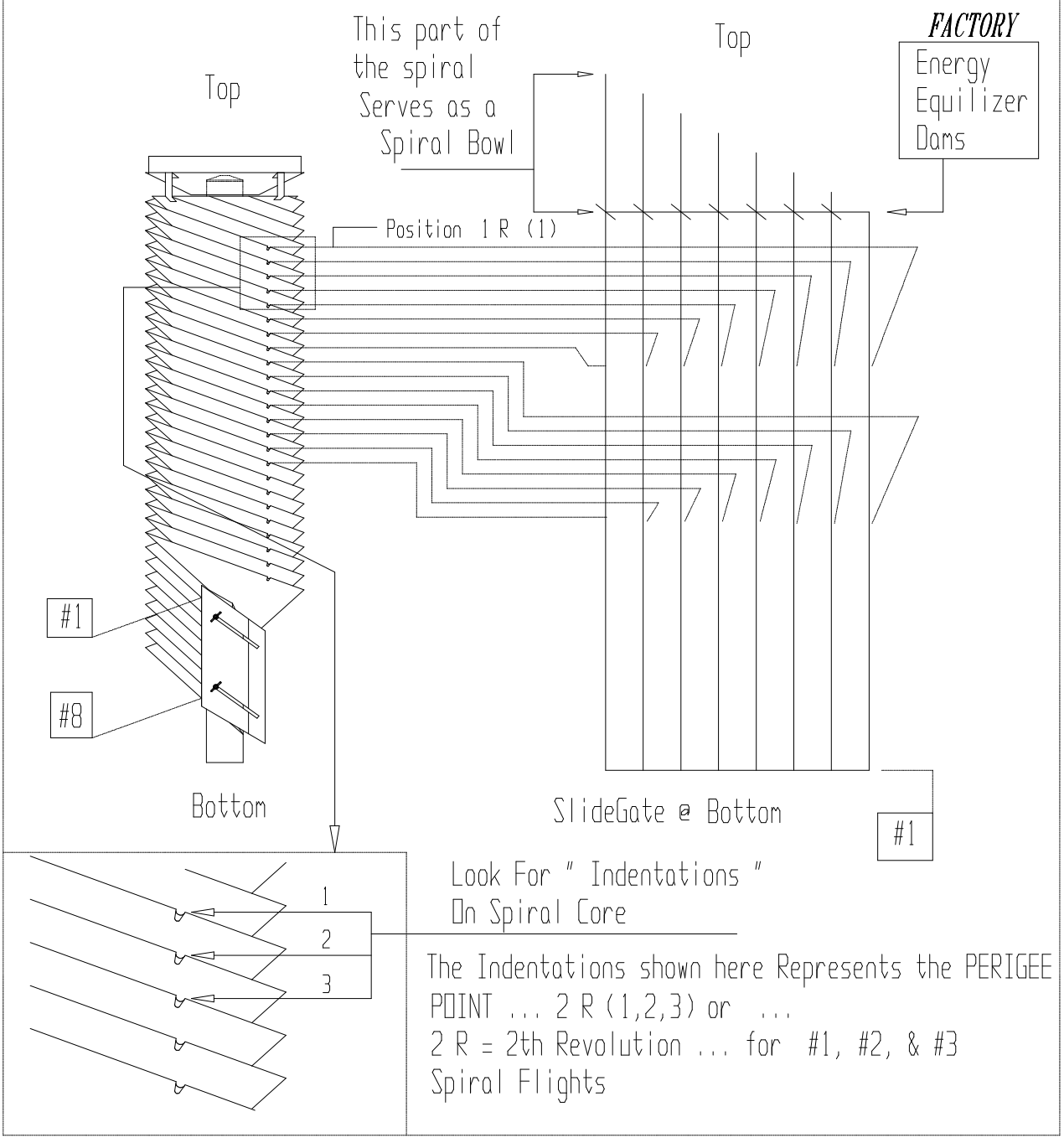
TOP Numbers = Downward Angles around the STEM Pipe →

BANKING ANGLES = BOTTOM Numbers - CENTER



H & T LAB CORES

Explanation of Energy Levels
Use as Guide for Placement of "MAGNETIC" Seed Dams



" I N D E N T A T I O N S " ARE USED AS ... ENERGY REFERENCE POINTS