Do It Yourself Trommel

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Written by Bruno Navarro

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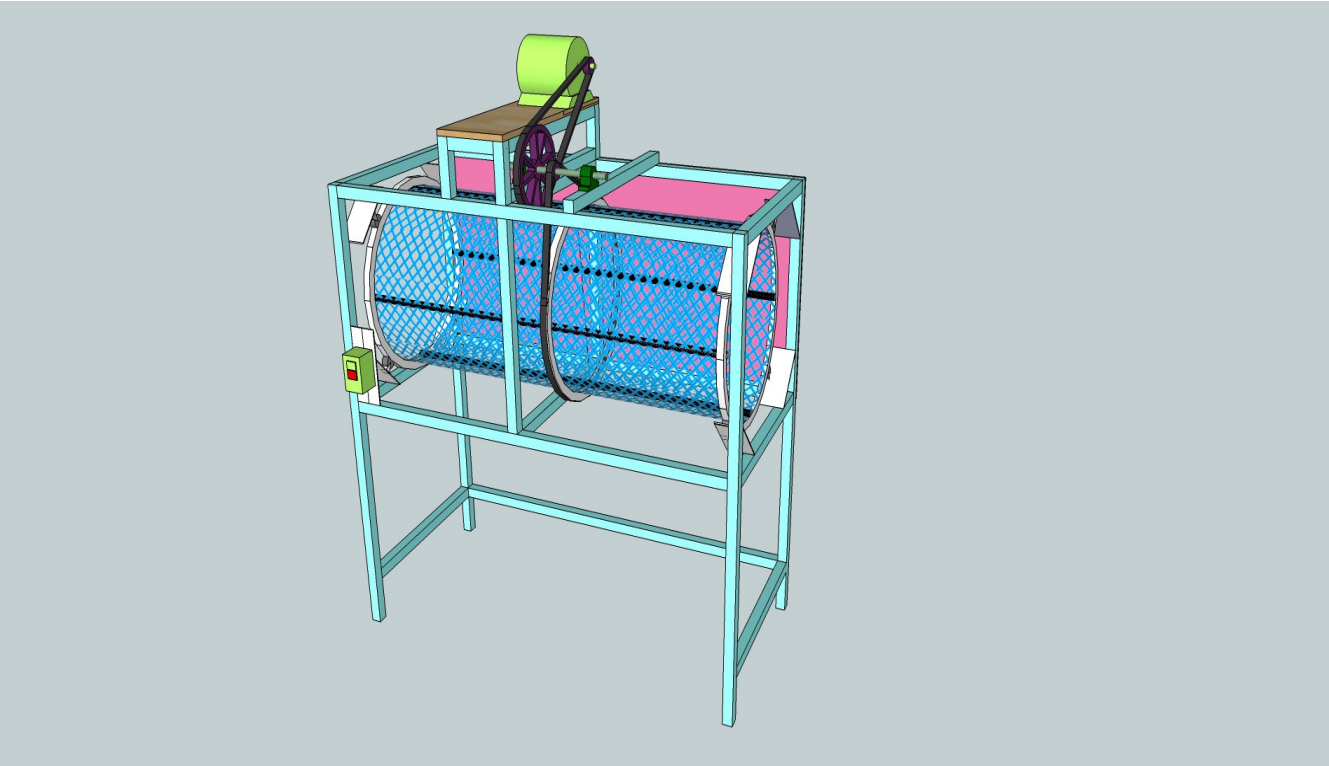
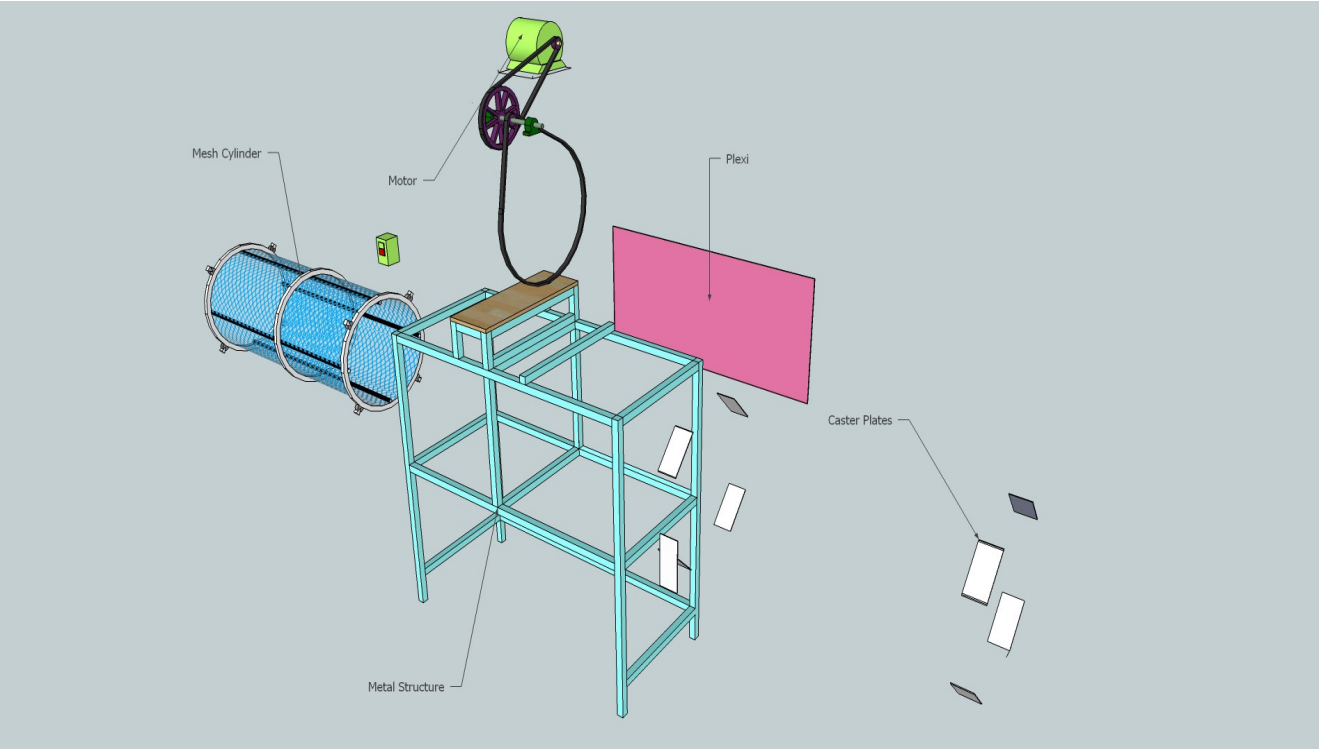


Trommel Construction

Preface

In the face of need you'll invent what is missing. This design stems from a necessity to match input with output. In NYC where every other street houses a cafe, bar, restaurant, deli , and residential homes the output of food waste is great. Unfortunately, the smallest scale compost sifter is a large commercial agricultural machine which would need too much physical space for what is available in a single NYC garden/site. My design is by far not a new design but a rudimentary one that allocates human power to a mechanical one to match an acceptable output. A little understanding of the basics of this design will allow anyone the ability to tailor the machine to their needs with confidence. The information provided is merely the latest modification of a design that has been worked on several times. For instance; after my first iteration of a wooden trommel design I decided the best material for this machine would be metal. In general metal is stronger and lighter in weight. The draw backs to using wood for a machine structure in the elements are too numerous and will eventually lead to a metal design. In terms of expertise required to build this machine; it will indeed take knowledge in welding, electronics, hand tools, and common sense. If this design is going to be used for a nonprofit or residential purposes I would highly recommend reaching out to your community and finding individuals versed in the areas you might not have training in. All of the nonprofits that I have previously built trommels for, use/make their connections available to them to upkeep the trommels.



The components to the trommel machine can be broken down into five parts: Metal Structure,Caster Plates, Motor/Pulley System, Mesh Cylinder, Additional

Project Breakdown

1. Metal Structure

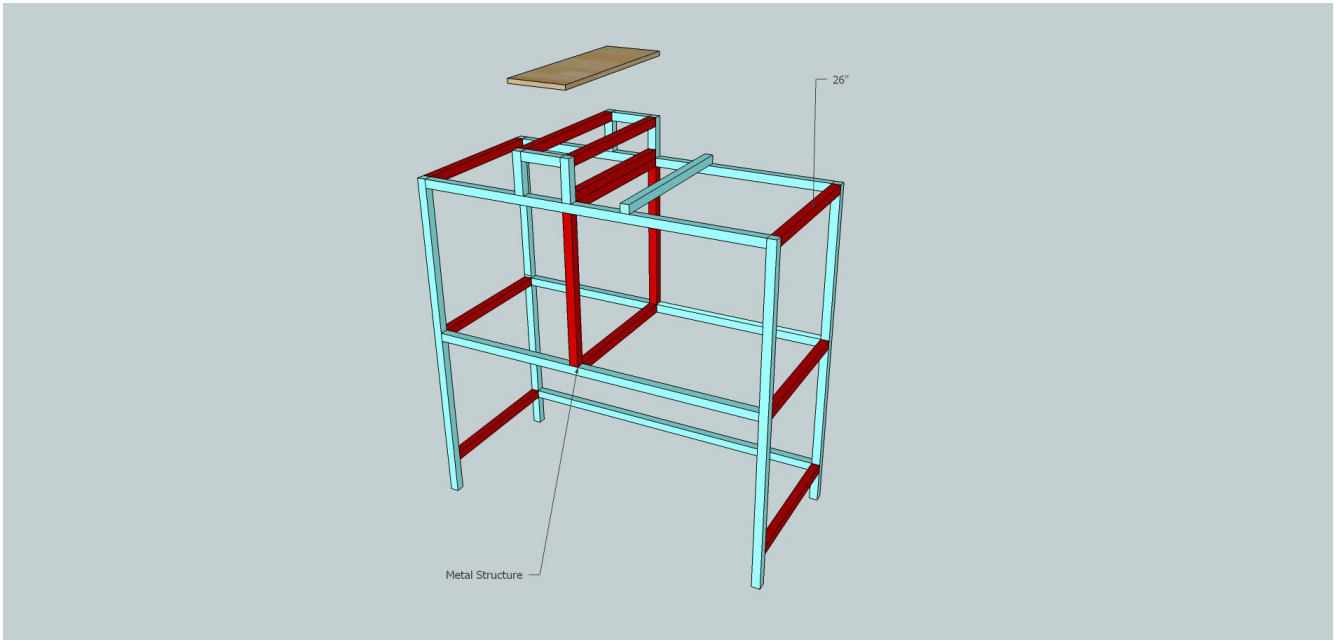
Total: 84' of 1-1/2” square metal tubing at 1/16” thick (includes material cutoff)
Cutlist:
13pcs – 26”
6pcs – 7”
5pcs - 59”
4pcs – 60”
1pc – 29”

Flat Plates for Caster Wheel Mounts

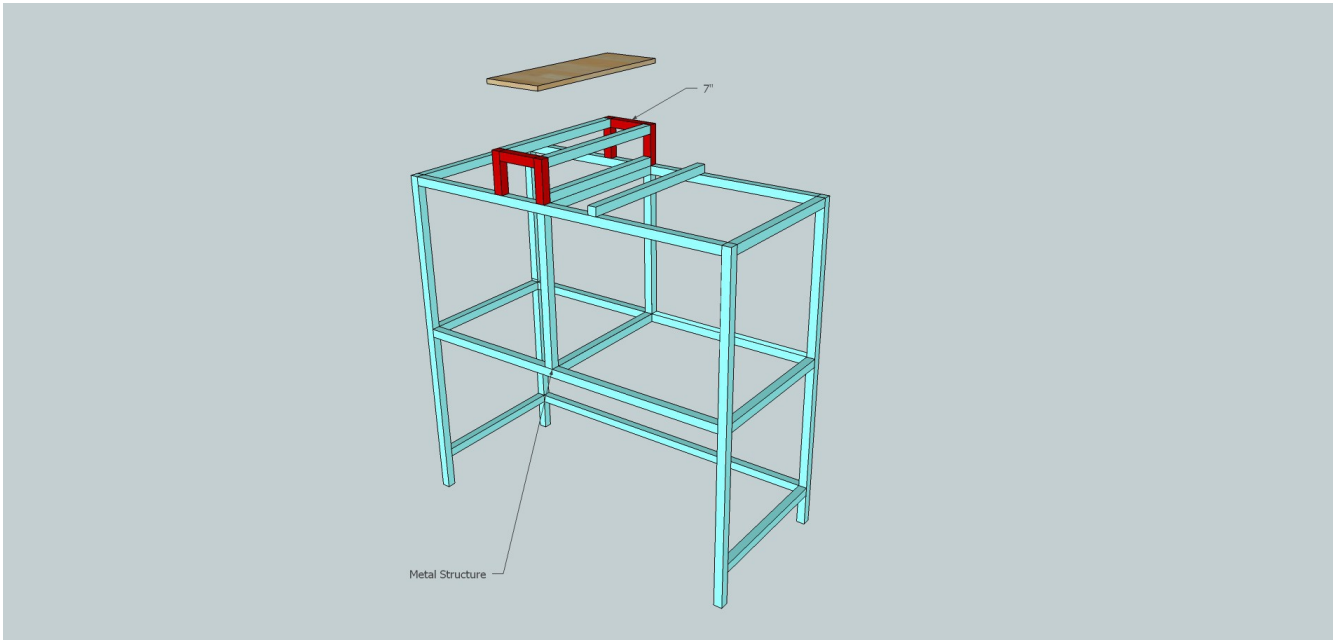
Total: 44” of 4” x 1/8” metal flat plate (includes material cutoff)
Cutlist:
4pcs – 8”
1pc – 10”

Wood

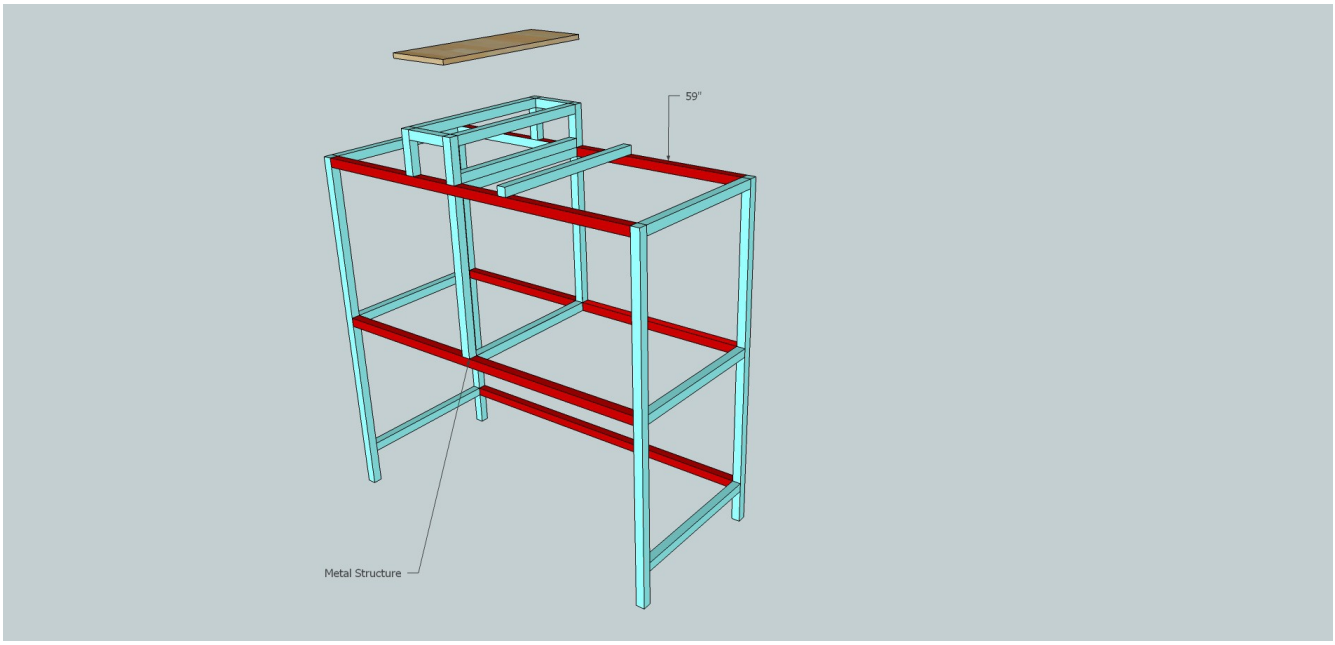
1pc – 10” x 29” x 3/4” Plywood



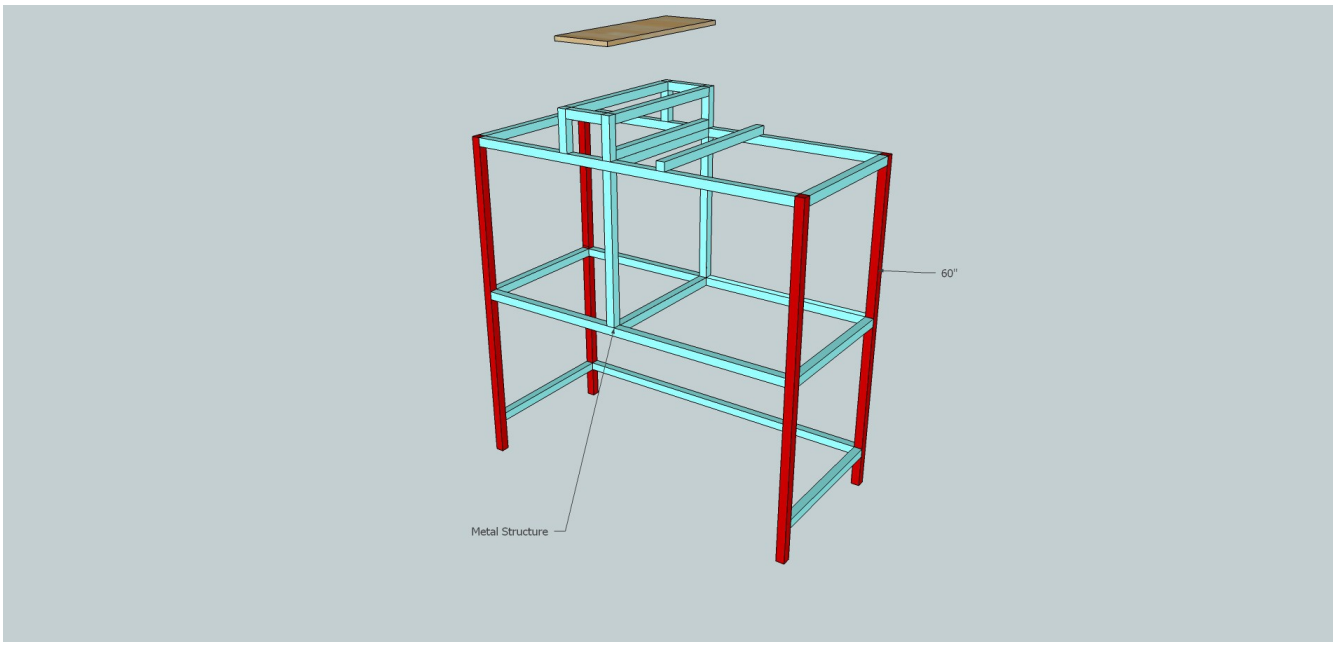
13pcs - 26”



6pcs-7”



5pcs-59”



4pcs-60”

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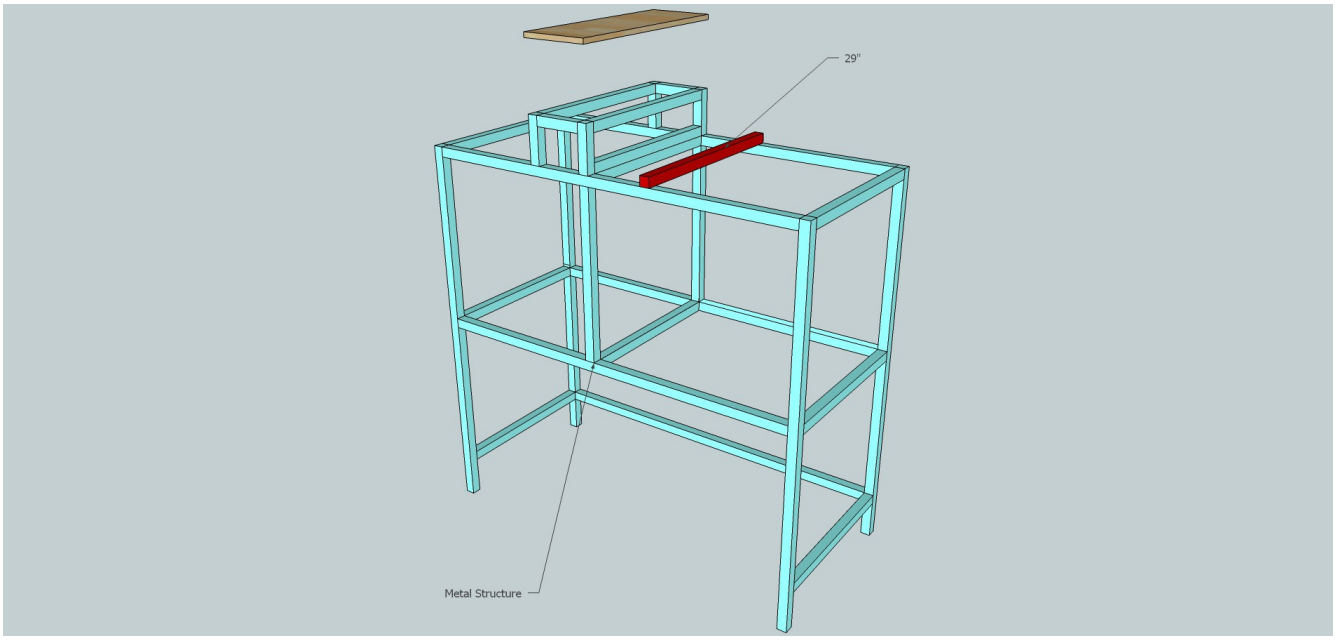
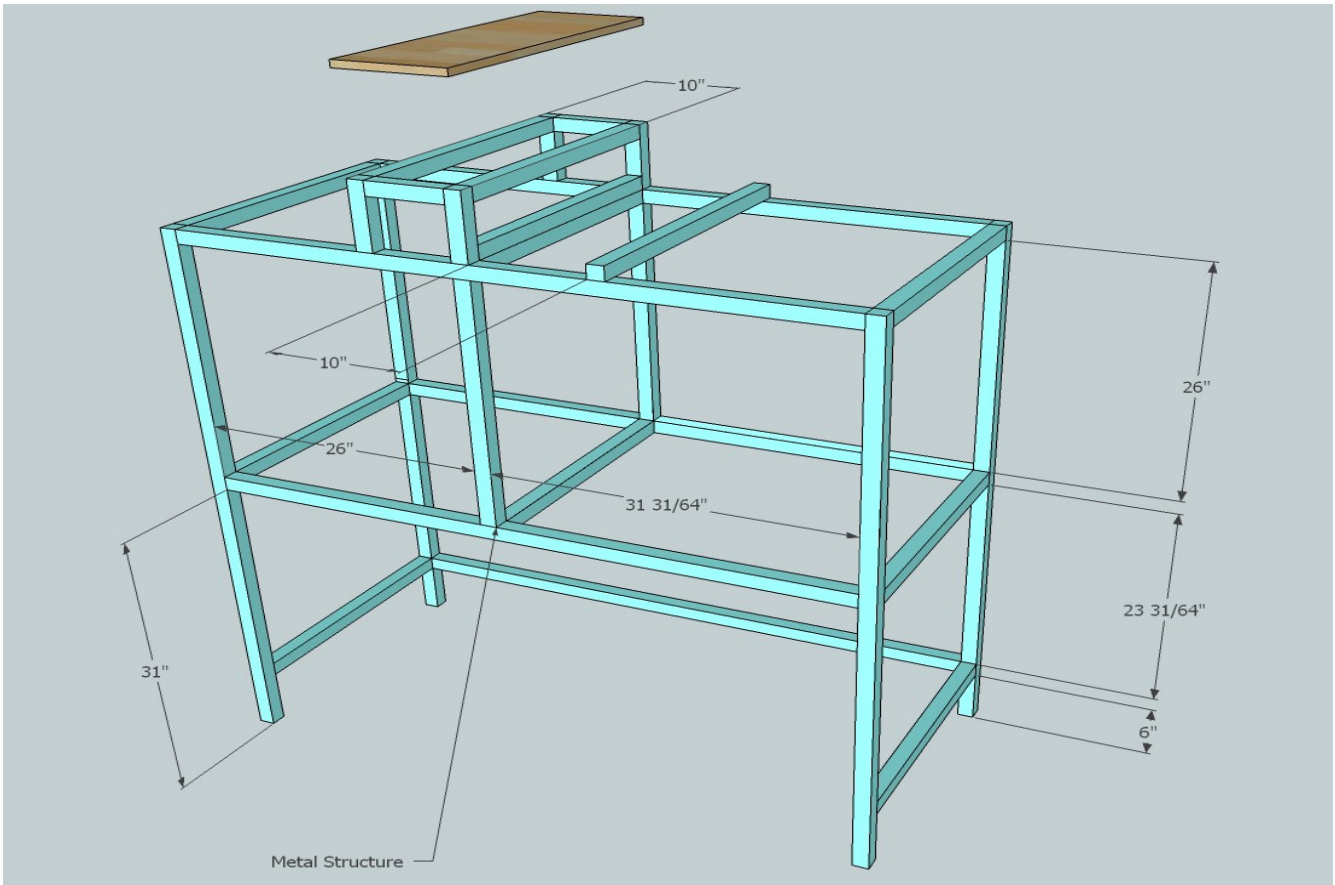
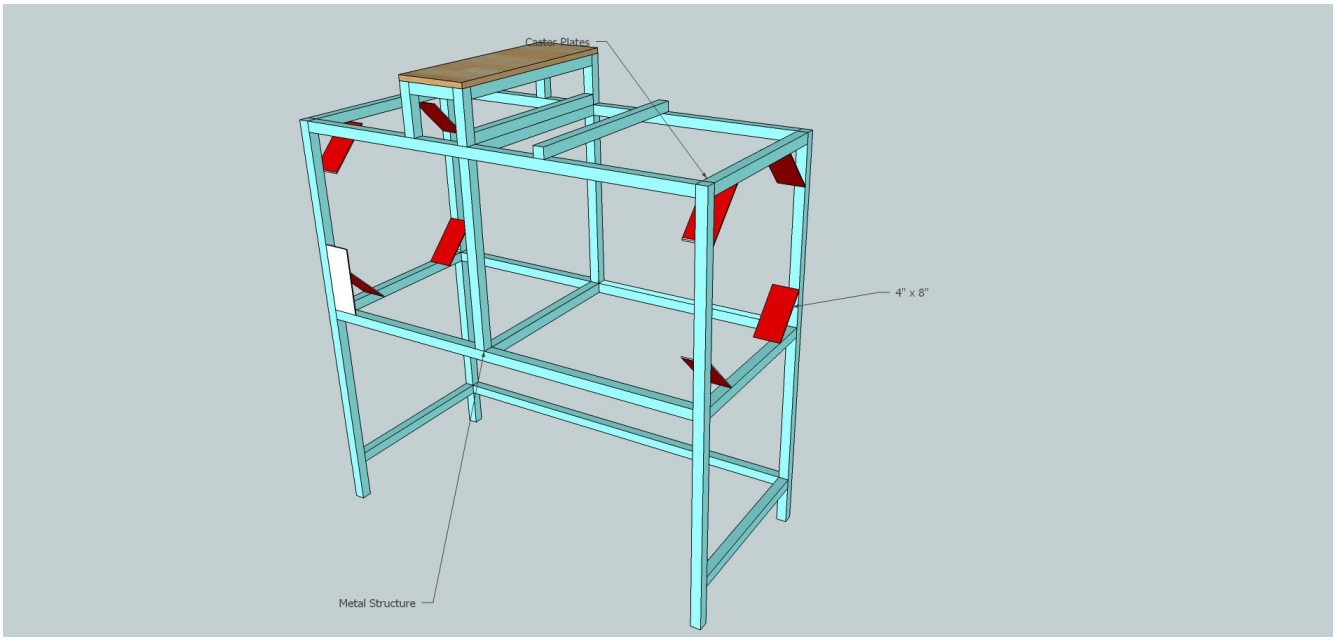


1pc-29”

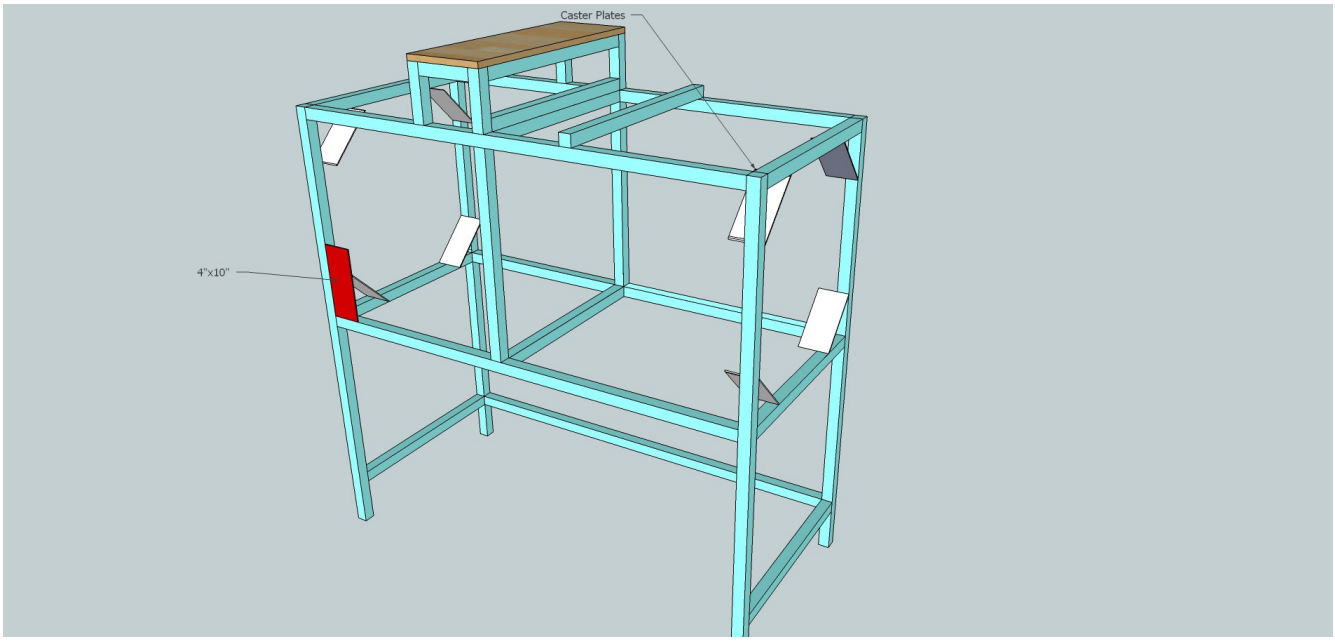


Dimensions

2. Caster Plates



8pcs-4”x8”x1/8” Flat Plates



1pc- 4”x10”x1/8” Flat Plate

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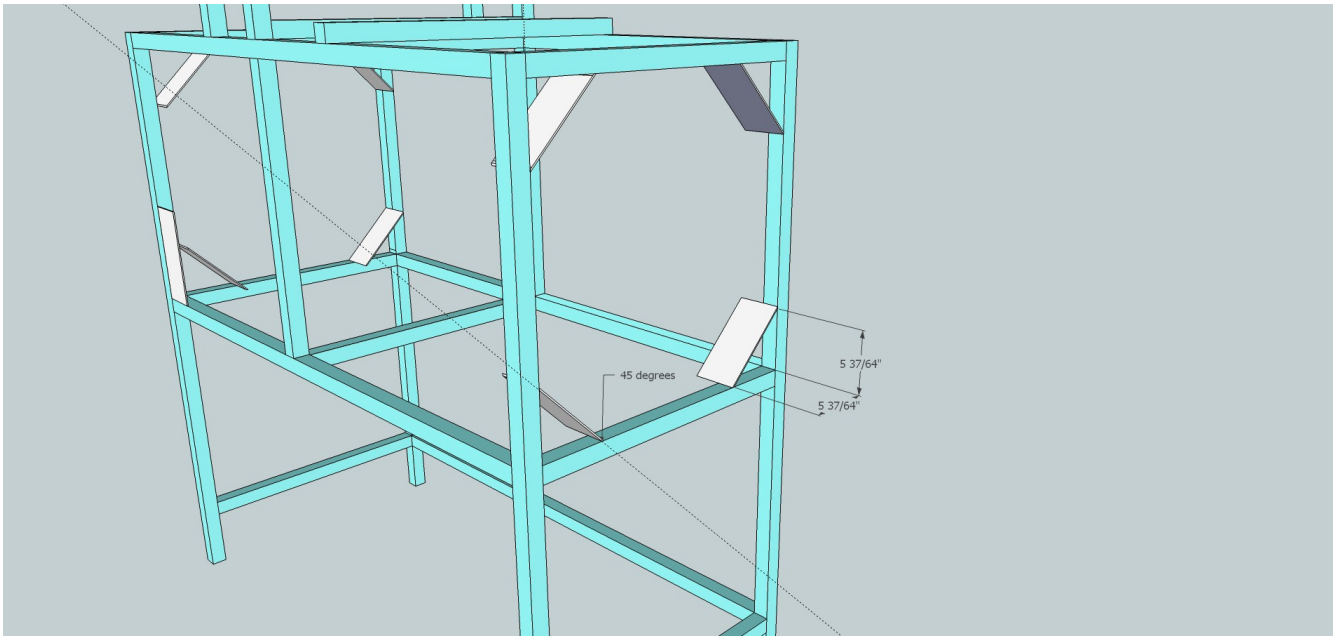
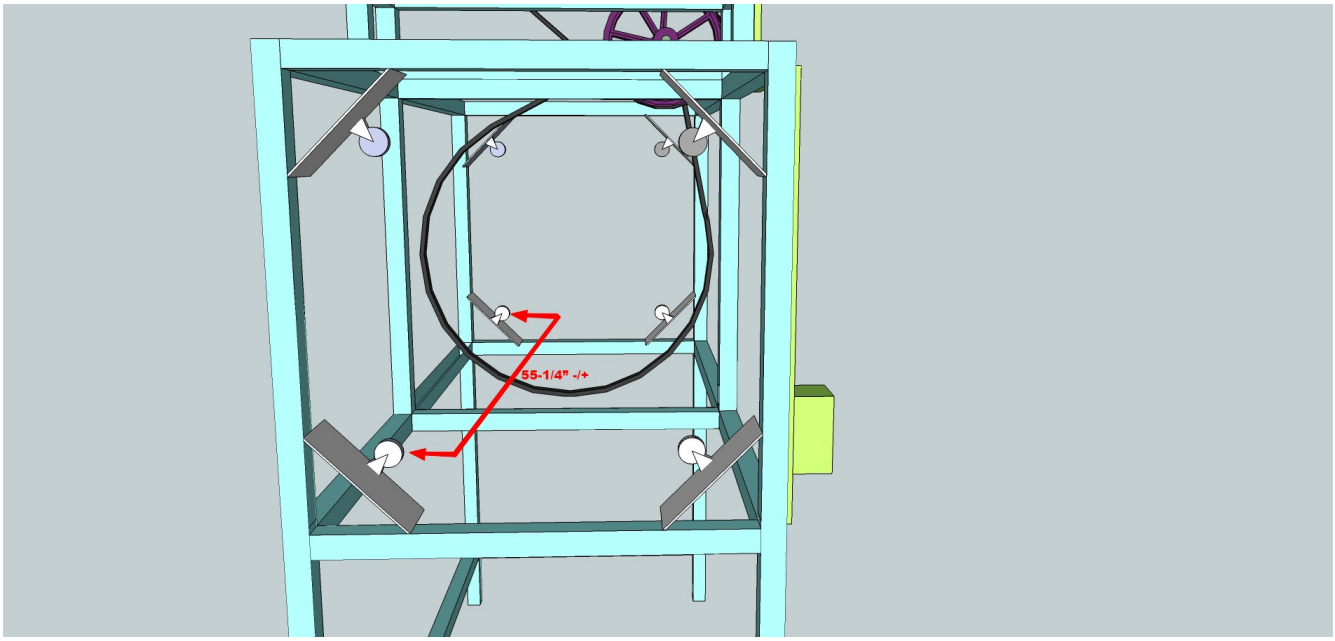


Plate Placement



The image above and below is to show that you'll need to predrill 1/4”/+ holes for the caster wheels and bolts.
Make sure the caster wheels are spaced out from center to center at approximately 55-1/4”

Paint to protect the metal

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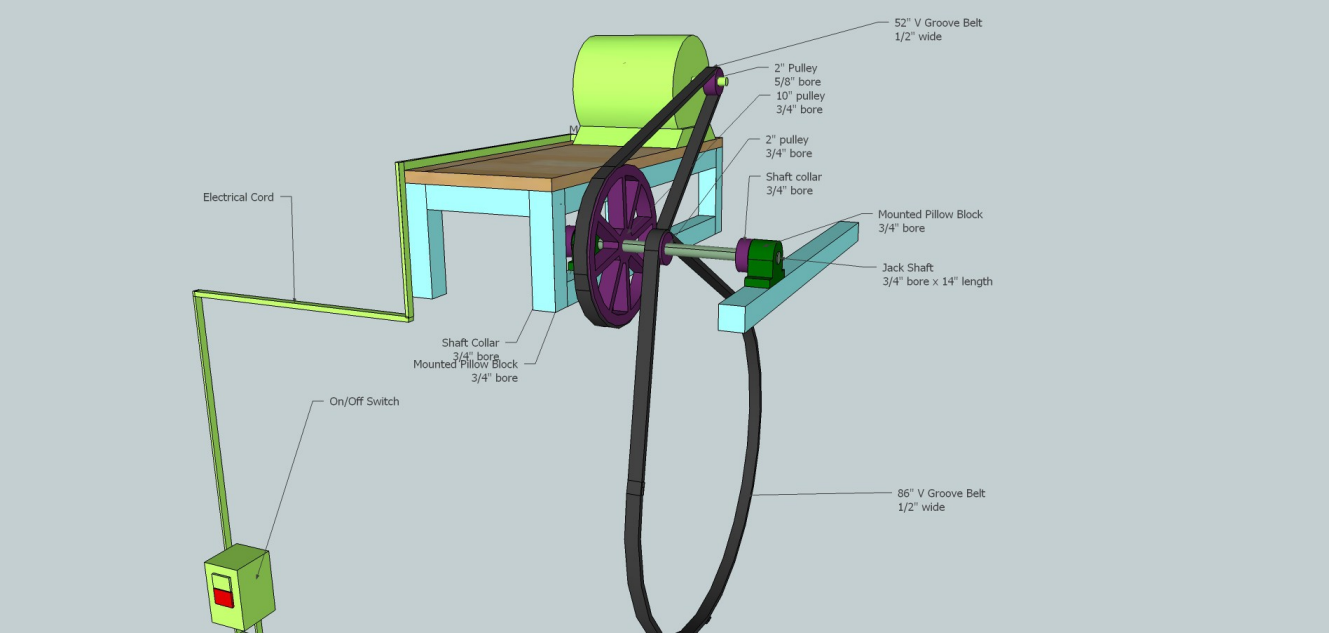


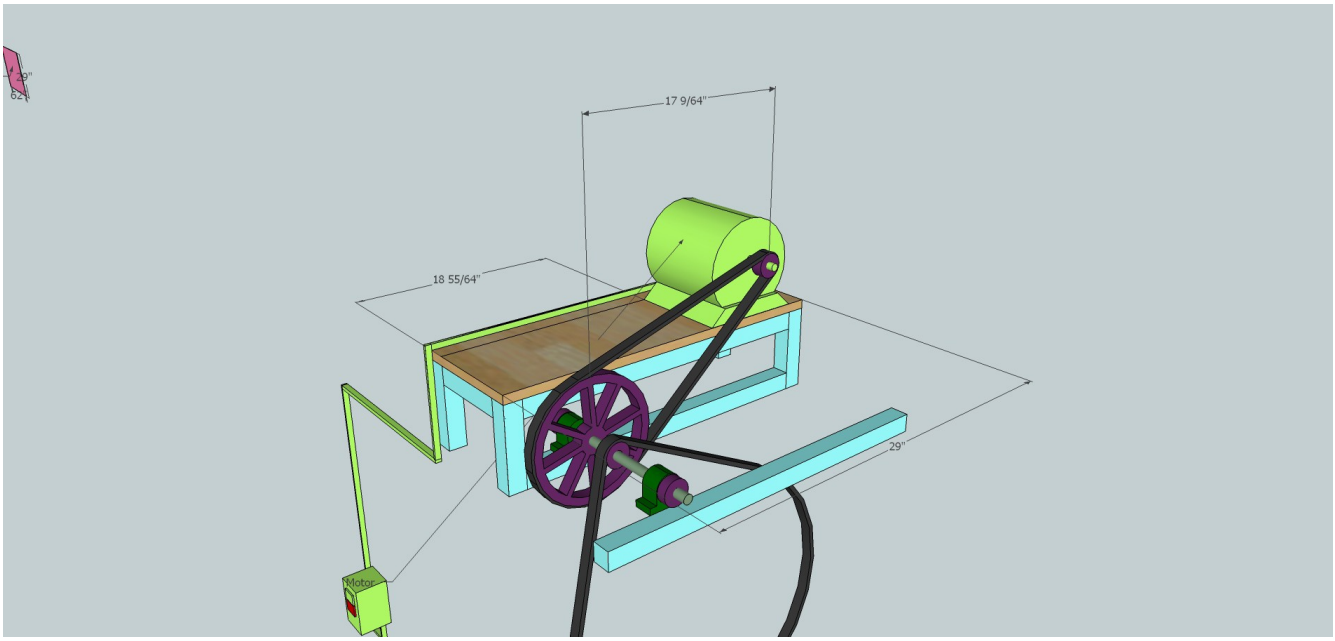
3.Motor and Pulley System

The motor used in this design is an agricultural motor at ¾ or 1 horsepower. You can also use a washer/dryer machine motor. If you are not familiar with basic electronic motors I'd recommend to purchase a new one. It'll come with instructions on how to wire a switch and plug to it. Most agricultural motors have an option for 240v or 120v. 120V is the desired setting, it'll plug directly into an outlet, most generators, and solar panels without any issues. It'll also have an option for the direction of the rotation, this design is built around the counterclockwise rotation of the motor but the reason behind this choice is to get any spillage from the compost inside the cylinder to spill out downward and towards the back. There will be an option to install a backsplash to contain/collect this spillage. I've used 2 different sized pulleys but there are a total of 3 pulleys for this trommel. This is the mechanical method to reduce the speed of the motor but you can opt out of using this option by using a single belt that would connect directly to the center bike rim and motor but the speed would be too great. In order for this alternative method to work you would need to also install a variable speed switch.

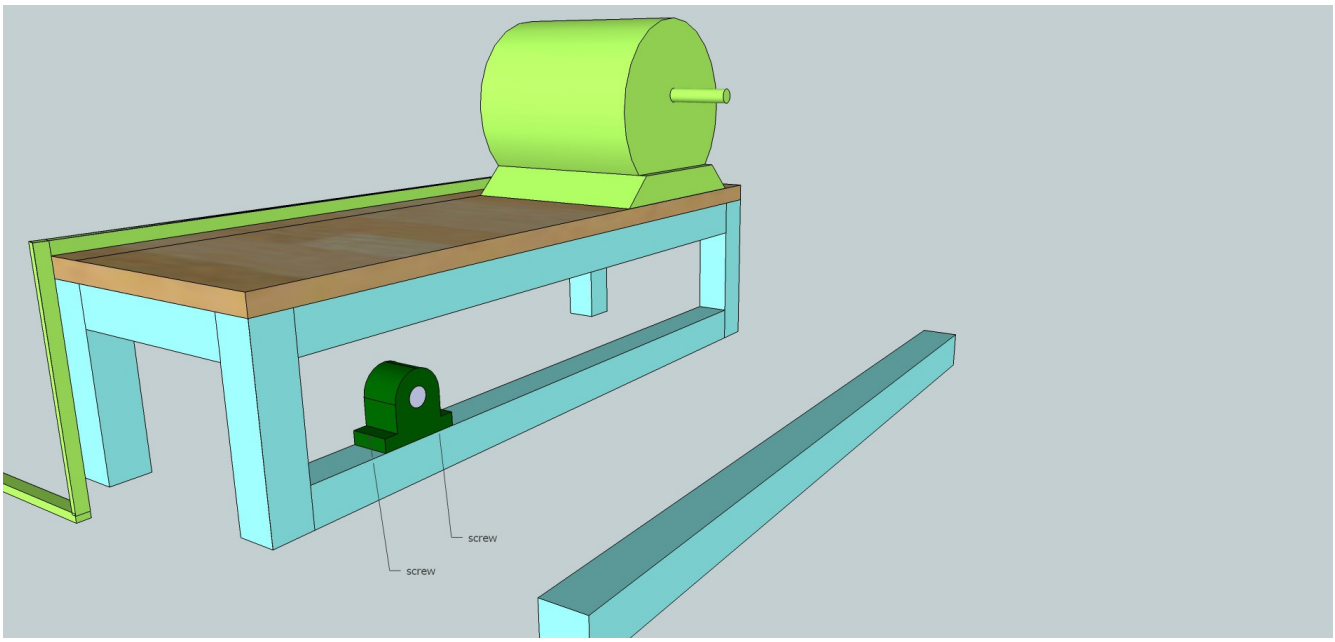
Parts

Motor	Links
1 - Agricultural motor at ¾ or 1 horsepower	Motor
1 – 120V off/on switch box	Off/On Switch
1 – 16' power plug extension cord	Extension Cord
1 - 10” V Groove pulley with 3/4” bore	10" Pulley
1 – 2” V Groove pulley with 3/4” bore	2" x 3/4" Pulley
1 – 2” V Groove pulley with 5/8” bore	2" x 5/8" Pulley
2 – 3/4” bore shaft collars	Shaft Collars
2 – Mounted pillow block bearings 3/4” bore	Mounted Pillow Block
1 – Jackshaft 3/4” x 14” with 3/16” keyway	Jackshaft
1 – Kevlar V-Belt 86” x .5”	86' V Belt
1 – Kevlar V-Belt 52” x . 5”	52" V Belt
4 – 1/4” Lag bolts at 1-1/2” long	
8 – 1/4” washers at 3/4” O.D.	
4 – 1/4” Lag bolts at 1” long	
2 – 1/8” sheet metal screws at 3/4” long	
8 – 1/8” sheet metal screws at 1-1/4” long	
1 – roll electrical tape and half a dozen wire caps	

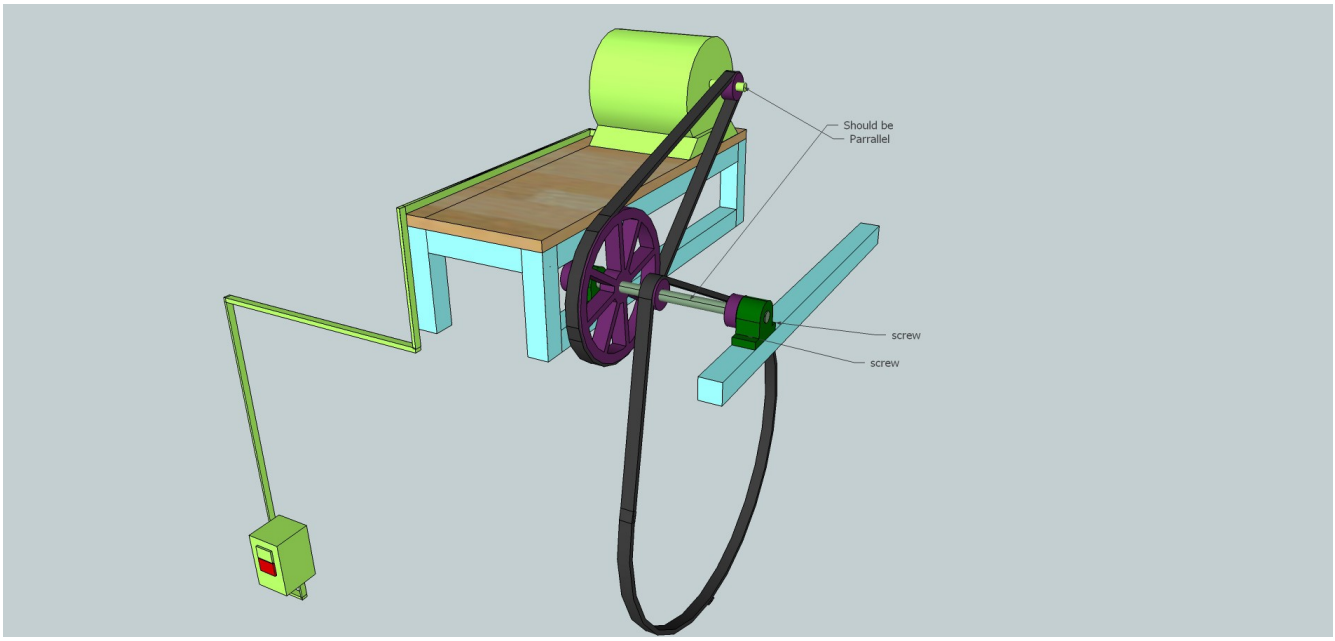
Follow the motor instructions to 120V CCW rotation and attach the On/Off switch.



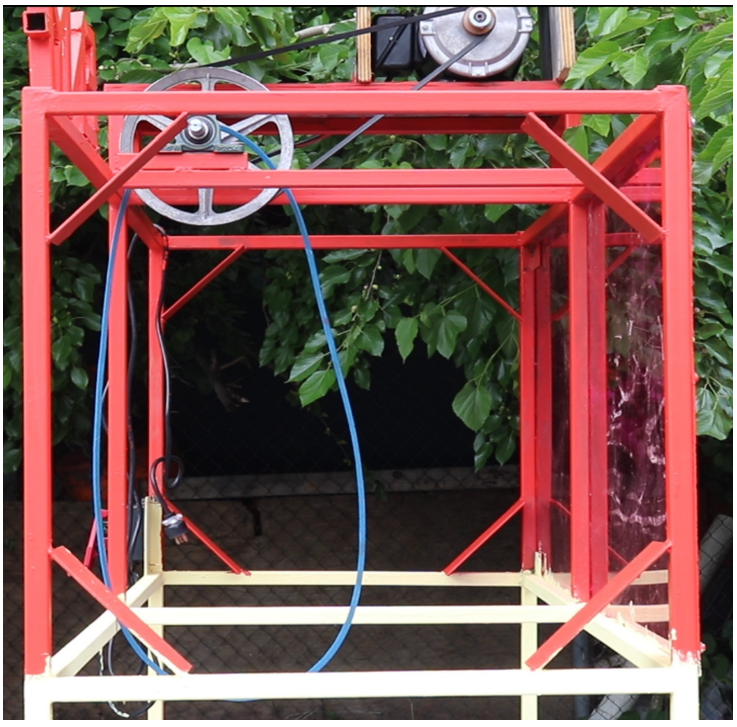
Mount motor first to the plywood base with 4 screws and washers. Assemble the Jackshaft with 10”x3/4”bore V-pulley and 2”x3/4” bore V-pulley and 52” belt between the 2 Mounted Pillow Bearings. Attach the 2”x 5/8” V-pulley to the motor. With an assistant pull the 52” belt between 10” pulley and 2” pulley taut and in line with one another. Place and mark the Mounted Pillow Bearing closest to 10” on the metal structure.



Remove the marked Mounted Pillow Bearing from the Jackshaft and fasten to the metal.



Reassemble the Jackshaft with pulleys and both belts Attach the second Mounted Pillow Bearing to the metal but making sure the 14” Jackshaft and the Motor Bore are parallel to one another. Finish the assembly by introducing the shaft collars to secure the Jackshaft. The location of the shaft collars could either be both on the inside or both on the exterior. You can also attach the On/Off switch to the front plate.

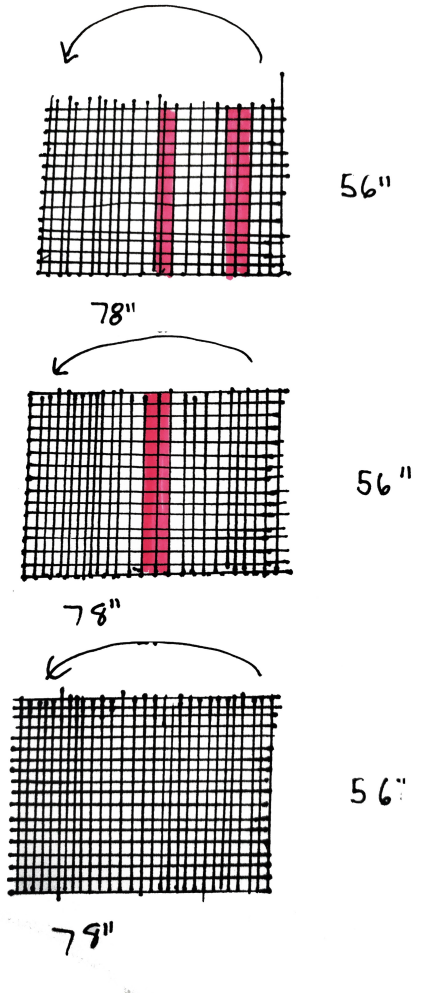


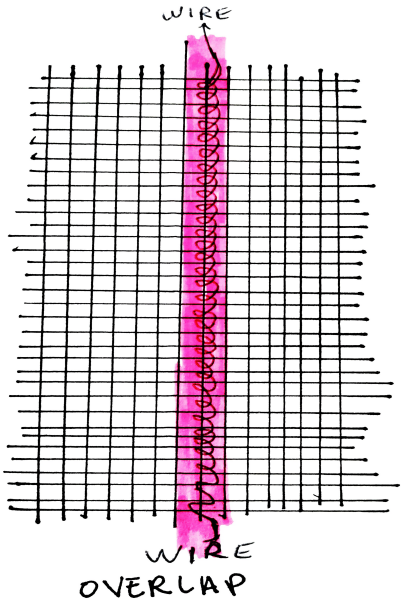
4. Mesh Cylinder

Parts

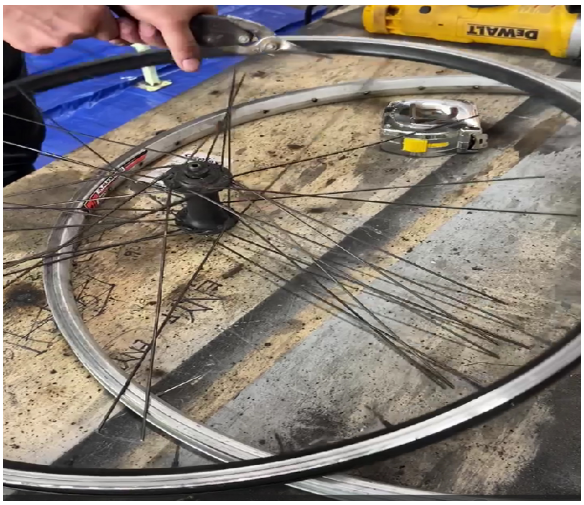
Motor	Links
3 – 27” Bike Rims with a U profile	
4pcs – Conduit pipes at 3/4” x 56”/each or an alternative 4pcs of 3/4” flat plate at 56”/each 1/6”thick	
1 – 56” x 78” x 1/4” Steel Hardware cloth	1/2" Mesh
8 – Fixed 1-1/2” caster wheels	Caster Wheels
100pack – 8”/+ zip ties	Zip Ties
25' Metal wire	Wire
12 – 1-1/4” x 1/8” Sheet metal screws (using conduit) or	
3/4” x 1/8” sheet metal screws (using flat plate)	
32pcs – 1/4” x 2” Bolts	
32pcs – 1/4” Nylon threaded metal nuts	
50pcs – 1/4” washers with an O.D. Of 3/8”/+	

In this guide we are using 27”-29” bike rims as our main support for the steel hardware cloth mesh. The interior circumference of a 27” bike rim is 78.25”. Knowing the circumference is key to making the cylindrical interior. If you can find a single roll of steel hardware cloth mesh at 80”x 56” then your only task is to stitch the two 56” sides to create a cylinder and simply trim off the excess material. If what is available in your region is only shorter pieces you'll need to stitch several together to get the circumference. Ideally choose the correct length of steel hardware cloth mesh so you are not also stitching along the circumference. The choice of the grid size is dependent on what you want your finish product to be. The smaller the grid the finer the product. Choose wisely.





After the steel hardware cloth mesh has been stitched together and it's taken a floppy cylinder shape you'll want to attach the mesh to the rims. The first rim to attach is the center rim. Find the center by measuring from both ends and drawing a line along the circumference. This is where the grid becomes helpful because once you have found the center column just simply follow that column all the way around with a permanent marker. Slide the steel hardware cloth mesh through the rim and align the first spoke hole to the center column grid. With either metal wire or zip ties thread through and attach. Please note! When tying off the wire or placing the head of the zip tie: it should always be done so on the inside of the rim. We want to keep the out side of the rim unobstructed as possible for it is going to have belts and wheels riding along the exterior channel.



Cutting off the spokes with wire clippers.


You can see a combination of wire and zip ties were used in this trommel. Also note the orientation of the zip ties.

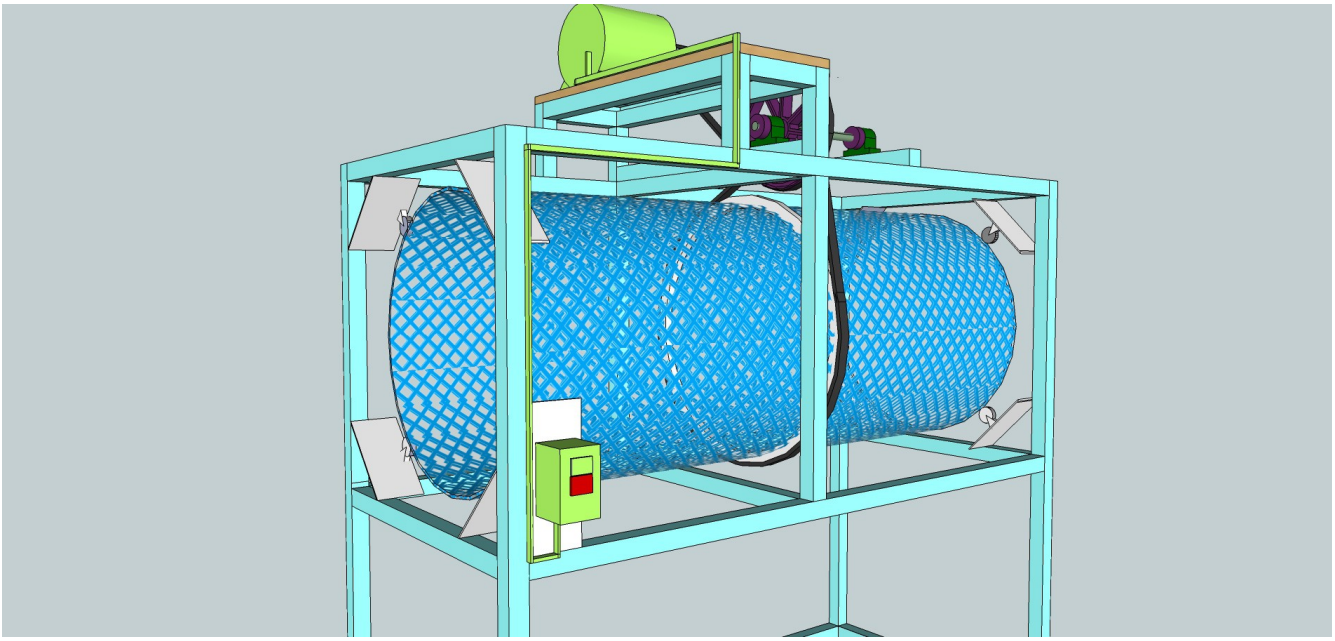
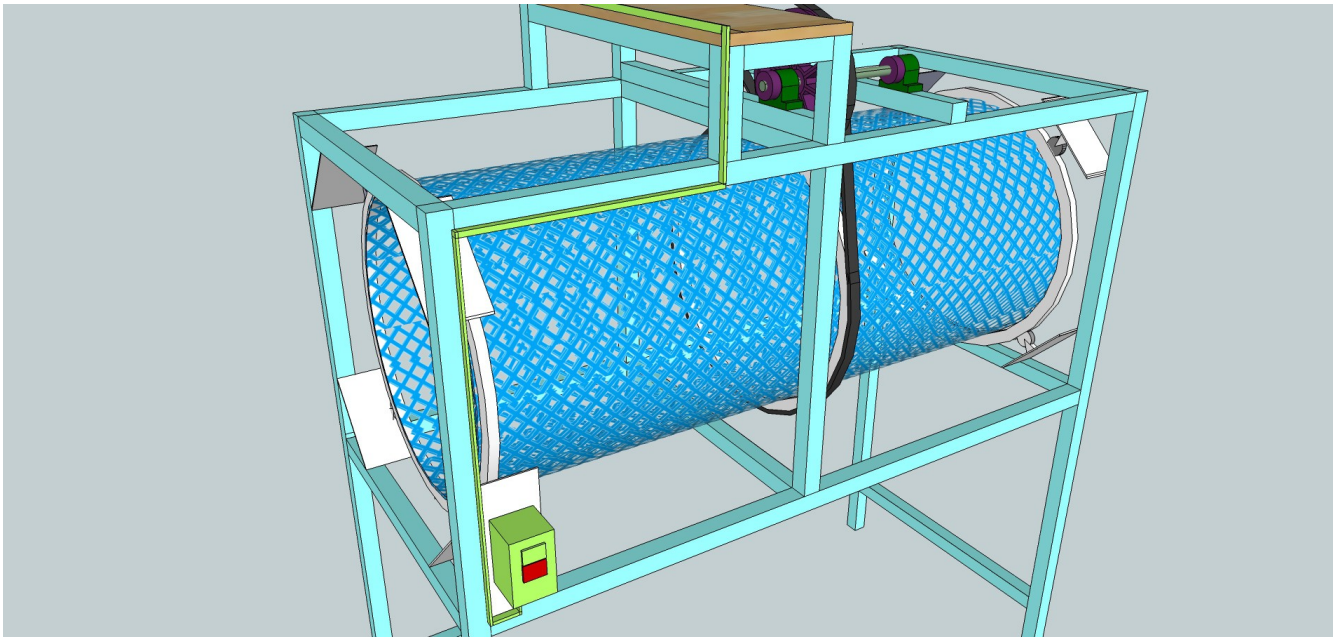


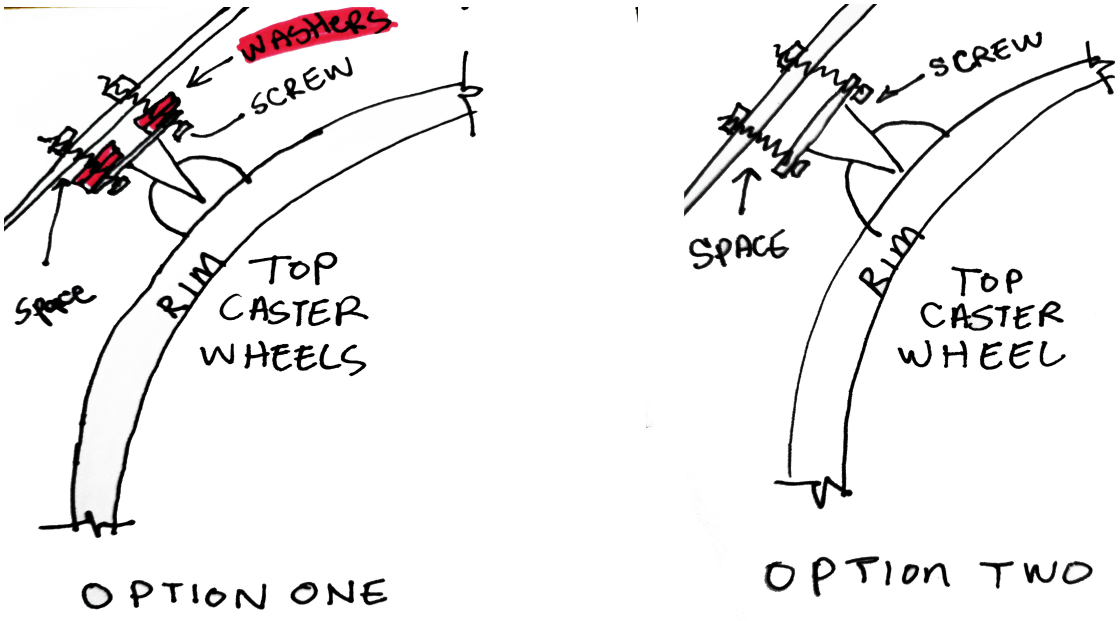
Image shows middle rim being held with belt.

Once the center rim has been installed you'll need to proceed to the outer rims. Place the first rim into the caster wheels: Make sure the rim can spin freely with little to no resistance. You can adjust the resistance by adjusting the top caster wheels through adding space between the rims and caster wheels but not enough for the rims to come off track. Spin several rotations with your hand to test, align, and adjust. This step will take a few tries but eventually you'll get the desired spin. Insert the steel hardware cloth mesh through the belt and the first outer rim and attach the belt to the center rim. Let the belt hold the cylindrical mesh as you insert the second outer rim into the caster wheels. After both outer rims have been set in, its time to wire both ends. Spinning the cylinder by hand will help you see the wired/zipped areas that need tensioning this process is called balancing. In an area where the steel hardware cloth mesh is slipping or being tugged too hard by the rotation on the wire/zip ties, relax or tighten the problematic area or the area near it. You'll have to do this as many times as needed until the mesh is balanced. The final step in securing the steel hardware cloth mesh is to introduce 4 conduit pipes that will help the rims spin as a single unit. Make sure to space the pipes evenly and to locate the pipes on the inside of the cylinder. There are two ways to connect them:

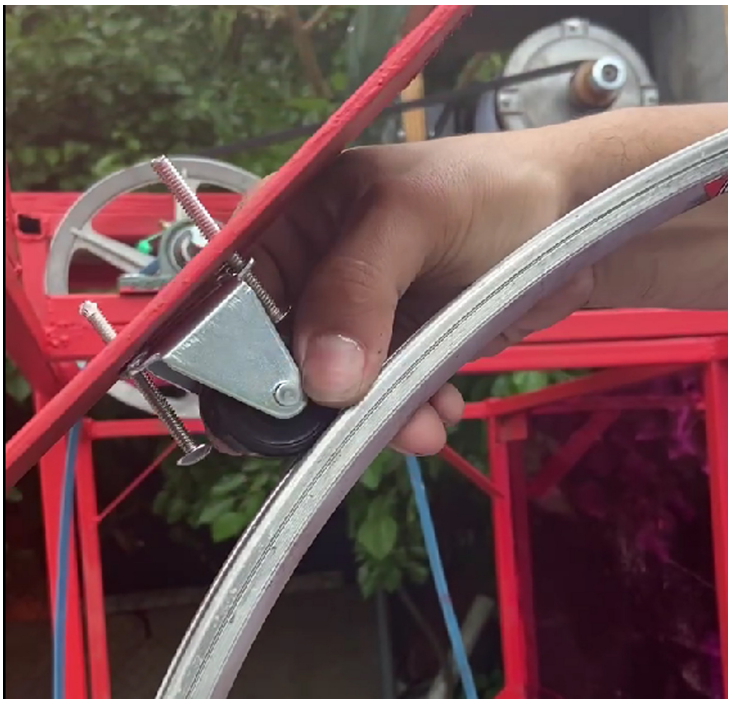
1. Leave the belt to hold the center rim and from above where the belt does not make contact with the rim you can screw through the 3 rims, mesh and into the conduit. Make sure the screw head is flat and not rounded or hexed. Now spin a quarter rotation and do the same thing. Rinse and repeat.
2. Remove the belt and attach the 4 conduits pipes equidistant from each other without having to spin the cylinder.



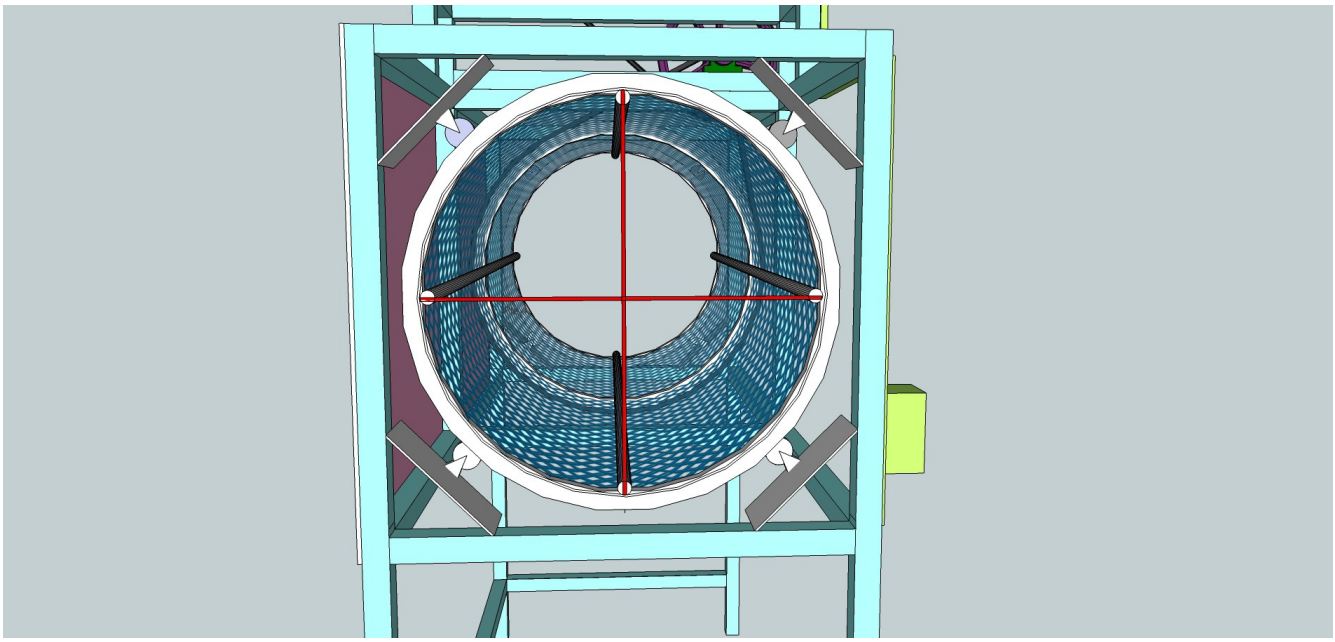
All three rims are installed in this photo.



Options to lock in the bike rims with top caster wheels.



It's better to have more space when attaching the rim to caster wheels and later adding washers.



Evenly space the conduits/flat bars but remember to screw from outside in. A secondary form of strength is wiring or zip tying the steel hardware cloth mesh to the conduit/flat bars.

5.Additional

A good way to stay tidy while the machine is in use, is to introduce a sheet of plexiglass to the back. This will help concentrate the spillage downwards.

Plexiglass

1pc – 1/4” x 62”x29” Plexiglass for backsplash

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A crude box finished with metal flashing was built for this one.

Enclosure

A second additional element is adding an enclosure for the motor. It's not necessary but does help with protecting it. When constructuing the enclosure make sure to have a large hole towards the back so any heat created by the motor can easily escape. An enclosure was added to this trommel more to hide the motor than for weather purposes.

In action.

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6. Tools

Impact Driver
Drill
Plyers
Adjustable wrench(es)
Measuring tape
square
Tin snips
Allen wrench set (Hex Keys)
Markers/Sharpies
circular saw or jig saw with wood blade
Metal bits for drill
*List excludes welder's equipment

Bonus	Link
The following link is of a build out of a trommel with the same specifications as this tutorial.	Process Video