

A Science Guide with Supplemental Experiment Kit

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SERIES



ASSEMBLY
KIT



theo jansen

mini rhinoceros

Animaris Rhinoceros Parvus

Theo Jansen is a Dutch artist who builds walking kinetic sculptures that he calls a new form of life.
"Animaris Rhinoceros Parvus" is a miniature version of "strandbeest" by Theo Jansen.

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- 10** Witness the birth of the newest artificial life form, the strandbeest!
Appearing at the coast of the Netherlands, Animaris Gubernare
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Jansen pulls the Rhinoceros Transport to test its walking mechanism.

Giant Beast

"Animaris Rhinoceros Transport"

-The Secret of Its Birth

This kit was designed after "Animaris Rhinoceros Transport". It is the largest Strandbeest in history with 6m in length, 5m in width, 4.7 m in height, and 3.2 t in weight. The beast walks by the wind caught in the wing like panel attached at the top. How did this beast come about? We are going to search the secret of its birth.

Cooperation/ Theo Jansen [www.strandbeest.com] Media Force Ltd. [theo.jansen.net]
Photograph/Loek van der Klis [loek@loekvanderklis.nl]
Text/Gakken Editorial Team

Theo Jansen
Jansen was born in 1948, in Scheveningen in the Netherlands. He studied physics at the Delft University of Technology and was involved in many projects that involved both art and technology. He has been creating a series of kinetic art, Strandbeests, since 1990. Today, Jansen is one of the internationally recognized artists.

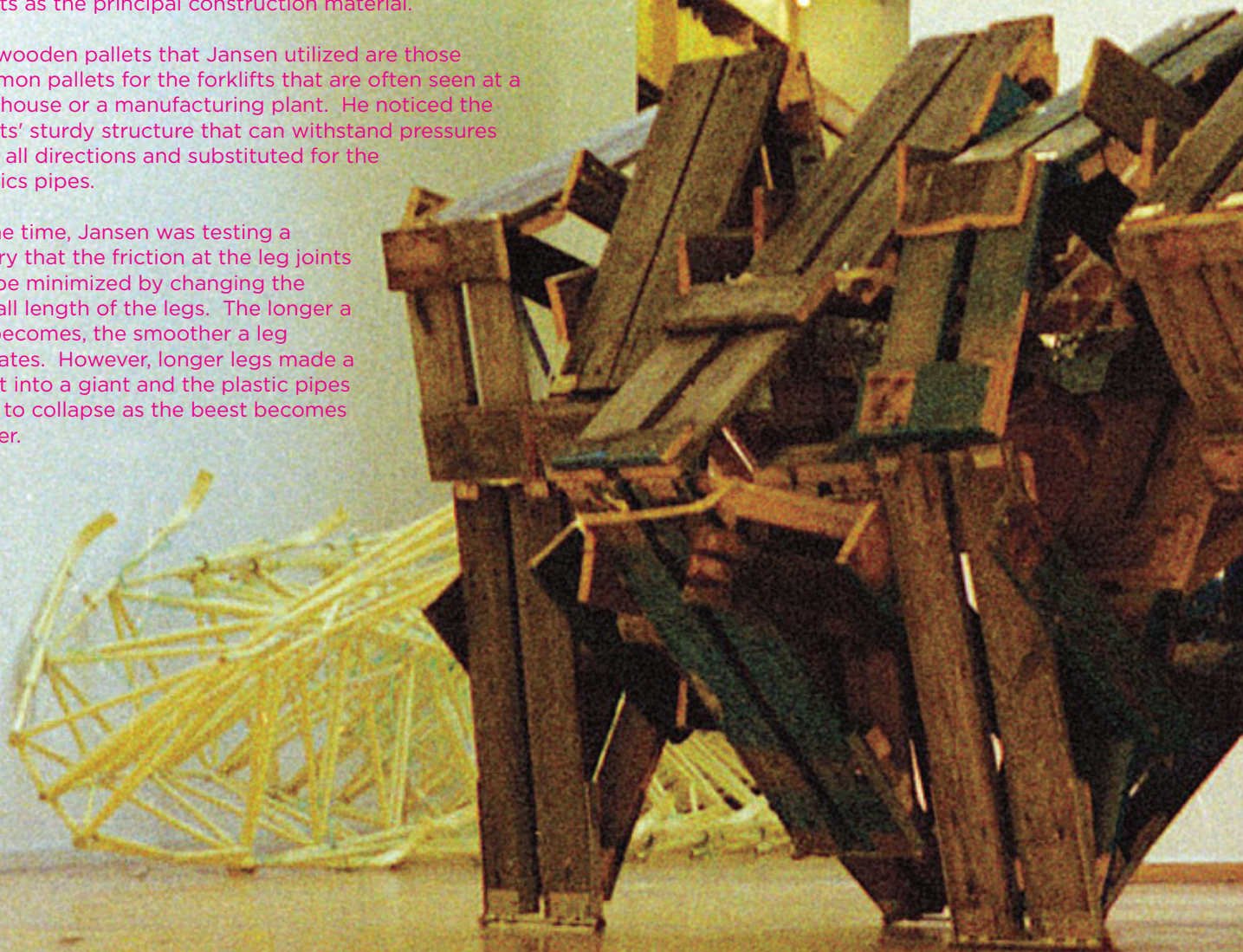
ceros transport

It all began from a wooden pallet

Jansen started creating the Strandbeests in 1990. The history of the beasts is categorized in several periods. From 1997 to 2001 is called the Lignatum (wood in Dutch) period. Jansen experimented with wooden pallets as the principal construction material.

The wooden pallets that Jansen utilized are those common pallets for the forklifts that are often seen at a warehouse or a manufacturing plant. He noticed the pallets' sturdy structure that can withstand pressures from all directions and substituted for the plastics pipes.

At the time, Jansen was testing a theory that the friction at the leg joints can be minimized by changing the overall length of the legs. The longer a leg becomes, the smoother a leg operates. However, longer legs made a beast into a giant and the plastic pipes tend to collapse as the beast becomes bigger.





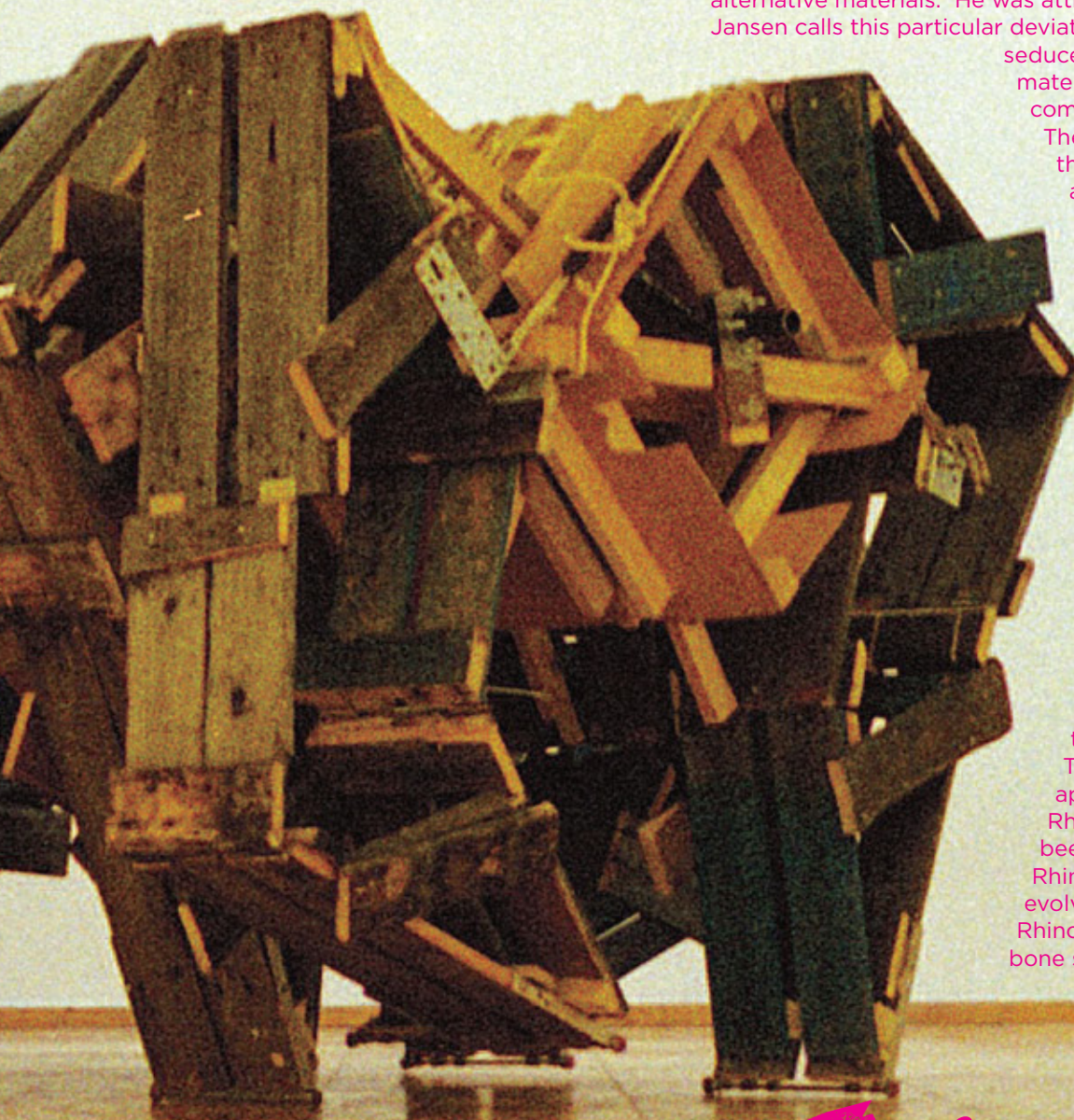
CG version of Animaris Rhinoceros Tabloi: The height of this design is an advantage by receiving stronger wind and minimizing the joint friction. Height 4.5m, length 6m, and width 4m.



CG version of the first generation Rhinoceros, Animaris Rhinoceros Vulgaris



Animaris Spissa Carta: This beast is made of cardboard. Height 0.3m, length 0.4m, and width 0.4 m.



He needed to find out either a different structural designs or an alternative materials. He was attracted to the wooden pallets. Jansen calls this particular deviation "an affair". He was

seduced by wood as a building material instead of his long time companion, plastic pipes.

The series of beasts created in this period had quite a different and unique look among all the beasts in history. The heavy and bulky structures are associated with the image of the rhinoceros. The name "Animaris Rhinoceros" was given to this series.

First a prototype was developed using CG (computer graphics) technology, then the real Animaris Rhinoceros

Lignatus was constructed using wooden pallets.

Though this is made from a new material, wood, Theo Jensen's 13 holy numbers are used throughout the calculations of mobile parts of the structure.

Thus, despite its unique appearance, Animaris Rhinoceros truly belongs in the beast family. Later, the original Rhinoceros Lignatus series evolved into the Animaris Rhinoceros Transport with steel bone structures.

animaris rhinoceros transport

The Animaris Rhinoceros Transport was tried out in 2004. This tryout version was developed as the final model in the Rhinoceros family after Jansen's affair with wood was over. Powder coated steel was chosen for the skeletal structure due to its sturdiness. The surface of the body is coated with polyester. The wheeled feet can support the massive weight while reducing friction with the ground.

There is a space for people to ride inside. Jansen calls this a "transportation vehicle in the tundra".

The tryout took place at north Leiden, A city in the southern Netherlands. The usual tryout spot, the beach, was not ideal for this massive structure because there was a likelihood of getting stuck in the sand. The long runway of the former Valkenburg Airport was chosen because the vast clear field and hard leveled ground would bring the best wind condition for this experiment.

The Transport was taken out from a container to the runway. Initially, Jansen himself pulled the beast for a trial walk so that he could make sure the joints functioned and checked for any troubles. Everything worked fine! The wind started to pick up. The massive feet started move. The beast's feet moved lighter than expected. The beast gained so much speed that some of the junctions gave way!

It was a complete success! The largest beast in history, "Animaris Rhinoceros Transport" marked a significant footstep in the history of evolution.



Receiving the wind from behind on the wing, the Rhinoceros walks effortlessly.



Tryout on the runway of a



The mighty backside.

animaris rhinoceros transport



former airport

Currently, the Transport is
stationed in the canal for
display.

**permanent exhibit
at a park**

and Now...

animaris rhinoceros transport



The Transport is exhibited in the courtyard of apartment complex developments in the suburb of Amsterdam. It is stationed there without walking any longer. It is a fossilized beast now. During the opening event for the installation, the children had a chance to climb in the beast; the news caught the attention of many people.

The growth of moss on the polyester surface reminds us of the passing time. The magnificent statue is still enjoyed by many people in the neighborhood. Its DNA is transferred and very much alive in this "Mini Rhinoceros"

Opening event for the Transport in Hassenfeldt, suburb of Amsterdam.

Photographed from the backside. The growth of moss shows that the time has passed.



Photographed from the side. It looks as if it will start walking right at this moment.



Witness the birth of the newest artificial



Scheveningen is the birth place of Theo Jansen and his creations, the strandbeests. Most beests take their first steps right here at Scheveningen.



Appearing at the coast of the Netherlands,

Animaris

life form, the strandbeest!

In May 2011, the strandbeest, Animaris Gubernare, first appeared at the Scheveningen coast in the Netherlands. With a body length of over 10m, this is one of the largest strandbeests. As usual, the beast is made from various plastic materials: yellow tubes are used for the skeletal structures and nervous system, PET bottles for the stomach, and vinyl sheets for the wings. Will the master of kinetic art, Theo Jansen succeed in this test walk?



Cooperation/Theo Jansen (www.strandbeest.com)
Media Force Ltd. (theo.jansen.net)
Photo/Loek van der Klis (Loek@Loekvanderklis.nl), Uros Kirn
Edit,Text/Gakken Editorial Team

Gubernare

Sun shines through the beautiful plastic skeletal structure of a beast.





Jansen holds a PET bottle stomach of the beest.

Jansen's beloved dog, Murphy is pictured in the foreground. The two life forms look as if they are communicating with each other.



The moment of birth of the new beest

All the parts manufactured at Jansen's workshop are brought to the beach as units and assembled and tested on the beach. Excess friction or air leakage will prevent the beest from walking. The beest is recognized as alive only when it takes its first step on this beach. The wind is picking up. The wings on the back capture the wind and they move gracefully. Each sway of the wings charges the wind power into the stomach of the beest made of PET bottles.

The pressure inside the bottle increases. Now everything is ready. The compressed air in the bottle is released to the structure. The plastic tube pistons rotate the cranks. We can hear the crank operating. Its feet slowly start moving and the support sticks assist the stride of the beest. A new artificial life form is born. This is a divine creature full of grace.

Nose

This portion always points into the wind. Jansen calls this part the nose. The nose prevents the beast from falling by a sideways gust.



Four wing like pieces are arranged to create aerodynamic flow.



A wing is also built on a plastic pipe skeleton.

Gubernare is a governor of the wind.

A prominent feature of this new beast is the nose, the wind sensing part. The beast always turns its nose into the wind. The beast turns against the wind and walks not only back and forth, but diagonally. It governs its own motion, so the name Gubernare (means govern in Latin) was given. Now, another sense was granted to the beast: the sense to detect the wind's direction. Strandbeests are evolving.

Tip of the leg (Foot)

The pipes are shaped so that the foot rocks back and forth. It is important to minimize the load on the feet.



These feet carry the massive weight of the beast. The feet don't get buried into the sand either.

Wings

Wings flutter in the wind and feed air into the stomach of the beast. The wing material is custom made UV proof plastic sheets. It is important to protect the wings from deterioration by UV rays since the beast belongs in the outdoors.



The compressed air in the PET bottles expand the wings.



Jansen checks the wings' expansion function.

Walking Stick

The walking sticks act like ski poles. A stick pushes against the ground and the reaction force pushes the body back up. The sticks help the feet to minimize the friction.

Combined with the other parts, the sticks make the beast walk back, forth, and diagonally.

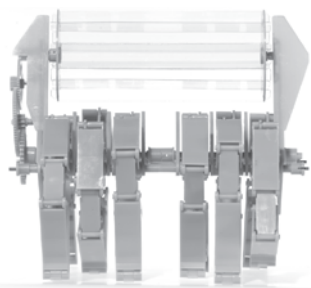


PET bottle stomachs

The stomachs are separated into two groups. One group is located at the center of the body, the other group is at the hind side. There are 94 bottles altogether.



There are valves on the PET bottles. The bottle keeps collecting the air until the valve opens.



How to Assemble and Use the Supplement

Assembly time: Approximately 1.5 hours

Theo Jansen's Mini Rhinoceros



Parts in the Kit

Separate the parts from the plastic trees that they come attached to and arrange them as shown in the picture.



Lower triangles
(12)



Lower triangle
covers (12)



Upper triangles
(12)



Upper triangle covers
(12)



Connecting rods
(inside, 12)



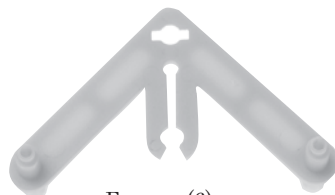
Connecting rods
(outside, 12)



Single-action rods (upper,
12)



Single-action rods (lower,
12)



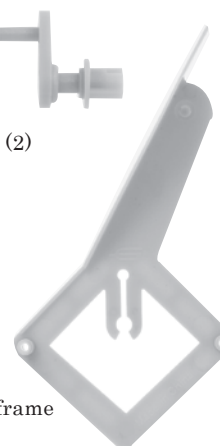
Frames (6)



Crankshafts (2)



Right frame
(with gear)



Left frame



Cogwheel (A)



Cogwheel (B)



Cogwheel (C)



Cogwheel
shaft



Fasteners
(6, including two
spares)



Leg tube
(Separate them to 13 for use. One is
kept as a spare.)

Metal shafts (2)

Rotating shaft (white)



Blades (6)



Fan base (right)



Fan base (left)



Flange



Tube (small)



Things you will need

Scissors, utility knife, etc.



CAUTION

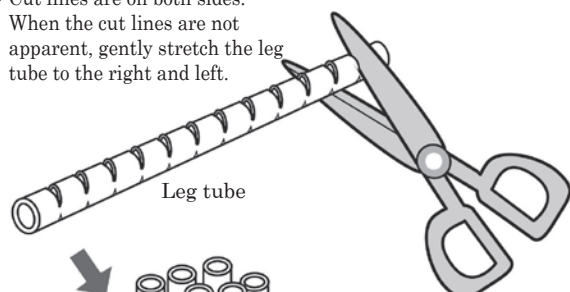
Please be sure to read the following instructions before assembling this kit.

- Take necessary caution when handling parts with pointed edges. There is a risk of injury.
- Be careful when using the smaller parts so that you do not put them in your mouth and accidentally swallow them. There is a risk of suffocation.
- Keep this kit out of the reach of small children when not in use.
- * Please read the instructions and cautions thoroughly before use.
- * For your safety, be sure to follow the instructions in this manual. In addition, do not use any parts that have become damaged or deformed during use.

Assembling the Legs of Mini Rhinoceros

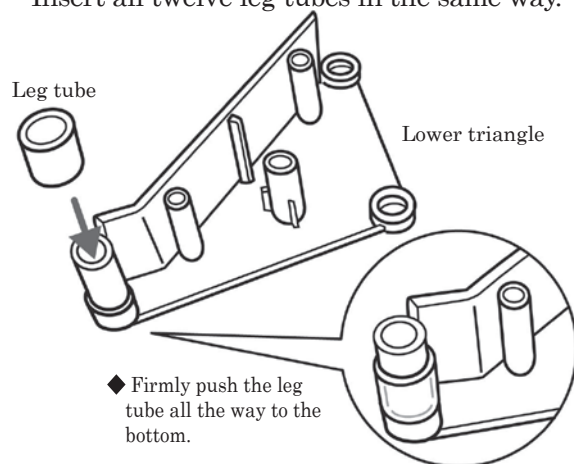
1. Separate the leg tube at the cut lines.

- ◆ Cut lines are on both sides. When the cut lines are not apparent, gently stretch the leg tube to the right and left.



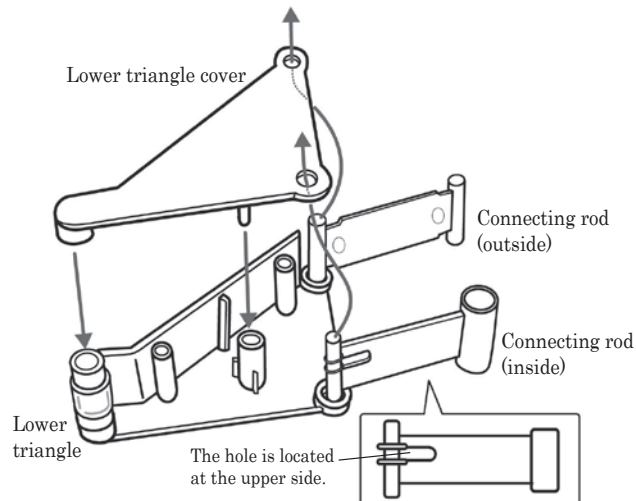
- ◆ There are thirteen leg tubes. Only the twelve of them are used for assembly. One is for spare.

2. Insert the leg tubes into the lower triangles. Insert all twelve leg tubes in the same way.



- ◆ Firmly push the leg tube all the way to the bottom.

3. Set firmly the inside and outside connecting rods on the lower triangle, and then attach the lower triangle cover on it.

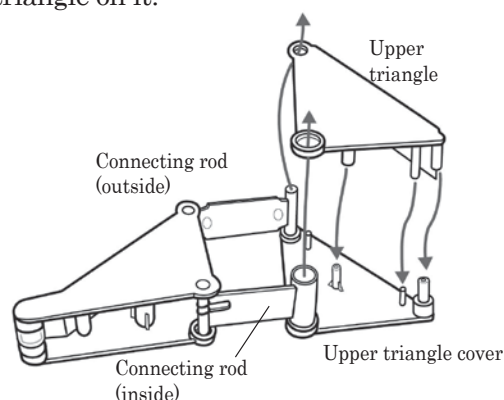


IMPORTANT

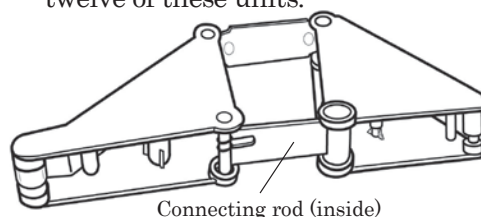
Set the connecting rods in the direction so that its hole is located at the upper side.

- ◆ Connecting rods need to be set so that "the circle mark used to push out the part from die" is located inside and the smooth surface is located outside.

4. Set the inside and outside connecting rods to the upper triangle cover and attach the upper triangle on it.



5. This completes one leg. Make a total of twelve of these units.



IMPORTANT

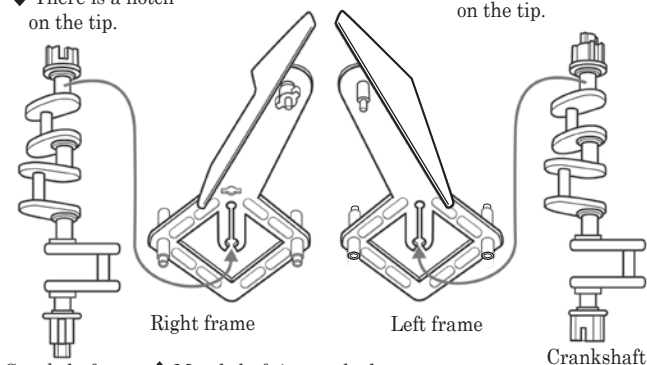
When attaching the connecting rods, make sure that they are attached in the correct direction.

Mounting the Crankshafts on the Frames

Attach the crankshafts to the right and left frames. Snap them into place, taking care to ensure that they are attached in the correct direction.

- ◆ There is a notch on the tip.

- ◆ There is a protrusion on the tip.



- ◆ It's a good chance to know that a crankshaft is made of crank axes for rotation (with frames attached), crank pins moving in a circular motion (with rods attached) and crank arms to connect them together.

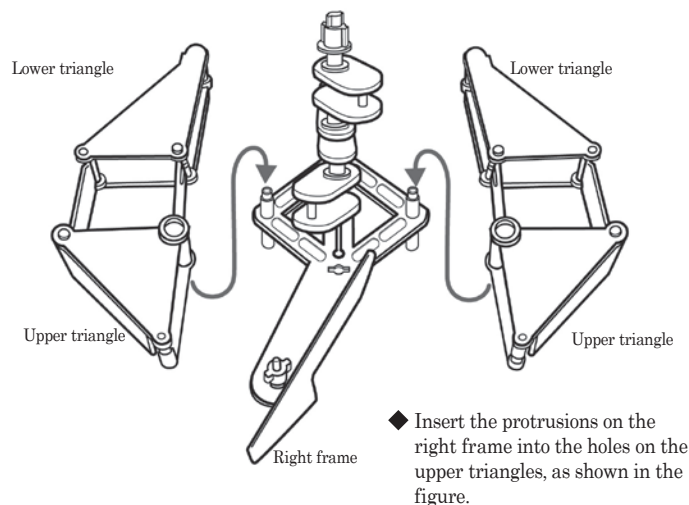
IMPORTANT

The two crankshafts are exactly the same, but they are to be oriented in opposite directions when attached as they will be linked together at the end. Confirm that you have connected the two crankshafts together as shown in the picture. Pay attention to the positions of the front and back sides of the left and right frames.

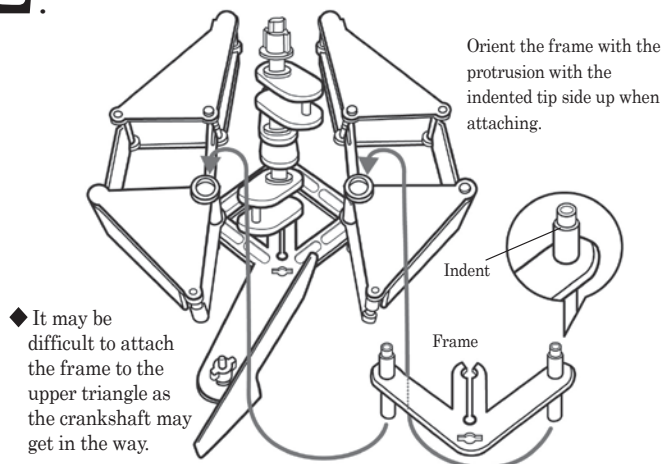


Assembling the Right Frame and Legs

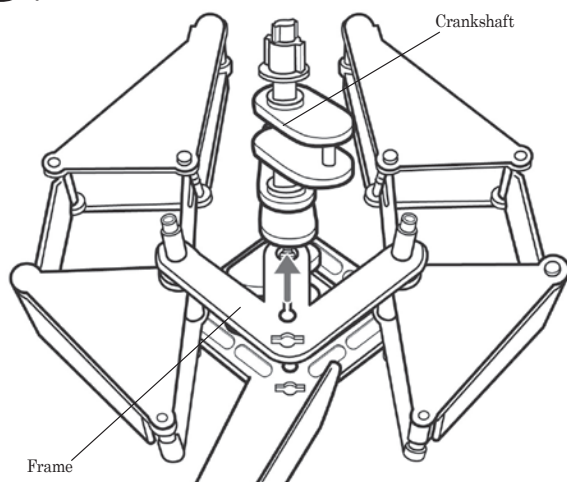
- 1 Start working on the right frame first. Attach two legs to the protrusions on the right frame. Be sure to check the orientation.



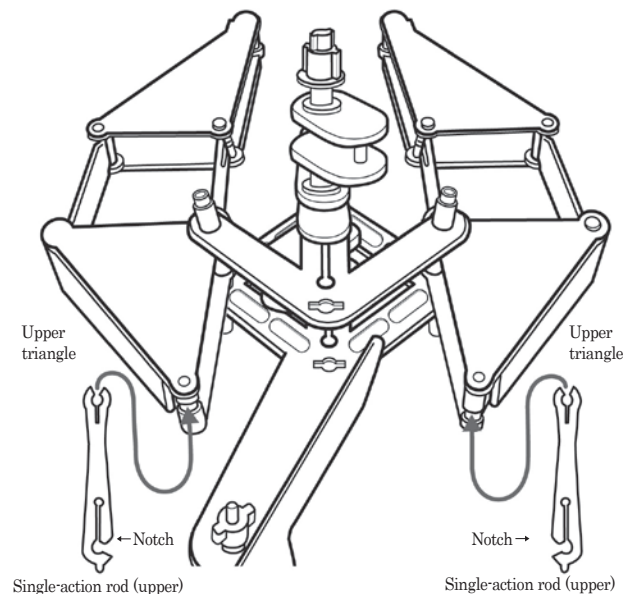
- 2 Attach the frame to the holes on the upper triangles in the direction as shown in the figure.



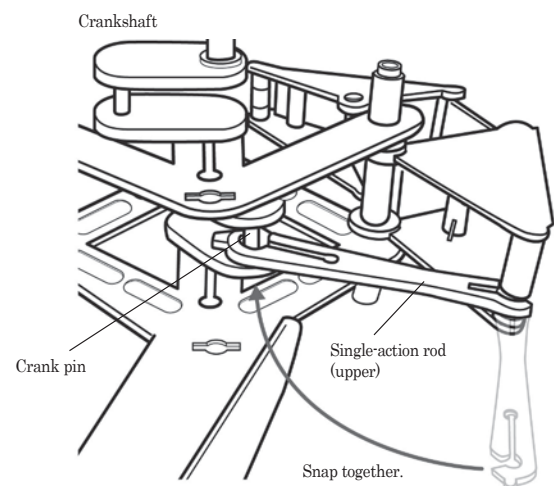
- 3 Attach the frame to the second crank axis of the crankshaft so that it snaps into place.



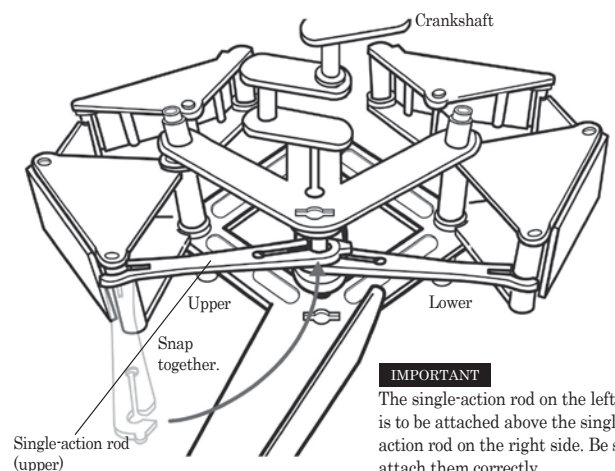
- 4 Attach the single-action rods (upper) to the left and right upper triangles. Pay attention to the direction of the notch.



- 5 Attach the single-action rod (upper) on the right to the first crank pin of the crankshaft.



- 6 Attach the single-action rod (upper) on the left above the single-action rod attached on Step 5.

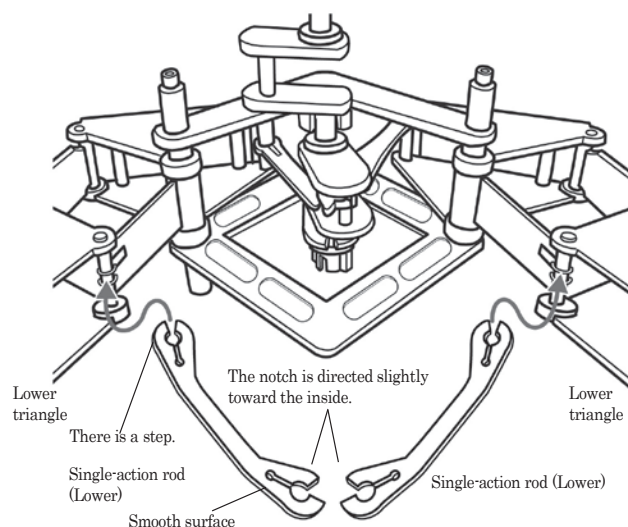


IMPORTANT

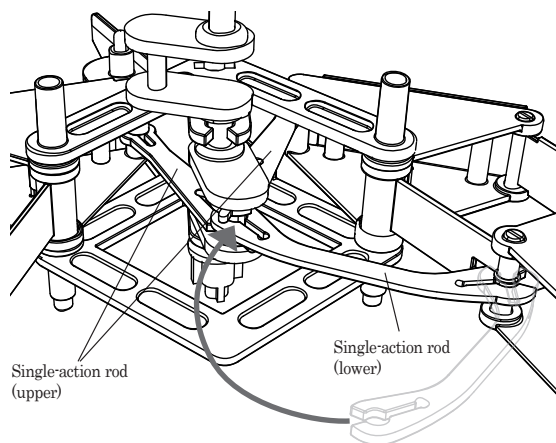
The single-action rod on the left side is to be attached above the single-action rod on the right side. Be sure to attach them correctly.

From this step onward, the figures are drawn with the lower triangle (with leg tube) facing out toward you.

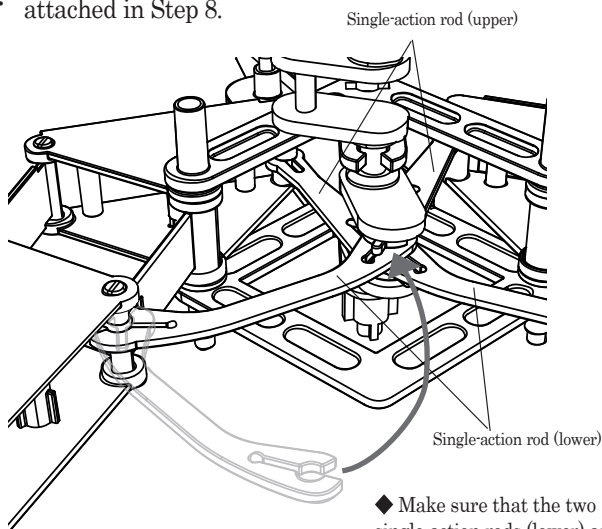
- 7 Attach the single-action rods (lower) to the lower triangles. Be sure to check the orientation.



- 8 Attach the single-action rod (lower) on the right side to the first crank pin on the crankshaft. Attach it between the two single-action rods (upper) that were attached in Steps 5 and 6.

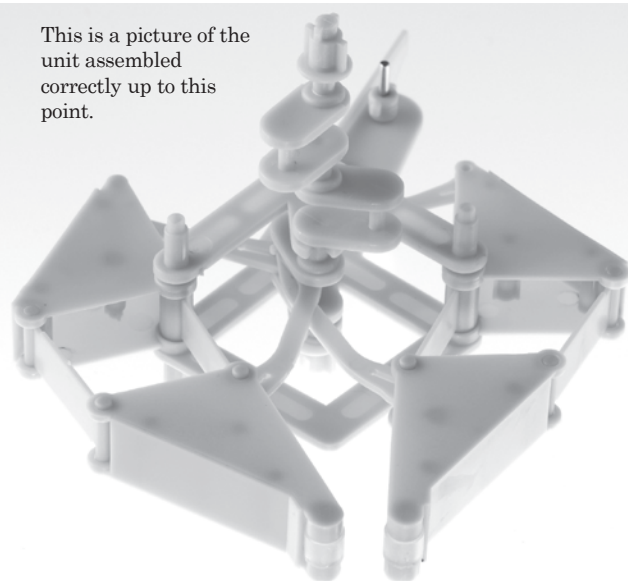


- 9 Attach the single-action rod (lower) on the left side just above the single-action rod (lower) that was attached in Step 8.



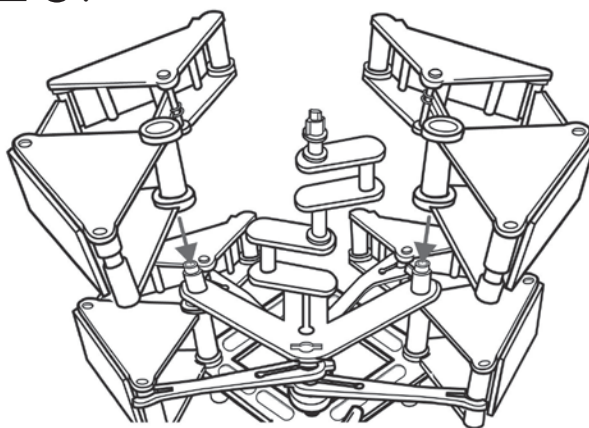
◆ Make sure that the two single-action rods (lower) are located between the two single-action rods (upper).

This is a picture of the unit assembled correctly up to this point.



The figures below are drawn with the upper triangle facing out toward you once again.

- 10 Attach the two legs to the protrusions on the frame in the same way as Step 1.



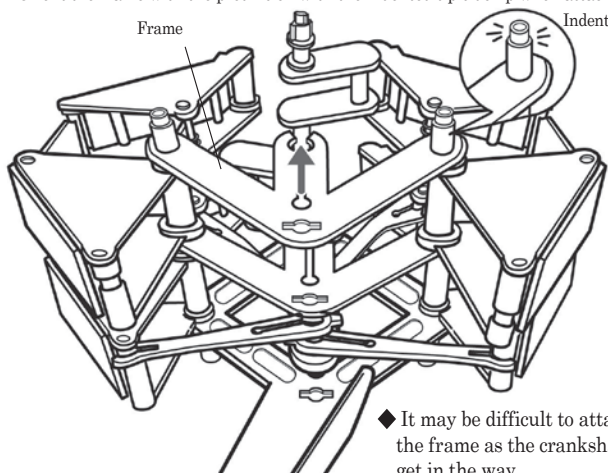
◆ Attach in the same direction as the two legs that have already been attached.

- 11 Attach the frame to the legs and fix it to the axes of the crankshafts. Then, attach four single-action rods in the same way as described in Steps 4 to 9.

Make sure to attach in the right locations and directions.

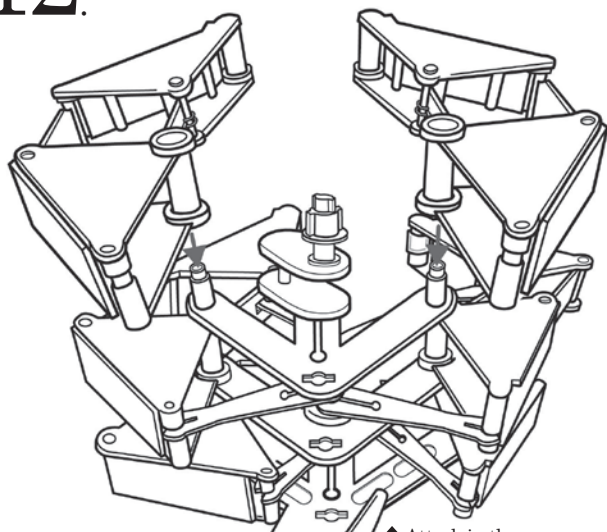
IMPORTANT

Orient the frame with the protrusion with the indented tip side up when attaching.



◆ It may be difficult to attach the frame as the crankshaft may get in the way.

12. Attach two legs to the protrusions on the frame as in Step 1.

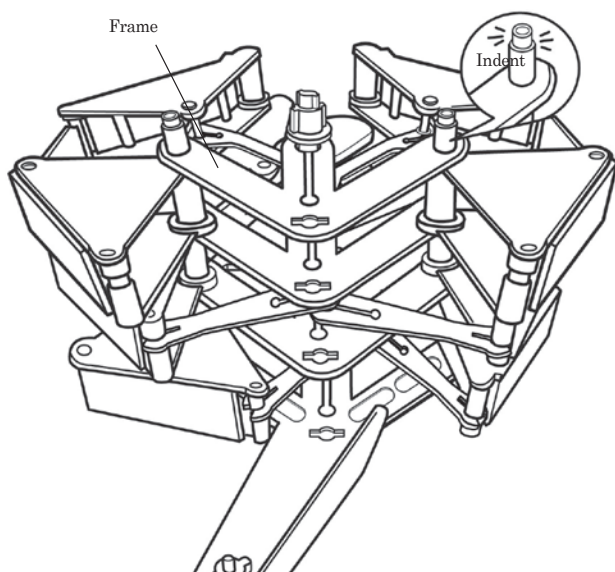


◆ Attach in the same direction as the two legs that have previously been attached.

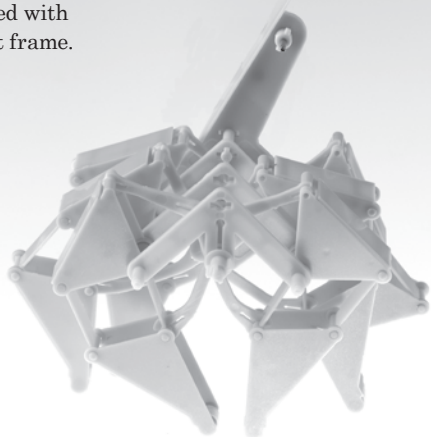
13. Attach the frame to the legs in the direction as shown in the figure. Next, attach four single-action rods in the same way as described in Steps 4 to 9.

IMPORTANT

Orient the frame with the protrusion with the indented tip side up when attaching.

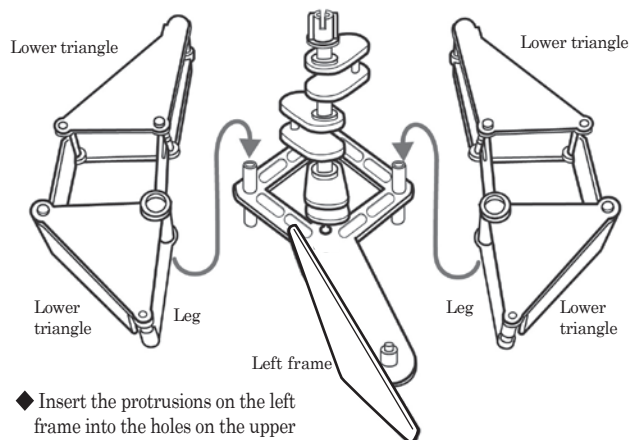


Six legs are assembled with the right frame.



Assembling the Left Frame and Legs

1. Assemble the left frame and legs. Attach two legs to the protrusions on the left frame. Be sure to check the orientation of the left frame.

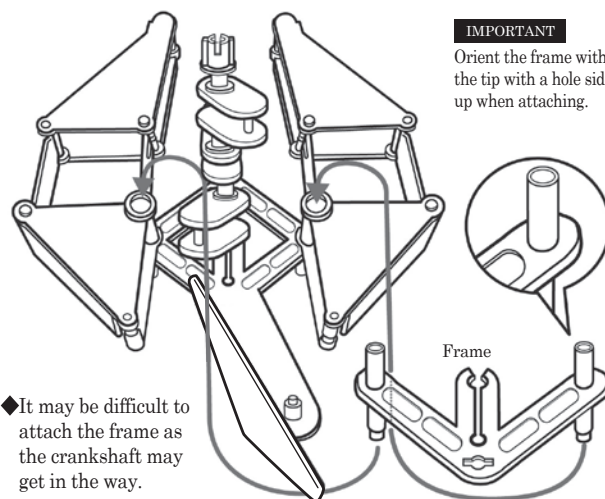


◆ Insert the protrusions on the left frame into the holes on the upper triangles, as shown in the figure.

2. Attach the frame to the legs in the direction as shown in the figure. Make sure to attach the left frame assembly in the opposite direction as the right frame assembly.

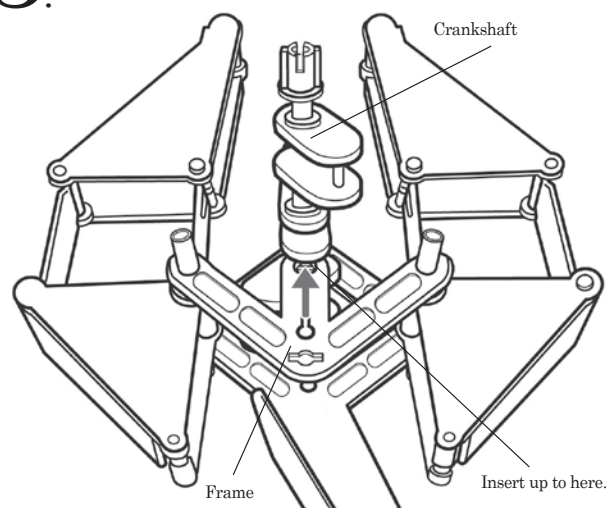
IMPORTANT

Orient the frame with the tip with a hole side up when attaching.



◆ It may be difficult to attach the frame as the crankshaft may get in the way.

3. Attach the frame to the second crank axis of the crankshaft so that it snaps into place.

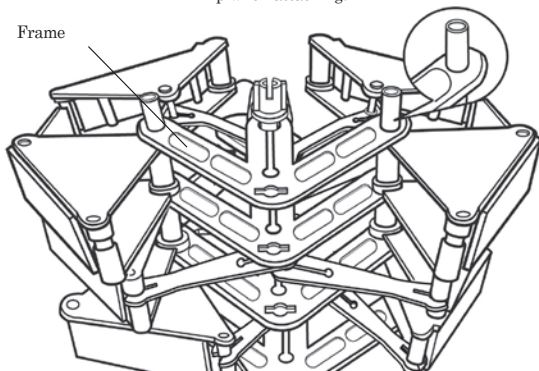


- 4.** Follow the assembly procedure of the right frame from Step 4 onward except with the left frame oriented in the direction opposite to that of the right frame. Follow the same procedures for attaching the single action rods for the right frame assembly.

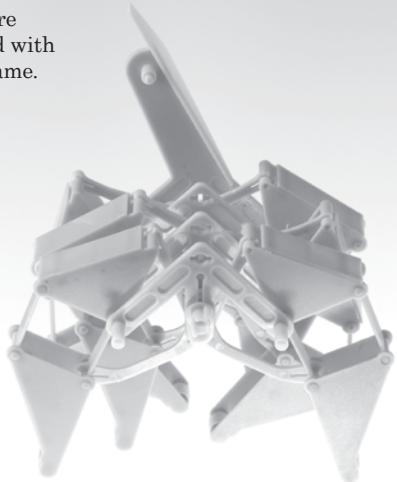
IMPORTANT

Orient the frame with the tip with a hole side up when attaching.

Frame

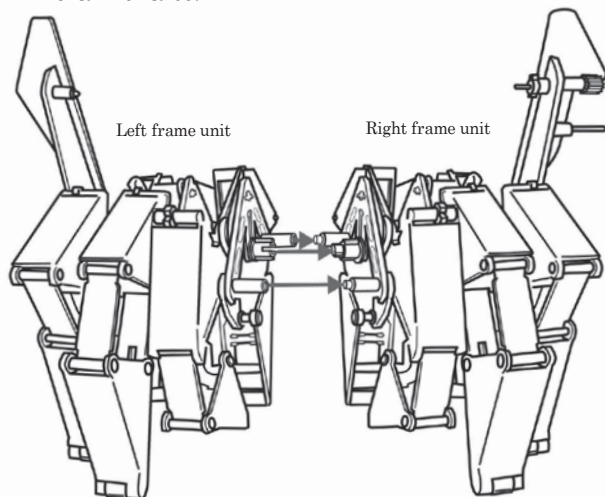


Six legs are assembled with the left frame.



Assembling the Body

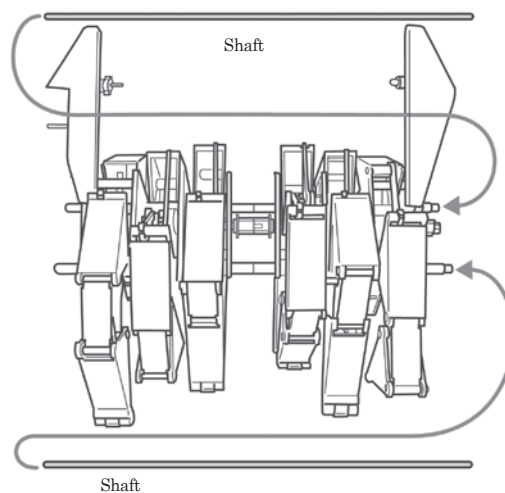
- 1.** Assemble the right frame and left frame units. Line up the joint parts on the frames and crankshafts.



IMPORTANT

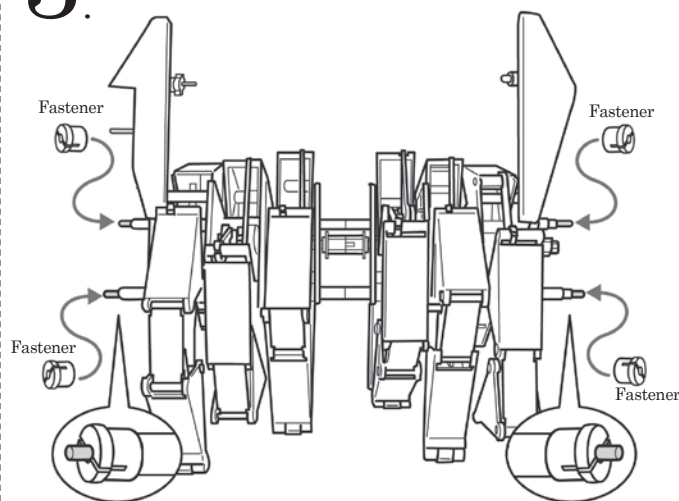
After assembling them together, try to rotate the crankshaft. The frames are attached together correctly if the six legs move at different timings. If the legs of the left and right frames move in the same way, turn the crankshaft joint part by 180° and connect them again.

- 2.** Insert the two metal shafts into the frame and pass them through the entire body so that they stick out on either side.



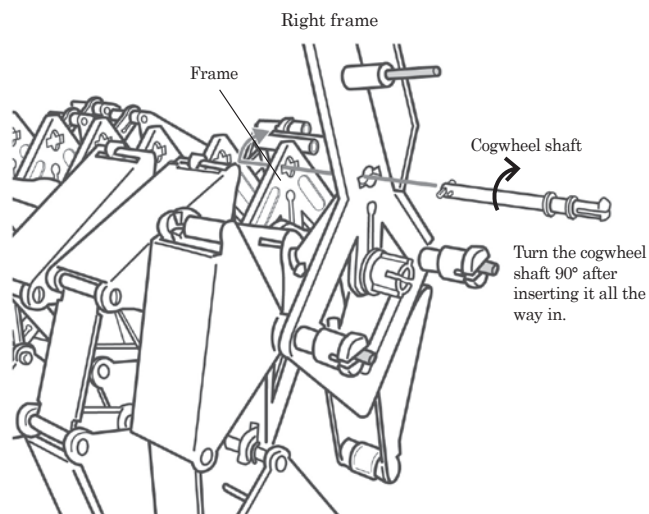
◆ Make sure that the shafts are protruding a little from left and right ends of the frame.

- 3.** Attach the fasteners to both ends of the shafts.

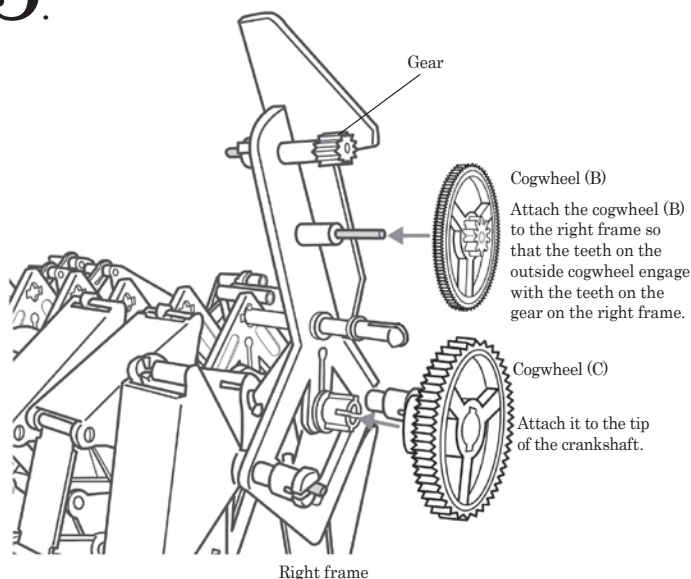


◆ Make sure the shaft ends are protruding by approximately 4 mm from the tip of fasteners.

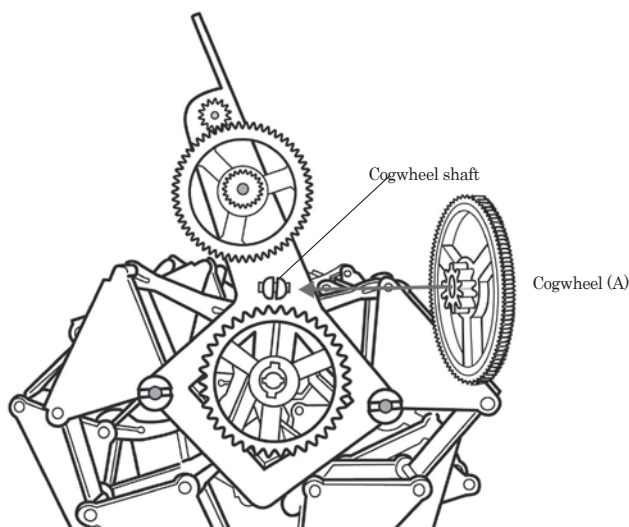
- 4.** Attach the cogwheel shaft to the right frame. Line up the pin on the cogwheel shaft with the hole on the frame and insert it into the hole up to the first frame. Then, turn the cogwheel shaft 90° so that it clicks into place.



5. Attach the cogwheels (B) and (C) to the right frame. Be sure to check the orientation.

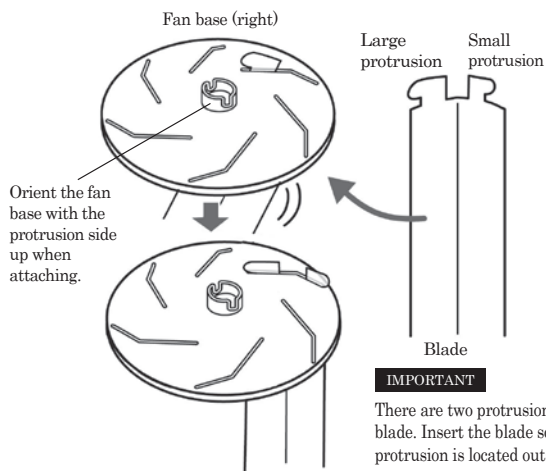


6. Attach the cogwheel (A) to the cogwheel shaft. Snap it into place, taking care to ensure that it is attached in the correct direction.

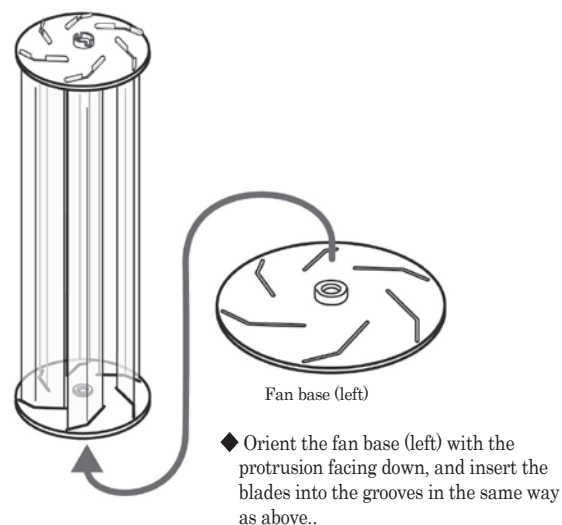


Assembling the Sirrocco Fan

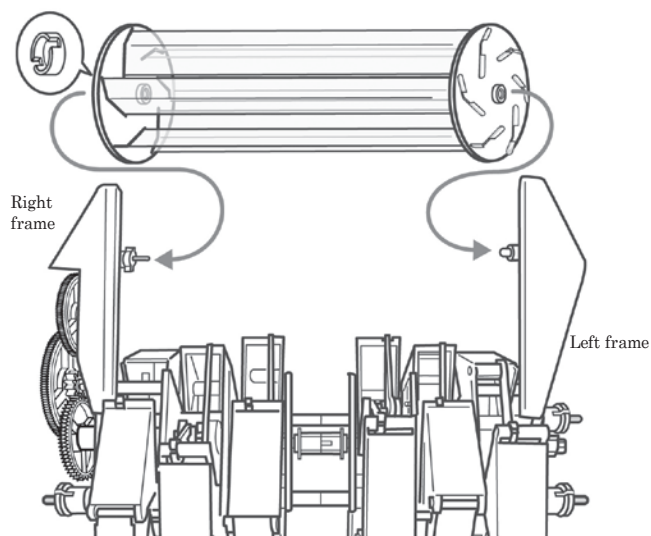
1. Attach the blades to the fan base (right).



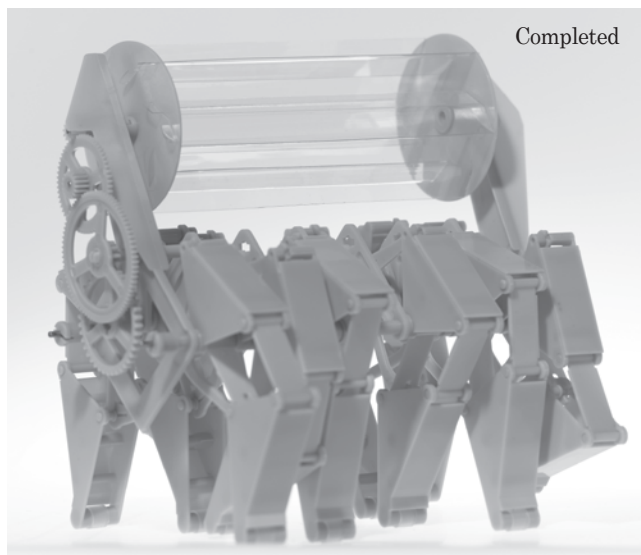
2. After inserting all six blades in the same way, attach the fan base (left) on the opposite side. This completes the sirrocco fan.



3. Attach the sirrocco fan to the body.



- ◆ Attach the fan to the left frame first, and then line up the protrusion on the fan base (right) with the cogwheel axis on the right frame to attach the fan.

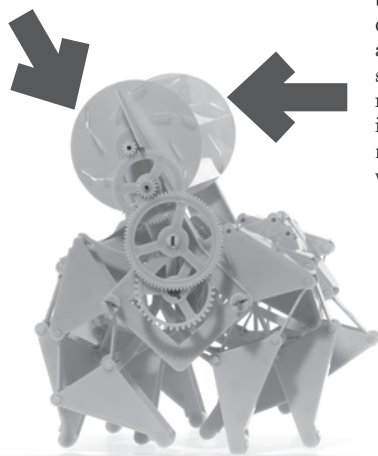


Getting the Mini Rhinoceros Walk

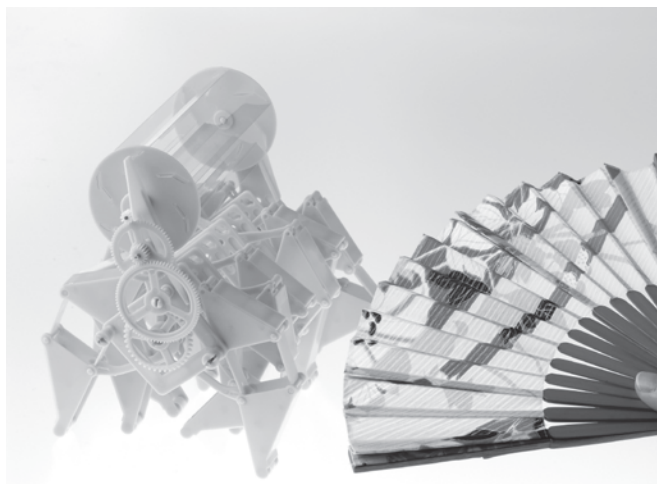
1. Using wind to make it move

The sirrocco fan rotates in the same direction as the wind either at its back or in its face. The Mini Rhinoceros starts to walk when the sirrocco fan rotates.

◆ When wind is blown on the Mini Rhinoceros in the direction shown by the arrows, the Mini Rhinoceros starts to walk toward the right. The walking direction is always the same no matter the direction in which the wind blows.



Walk towards this direction.

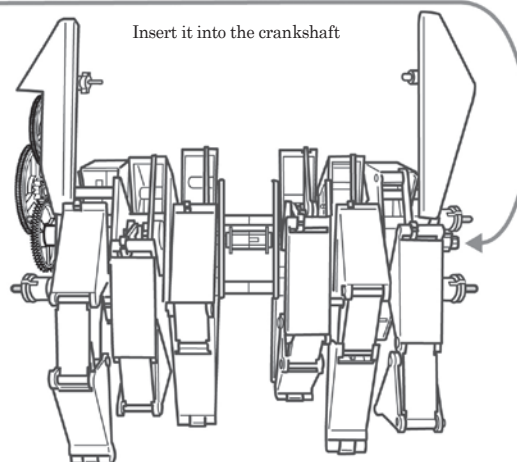
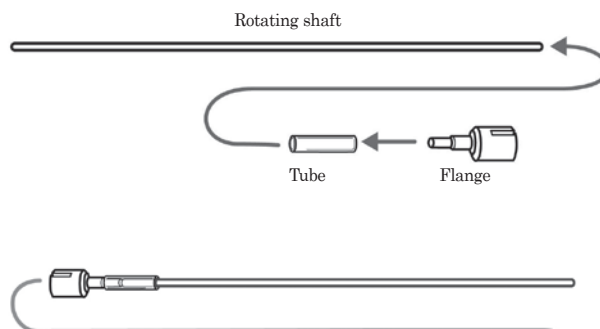


◆ You can wave a round paper fan or a folding fan toward it or use an electric fan to blow air at it. It is recommended that you use the cool setting if using a hair dryer. (Do not use hot air as it may change the shape of the blades.)

2. Using the rotating shaft to make it move by hand

Use the tube (small) to connect the rotating shaft and flange together.

Remove the sirrocco fan to reduce weight of the load and insert the rotating shaft into the crankshaft that does not have a gear (left frame). When you turn the rotating shaft, the Mini Rhinoceros starts to walk.



◆ If it moves sluggishly, remove the cogwheel (A) and cogwheel (B) and try again.

Q&A

Q: The crankshaft gets hard to turn at one spot in each revolution.

A: Confirm the assembling order of the single-action rods. Especially check the order of the upper single action rods.

Q: I tried the solution suggested above, but it didn't help.

A: Disassemble the right frame unit and left frame unit. Find the causes of trouble by removing the single-action rods from the frame unit on the side that moves more slowly.

Q: The Mini Rhinoceros does not move right.

A: Refer to page 21 and check the movement of the left and right frame units. When the leg movement of the left and right frame units are synchronized, reassemble the frame units after rotating the joint part of the crankshafts 180°. Confirm that the six legs on a unit move differently.

Q: The sirrocco fan rotates slowly.

A: Confirm that the cogwheel shaft and cogwheel (A) are engaged properly.

The cogwheel (A) should snap into place. If there is rattling, remove the cogwheel (A) and try to reattach so that it snaps into place. Check the notch on the tip of the cogwheel shaft. If it is oriented vertically, the cogwheel shaft and cogwheel (A) should be attached together properly.

Q: The rotating shaft is hard to turn when rotated by hand.

A: Try to make the Mini Rhinoceros walk with the sirrocco fan removed.

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Theo Jansen's mini rhinoceros

Animaris Rhinoceros Parvus

Theo Jansen is a Dutch artist who builds walking kinetic sculptures that he calls a new form of life.
"Animaris Rhinoceros Parvus" is a miniature version of "strandbeest" by Theo Jansen.

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