

# “SHRINKING MACHINE”

## PROP DOCUMENTATION

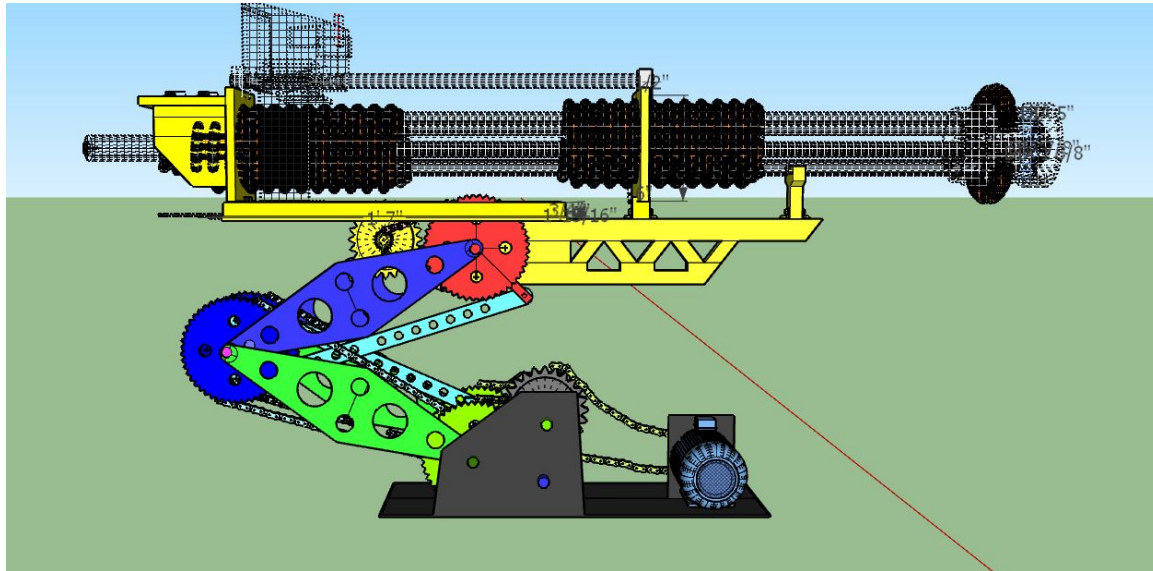
by RagnarokAndRoll  
v1.0, June 21, 2020

THE CONTENTS OF THIS DOCUMENT REPRESENT THE ARTISTIC INTERPRETATION OF THE PROP BASED ON IN-PERSON OBSERVATIONS AND PHOTOGRAPHS, AS WELL AS STILL IMAGES FROM THE FILMS. THIS DOCUMENT IS FOR ACADEMIC / ARCHIVAL / HISTORICAL PURPOSES ONLY, IS COVERED UNDER FAIR USE, AND IS NOT FOR SALE.

PLEASE NOTE THAT THE IMAGES WHICH ACCOMPANY THIS DOCUMENT ARE NOT TO SCALE AND SHOULD ONLY BE REGARDED AS ILLUSTRATIONS TO AID IN EXPLANATION, NOT AS SCALE DRAWINGS OR SCHEMATICS. MODELS SHOWN ARE A HODGEPODGE OF MISCELLANY FROM SKETCHUP WAREHOUSE / CUSTOM MADE AND ARE NOT SCREEN ACCURATE, ALTHOUGH SIZE IS IN THE RIGHT BALLPARK.

## SECTION INTRODUCTION: SCISSOR LIFT MECHANISM MECHANICS

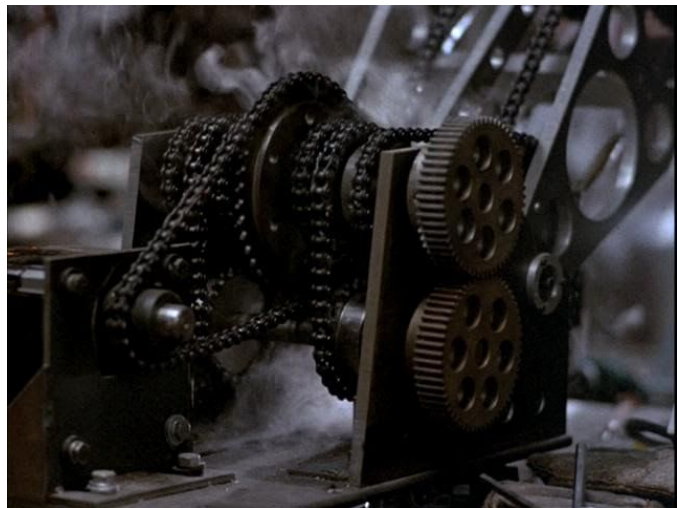
The purpose of this section is to document the way the prop *Shrinking Machine From Honey, I Shrunk the Kids* works mechanically, specifically the part heretofore referred to as the **Scissor Lift**, as seen here:



Specifically, the workings of the part of the prop called the **Transmission Base**, within which the **Scissor Lift Transmission System** is contained, seen here in a still from the first movie.

The following sections will illustrate:

- How the Scissor Lift raises and lowers
- How the Barrel automatically accounts for tilt relative to the height of the lift
- How the Barrel is capable of tilting on its own



All sprocket sizes are approximates, as new details are being worked on. The next iteration of this document will contain correct sizes and hopefully ratios as well.

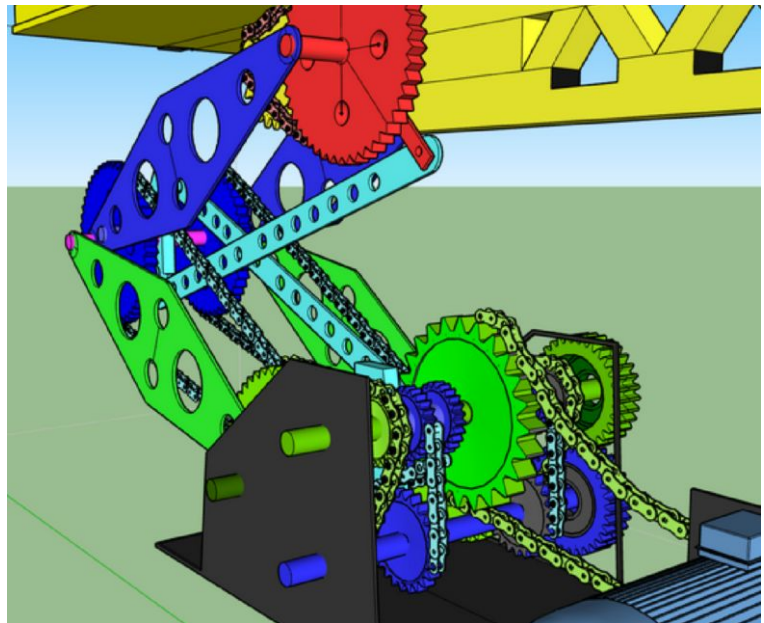
Author's note: Each replica is going to have its own personality, quirks, and bespoke on-the-fly adjustments based on how all the parts fit together. In observing close-up detail throughout the

years of the prop's life, I will conclude that this is the manner in which it was originally constructed, which reflected aspects of one of the film's main characters, Wayne Szalenski.

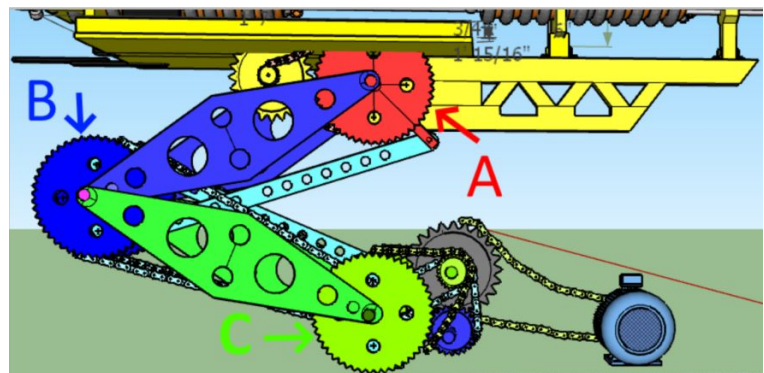
# 1. How the Scissor Lift Raises and Lowers: Step by Step

The pieces seen in the images in this document are color-coded according to how they rotate.

Each color group rotates and/or moves independently of one another, with a few caveats which will be noted.



The 3 sets of **Large Sprockets** are all the *same size*, and are labeled for the sake of clarity with **letters: A, B, and C**, as seen below, right. They will be referred to by both letter and color.

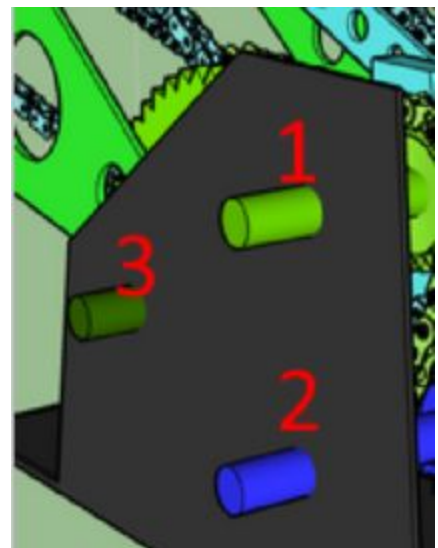


The **Transmission Base** is made up of 3 axles, which will be referred to as follows:

No.1 Axle : The **primary drive axle**

No.2 Axle : The **counter-drive axle**

No.3 Axle : The **secondary drive axle** (rear)

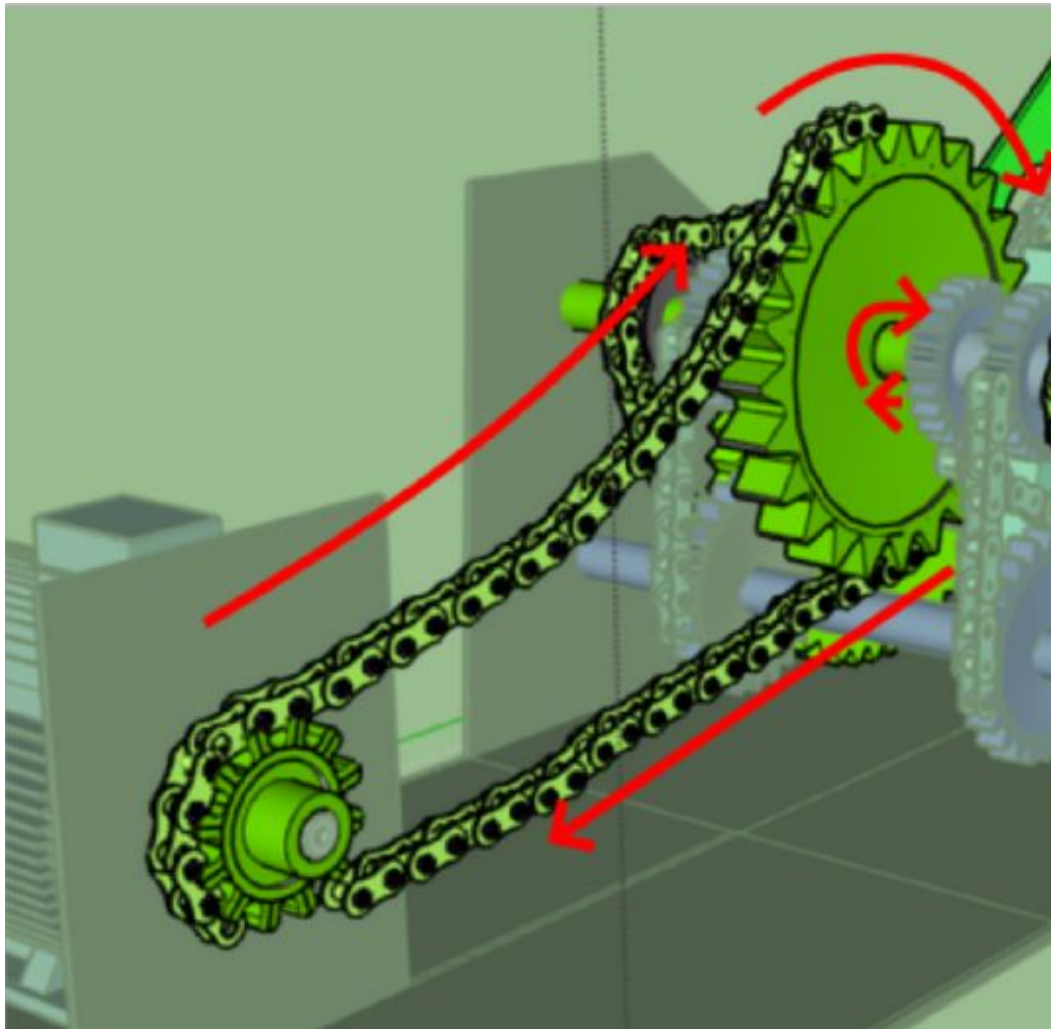


## STEP ONE

With a direction selected - in our examples, it shall be “DOWN” so that the Scissor Lift is lowering - the motor is activated at a given base speed. ***This speed will be called S0.***

The motor's axle turns the small **Motor Sprocket**, which is about 2” in diameter. It is chain-linked to the **Primary Drive Sprocket**, which is roughly 5” in diameter; they both turn in the same direction. The ratio of Motor Sprocket : Primary Drive Sprocket is approximately 1:2.5.

In turn, the Primary Drive Sprocket is attached to the No.1 Axle directly, which turns at the same direction, and speed. ***This speed will be called S1.***

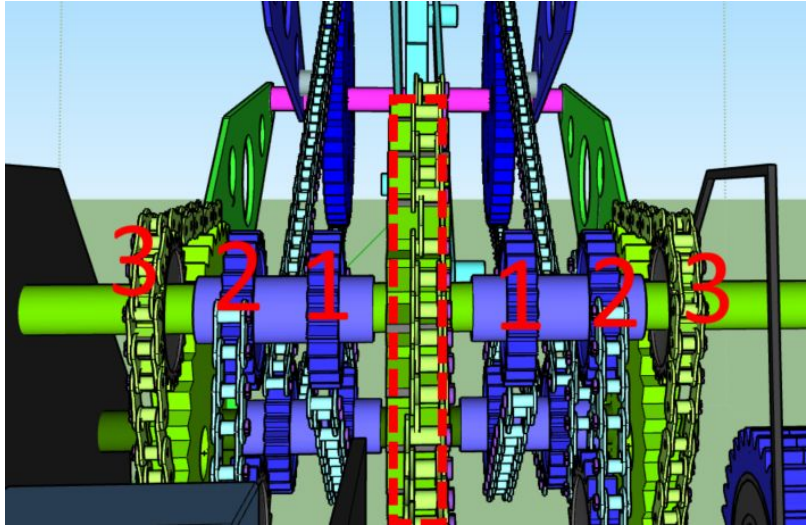




## STEP TWO

Starting here, the mechanisms and connections described are mirrored on both sides of the machine's scissor lift up to a point, which will be called out later. So we only need to focus on one side to understand how the entire Scissor Lift works.

The Primary Drive Axle has three smaller, ~3" sprockets on each side. We will count them relative to the Primary Drive Sprocket-outward, like so:



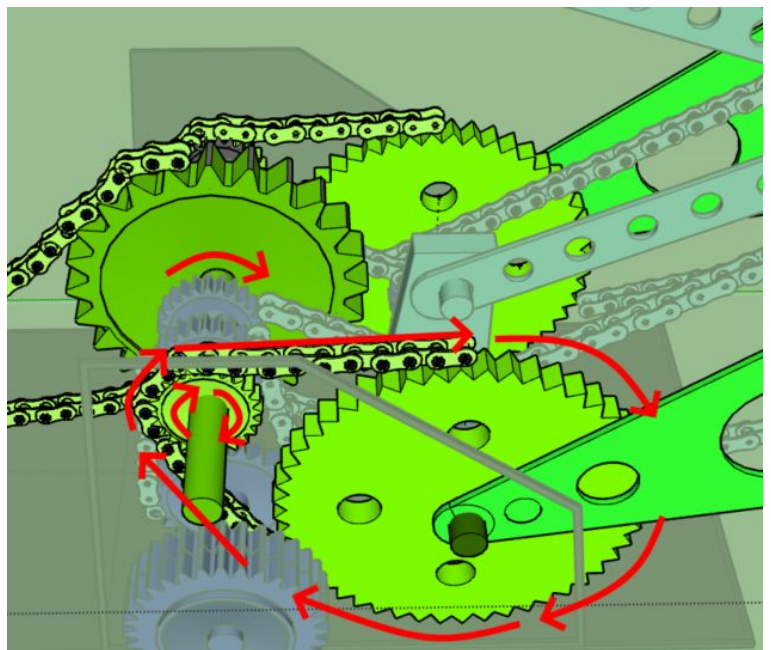
The primary drive axle is directly connected to the #3 sprocket as numbered above.

The #3 sprocket, in turn, is linked to the **Lower Wing Sprocket**, also known as **Large Sprocket "C"**, the large green sprocket in the image on the right.

*(Note that there are 2 mirrored sides, so there are in fact 2 Lower Wing Sprockets)*

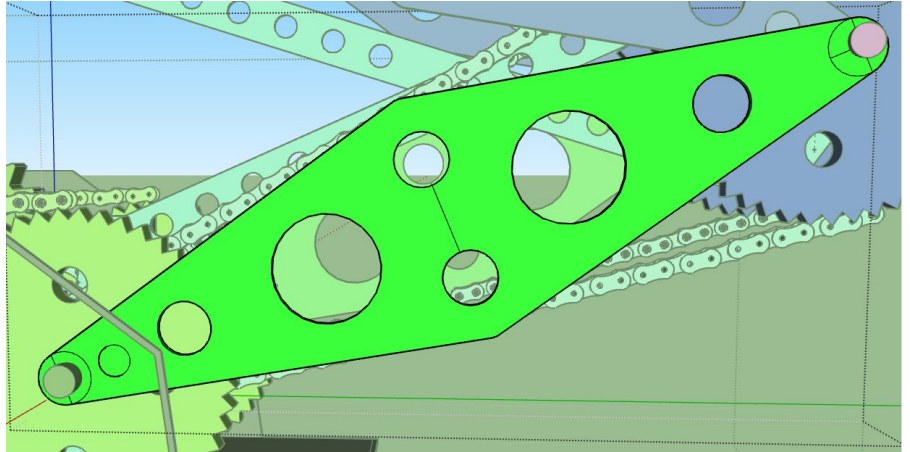
The ratio is about 1:2, so the speed of the secondary drive No.3 axle, and the large "C" sprockets, is effectively halved, observable in the first film at 00:00:00.

**This speed will be called S2.**



The Lower Wing Sprocket(s), in turn, are connected directly to the **Lower Wings**, which are the football-shaped arms that give the Scissor Lift strength.

Therefore, the large, green “C” Sprockets rotate the Lower Wings: Clockwise to lower the machine, counter-clockwise to raise it, at speed **S2**.



### STEP THREE

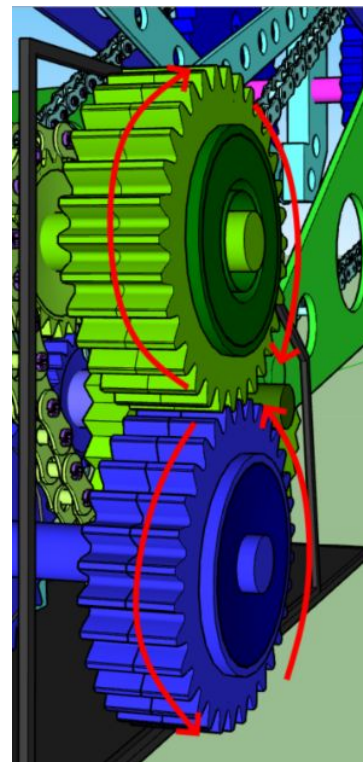
The blue pieces in the illustrations all rotate opposite to the green pieces in either direction. So when lowering, the blue parts are in fact turning counter-clockwise, and when raising are turning clockwise, which is the inversion of the green pieces (as described earlier).

One function of the **Transmission Base** is to transfer inverted motion to the Large, blue “B” Sprockets towards the rear of the machine, which are the same size as the Large, green “C” sprockets (6” - 6.5” in diameter), and are attached to the **Upper Wings**. This is done in such a way that the “B” Sprockets move at a speed equal to but in a direction opposite of the Large, green “C” Sprockets (green).

The inversion itself takes place on the outer right side of the **Transmission Base**: the No.1 and No.2 axles terminate in the **Outer Inversion Gears**, pictured on the right.

In our continuing example, the Primary (green) axle is turning clockwise (lowering); the Upper Inversion Gear (green) transfers the inverse of this rotation via direct connection to the Lower Inversion Gear (blue).

Since the Lower Inversion Gear is similarly connected to its axle, in this case the No.2 Secondary Axle, the inverted rotation is adopted by the No.2 Axle, which is counter-clockwise in our example. They rotate at speed **S1**.



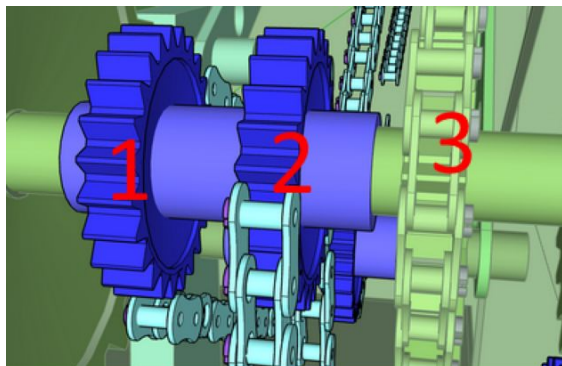
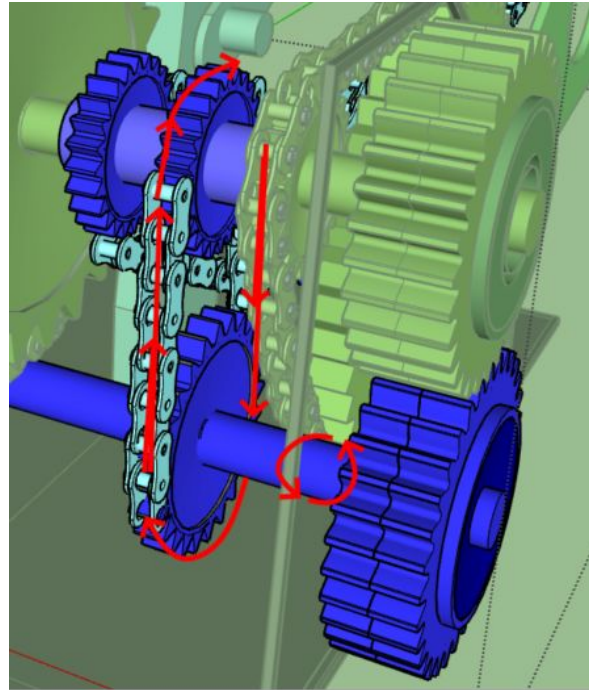
## STEP FOUR

The No.2 axle, aka counter-drive axle (blue), has the exact same ~3" sprockets that link to the large green "C" sprockets.

The 3" sprockets on the counter-drive axle link directly to the #2 sprocket on the No.1 axle, so the counter-drive axle rotates the #2 sprocket in the same direction (see image, right), at speed S1.

### About the #1 and #2 Sprockets

The #s 1 and 2 sprockets, seen to the right (in blue), seem to be affixed to the primary drive axle in such a way as to utilize it without adopting its rotation, that is, the #1 and #2 sprockets seem to be capable of rotating independently of the direction of the primary drive axle. How, precisely, or via which components specifically, is a mystery. Here are some of the closest, most direct photos of this mechanism, along with the equivalent area from the illustration:



The specific parts involved in this aspect of the lift mechanism are unknown, but somehow, the rotation of the #2 sprocket is transferred directly to the #1 sprocket, suggesting a direct connection somehow. This is observable in HISK at 00:00:00.



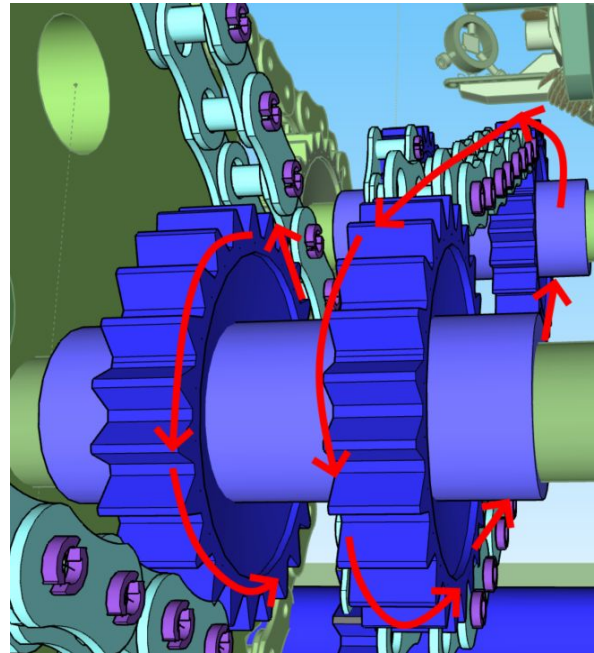
## STEP FIVE

The rear No.3 axle has finally been recently observed firsthand, and the following descriptions have been verified as accurate.

The #1 sprocket on the primary drive axle, which rotates in step four (thanks to a direct connection to the #2 sprocket)...

...links directly to a similar if not identical set of two connected ~3" sprockets on the rear No.3 secondary drive axle, as seen in the illustration (right)

These ~3" sprockets on the No.3 secondary drive axle are capable of rotating freely and not adopting the motion of the rear axle, the same as their counterparts on the primary axle; they rotate the same direction, at the same speed **S1**.



## STEP SIX

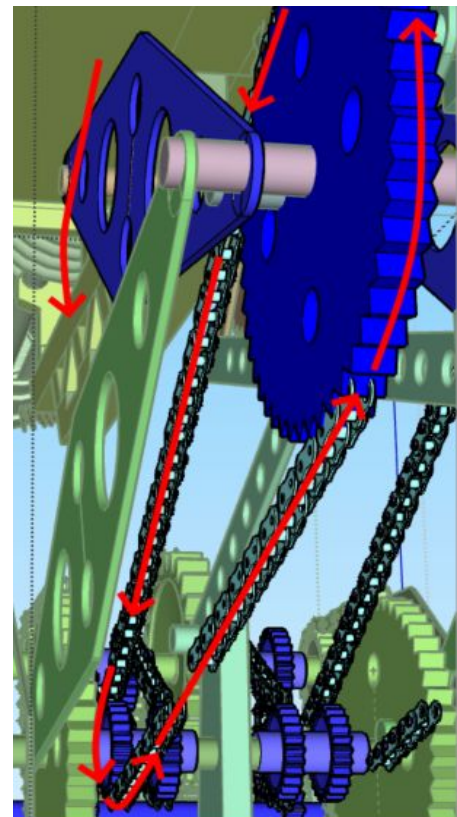
Last but not least, the final ~3" sprocket on the No.3 secondary drive axle, rotating at speed **S1**, links directly to the rear, large, blue "B" sprocket(s)...

and transfers the same rotation direction at a ratio of ~1:2. This differential matches the green "C" sprockets, at a speed of **S2**.

These large rear blue "B" sprockets are connected directly to the **Upper Wings**, seen in the image at right in blue.

Therefore, to rotate the rear "B" sprockets is also to rotate the Upper Wings in the opposite direction from the Lower Wings, at speed **S2**, which matches the "C" sprocket speed.

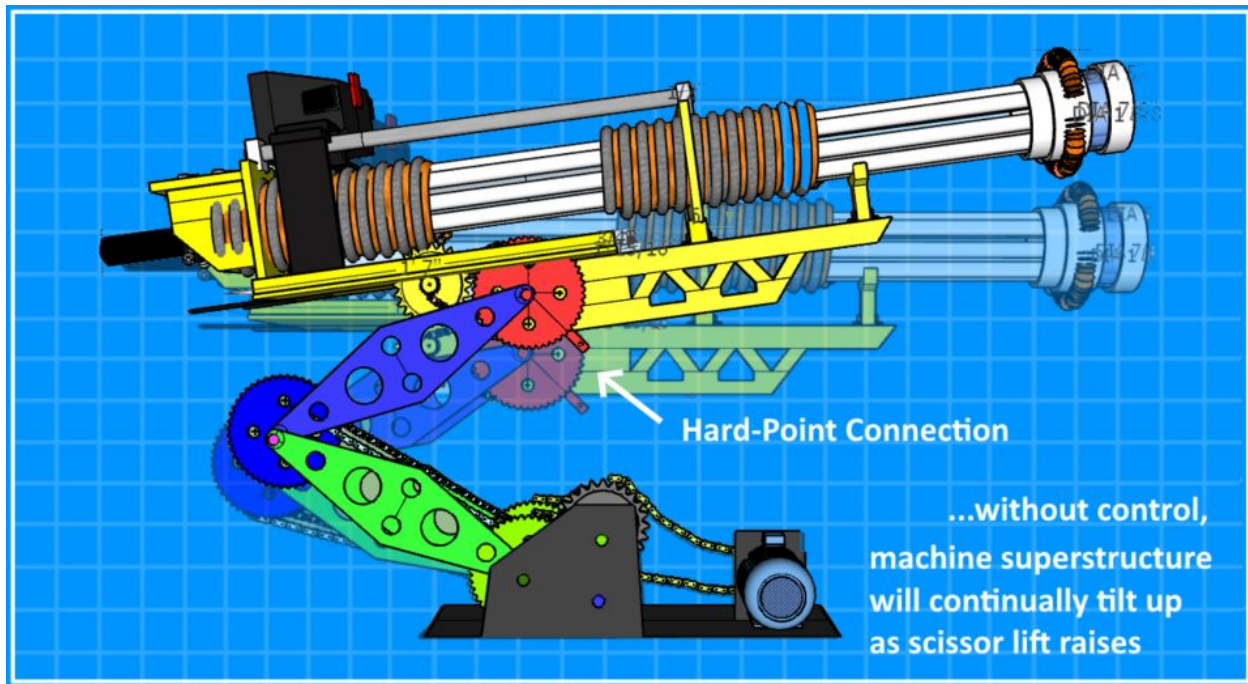
**Thus, in a lowering motion, the Lower Wings turn clockwise, and the Upper Wings turn counter-clockwise, by way of the six steps described above. The inverse is true for a raising motion.**



## 2. How the Lift Mechanism Automatically Accounts for Tilt

We now know how the machine lowers and raises. Imagine for a moment that we're engineering this prop from the ground up. We have a problem to solve!

If we hard-attach the Machine directly to the top of the Scissor Lift, the Barrel will continually tilt towards the ceiling as the lift mechanism raises:

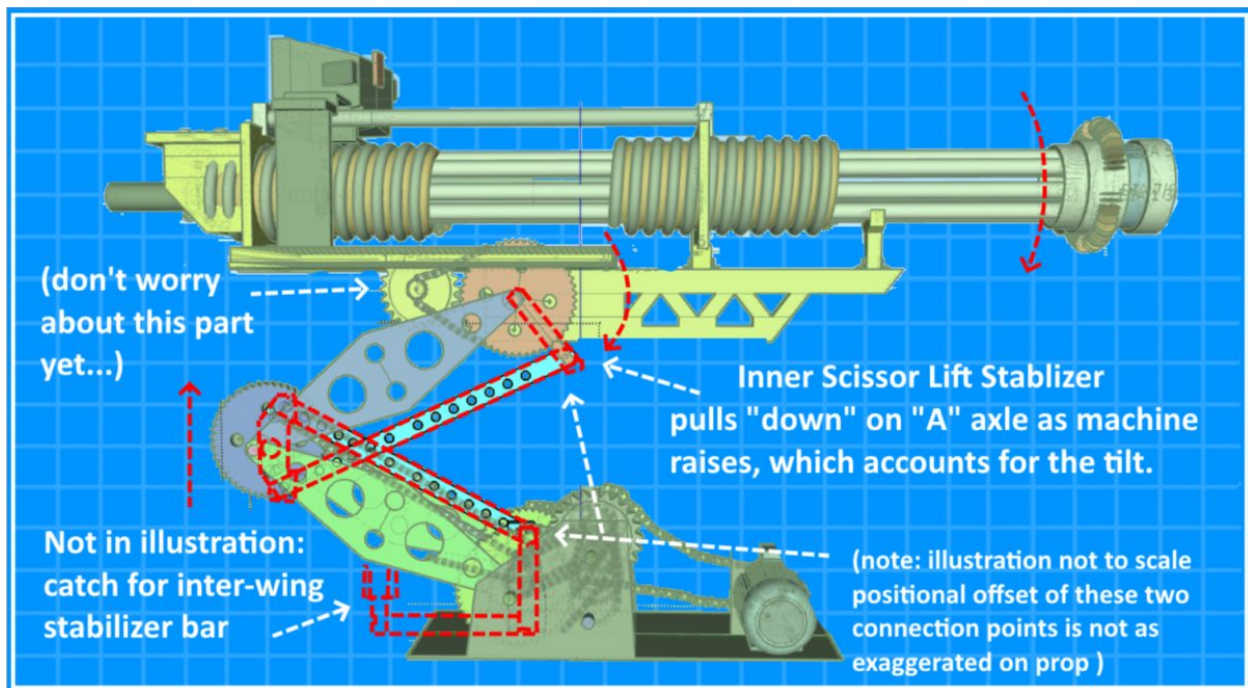


...so clearly we can't just bolt the prop directly to the red "A" axle. The Machine superstructure must be able to rotate independently, which is why the red "A" axle and sprocket are color-coded differently; they are all connected and rotate together.

For now, let's just assume that the red "A" sprocket is effectively hard-connected to the machine itself (*we will turn our attention to the purpose of the "A" sprocket momentarily...*).

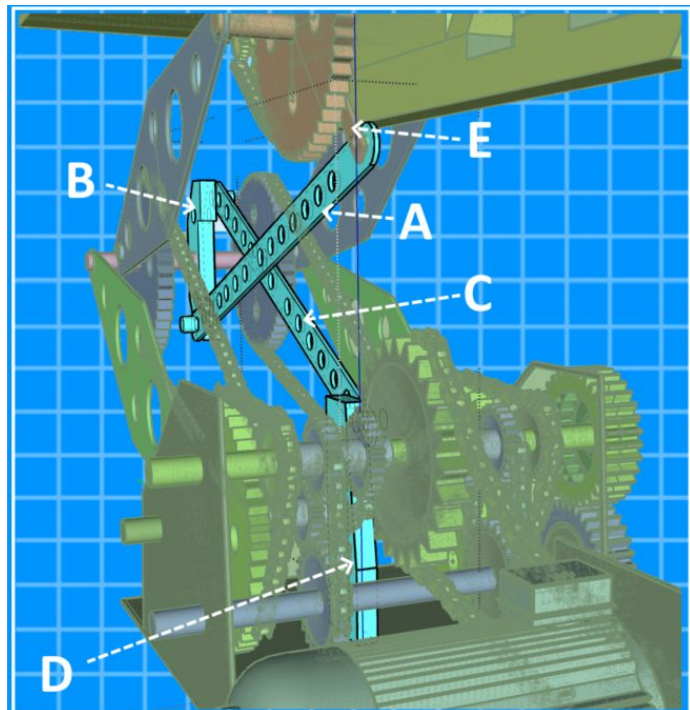
So how do we prevent the machine superstructure from flopping and flying all over the place, unhinged, since it can't be hard-connected?

By means of the **Inner Scissor Lift Stabilizer Bars**:



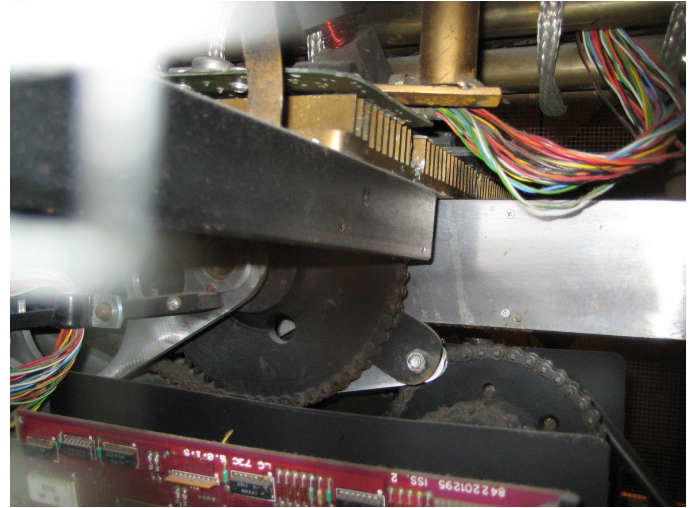
### Components and Terminology

- A: Upper Inner Arm / Lift Bar
- B: "Banana"
- C: Lower Inner Arm / Lift Bar
- D: Inner Post
- E: Sprocket Bar



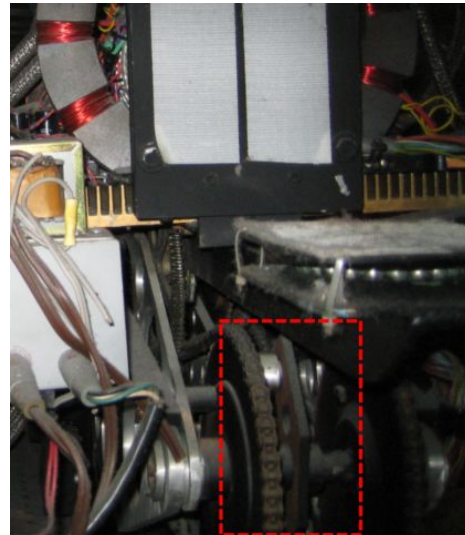


This system is visible in close ups of the Machine at MGM studios in 2006. The Machine has likely not moved from the following configuration since the mid-1990s.



A rare rear-view shot of the piece called the **Banana**, during the Machine's time as a queue attraction at MGM studios, circa 2006.

Note that we can plainly see the large rear "B" sprocket is attached via a ~1" post to the Upper Wings!



At the Bowers museum, 2020. Here we can see the Sprocket Bar connected from the Upper Inner Arm, and the Lower Inner Arm connected to probably the first image captured of the 'Inner Post', the existence of which was theorized but only recently confirmed.

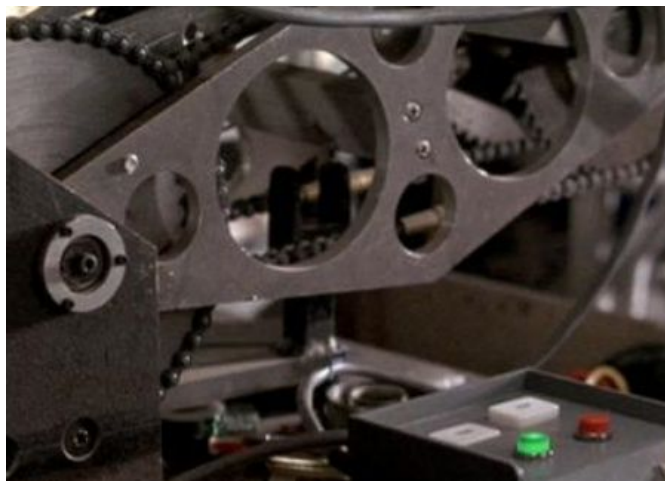
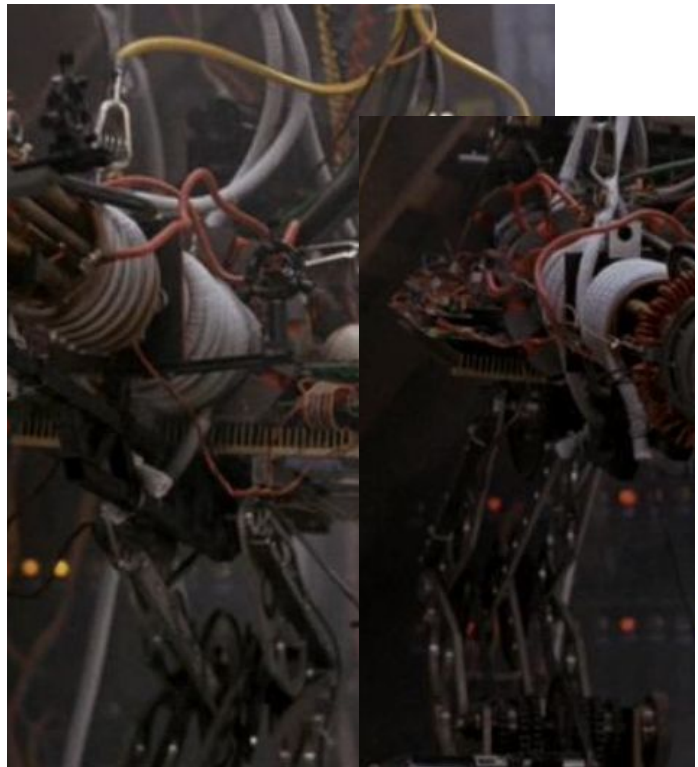
Note that in the fully lowered position, the Sprocket Arm is at ~45 degrees.





In these images from *Honey, I Shrunk the Kids*, we can see the Inner Lift Stabilizer Bars in action. Notice the angle of the bars, which are more extreme now that the machine is at what might be fully lifted (below).

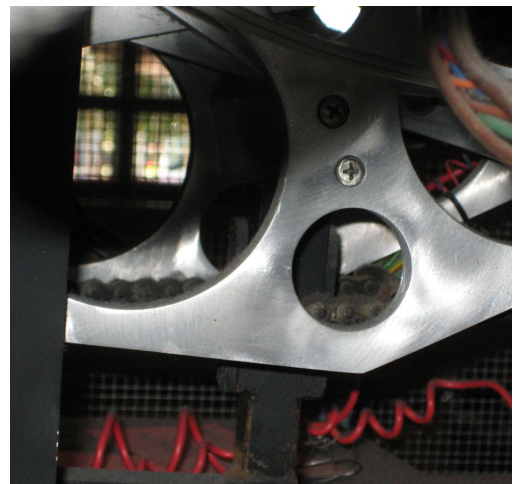
Notice the range of motion of the sprocket bar seems to be ~35 degrees relative to its fully-lowered position, meaning that not much correction was needed.



Here's the aforementioned "Catch" and the Lower Wing Cross-Bar, from *Honey I Shrunk the Kids* (*left*)

Here's a close up of the same pieces, from 2006 (*right*).

Note that at some point, some sort of block was added to the catch, as the Machine likely stopped working properly a long time ago...or perhaps this component never worked properly and needed extra support, as *no image of the catch working properly exists*.



Same parts in Bowers, 2020. It's hard to make out, but the Block is still there wedged in the catch, propping up the cross-bar.

The catch is connected to the Inner Post via the small horizontal square bar, which is all likely made of the same material as the Armature piece on the superstructure - 1" to 3/4" square steel tubing, welded together.

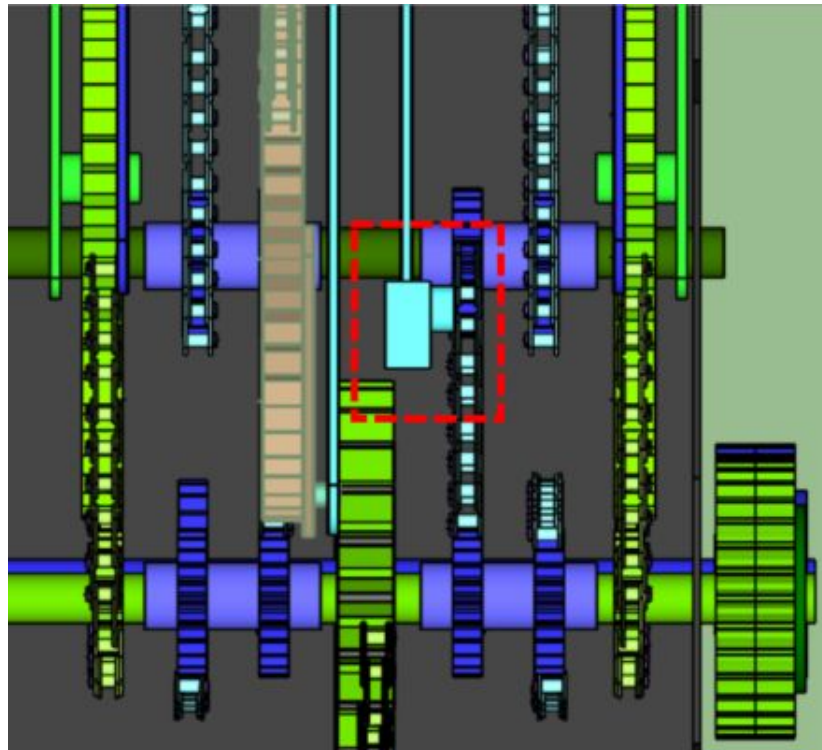
Note: the Inner Post is a straight piece of square tubing located just behind the rear No.3 axle. It is connected to the Lower Inner Lift Bar via a notch and bolt.



(right)

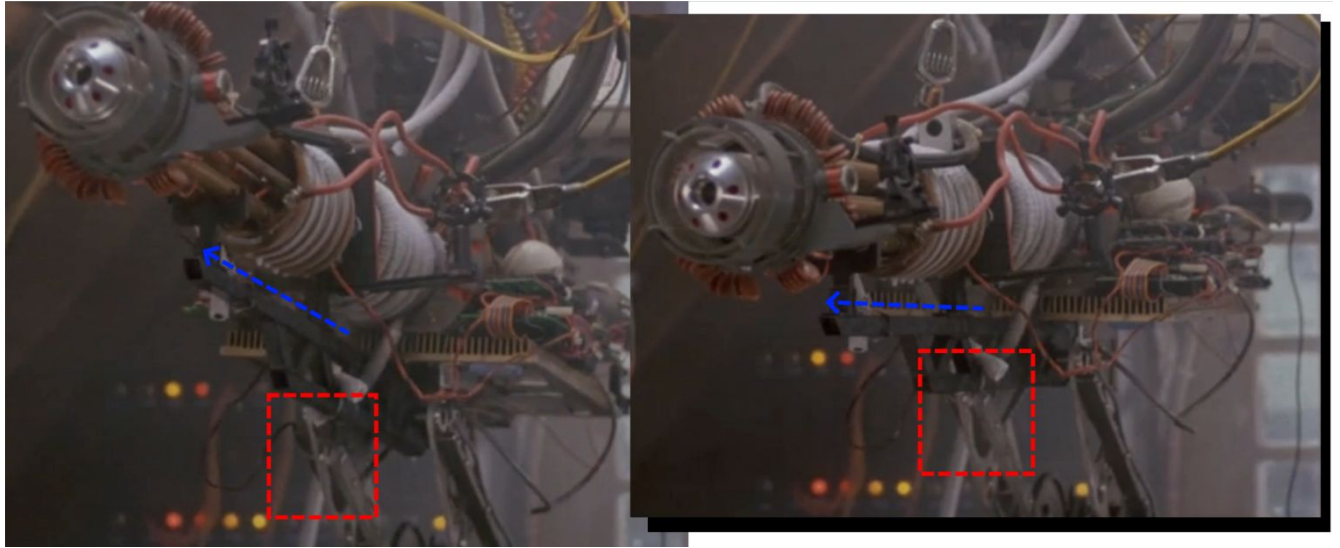
The red box indicates the approximate position of the inner post within the rest of the Transmission Base, just "behind" the No.3 axle. The parts involved are *teal* / *light blue*.

Note: Placement of Inner Post within this illustration is not 100% accurate. In reality it's closer to just behind the Primary Drive Sprocket, ie slightly to the left of its placement in the illustration image on this page.



#### 4. How the Laser Barrel Tilts Independently: The Third Axis of Motion

As evidenced in both *Honey, I Shrunk the Kids* and *Honey, I Blew Up the Kid*, the Machine was originally capable of tilting its superstructure independently of the angle of the **Sprocket Bar** within the **Inner Scissor Lift Stabilizer Bars**. This can be observed here:



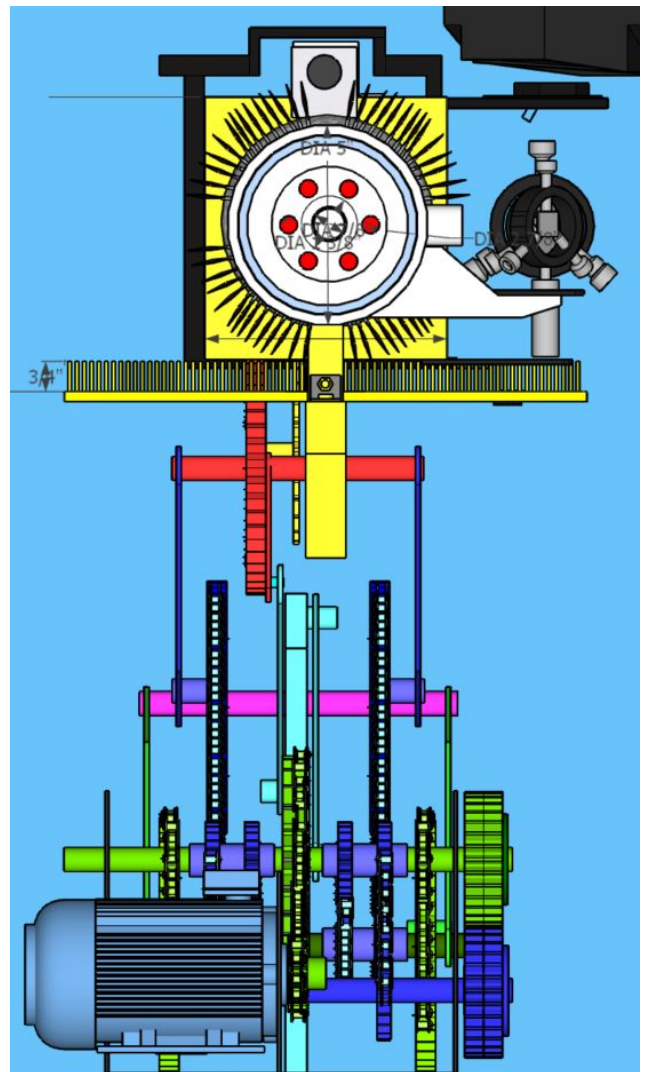
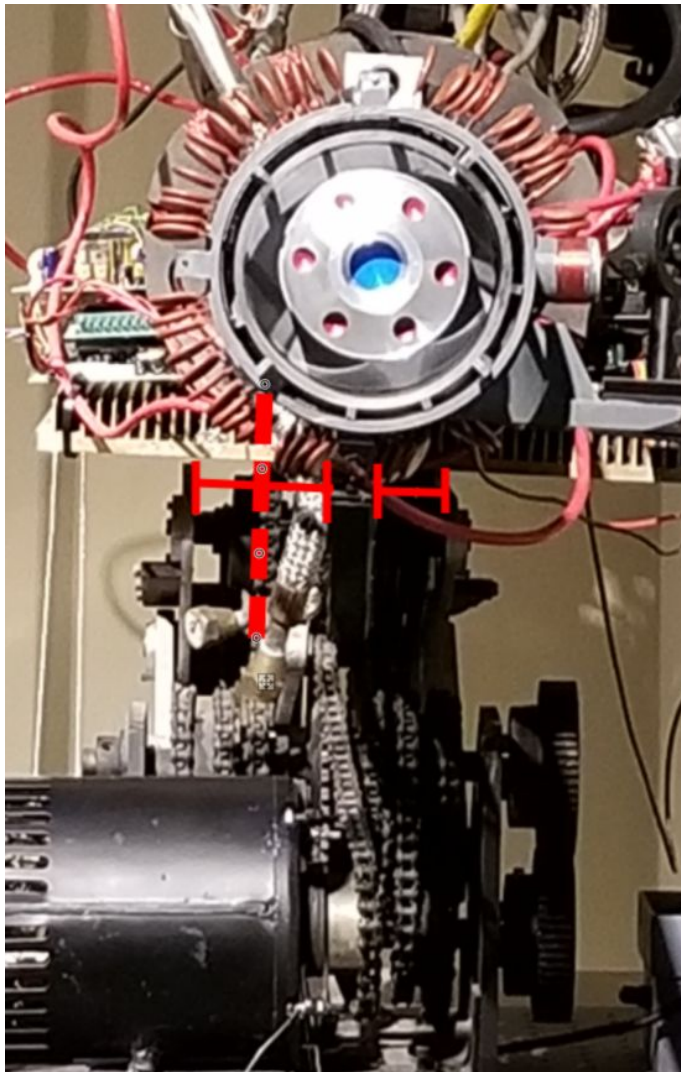
In the red boxes, you can see that the angle of the upper inner lift bar / sprocket arm / sprocket does not change when the laser tilts down (blue arrows).

This is because the Laser Barrel is capable of tilting on its own via the **Tilt Offset Gear**, and **Onboard Tilt Motor**. The latter is connected to the former with a ~1" **Worm Gear** located nearly centered, on top of and through the Large Heat Sink, approximately at the center of the Machine's mass for balance reasons.

We will illustrate this next.



Let's take a look at the Machine straight on:



(Left, Bowers museum, 2020. Right: illustration )

Notice how the machine is slightly off-center relative to the midpoint between the two sides of the Scissor Lift. Notice also that the rear **Tilt Offset Gear**, yellow in the illustration, is approximately dead centered behind the Armature / center point of the Laser Barrel.

*(Author's note: For years I struggled with the mystery of how this mechanism worked, assuming some kind of connecting between the lift mechanism. In reality, not only was my theory of independence correct, but I in fact had picture evidence for years without realizing it!)*

...that's all well and good, but how does it *tilt*!?

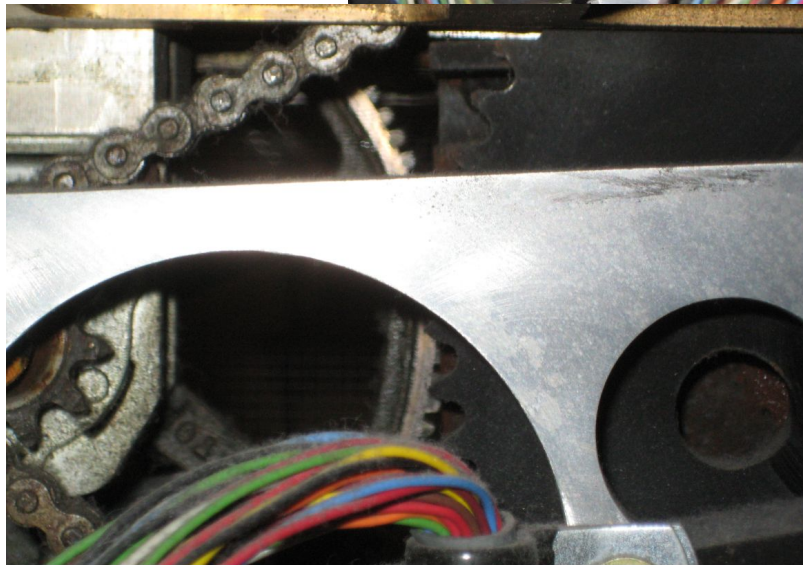
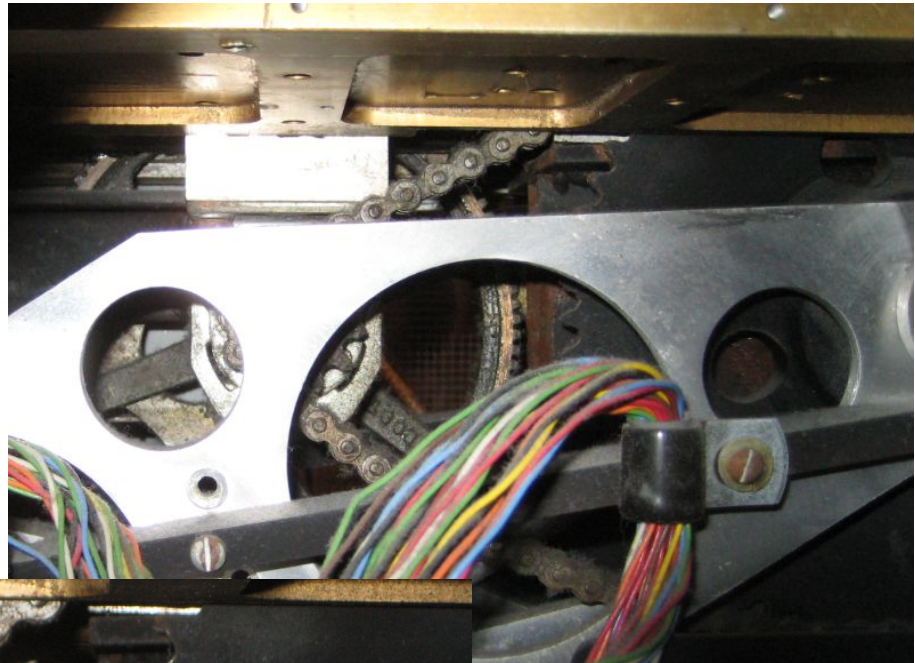


Let's start by stating that the *Large Sprocket "A" - Red* - **does not rotate**.

It is essentially "orbited" by the **Tilt Offset Gear**, which is connected to the **Large Red "A" Sprocket** via a high-ratio connecting sprocket, approx 1:3 / 4:13, or 2" vs. 6"-6.5".

We can see evidence of this connection here, from MGM studios, in 2006:

And below, in extreme close-up:



How does the Tilt Gear (left side in above images) "orbit" the Large "A" Sprocket (right side in above images)?

Something must move the Tilt Gear. Another source of independent motion.

## The Mystery of the On-Board Tilt Motor

Such a piece was literally impossible to observe in the first two films. Its existence could only be inferred, until the Machine was stripped of its original components for the sake of the third film, *Honey We Shrunk Ourselves* in the mid-90s.

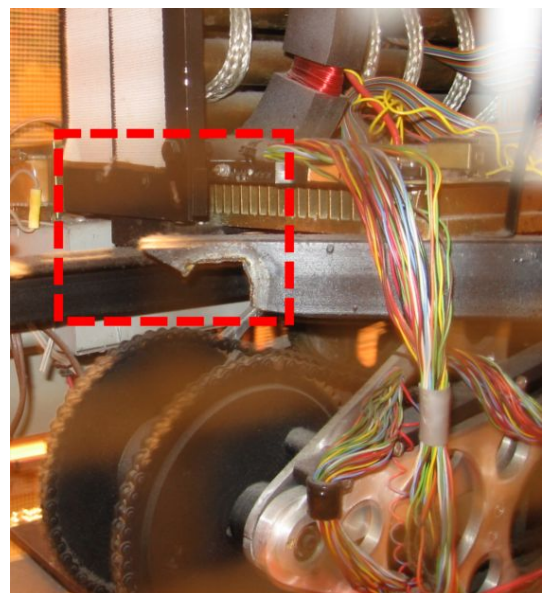


The relative sparsity of the Machine's new adornments, and its subsequent storage in plain sight for a number of years, meant that certain things could be observed which would have been impossible before.

The following are close up images taken in 2006 of the Machine in its HWSO configuration (Machine III), from the "Starboard" side.

Towards the back, we can verify that the read Square Flange is connected via an L-bracket to the Large Heat Sink. This is important to establish that the Heat Sink is indeed structural.

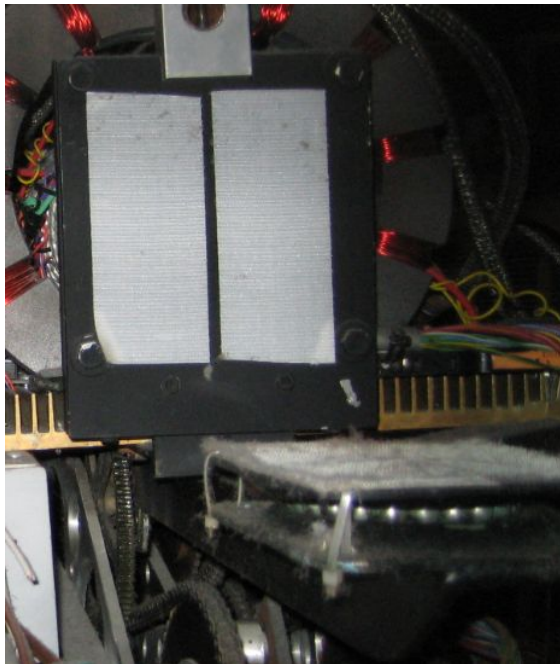
*Note:* do not be confused by the rear bar / monitor shelf sticking out of the back of the Machine. This was added to support a new monitor in Honey, We Shrunk Ourselves, and is still attached to the Machine now (June 2020).





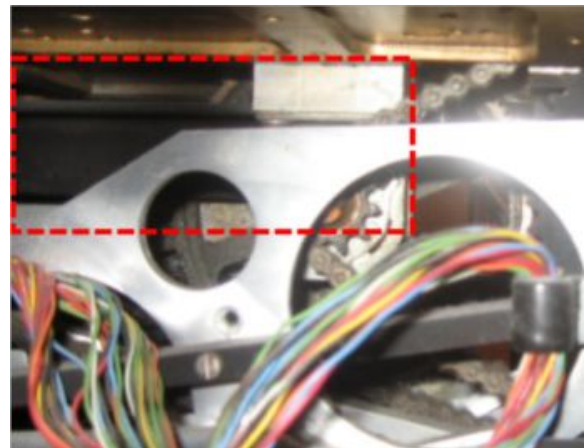
(right: **Machine III**, with color monitor and large green nitrogen tank, both of which were missing from *The Machine* when the 2006 series of MGM pictures were taken)

The monitor arm and swivel base can clearly be seen in the image taken in 2006 of the back of the machine, as seen below:

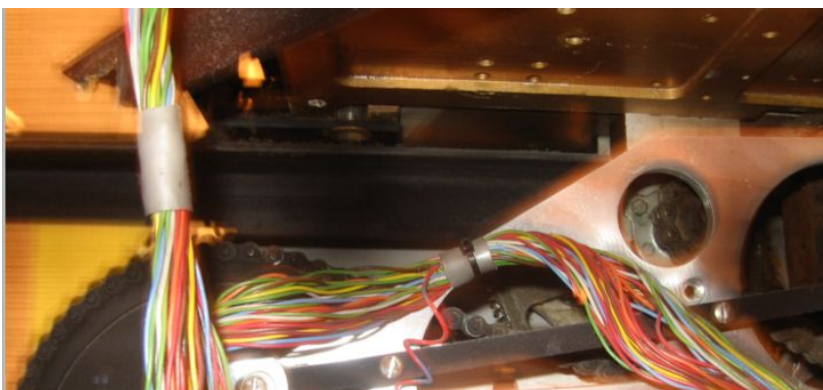


One can also observe that the Rear Square Flange is anchored to the lower L-bracket, and that the L-bracket itself is quite wide.

In the next picture, below, we can see that the monitor arm was added to the same bracket that houses the Tilt Offset Gear, but does not actually attach to the heat sink as there is a sizable gap:



And finally, we can see the underside of the L-Bracket which attaches the rear Square Flange to the Large Heat Sink:



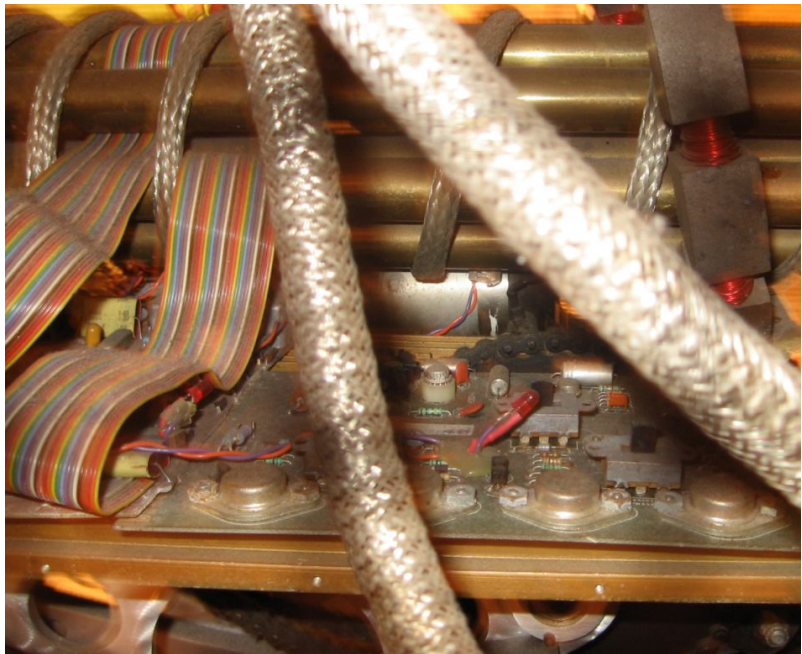
Next, note that both Large “A” Sprocket (red) and Tilt Offset Gear go through the Large Heat Sink:



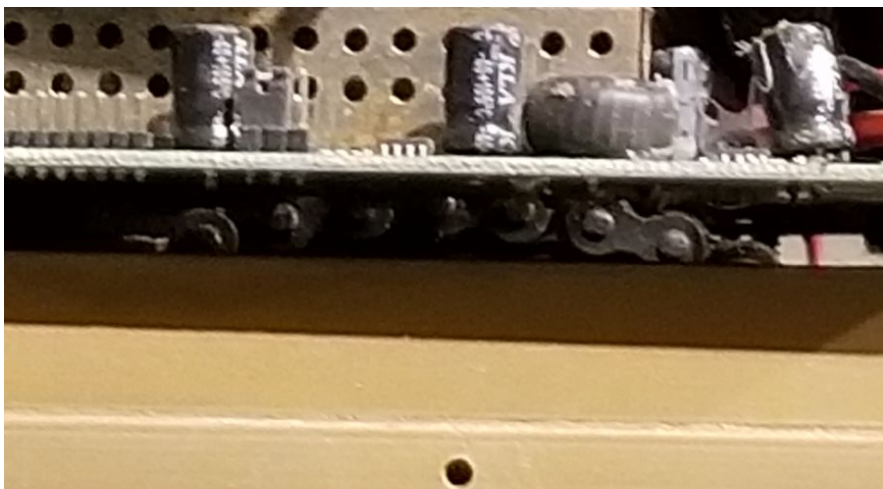
This can be observed on the top of the Large Heat Sink as well, as pictured on the right, again of the “Starboard” side of the Machine, MGM, 2006, pictured right.

Notice, in the dead center of the picture, a cylindrical object...that just so happens to:

1. Be very inward and not consistent with the other ornamental “greeblies”
2. Has what looks like actual wired connections
3. Is positionally aligned with the Tilt Offset Gear, ie, about 1-1.5 inches offset from the Large “A” sprocket sticking up through the machine.

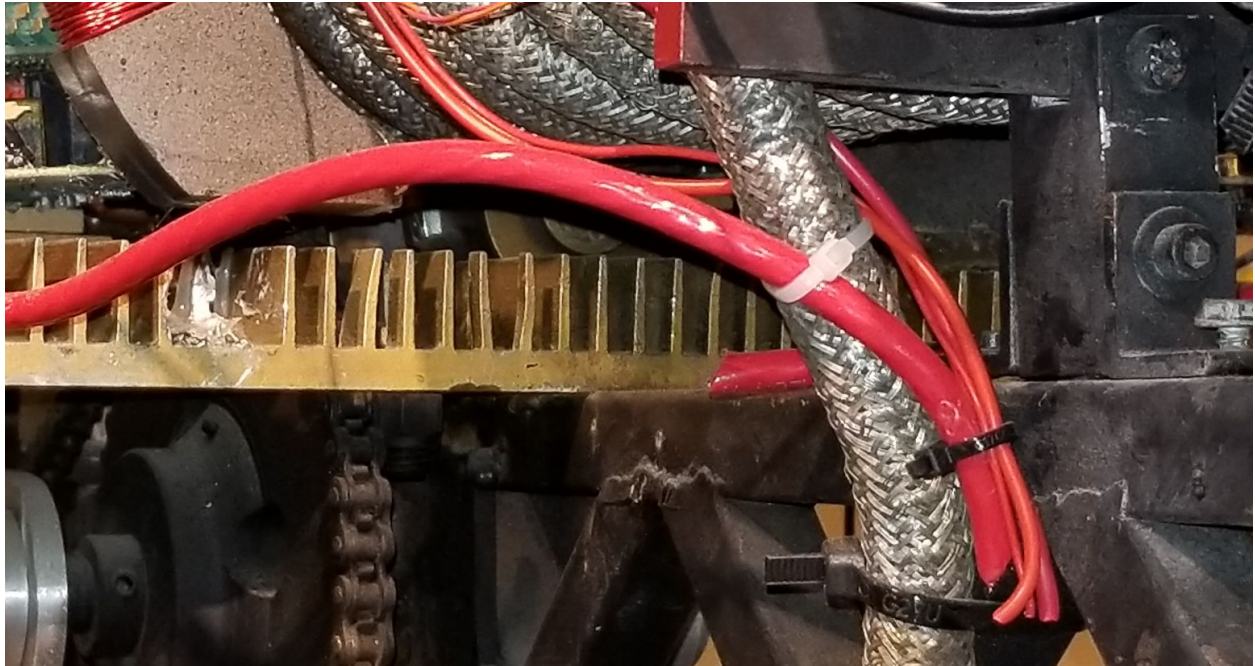


In Bowers 2020, the replacement “greeblies” cover all of this. You can still see the “A” sprocket peeking through however:



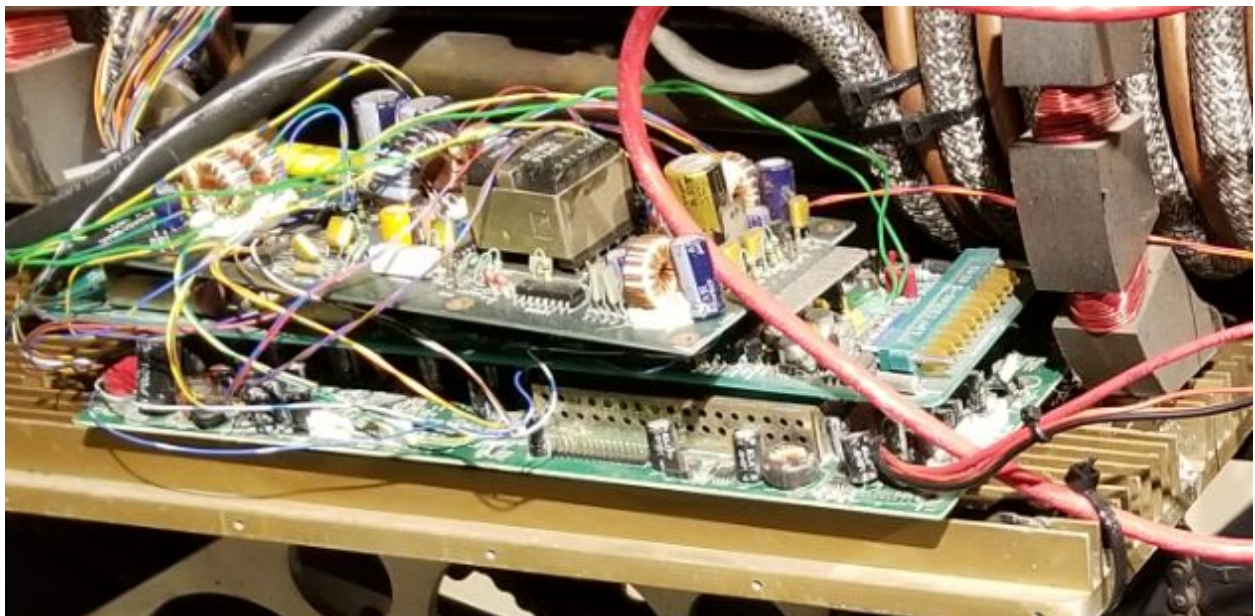


In the following shot from Bower's 2020, you can see that, even though it's pretty well-hidden, that cylindrical object is still there, held in place with distinctive metal clamps, and in a position to interface with the Orbital Tilt Offset Gear...see it peeking out from behind the red wire?

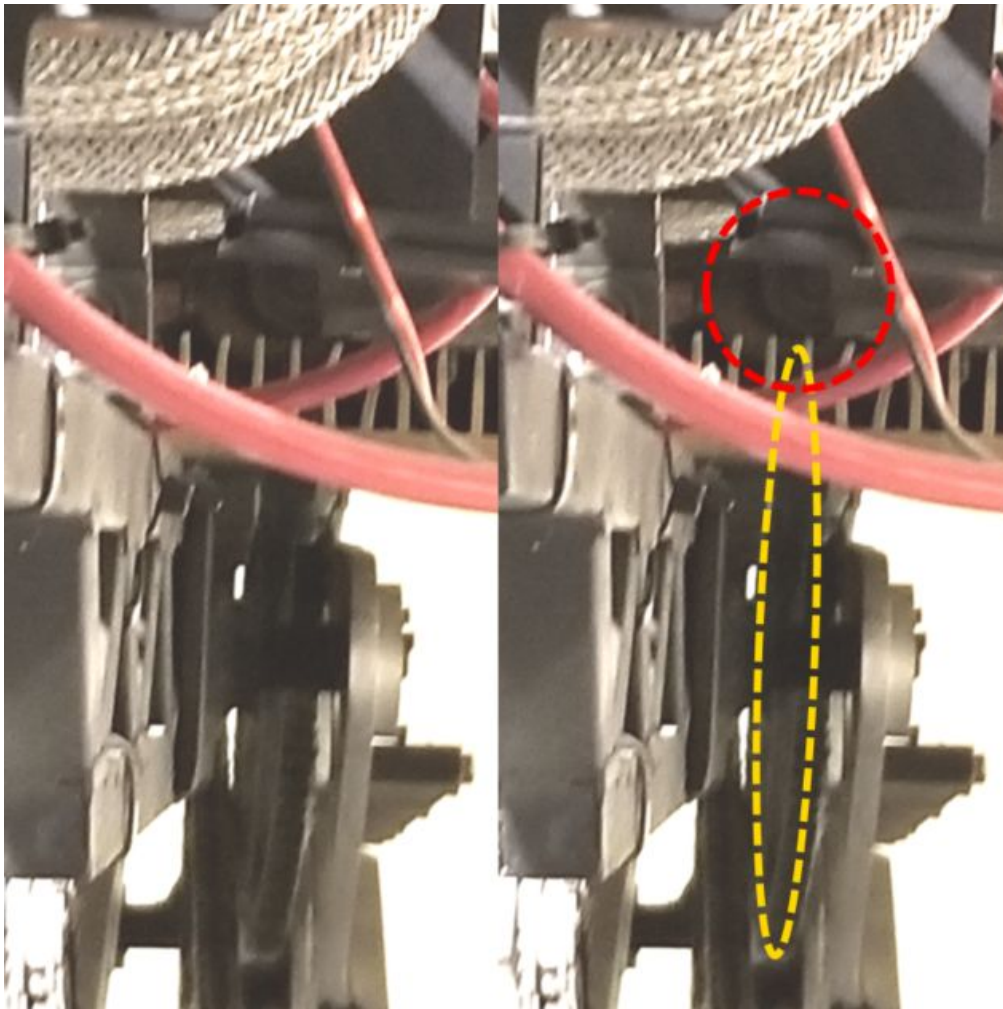


Of course, if this really were *THE* motor, why there'd be a worm gear to go along with it, right?

Good luck getting a picture of it now:



We can see in this straight-ahead shot from Bowers, 2020 - heavily zoomed in and manipulated w/ contrast and brightness adjustments - that the cylindrical object (red outline), is indeed directly over the Tilt Offset Gear:



Could our earlier, Greeblie-free 2006 pictures reveal the secret?

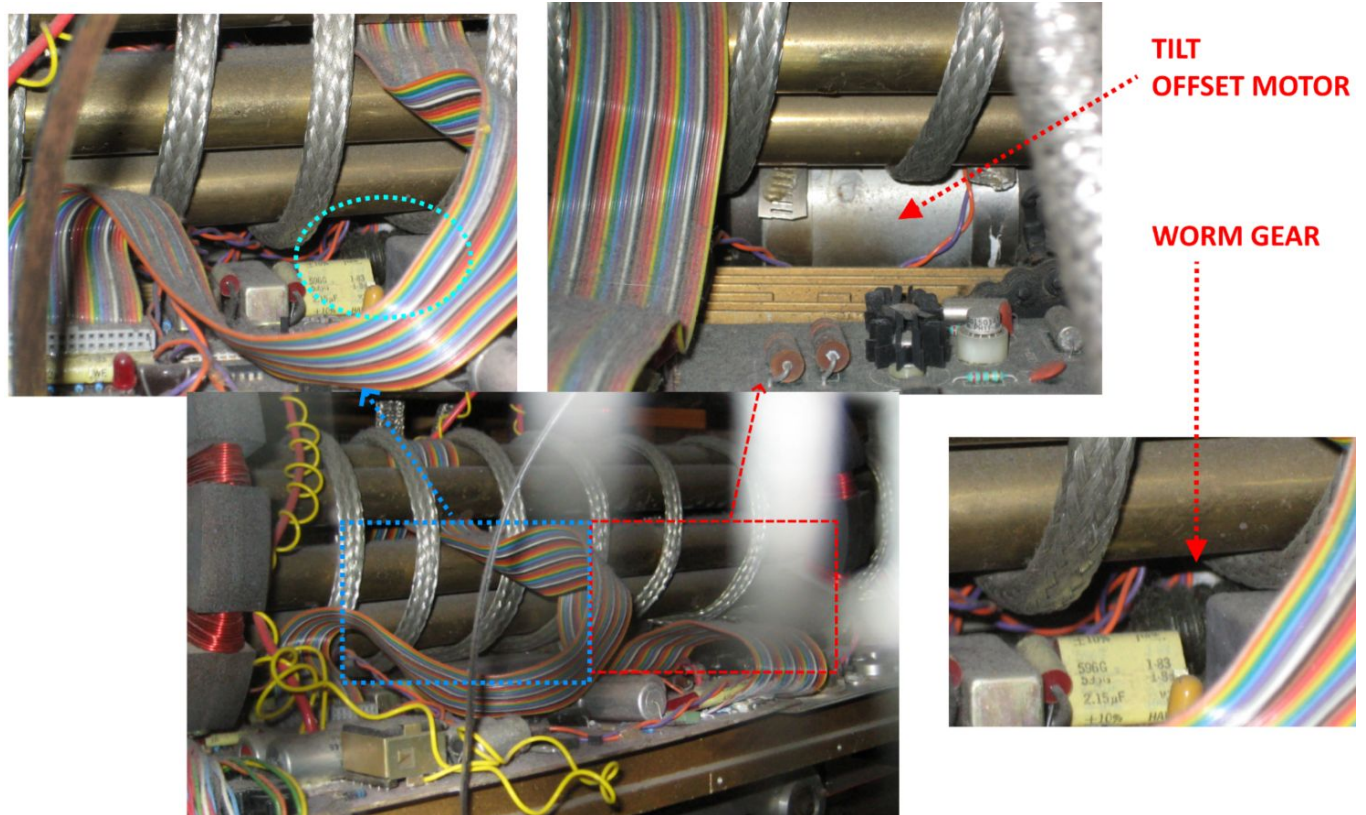
*(author's note:*

*The image at right illustrates how difficult it was to capture a picture of the prop in general. This was a time before the ubiquity of the smartphone, and if I held the lens of my small Canon still digital camera at an angle, I'd get more mesh than prop.)*





Notice that in addition to the prop being difficult to capture, there were a lot of extraneous ribbon cable covering the *exact area* that the worm gear was supposedly hiding. Many pictures were taken in rapid succession, but only recently was it revealed that one of them happened to capture the perfect angle:



This last image is the final piece of the long-standing question of how, exactly, the machine from Honey, I Shrunk the Kids was capable of tilting as well as raising and lowering.

Next revision will include information about the lower motor which was responsible for rotation of the entire Machine (lower torque motor, *coming soon!*)