AUTOMATA MAGAZINE

Federico Tobon built an automaton a day

1/5—Sep/Oct 2019

CONTENTS

COVER: Federico Tobon's 30 automata in a month. See page 5

FEATURES


12


16


21


29

DEPARTMENTS

Automata Magazine is published six times a year by Sidestreet Bannerworks, Denver, Colorado, USA.
Editor and Publisher: Marc Horovitz
Copy Editor: Barbara Horovitz
Website: *http://www.automatamagazine.com*
E-mail: *automatamag@comcast.net*

EDITORIAL

Happenings

by Marc Horovitz

I want to begin this time by sincerely thanking *The Australian Woodworker* magazine (*https://tinyurl.com/australianwoodworker*) for giving *Automata Magazine* a big shout-out in their July-August issue of this year, as well as running a photo of our March-April cover.

Also, *AM* author Terry Ware wrote a story for *The Music Box* magazine (the publication of the Musical Box Society of Great Britain—*https://www.mbsgb.org.uk/*) that featured *AM*. Much appreciated!

New online forum

Automata Magazine now sponsors an online forum! This forum is a great way for automatists to connect with each other and share work, ideas, tips, and chat. If you have a problem or a question, someone else on the forum will often have an answer. If you have a new topic you'd like to explore, you can start your own discussion. You can find the *AM* forum at *https://AutomataMagazine.com/forum*. You can participate using your browser and/or via email. Thanks to Jim Coffee (*https://JamesCoffee.com/*) for suggesting this, setting it up, and helping to moderate.

New YouTube channel

The other news is that *Automata Magazine* now has an official YouTube channel (*https://tinyurl.com/automatamagazine*). There are just a few videos up at the moment, but the plan is to add more at regular intervals. If you subscribe to the channel, you'll be notified when new ones appear.

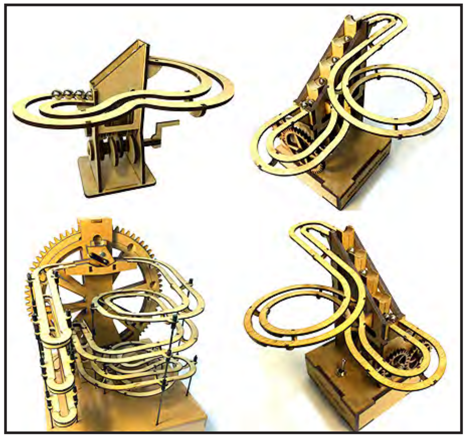
To begin with, the videos will be just me, discussing my own automata—what they are, how they were made, and how they work—because that's what I have to work with at present. As time goes on, I hope to discuss the construction of new projects as well.

I also hope to branch out with the videos, but am currently not sure of the direction. If you have any suggestions of things you'd like to see, I'd like to hear them. We might also be able to feature the work of others, under the *Automata Magazine* banner. If you're interested in this, drop me a note.

Both the forum and the YouTube channel are open to all automata enthusiasts. You don't have to be a subscriber (but you do have to sign up for the forum).

These new additions to the magazine's scope are exciting and I'm hopeful that they will not only help to bring in new readers, but also to generally expand awareness of the world of automata in all of its aspects.

NEWS



MAD Factory by The MAD (Mechanical Art & Design) Museum (*www.themadmuseum.co.uk*) is offering four Marble Machine kits. These kits are all laser cut, and assemble into small rolling-ball sculptures. Prices range from £7.99 to £39.99. For complete information, visit *https://www.madfactory.co.uk/*

EVENTS

Cabaret Mechanical Theatre (CMT) has announced the following touring exhibits:

The Mechanical Circus is a collaboration between CMT and Rijksmuseum Boerhaave, the Netherlands. Banbury Museum, Banbury, UK, May-Sept. 2019.

Puke Ariki Museum, New Plymouth, New Zealand. November 2019-April 2020.

Marvellous Machines features automata, hands-on interactives, workshops, and a series of artists' events. Ipswich Art Gallery, High Street, Ipswich, UK. July 20-October 31, 2019.

The Fantastic Fairground Factory is a new CMT Touring Exhibition. Peek into the Mechanical Marvels behind the Scenes at the Fair. Debut venue: Tullie House Museum and Art Gallery, Carlisle, UK. July-October 2019.

Poisoned Milk and Other Fairytales features automata, with a focus on extended workshop activities and tinkering opportunities. phaeno, Wolfsburg, Germany. November 2019-February 2020.

A Day at the Architects: Paul Spooner—New Works 2019 Rodić Davidson Architects, London, UK. Now through September 30, 2019. More info: *https://cabaret.co.uk/exhibitions/current/*

AutomataCon

Hosted by The Morris Museum: May 29-31, 2020. More info: *http://www.automatacon.org*

CALL FOR ENTRIES

Morris Museum

A Cache of Kinetic Art: Tiny Intricacies: March 13-July 12, 2020

Timeless Movements: March 12-July 11, 2021. A multi-year juried exhibition series, *A Cache of Kinetic Art*, showcases contemporary automata and their inventive creators. For artists, the prospectus and entry forms for the 2020 and 2021 exhibitions can be viewed at *https://morrismuseum.org/mechanical-musical-instruments-automata*

LETTERS

Baranger video

I saw the review of the Baranger book in the July-August issue of *AM*. I got my copy a long time ago, along with the video (VHS). Apparently this was upgraded to a DVD later but I don't see it listed anymore. However, the one-hour video is available on youtube: *https://www.youtube.com/watch?v=B1DIyuI4HQw*
—Brian Dunn

Pleased reader

I just wanted to congratulate you on this new magazine. I find it to be really inspirational and I shall look forward to seeing each issue.

I'm a complete beginner in the field and have already seen ideas that I should be able to take forward. *—Jim Bryant, Sheffield, UK*

In the next issue of

AUTOMATA MAGAZINE

- **Mike Palmer** discusses the magic behind his elaborate *Merlin* automaton
- **Kim Booth** takes us to the Czech Republic to visit Probošt's mechanical Christmas crib
- **David Bowman** begins a series of automata adventures with Baron von Steubon and Cromwell
- **Peter Hurney** describes his latest automaton: *Dead Men Don't Waterski*

Follow *Automata Magazine*…

An automaton a day

Respondng to a challenge

by Federico Tobon • Los Angeles, California, USA • Photos by the author

What gets me excited about daily challenges is that you can't wait for inspiration. If you have committed yourself to making something today, the best thing to do is to get started and use whatever is at hand. When I read about *Make Magazine*'s "Makevember" challenge at the end of 2017, I loved its simplicity: "Every day in November make a thing—if you can't do it every day, then do what you can, but the idea is to push yourself to work daily and with less procrastination…."

I thought this would be a great way to finish a few projects and explore some ideas throughout the month. I didn't really set out to make only automata, but that night, already one day into November, I decided to try something with stuff that was around my desk. Paper clips, a wood block, some popsicle sticks, and some black paper yielded a little hand-cranked flying bird, using a design I had seen before. I casually chose paper as the material for the bird because I wanted to cut it out quickly and easily, but as I kept on making more machines, I came to really appreciate how versatile and expressive paper can be.

After making four of these little machines using the same materials, I felt I had stumbled onto something special, so I decided to stick with it. I also gave myself some restrictions, like using common materials and tools, since I thought that the hand-made look, apparent simplicity, and use of ordinary stuff was part of the appeal.

The basic materials I used were paper, wood, wire, glue, and rubber bands. I know makers like specificity, so we'll take a dive into the details. I will also tell you about the process and give you some tips for making your own automata.

Paper

Paper is wonderful because it's inexpensive, easy to work with, and can move in an organic way.

LEFT: In response to a challenge issued by *Make Magazine*, Federico Tobon created all of these automata in a single month—one per day.

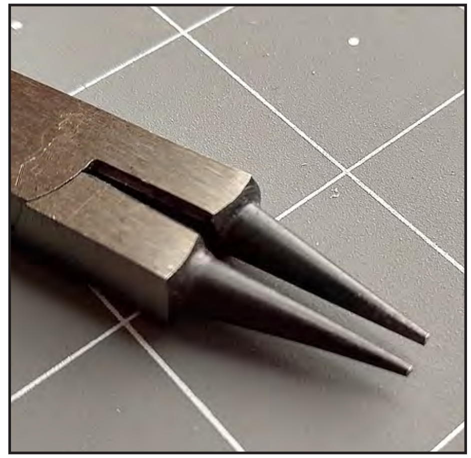
Working with paper can also allow you to make multiple versions and experiment freely in a short amount of time. Paper can function as a structural element, both in tension and compression; it can act as a spring or a string; and it's great for making decorative elements. Even two-dimensional paper shapes can come alive with simple motions.

I mostly used black paper because I like the look. Thickness is perhaps the most important consideration, as the paper should be both stiff and a little springy when you need it. I like working with drawing paper that has a weight of around 120 gsm (grams per square meter). I use scissors and a hobby knife to cut the paper; for gluing it, I like to use common white PVA glue, both when bonding paper to paper and paper to wood.

Wood

You could make *everything* out of paper—and you should at least try one of Rob Ives's wonderful all-paper automata—but for something stronger yet easy to work with, wood can't be beat. I used wood in four forms: the wooden blocks that mostly served as the bases, craft sticks (also called popsicle sticks or tongue depressors), bamboo skewers, and wooden dowels (**photo 1**).

1. Tongue depressors, craft sticks, small dowels, and blocks were all of the wood components. Paper clips provided most of the metal.



2. Jeweler's round-nose pliers, in conjunction with standard needle-nose pliers, were used to shape the wire parts.

The wooden blocks I used were left over from another project, so they have an unnecessary slot that could safely be ignored. I used a square stick made of poplar to cut 3/4" (0.75" or 19mm) cubes, but the dimensions and type of wood are somewhat arbitrary—almost any wood with similar dimensions would have worked. Because I was working fast, I used cyanoacrylate adhesive (also known as Super Glue, or CA cement) to join wood pieces. If I were to make something long lasting, I would use wood glue. The tools I used for working with the wood were a small hand saw, a miter box, a utility knife, a rotary tool, and a small drill press that held the rotary tool.

The small miter box is nice for making square cuts, but you could probably get away without one if you can make reasonably straight cuts by hand. The drill press, however, is really important because it helps to keep the axles of some mechanisms parallel, which ensures smooth movement.

Metal

The metal parts I used were sewing pins and wire from paper clips. Paper clips are ubiquitous and I had a good supply, so I kept on using them. I don't think they are the ideal source of wire, however, because if you need a long piece, you have to spend time unbending then smoothing the kinks. Also, the wire is really stiff, which makes it harder to bend small features. For prototyping and future projects, I would rather use something like 18-gauge annealed wire from the art store. I used sewing pins here and there when I wanted a neat end for a pivot point.

For working with wire, I used needle-nose pliers with flat jaws (the common type found at the hardware store) and the type of round-nose pliers that jewelers use (**photo 2**). One of these usually comes with built-in wire cutters, but a dedicated wire cutter is also nice to have.

The design process

After thinking about the design process for a while, I have identified three distinct starting points: an existing design, a mechanical idea, or a character idea.

Sometimes I tried to replicate an existing design; sometimes I had a specific mechanism in mind, then tried to fit a character or idea to that mechanism; and at other times I had a character or idea in mind, then tried to work out the mechanism to make it happen.

Naturally, things are not always

this clear, but it was a general way to think about it. I believe that, even if you are replicating existing designs, there is still creativity in figuring things out based on your own materials. And even if you think you are doing something original, you are probably still borrowing ideas from someone else.

Examples of the first case (starting with an existing design) are the flying bird (**photo 3**), the boat sailing on the waves (**photo 4**), and the bat (**photo 5**). These were inspired by the work of automatist Eduardo Salzane.

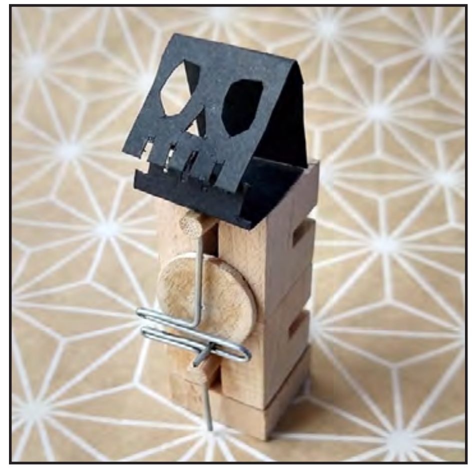
When the starting point was an interesting mechanism, the first thing I did was to try to make it functional with the materials I had on hand. Then I figured out a whimsical or interesting story to tell. Examples of this case are the dinosaur that bites with the scissor mechanism (**photo 6**), the skull that uses the Scotch yoke (**photo 7**), and the dragon head on the windshield wipers (**photo 8**). I often browsed the pages of the classic book *507 Mechanical Movements*, looking for things to build. I was sometimes tempted to build something using gears but at this scale they would have been hard to cut by hand or I would have had to use a laser cutter or CNC machine, which I was deliberately avoiding.

3. Flying bird.

4. Boat on the mini wave machine.

5. The bat.

6. The dinosaur with the scissors mechanism.



7. The skull, activated by a Scotch yoke.

8. Dragon head.

I think the hardest part about this method is finding something interesting to do with a given mechanism. When I built the moving parts for the dancing spiders (**photo 9**), I had no idea they were going to be dancing spiders. I remember spending about 40 minutes building the seesawing popsicle sticks, which I was quite happy with. Then I spent two or three hours cutting and taping pieces of paper to find something that looked less mechanical and stiff, and paper gave me the look I was seeking. I think the dancing spiders are a great example of the way paper adds a fluid and organic feel to these pieces.

When I had a particular idea or character in mind, most of the effort went into working out the mechanism. The walking person (**photo 10**) and the snapping turtle (**photo 11**) are good examples of that process. For the turtle, I really wanted the neck to spring out and the mouth to open and close, which was the most difficult part (**photo 12**).

Failure was naturally part of the process. I tried several versions of walking creatures, with varying degrees of success, and I don't think I ever arrived at a satisfying four-legged gait. Building these machines after a full day's work was often challenging but I forced myself to at least finish something and post it online, even if I wasn't proud of it, like the crooked dragon (**photo 13**) and the sad face (**photo 14**).

All these pieces were displayed online and now live in a box in my apartment as reference material. I've been asked about selling them but I'm reluctant because most of them are fragile prototypes that would probably break with repeated use. I'm also concerned about the longevity of paper, so I'd like to explore other flat materials, like felt or stiff fabrics.

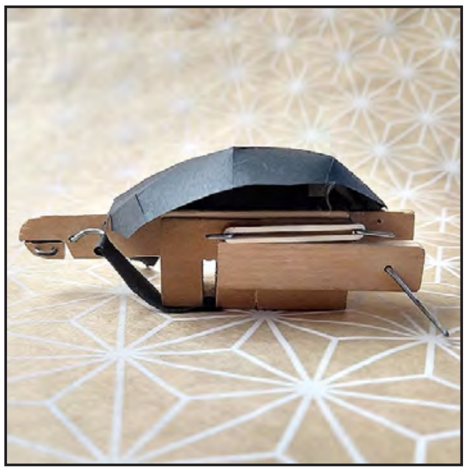
The average time to build each piece was around three to four hours but most of that time was spent figuring things out. I would expect remakes to take less time. Throughout the month I found some good techniques but the creative process didn't necessarily get any easier or faster, because I was going in many different directions. It was quite rewarding, nonetheless. I liked the way this project allowed me to combine two interests—drawing and making things—as these pieces work at a visual level like moving illustrations.

Equally gratifying were the reactions and interactions I had online. Several people made their own versions and sent me videos and pictures. There was even a school in Barcelona that had a whole class of 5th graders making their own automata based on these! I feel like the most rewarding thing as a maker and artist is to inspire others to make something with their own hands.

9. Dancing spiders.

10. Walking person.

11. Snapping turtle.



12. The mechanism for the snapping turtle.

13. Crooked dragon.

14. Sad face

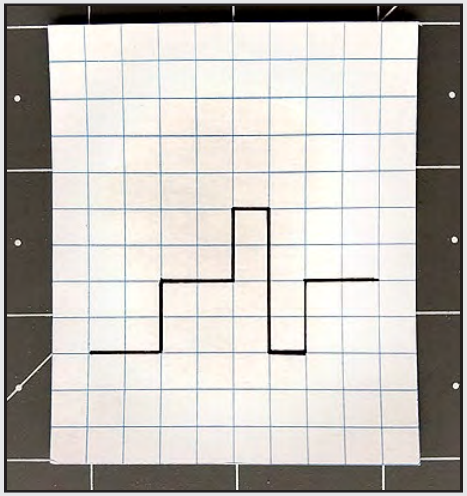
Build the walking person

by Federico Tobon

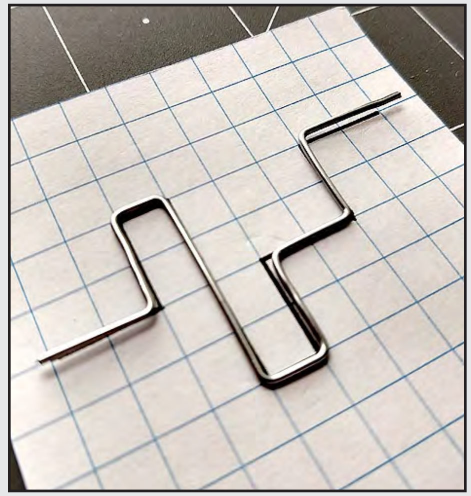
To share some tips and tricks I learned along the way, I'll show you how to build the walking person (**photo 10**). You will need a small block of wood (mine is 0.75″ x 0.75″ [1.9cm x 1.9cm]), a craft stick, paper, CA cement, and some wire.

I like to plan the shape of the crank on graph paper before I start bending the wire (**photo 15**), to make sure the bends are as close to being aligned and perpendicular as possible. After this, I take a more intuitive approach to measuring, using existing parts to measure the parts I'll make next.

The next step is to bend the wire to the shape you've drawn, using needle-nose pliers. Try to get a reasonable approximation—it doesn't have to be perfect (**photo 16**). After that, determine the length of the side pieces and the location of the bearing hole by measuring with the bent wire. Make sure there is some clearance between the crank and the base (**photo 17**). Mark the hole location and the bottom of the base on the craft stick (**photo 18**). Cut the craft stick at the line (**photo 19**), then



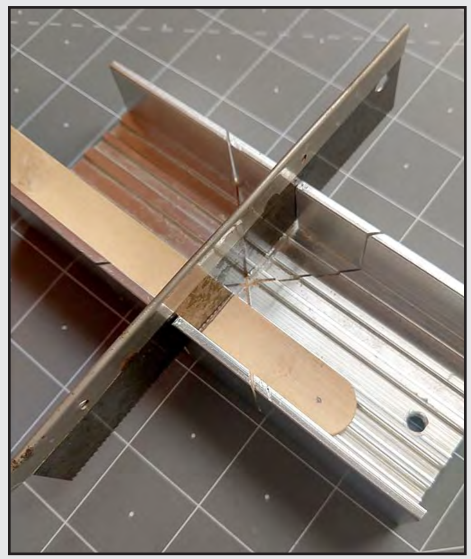
15. The crankshaft shape is first drawn on graph paper.



16. Paper-clip wire is bent as accurately as possible to match the drawn shape.

17. The bent wire is used as a guide to determine the length of the side piece.

18. The side piece is marked for cutting.



19. A small miter box is used, to cut two identical side pieces.

20. The two cut pieces.

use this cut piece to measure and cut a second, identical piece (**photo 20**).

Holding both side pieces together, drill the hole for the crank (**photo 21**). This will guarantee alignment. The trick for drilling holes that accurately match the wire size is to use a short piece of the same wire as the drill bit, which is generally sufficient to penetrate soft woods. Keep the bit as short as possible, to avoid the chance of it bending with the spinning force (**photo 22**).

At this point you can draw the figure onto the paper. Use the crank as a guide for the leg spacing and make the legs long because you'll need material for the feet and the crank attachment (**photo 23**). Cut the figure and bend its legs at the hips, knees, and ankles (**photo 24**). Then fold the tip of each foot around the wire. When you are happy with the bends, use a small amount of white glue to attach the feet to the wire. Be careful not to glue the paper to the wire, as the wire needs to rotate freely (**photos 25** and **26**).

While this dries, you can drill a hole on the backside of the base, into which you'll insert the piece of wire that will hold the person in

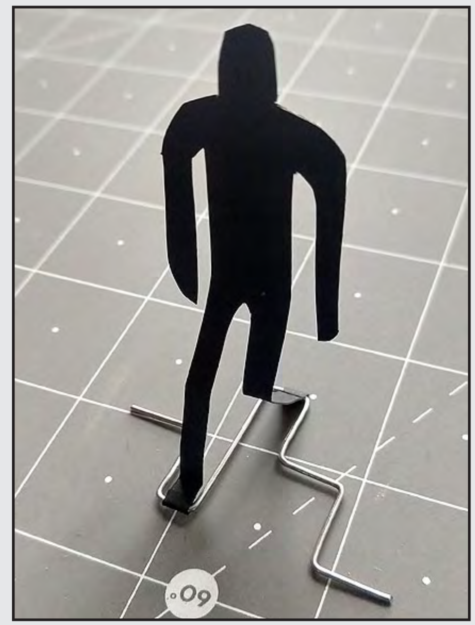
21. Crank holes are drilled in both pieces together, for accuracy.

22. A short drill bit was made from a piece of paper-clip wire.

23. Drawing the figure on paper. Leg spacing is made to match the crankshaft.

24. Bends are made at the hips, knees, and ankles.

25. Feet are carefully glued around the crankshaft.



26. Once glued in place, the figure begins to come to life.

27. The block is drilled for a rod that will be inserted into the hole to support the figure while it's walking.

28. A clamp temporarily holds the piece together for a dry run. Note the wire in back holding the figure up.

place (**photo 27**). This wire needs to act as a spring, so it should have a slight bend. Use a little bit of CA cement to fix the wire to the base.

At this point you could do a dry run by assembling the whole thing. Hold the sides to the base with a clamp, and the paper person to the supporting wire with a piece of tape (**photo 28**). If you are satisfied with everything, glue the sides to the base with some CA cement and clamp it again while it dries. You are finished (**photo 29**)! AM

You can watch videos of all of the author's automata at *http://bit.ly/tinyautomata*

29. The finished walking person.

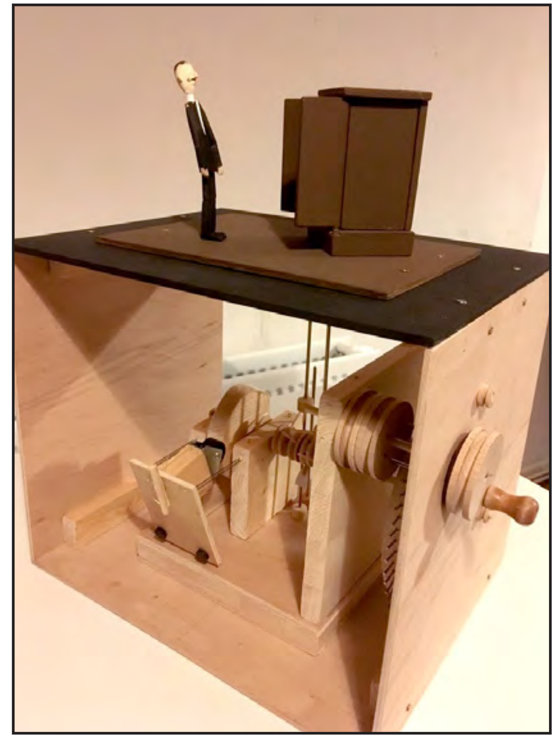
GALLERY

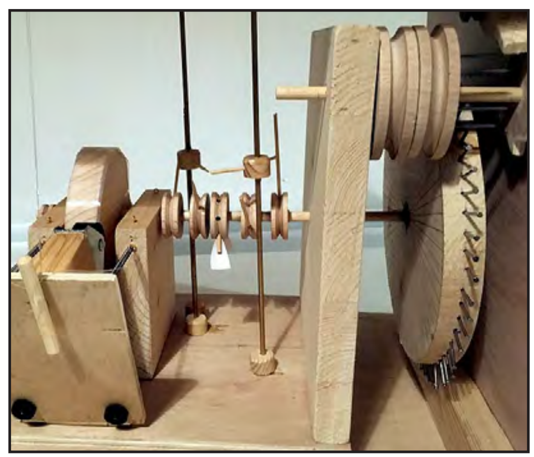
Poor Albert's Haunted Wardrobe

by Chris Michael • Oxford, UK • Photos by the author

Poor Albert thinks he hears a noise in his wardrobe. To his horror, the doors open to reveal a terrible specter! Frozen in fear, Albert watches as the doors close. His legs finally give way and he faints.

See a video of *Poor Albert* at: *https://youtu.be/qFE0GPGKbt8*





Awesome automata!

A spotlight on the Guinness Collection: Part 2

by Michele Marinelli, Curator of the Guinness Collection at the Morris Museum • Morristown, New Jersey, USA
Photos by the Morris Museum

In the first part of this article, in the July-August issue of *Automata Magazine*, commercially available automata by American and French manufacturers were discussed. In this part, we'll continue the overview, with French, Swiss, and Austrian pieces in the Guinness Collection.

Jean Roullet established a tool factory in Paris in 1866 and, a year later, with partner Monsieur Lamour, produced their first mechanical toy. The partnership, however, only lasted a few years. Further expansion into the manufacture of mechanical toys and automata reaped recognition for Roullet and resulted in him winning a bronze medal at the International Exposition of 1867 in Paris.

In 1879, Roullet's daughter Henriette married the shop foreman, Ernest Henri Decamps. Moving away from mechanical toys, the Roullet firm increased its focus on automata production and, in 1889, Decamps became a full partner in the firm. Imagine the wonder of children gazing at the Velvet Egg (c. 1890—**photo 10**), when the lid magically pops open to reveal a "musically talented" rabbit!

10. Musical Rabbit in a Velvet Egg automaton, c. 1890, Roullet et DeCamps, Paris, France.

Upon Roullet's death, in 1907, Decamps inherited the firm and his eldest son, Gaston, joined him in the business. Ernest Henri Decamps died two years later. In 1925 Gaston Decamps acquired the stock of the closed Phalibois shop (see Part 1 of this article). The family business thrived throughout upcoming decades by staying in touch with the times and remaining current with technology. The firm successfully continued to produce large advertising and window-display automata using electrically, electronically, and radio-controlled pieces. Decamps's daughter Cosette and her husband took charge of the company upon Gaston's death, in 1972. In 1995, intense competition drove the firm to close its doors.

Leaving a small village in 1873, **Leopold Lambert** and his family relocated to Paris, where he trained as a clock-maker and jeweler. By 1877, he was apprenticed to Vichy (see Part 1) and eventually became the shop's foreman. Lambert's interest in making automata motivated him to open his own shop, in 1886. Many of the automata created by Lambert were costumed by his seamstress wife. Initially successful into the early 20th century, the firm had declining sales, which finally led to Lambert's closure in 1932.

11. Méphistophélès Playing the Mandolin automaton, c. 1886 -1900, Lambert, Paris, France.

12. Clown Teaching a Dog a Trick automaton, c, 1890 -1900, Louis Renou/M. Verger, Paris, France.

Based on Charles-François Gounod's popular1859 opera, *Faust*, Lambert created an automaton depicting Méphistophélès, or the Devil. In the opera, Méphistophélès is called upon when someone is in desperate need of knowledge, wealth, or youth. A pact is agreed upon, with payment being one's soul forever after in service to the devil. Lambert's Méphistophélès Playing the Mandolin musical automaton (c. 1886 -1900—**photo 11**) appears harmless enough, don't you think?

By the time Gounod died, in 1893, the popular opera had been performed over 1,000 times at the Garnier Opera House, which had become the center of social life of affluent Parisians (who were most likely to purchase luxury objects). Lambert's firm sought to appeal to this particular wealthy and sophisticated clientele.

The firm of **Dehais & Laforest**, founded in 1847, began making mechanical toys and various novelty items. In 1861, Laforest left and Pierre Verger, Dehais's son-in-law, joined the firm, taking it over in 1871. Verger was succeeded in 1886 by his nephew Louis Renou, who continued offering the same type of products—specifically toys—which also included automata.

By reducing the size of his automata, Renou was able to simplify the mechanisms, making them relatively inexpensive. Even as he strived to make his automata less elitist and more accessible to a wider public, Renou was recognized for making a quality product, as exampled by his Clown Teaching a Dog a Trick automaton, 1890 -1900 (**photo 12**). Louis Renou retired in 1922, at which time the firm continued under the leadership of his son Ludovic and Ludovic's wife, Jeanne. With automata falling out of fashion, Renou created a popular doll figure around 1930 and, by 1957, the firm was taken over by their children. Louis Renou died in 1958.

During **Blaise Bontems**'s apprenticeship to a clockmaker, he was disappointed by the lack of realistic birdcalls, or whistle control, of most mechanical-bird pieces. He eventually attained the status of Master Clockmaker and opened his own shop in 1849, specializing in creating realistic and authentic-sounding mechanical singing birds. He began exhibiting his work at the Great Exhibition of 1851, in London.

Blaise Bontems died in 1893, and the firm was handed down to his son Charles Jules, then subsequently to his grandson Lucien. Lucien passed away in 1956, and the firm was acquired by **Reuge S.A.** of Sainte-Croix, Switzerland, in 1960. It was at this time that Reuge entered the singing-bird industry. The company is still in business today, producing singing-bird automata, as well as other fine mechanical-musical pieces.

Photo 13 depicts Bontems's c. 1910 Epergne, which contains a delightful surprise, although not unexpected, considering the firm's signature singing-bird boxes. The centerpiece displays

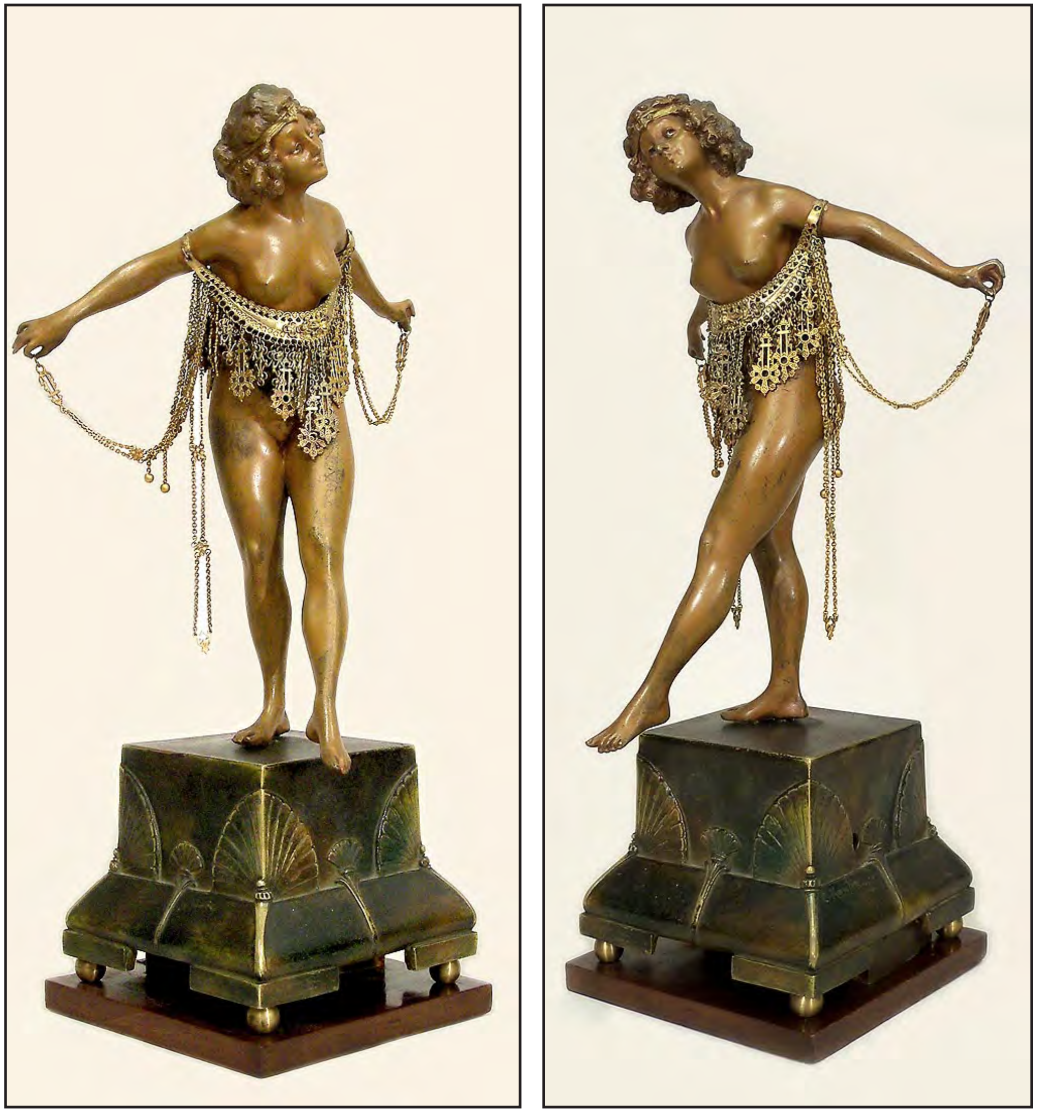
13. Epergne (pineapple with bird and fruit) automaton, c. 1910, Bontems, Paris, France.

fruit in a glass bowl but the real prize is hidden within the pineapple and revealed by its owner upon presentation: a most colorful and delicate singing bird!

Son of a shoemaker, Austrian sculptor **Carl Kauba** studied his craft in Vienna, at the Academy of Fine Arts. Afterward, beginning in 1886, he spent two years in Paris. Inspiration for many of his popular American West sculptures seems to have come from studying artifacts sent to Vienna by American friends, as it is believed he did not actually ever visit America.

Kauba's creative process included using the lost-wax casting method to produce bronzes, and he utilized some of the best foundries in Vienna. In the lost-wax method, a model is sculpted out of hard wax, then covered with fine slips of soft clay. During firing of the piece, the wax melts away, leaving behind the hard clay mold. Molten metal is then poured into the mold, where it solidifies. The clay is then removed, revealing the casting. The lost-wax method is preferable to traditional sand casting in that it can accurately render fine detail.

Kauba is also noted for a range of mechanized bronze sculptures, such as the Musical Dancer (**photo 14**). Many of these pieces are known as "naughties," as they depict the female form in sparse costuming. Most other mechanical bronzes of this period are manually "loaded" by means of a simple leaf or coil spring, having a simplified reveal mechanism that is released by a push button or lever. What is extremely rare in this example is that the c. 1900 -1910 articulated bronze sculpture is driven by a spring-wound clockwork mechanism with musical accompaniment, and the entire sculpture revolves atop its stationary bronze base. How naughty is that! A1



14. Musical Dancer musical sculpture, c. 1900, C. Kauba, Vienna, Austria.

Kauba's signature.

The dealer's label.

The Morris Museum

The Morris Museum is the home of the Murtogh D. Guinness Collection of 750 historic mechanical musical instruments and automata.

6 Normandy Heights Road
Morristown NJ 07960
https://morrismuseum.org/

The Novelty Automation Arcade

A visit to Tim Hunkin's quirky attraction

by Holly Bollier • Guilford, Connecticut, USA • Photos by the author

On a recent trip to London, I visited Tim Hunkin's Novelty Automation arcade in the bustling district of Holborn (**photo 1**). Upon entering the arcade, I was instantly transported from the busy streets of London to a seaside amusement park of my youth. I suddenly found myself back in the penny arcade, with its flashing lights, whirring bells, and colorful coin-in-the-slot machines. I felt like a kid again and couldn't wait to get started!

Pet or Meat? (**photo 2**) asks the unsettling question about our relationship with animals. The outside of the machine is cleverly painted with little white lambs and pieces of pink meat, while a lamb watches over the proceedings from the top of the machine. The spin of a hand crank sets a flywheel into motion, and the fate of the lamb is determined. Will it become a beloved pet, lounging on the sofa, surrounded by a loving family, or will it be the centerpiece of a Sunday supper, soon to be devoured by that same family? Rotating 3-D scenes flip and show the two possible outcomes, based on where the needle comes to rest on the dial. It's one of those pieces that makes you smile and

1. Tim Hunkin's Novelty Automation arcade, in London.

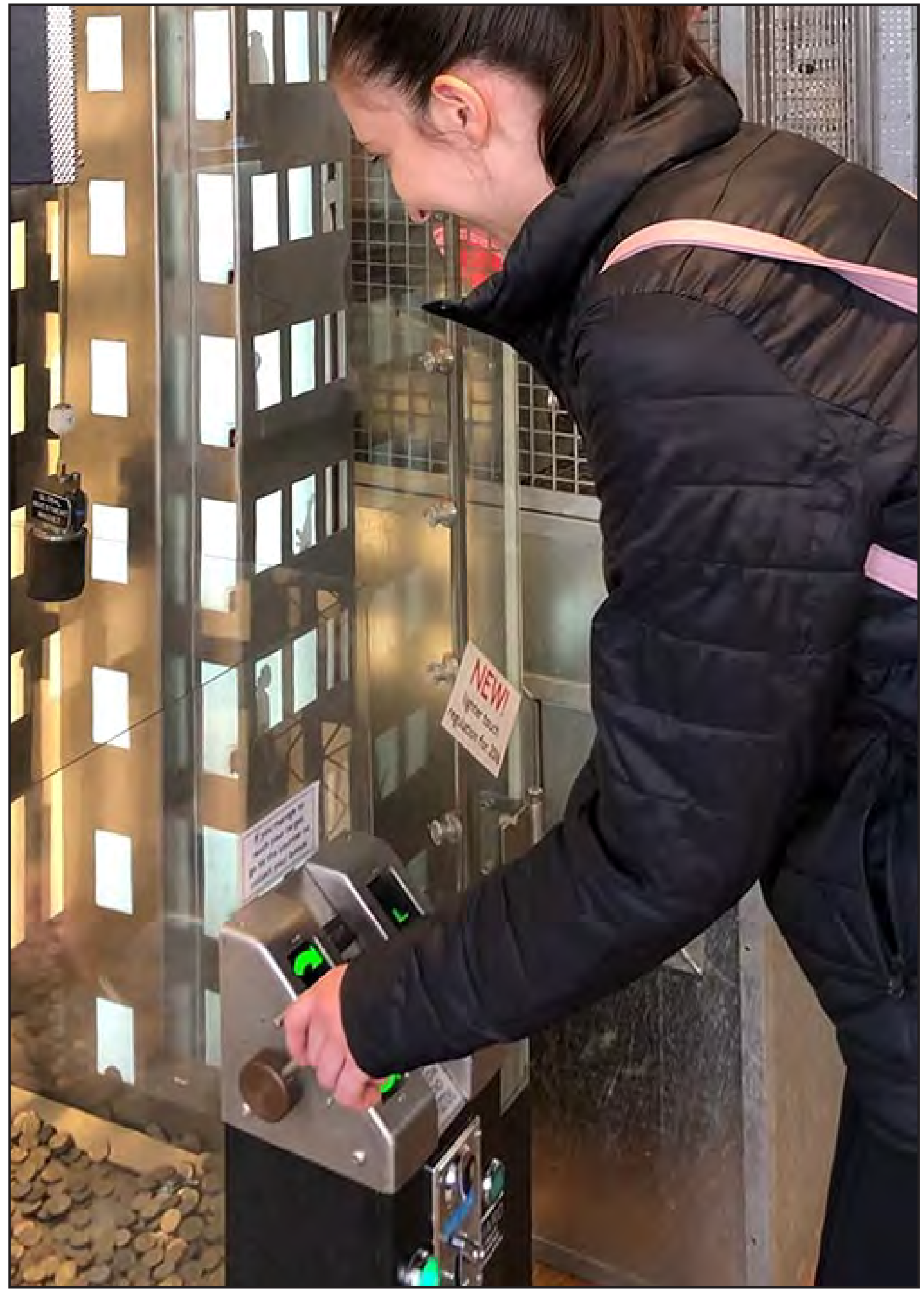
2. *Pet or Meat?* Will the lamb remain on the sofa or end up on the table?

3. *Microbreak*, the armchair holiday.

cringe at the same time.

Microbreak (**photo 3**) is a simulator ride that pokes fun at armchair travelers who prefer to watch life go by, rather than experience it for themselves. In this piece, you sit in a frumpy old lounge chair (buckle your seat belt first!) in front of an old television that screens a hair-raising travel adventure while you bump and jostle along from the safety of your armchair. It's a fun throwback to the simulator rides in the old arcades, as well as an example of absurdist Python-esque humor.

As London is a global financial center, *Money Laundering* (**photo 4**) is a perfect opportunity for visitors to get an idea of some



4. Someone has a go at laundering her money.

of the inner workings of these banking institutions. The goal is to try to meet your Discreet Wealth-Management Financial Target (i.e., your personal stash of laundered cash) with the help of a crane that has a magnet on the end of it—a.k.a. the Global Investment Magnet.

To achieve your goal, you gather your coins from the bottom of the case and try to lift them past the financial regulators, who occasionally look out of their windows in the neighboring skyscrapers. If one of the regulators sees your coins going by his window, a Financial Conduct Authority flag spins, lights flash, the magnet releases your money, and you have to try all over again. You must keep one eye on the clock and two hands on the crane to be successful. It's satirical British humor at its best, and I loved it!

One of the older automata is *The Chiropodist* (**photo 5**), which features a nurse, on whose face is a sweetly creepy expression. You place your foot into a bay while she looks down at it. Then your foot gets a gentle patting. It's silly and entertaining at the same time.

5. *The Chiropodist* offers sympathy, if not relief.

6. This fellow will assess your offering—*Is it Art?*

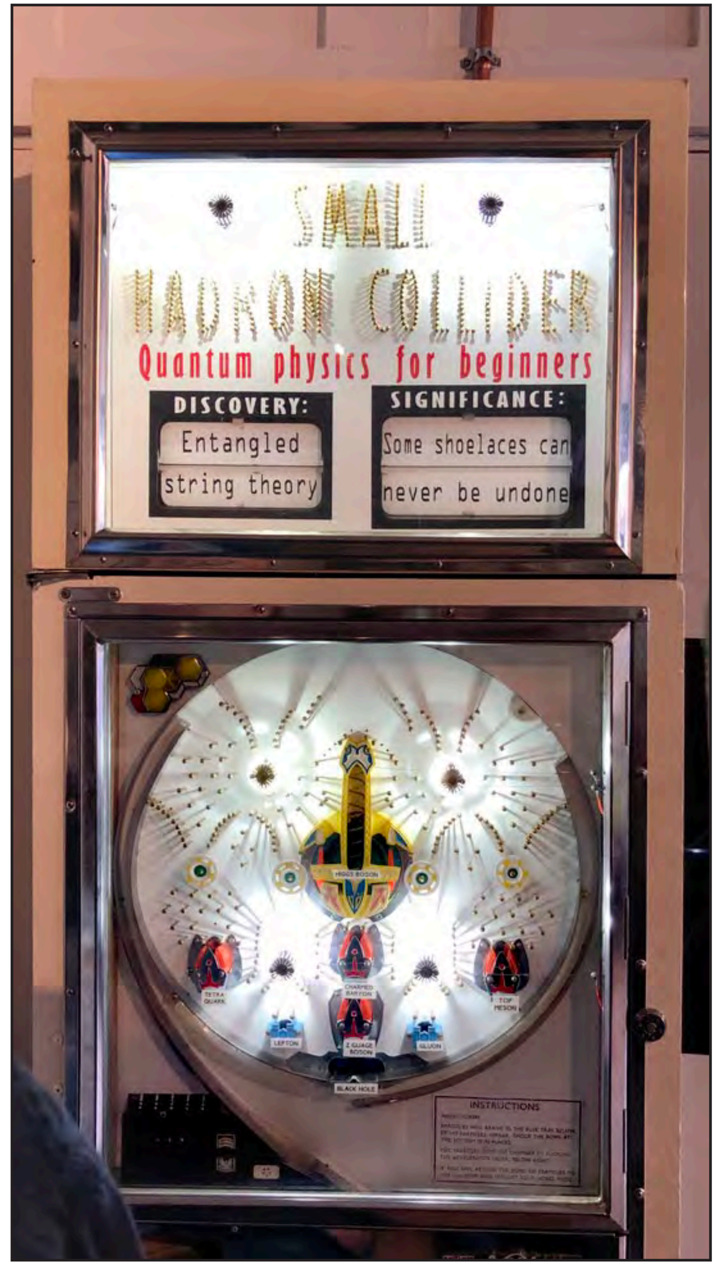
Is it Art? (**photo 6**) asks the questions, Who determines what is art? and How is it decided? This piece features a rather haughty-looking fellow in an arrogant pose. You insert a small item (e.g., a pair of glasses or a wallet) into a tray, which rises into the appraiser's space. He leans in for a closer inspection, then nods his head approvingly. But then, after a brief moment, he shakes his head, giving the item a negative assessment, and your item is returned forthwith. You have to look quickly, then, because the appraiser sticks out a forked tongue at you. As artists, we need to keep in mind the subjective—and sometimes political—nature of assessing art.

The Divorce (**photo 7**) leaves one with an uneasy feeling, similar to *Pet or Meat?* Here, after turning two hand cranks, you see an angry couple pulling their home apart and separating their family and pets. It's a painful division that leaves the pets literally torn apart and the kids dangling in midair.

Inspired by the discovery of the Higgs boson particle in 2012, *The Small Hadron Collider* (**photo 8**) gives participants a chance to "Win a Nobel Prize with Their Intellect." It reminded me of an old pinball machine, with random ball bearings that scatter over a board before dropping into holes.

There are more than a dozen automata in this arcade. They illustrate Tim Hunkin's intellect, ingenuity, love of history, and wonderful sense of humor. If you're traveling to London and want to have a rollicking good time, stop into the Novelty Automation arcade. You'll be glad you did! A1

7. The truth about divorce.



8. Quantum physics explained.

Visit Novelty Automation at *http://www.novelty-automation.com/* and learn more at *www.timhunkin.com*

Stella the Starfish

An ecological paper automaton to download and build

by Peter Lawrence • London, England • Photo by the author

A couple of years back, a friend asked me if I'd like to share an exhibition space in St. Ives, so I started to devise some work that I could take down there in a suitcase, on the train. I'd been making animated cardstock models for some time and decided that, since I was going to the seaside, I should make some postcard-sized pieces.

With the current concern about human impact on the environment, I felt that these postcard automata should have an ecological theme. The series ended up including: gulls hovering over a wastebin, a threatening crab with a burger box stuck on its claw, a jellyfish dancing with a shopping bag, shrimps feeding on seaside rock [candy] in a rockpool, water bottles bobbing under a dock, and the starfish you see before you, trapped in a beer tether.

It took a fair amount of trial and error to make the starfish work (I have a box full of rejects under the bed), followed by the frustrating business of getting the original watercolor rendering into my computer and making it all fit on an A4 sheet. I hope you think it's worthwhile.

Subscribers can download *Stella* by clicking ***here*** or from the "Extras" page on our website: *https://tinyurl.com/subscriberextras*

Six windows

A Day at the Architects

by Paul Spooner • Stithians, UK
Photos by the author, except where noted

ALAN WILLIAMS PHOTOGRAPHY

GARY ALEXANDER

1. The windows of Rodić Davidson. Visible (left to right) are *We Want a Window and We Want It Here*; *Solid, Liquid, Gas*; and *Suddenly It's Now*. The exhibition will be up through the end of September 2019.

This job came suddenly. The architects Rodić Davidson, whose offices are in London, entertain pedestrians with changing displays in their six windows, which look onto Bury Place (**photo 1**). Large numbers of passers-by are on their way to the nearby British Museum. The eponymous Ben Davidson offered me the next show and I was happy to say, "Thank you, Ben—I'll get cracking on six new things."

There were about three months before the show was to change, so a fortnight for each new piece seemed plenty. This was an opportunity to revisit some ideas I'd had in the past, perhaps enlarging and improving them a little.

I find that the prospect of starting afresh on a project is accompanied by a kind of euphoria—that the as-yet-unmade machine floating in front of my mind's eye will satisfy all my criteria: that it should be a feast for the eyes and the intellect, make people laugh, and bloody well keep on working. Often this euphoria lasts some way into the making process. The drawings might have some charm. Even the first assembly of the mechanism might be encouraging, but from then on, it's a steady journey downhill. Not that I'm downhearted—after all, I get to spend my life messing about and haven't done a proper day's work in 40 years. Following are the pieces, in order of making.

Physics for Cats

When I first went to secondary school, I liked doing physics. The apparatus was fun and you could see what it did. There, a demonstration of gravitational acceleration comprised a long mahogany trolley on brass wheels. The trolley was attached by a string to a weight hanging over the end of the bench. On a springy arm, mounted to the bench, was an ink-laden brush that made its mark on a strip of paper pinned to the trolley. Set the brush vibrating, release the weight, and the brush would trace a zigzag line that opened out on the paper as the trolley accelerated. It looked something like **figure 1**.

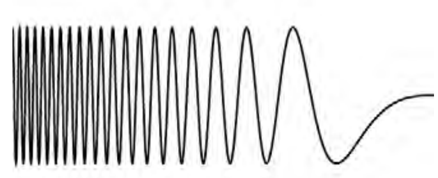


Figure 1

Physics for Cats (**photo 2**, **figure 2**) has a trolley rolling on a centrally pivoted track. A ratchet, with a crank and connecting rod, raises and lowers one end of the track so that the trolley, with a cat onboard, travels from left to right and back. A mechanical mouse in a wheel drives a pawl that steps a 24-tooth ratchet around. That is driven by a geared DC motor. To prevent the ratchet from freewheeling when the weight of the cat and trolley

2. *Physics for Cats*.

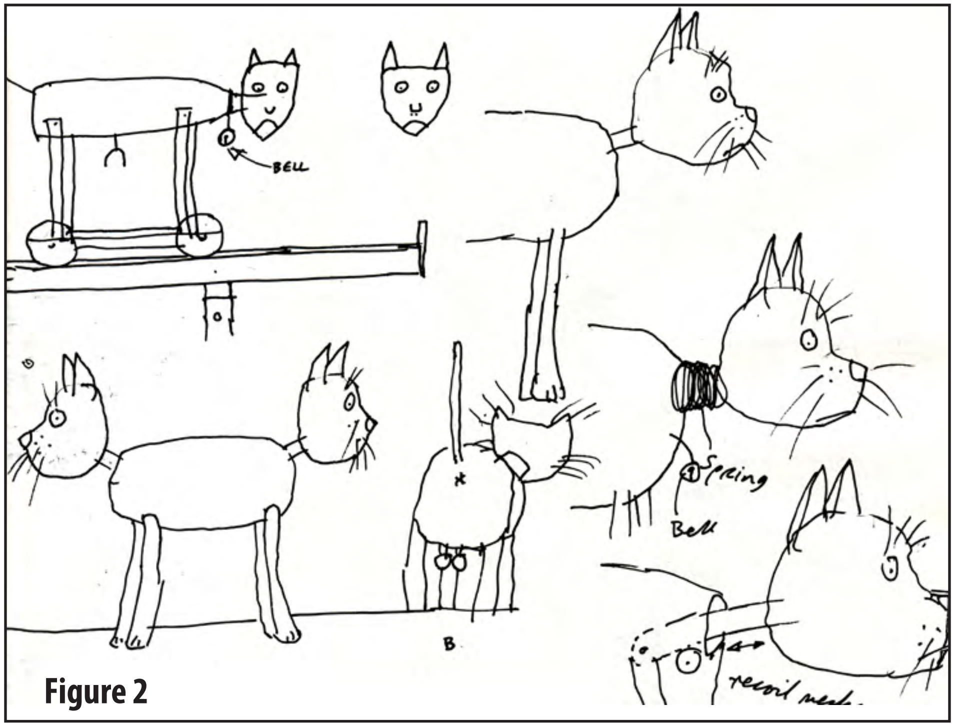
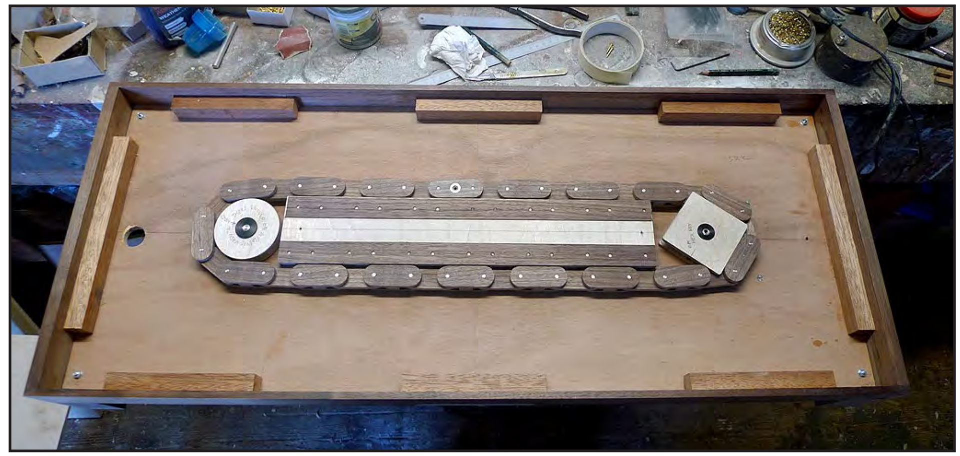


Figure 2



LEFT: 3. *Cork Cathedral*.

BELOW: 4. The wooden-chain mechanism that moves *Cork Cathedral*. A magnet embedded in the chain engages a similar magnet in the cathedral above.

overcomes the drag of the driving pawl, a sprung roller presses between a pair of adjacent teeth on the ratchet. It's an homage to the bygone physics apparatus.

In a cavity at the back of the cat, two 8mm (5⁄16") boxwood spheres hang from threads. At the end of each journey, these balls oscillate energetically, demonstrating Newton's first law of motion.

Cork Cathedral

There are two cathedrals in the city of Cork, in the Republic of Ireland. One is Protestant and the other Catholic. Although that distinction doesn't matter much to me, I chose to make an inaccurate model of the Protestant one (**photo 3**) because I found its history more interesting. It was built in the late 19th century by the Gothic Revivalist architect William Burges. As a student in Cardiff, South Wales, I'd seen two other buildings worked on by the same architect: Cardiff Castle, the construction of which was commenced in the 11th century and was added to by Burges in the 19th, and Castell Coch, another castle started by the conquering Normans around 1081 and not quite finished 800 years later, at the time of Burges's death.

My interest in Cork Cathedral is not architectural. I just wanted to make a cathedral out of cork and call it *Cork Cathedral*. It's not solid cork, just a thin veneer over a substrate of wood.

I thought movement would add interest to the piece. Almost everything I make is *meant* to move, even if it doesn't. I made *Cork Cathedral* slide on a smooth plywood base. Below the plywood, a wooden chain runs horizontally between two sprockets (**photo 4**). Embed-

GARY ALEXANDER

5. The cathedral is followed by its flock.

ded in one link of the chain is a powerful magnet that attracts another magnet in the base of the cathedral. Thus, the cathedral follows the path of the link.

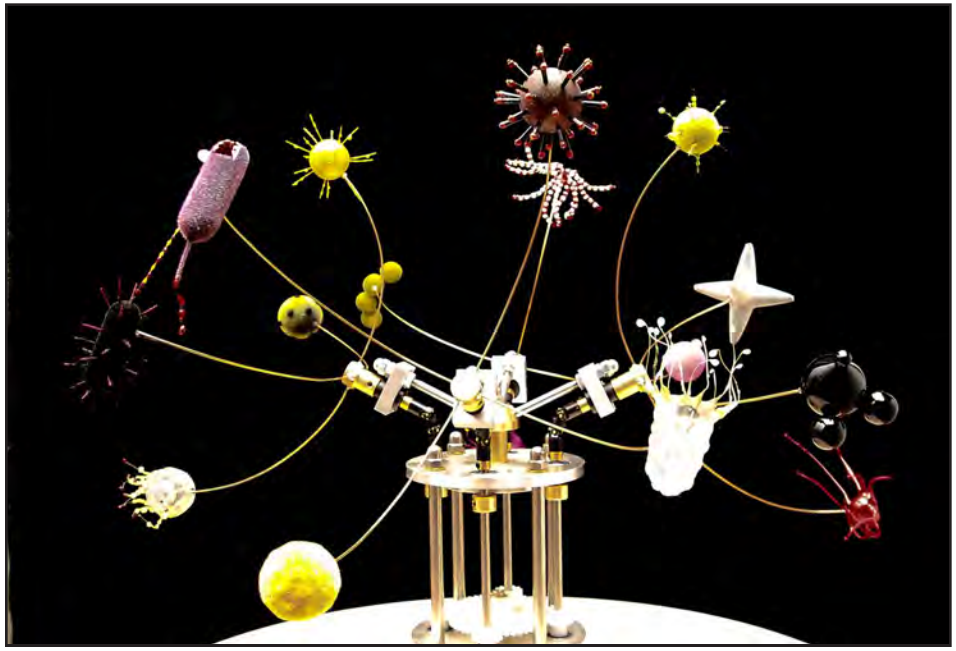
It was a plain and simple piece, too pure and minimal for my taste, so I made the cathedral tow a small flock of sheep in its wake by a wire hooked into its apse (**photo 5**).

6. *We Want a Window and We Want It Here*. The pointing finger describes a square in the air.

We Want a Window and We Want It Here

The cam on the left of the automaton in **photo 6** is divided into four sections. The white ones are segments of different circles whose diameters are concentric; the other two have profiles that connect the large and small diameters. Two followers roll on the rim of the cam. When a follower rolls on a concentric circumference, there is no displacement; on the connecting surfaces the follower is displaced and movement occurs. As the followers are at right angles to one another, one follower is at rest as the other is moving, and vice versa. Thus, the effect of the cam is to produce two distinct motions, one vertical and one horizontal. Levers connecting the followers to the figure at the right in the picture impart either a raising-and-lowering of the arm or a right-left swiveling of the body. The pointing finger traces a square in the air.

7. An earlier iteration. This one features a member of the royal family.



ABOVE: 8. *Whirling 1: Bacteria*, at the Copernicus Science Centre, Warsaw. This is the first of a family of the author's whirlers.

LEFT: 9. *Whirling 2: Biodiversity* includes 20 different humanoids, including a model of Peter Markey. This automaton is in Cabaret Mechanical Theatre's collection.

I've made a few versions of this machine (**photo 7**), one quite good and six utter failures that had to be recycled. This one is somewhere in the middle of that quality spectrum. Next time, I hope to get a better disconnection of the two component movements so that a nearly perfect square is indicated.

I considered calling this piece *Windows for Dummies*, but decided not to because only people who had computers were likely to understand the joke.

Winter

I don't usually make mechanical pieces that just whirl about. Something tells me that there has to be a narrative, or at least an event that someone can "read." **Photos 8-10** show some exceptions. These all operate on the same principle: figures, geared together, rotate in different planes, crossing in front of each other, generally looking busy. In some, the central post is static, while in others, extra gearing makes the post turn, compounding the action.

Figure 3 shows the drawing I

10. *Whirling 3: A homage to Johann Knopf 1866-1910*. Knopf was an outsider artist whose drawings of blackbirds had a definite whirling quality.

made in my notebook when starting this job; if only the finished thing (**photo 11**) could have been as fresh.

The spur gears in the box allow the inner and outer vertical shafts to turn at different speeds, adding to the whirling effect. You might notice that the left side of the box has been cut away to make room for two of the gears. That's because I made it too small.

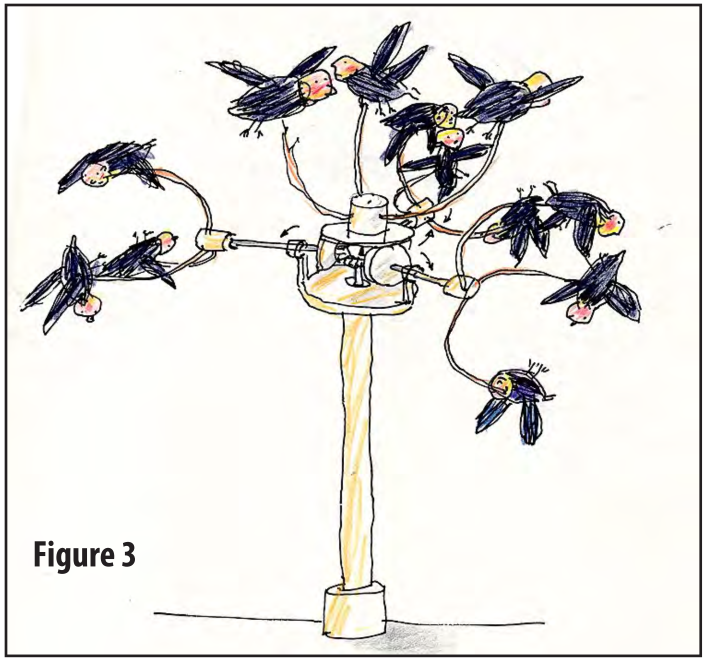


Figure 3

LEFT: 11. *Winter*.

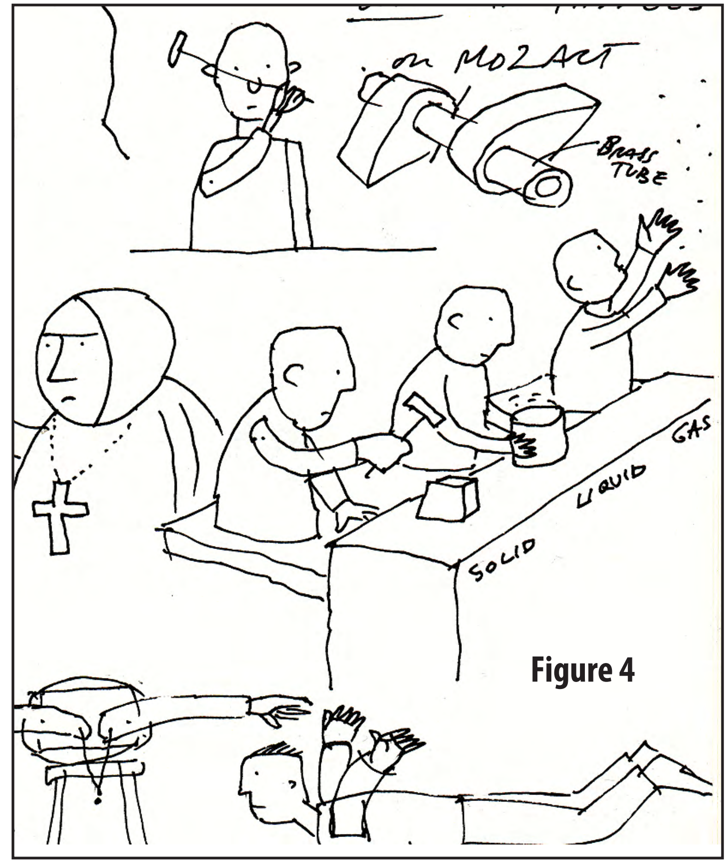


Figure 4

Solid, Liquid, Gas

Figure 4 is part of my notebook drawing of this piece. Three personages investigate three states of matter. Plasmas and Bose-Einstein condensates are outside their remit, as are all the other states of matter that proliferate in scientific literature. I'm hoping someone will draw the line at Harrypotterine.

To demonstrate solidity, the person on the left (**photo 12**)

GARY ALEXANDER

12. *Solid, Liquid, Gas*.

bangs a fist on the table. These actions are the most infrequent because, as the molecules in a solid move only very slowly, there is plenty of time for whacking. The central figure in the automaton is experiencing a more active state of matter. The liquid in the vessel could escape if he/she doesn't control its slopping about—molecules are moving faster here. On the right, despite the demonstrator's frantic attempts to grasp gas particles, they are dispersing much too quickly.

GARY ALEXANDER

13. *Suddenly It's Now*.

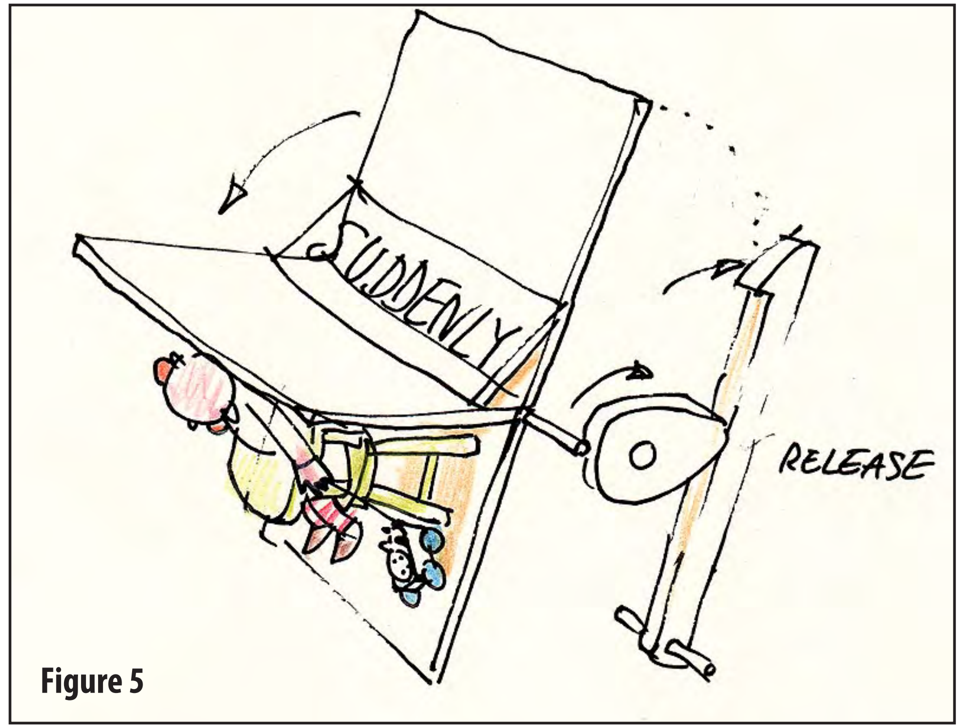


Figure 5

Suddenly It's Now

Performing what people now call "research," I find that Google is unable to give one example of the three words above, in that order, among the 544 million or so similar little sentences it discovered in just under half a second. I'm surprised by that because those three words, in that order, are constantly churning about in my head.

Photo 13 shows the second iteration of an *S.I.N.* machine. I doubt if it will be the last, unless I suddenly experience a new kind of now.

There are three scenes, in which people at different stages of their lives sit in chairs appropriate to their station: a baby in a high chair, a grown-up woman in an office chair, and an old lady in a high-backed easy chair. Each scene is latched in position but can swing forward under its own weight when released, in order of the age of the subjects. When the mechanism releases the scenes, their back walls become the floors of three new areas, with the three words—SUDDENLY, IT'S, and NOW—painted on the new back walls (**figure 5**).

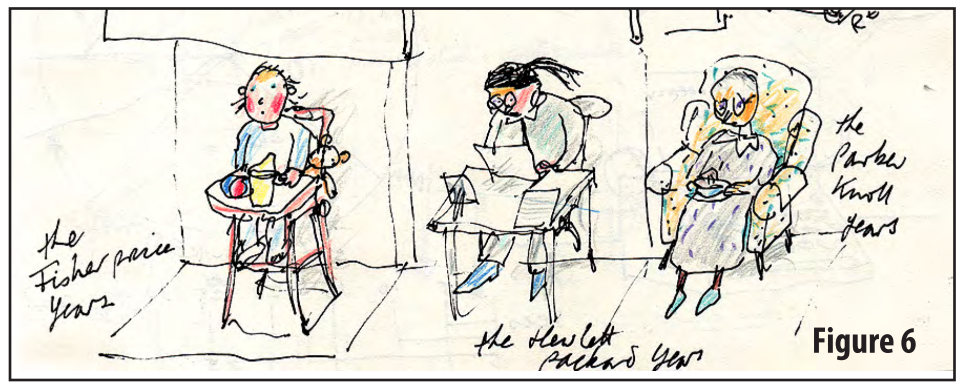


Figure 6

I was quite pleased with the double-barreled subtitles: *The Fisher-Price Years*, *The Hewlett-Packard Years*, and *The Parker Knoll Years* (**figure 6**), until I considered my international audience. Maybe very old Americans don't sit in Parker Knoll easy chairs as they wait for their last now.

The experience of Sharmanka

A description of a unique kinetic show

by David Soulsby • Billingshurst, UK • Photos by the author

1. Eduard Bersudsky's early machines, built in Russia. In the center of the space is *The Tower of Babel*.

My wife and I recently paid a visit to the Sharmanka Kinetic Theatre, in Glasgow. The description of the show in the advert was intriguing:

> Hundreds of carved figures and pieces of old scrap perform an incredible choreography to haunting music and synchronized light, telling the funny and tragic stories of the human spirit as it struggles against the relentless circles of life and death.

This might not be everyone's cup of tea, I grant you, but I was keen to experience the performance and perhaps get an insight into the difference between kinetic sculpture and automata.

Sharmanka is the Russian word for barrel organ, a form of mechanical music synonymous with fairs and having a good time. Certainly, there are elements of this in the show, but there are darker, more threatening images as well. The creator, Eduard Bersudsky, was born in St. Petersburg, Russia in 1939 and was witness to some of the most insidious as well as the uplifting aspects of the Soviet Union. He is now retired, but his amazing constructions are regularly exhibited in Glasgow and can be seen on tour in the UK.

We were shown into a darkened room by an unassuming Scotsman, in a black T-shirt and jeans, about half an hour before the show was due to start. Our host gave us a program, which showed silhouetted drawings with enigmatic titles, such as *The Dreamer in the Kremlin* and *Jock's Joke*. We wondered if we were going to be the only ones there, but after about 15 minutes, a number of others shuffled in. About 30 of us were seated on several rows of benches by the time the show got underway. Opera glasses were provided so that we could more closely view the proceedings.

In front of us were a number of weird and wonderful machines, some illuminated and others in darkness. These were from Bersudsky's early work, constructed in Russia, before he took up residence in Scotland.

The quiet and darkness were suddenly shattered by a burst of sound, and light striking three carved wooden figures—*Bell-ringers*—operating bells via ropes, firmly gripped in both hands. In Old Russia, this was a skilled job, with the ringers climbing to the top of the tower and sounding the bells there, rather than more conventionally, from the ground. Bells were forbidden under the Communist regime, so most were removed and sent to foundries for re-smelting.

2. The *Big Organ Grinder*, in his jester's hat.

This was the curtain raiser to the tall construction at the center of the display, titled *Tower of Babel* (**photo 1**), which then sprang to life, accompanied by rousing music. The amount of movement was staggering—wheels turning, bells ringing, figures tugging on pulleys, others swinging on ropes or suspended by chains. Shadows of the moving figures were cast on the wall, in ever changing colors from synchronized lighting.

Characters from Russian history were in the thick of it: Lenin making a speech, Stalin swinging an axe. As the lights were extinguished on some figures, they stopped moving, while others came alive as the light fell on them. A single mannequin turned a wheel, reeling up a figure suspended by its ankles, then releasing it, over and over. Another, wearing a top hat, endlessly launched a fishing rod with an industrial-size hook at the end. Around 40 figures took part in this tableau alone.

To the left of the tower was a statue of the *Big Organ Grinder* (**photo 2**), wearing a jester's belled hat. A bird on his head also held a bell. A white-suited Pierrot tugged on a cymbal. The bird sounded the bell and a dour monkey at the side joined in, as the organ grinder cranked the handle. In front of him, the *Small Organ Grinder*, brought into sharp relief by the light, cranked the handle of his barrel organ in time, while a somewhat more contented monkey moved his head. *Circle of Clowns* (**photo 3**) spun above.

After all machines had been illuminated and played individually, the whole moving spectacle reached a climax together. All movement, light, and sound is computer controlled, so the synchronization was spot on.

The show continued with everyone in the audience progressing around the room to watch the more-recently built machines, as each lit up and began its performance. Unfortunately, these were not always adjacent to one another, which led to a lot of people scrambling about in the dark to get a closer view.

The contraptions were constructed from scrap materials, such as bicycle wheels, old sewing machines, and typewriter keys. Each one played out a story with figures—human and animal—which moved to the accompaniment of lights and music. Motion gradually spread from one part to another, as belts flapped and gears clunked. Echoes of Bersudsky's life in Russia are mimicked by the nature and interaction of the carved models, hidden or in plain sight. Some of these worked well, while others, I thought, were rather annoying.

One of my favorites was *Titanic*

LEFT: 3. *Circle of Clowns.*

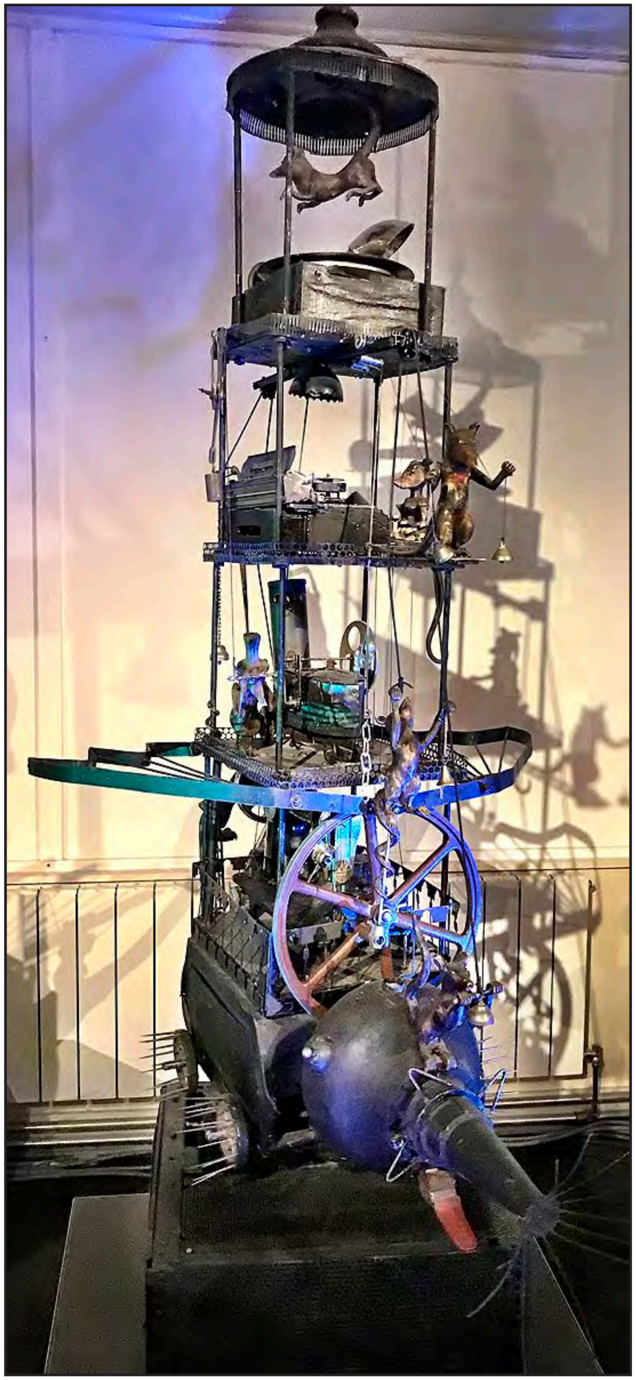
BELOW LEFT: 4. Overall view of *Titanic*. Note the woman looking through the telescope in the upper left, and the large fan at the right.

BELOW RIGHT: 4a. This top-hatted automaton is evidently driving *Titanic* by means of the wheel he's grasping.

(**photos 4** and **4a**). The contraption stood in compete darkness until a light shone on a model of a seated man wearing a top hat and tilting a steering wheel from side to side. As more lights snapped on, a woman peering through a telescope began to spin around. A large, three-bladed fan started up and "wings" of more junk began to rise and fall, while a barrel rotated continuously below it. A naked man swung weights like a whirling dervish, and a naked crone butted a bell inscribed "Titanic 1912." Pedals and wheels, which once belonged to a bicycle, began to turn.

The whole spectacle, accompanied by music, was enigmatic. I didn't understand it but one needn't be too literal with Bersudsky's work.

Another favorite was *Time of Rats* (**photos 5** and **5a**). A rat in a top hat cranked a lever, turning a movie-projector spool. Green light shone everywhere and another rat, wearing spectacles, shook bells held in each hand. Two other rats furiously turned handles, and the whole machine began to move in a circle. At the very top, a suspended rat started a gramophone turning while another began hitting the keys of a typewriter. The colony of rats is mounted on a



LEFT: 5. Overall view of *Time of Rats*, supported by a giant mole.

ABOVE: 5a. This rat, with poor eyesight, shakes the bells that he holds in his hands.

mole, apparently representing Russia, blindly plodding forward, but under the rats' control.

Then there was *Master and Margarita* (**photos 6** and **6a**). Trills on a piano began, as a raven rotated above a giant animal skull with extended horns—the Devil. A red light fell on the skull and a luminous glow burned from inside the sockets. A curtain of chains, from top to bottom, was bathed in emerald light. A monocled, bearded figure jerked, suspended by his ankles. A man played a barrel-shaped organ, a headless man banged a gavel, and a female figure, clad only in high heels, rode an inverted boot with a horse's tail. The piano music shrieked and was replaced by drums and a trumpet playing jazz. The performance finally ended with just the rattle of the chains.

6. *Master and Margarita*. The horned skull of the Devil graces the top of this assembly.

6a. *Master and Margarita*. Figures are curtained by suspended chains.

It is impossible to convey in detail the nature of the automata moving in the machines on display. Rolling heads, objects tumbling through moving cages, individual figures interacting, then suddenly jumping apart. All the time, the coordination of the music and light cast ever-changing shadows on the wall.

We were only allowed to take photographs before and after the show, so the static nature of this medium cannot convey the wonders of Sharmanka. As is the case with articles on automata, the essential element of movement cannot be shown, but I hope the photographs convey some of the unique nature of the theater. The website (*www.sharmanka.com*) contains moving images from the show itself.

The whole experience of viewing Bursudsky's machines was a one-off. There may be a fine line between automata and some kinetic sculptures, for example those of Roland Emett. The dynamism and coordination of the moving elements and figures displayed here exhibit characteristics that I think are clearly the former, though other people may disagree. The trip was well worth it and I thoroughly recommend Sharmanka to anyone interested in automata. This was an enjoyable and thought-provoking encounter.

THE FRANKEN-HAND

An animated appendage

by Carlo Spirito •Saco, Maine, USA • Photos by the author

The author's clay-and-metal hand pensively taps its finger on the cigar box when the button is pushed.

This project began in 2011, when I sculpted a series of "self portrait" life-size hands in terra-cotta clay and kiln fired them. This was an exercise to help me learn and become better at sculpting human hands. At the time, I called this series *Working Hands* (**photo 1**).

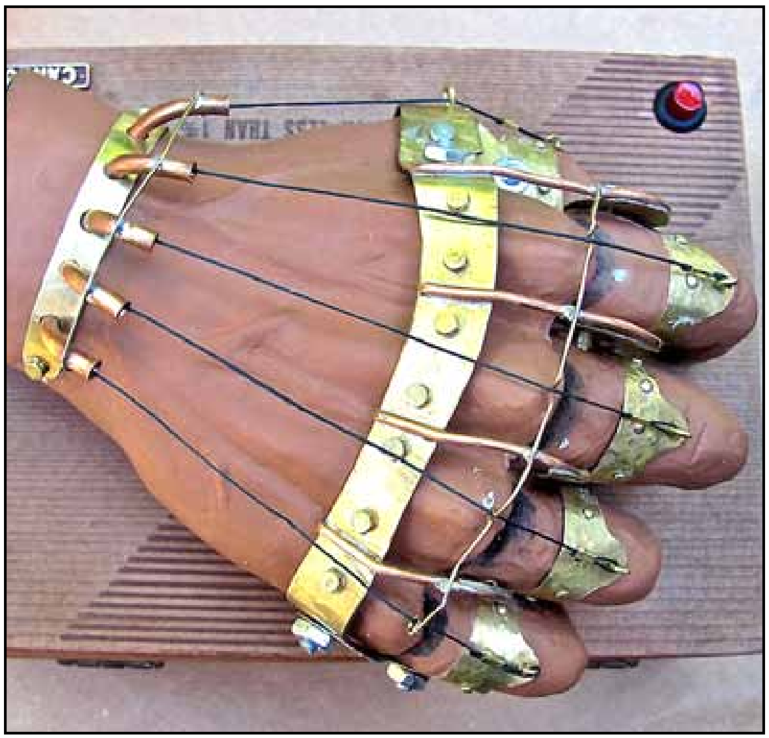
A few years later, I decided to take my *Working Hands* sculpture series to the next level by creating simulated human movement, adding a robotic look, in a Victorian/steampunk brass-and-copper style. I sculpted another life-size hand, this time in air-drying clay. I chose a relaxed pose and separated the joints at the knuckles (**photo 2**).

The next step was to add brass joints, hinges, support bands, and guides for the cables that would operate this hand. On some of the brass pieces, I added a hammered texture, along with extra nuts, bolts, and other hardware, to make the hand look suitably steampunk-ish. The hand was then mounted on a vintage wood cigar box (**photos 3** through **5**).

In fact, the index finger is the only one that moves. All others are static but were made to look as though they, too,

1. *Working Hands*, the series of self-portrait hand sculptures in terra-cotta.

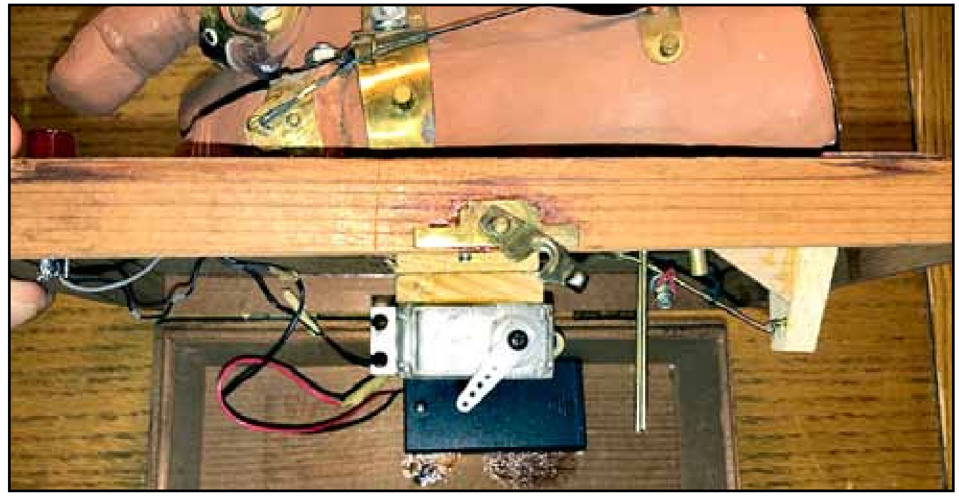
2. The articulated hand, made of air-drying clay.



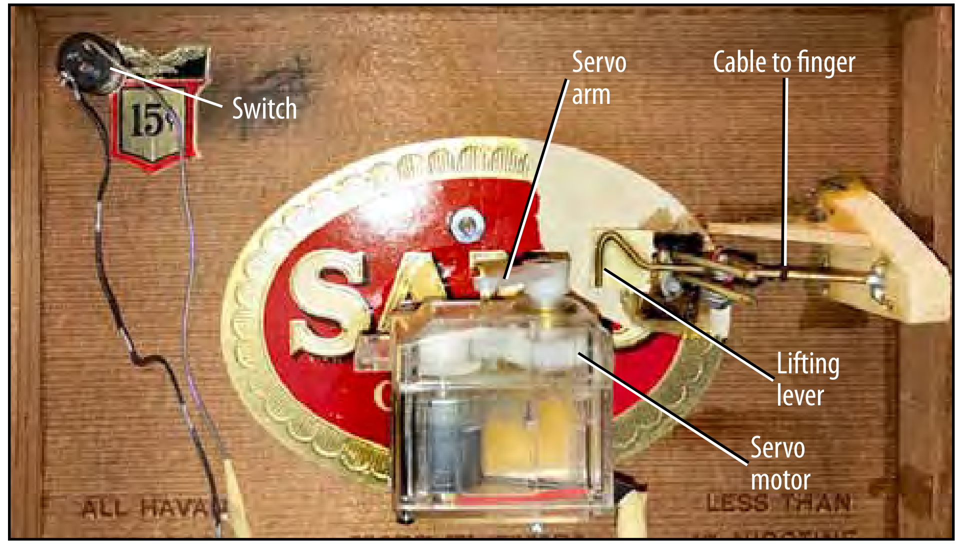
3. Brass and cordage give the finished hand a steampunk look.

4. Though all fingers appear mechanical, only the index finger actually moves.

5. The finished hand is mounted on a wooden cigar box, in which resides the mechanism. Note the builder's plate in the corner.



6. In the box is the servo motor, a battery box, the switch, the lifting mechanism, and the wiring.



7. The rotating servo arm engages the lifting lever, which raises the finger. When the arm rotates past the lever, the finger drops and the cycle is repeated.

could move. The index finger is attached by a thread to a mechanism inside the cigar box. A small, electric servo motor in the box drives an arm, which depresses a lever that pulls the cable and slowly raises the finger, then lets it drop (**photos 6** and **7**). This makes a satisfying sound when the fingertip hits the box. A push button on the top of the box activates the automaton.

A video of the *Franken-Hand* in action can be found at *http://tinyurl.com/carlospirito*

MY DEVELOPING INTEREST IN AUTOMATA

Building personal adaptations of existing pieces

by Barry Falkner • Otley, UK • Photos by the author

Some 25 years ago, I saw two automata—an egg-laying hen and a lion tamer—and the memory must have lodged in my brain. In 2014 (now retired), I decided to design a version of the hen that I could build. One day, while I was busy drawing on the computer (3D AutoCAD), the phone rang and it happened to be the old friend who owned the hen automaton I'd seen. She told me that she still had it, and that it was made by a man called Ron Fuller. I managed to track down Ron and he agreed to make me one, so I looked for something else to make.

That same year, I passed a building site where a sign advertised free fire wood. I stopped and collected some old bits of drawers from a broken chest. The sides were of dark, 9mm-thick (3⁄8") mahogany and were too good to burn, so I gave several pieces to a friend who makes wooden toys. I kept a couple for myself and wondered what I could make with them. While browsing the internet, I came across a fascinating wooden automaton, called *Decoy*, by Kazuaki Harada, and thought I would try and make a version. I loved trying to devise the mechanism. I used colored MDF for the duck, and the box is from the salvaged mahogany (**photo 1**).

1. *Duck.*

2. *Dog.*

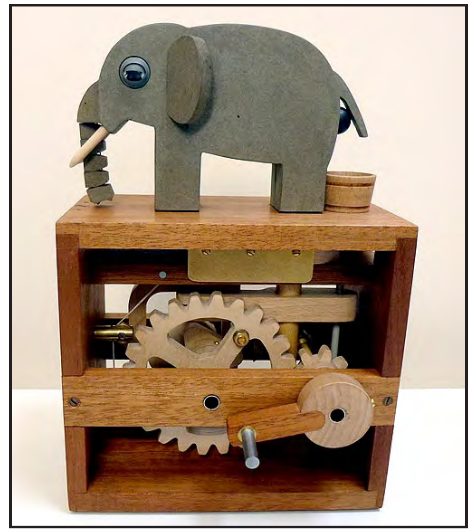
I was smitten—automata making was to be my new obsession! Besides having a great hobby in retirement, I was delighted by the reaction of friends and family. They were quite enthusiastic. I kept in touch with Ron Fuller by email, checking to see if there had been any progress on the hen. He was always quite willing to advise and encourage me in my own pursuits.

I next made a dog automaton (**photo 2**), from a much reproduced, simple design. For this, I used beechwood.

Then I came across Neil Hardy's Fabulous Animals. Neil had designed *Rover and the Hen*, a beautiful automaton of a scratching dog with a hen pecking at its back. Neil was happy for me to try to make my own version and he was a great help. It turned out

3. *Dog and Hen.*

4. *Camel Rider.*



5. *The Elephant.*

6. *Lion Tamer*

well (**photo 3**) but was extremely difficult for me to make, especially getting the dog's head to turn. To help protect my work from being damaged by careless hands, I started adding backdrops.

Il children seem determined to break things. They wind the automata the wrong way and try to push the balls back up the elephant's bottom!

In 2016, I made a version of Paul Spooner's *Camel Simulator*. Paul's design has been fabricated for many years by Matt Smith. The original is much, much smaller than mine (**photo 4**). Drawing designs on a computer does not give you a sense of scale or size until you print out an elevation drawing. I often downsize the design several times until it feels right, though I could never get down to the scale of Matt Smith's automata.

I was finding it difficult to get mahogany to make the boxes. Buying new mahogany boards off the internet was a waste of time, as they warped so much they were useless. I managed to buy eight old mahogany microscope boxes from a local auction, and these are keeping me going. A local joinery shop reduces the thickness for me, from 13mm (½") down to 10mm (⅜").

I next tried to make a variation of Philip Lowndes's elephant automaton, *What Goes in Must Come Out*. His design has an ingenious mechanism. Six balls travel up the leg, drop out of the elephant's bottom and into the basket, and so on. I got in touch with Philip about the project and sent him a copy of my plans. I used 8mm (5/16") gray MDF for the elephant (**photo 5**). This automaton is a great hit with the grandchildren.

From Ron Fuller's book *Simple Wooden Toys*, I started making the *Lion Tamer* (**photo 6**). I used plywood instead of hardboard for the base and top (I'm not keen on hardboard but Ron liked it). I thought I had a brilliant idea for the ¼", hollow tube, middle axle—a wooden pencil with the lead pushed out. Ron was not impressed with the idea.

In 2017, Ron contacted me to say the *Egg Laying Hen* was ready, so I arranged to go down to Laxfield, Suffolk, to collect it. It was wonderful meeting him and seeing his workshop, full of all of his ongoing pieces. I asked him to make me a *Sheep Shearing Man*, and he readily agreed to do that (he usually made automata in batches). I had no idea that Ron was not well. Sadly, he died a few weeks later.

I made another automaton from Ron's book. The *Puffin* (**photos 7** and **8**) is quite similar to the *Egg Laying Hen*.

Then I thought I would try and figure out how to make Ron's *Sheep Shearing Man*. Fortunately for me, an internet friend had some sketches given to him by Ron, and these helped no end. What a fantastic design (**photo 9**)!

In 2018, I contacted Keith Newstead and asked for permission to make a version of his *Great Fishtank in the Sky*. He was most helpful. This piece turned out to be a real challenge because there was so much going on in it (**photo 10**). It's the first time I have used Meccano parts—two sprocket wheels and a chain.

For my daughter's birthday, I made a copy of Ron's *Egg Laying Hen*. Having already made the *Puffin*, I found this to be quite straightforward, but I really struggled with painting the feathers (**photo 11**). Ron was an artist and I am sure he did this step in a matter of minutes. I labored over the painting of the feathers for hours!

I was lucky to visit Falmouth last summer (2018), as Falmouth Art Gallery was hosting an exhibition called *A Cabaret Of Mechanical Movement*. Fantastic! Also, the gallery manager kindly let me have access to the automata store room! Heaven.

While down that way, I called on Matt Smith, who has been very supportive of my efforts. He said I could visit, and he showed me his workshop. I am astonished at how

7. *Puffin* under construction.

8. Finished *Puffin*.

9. *Sheep Shearing Man*.

10. *Great Fishtank in the Sky*.

11. *Egg Laying Hen*.

small, well finished, and beautiful his models are.

I was also able to pay a visit to Paul Spooner, of Stithians, and see his workshop. What an amazing man. How he can produce so many innovative designs is beyond me. I think both he and Matt have an extra part to their brains that I do not possess. They both just work things out on paper or in the flesh. I construct 3D models on the computer (**photo 12**) and am fairly sure they will work before I cut one piece.

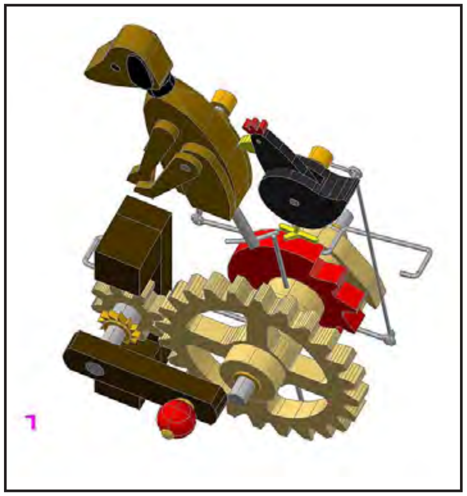
One of my favorite automata is Paul Spooner's *A Carrion Crow With His Eye on Someone's Finger*. With Paul's permission, I made a version of it (**photo 13**). What a bizarre piece. I could not quite replicate the action, but it is still fascinating.

The last thing I made in 2018 was a replica of Peter Markey's *Kissing Couple* (**photo 14**). Peter, who died in 2016, was a genius in creating simple, colorful, artistic designs.

I find that you develop techniques as you go along. The longer a design remains in your head, the more it will change and (usually) improve. If things go wrong, you make it again. One of my typical disasters is, on applying the final varnish, seeing it melt one of the paints.

I have found that broken aluminium arrow shafts (I am a recurve archer) make great axles. I use a lot of model-aircraft-landing-wheel collets, which are available in various sizes. Drill-bit depth stops are also useful. As a repairer of antique clocks, I have a good selection of cutting broaches (for gradually increasing a hole's size), without which I would be lost.

One limiting factor I've found is gear ratios. Any wooden gears with a ratio above 1:3 get rather large. Also, plywood gears tend to shed tooth edges if the size is small. On one of my automata, for the main gear wheel, I tried black Perspex (Plexiglas), which was fine. For a version of Paul Spooner's *Owl House*—a new project of mine—I am looking at using a 1:5 worm gear from AliExpress.com. The gear is rather large, sitting on an 8mm (5/16") shaft, but it works fine. For generating wooden gears, I recommend this program: *https://woodgears.ca/gear_cutting/template.html*



12. Computer model of the scratching dog.

13. *Carrion Crow*.

14. *Kissing Couple*.

I do not have a lathe, but do have a table saw, a pillar drill, a disc sander, and a scrollsaw. All of these are from Proxxon. I do an awful lot of filing and sanding. My workshop is 1700mm x 1700mm (5'7" x 5'7"—**photo 15**), so I can reach everything without getting up from my chair.

I am currently working on several other ideas, including a violin player with a dancing cat, a design for Sisyphus, and more. As yet, I have not been able to come up with a completely original design. I am more of a mechanic than an innovator or artist. One of my faults is being too fussy, and I often spoil pieces trying to achieve impossible accuracy. Artists just get on with it! AM

15. The author's small workshop provides everything necessary for his prolific output.

Videos

Barry's automata appear at "Banofalk of Otley" at *www.youtube.com*

Make your own worm gears

Two methods for slowing down your automata: Part 1—the washer

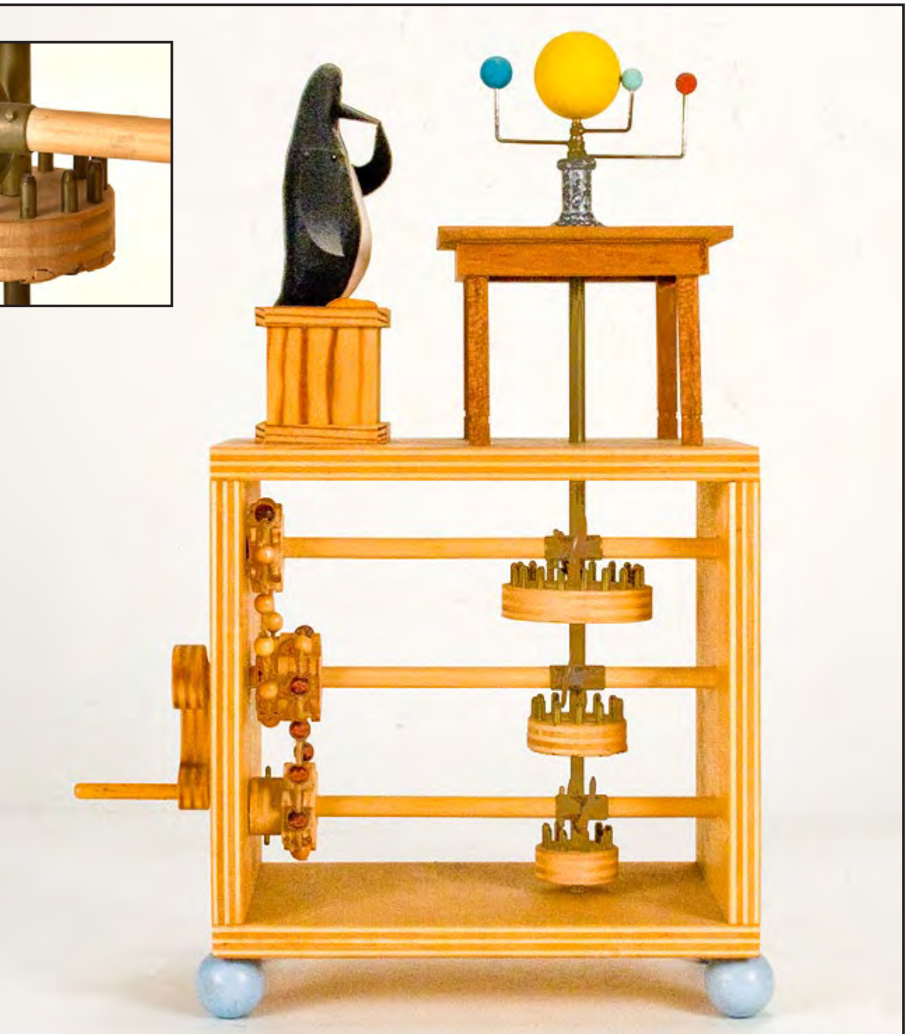
by Marc Horovitz • Denver, Colorado, USA
Drawings and photos by the author

Using a worm gear is a great way to slow down an automaton's action, or even a single motion. Basically, a worm gear is a helix that turns concentrically on a shaft. The edge or "tooth" of the gear engages the teeth on an adjacent spur or pinwheel gear. For each full revolution of the worm, the adjacent gear will advance one tooth. So, if a 12-tooth gear is engaged with the worm, it will take 12 revolutions of the worm to make the other gear rotate one revolution. If the worm engages an 84-tooth gear, it will take 84 turns of the crank to advance the engaged gear one full revolution.

Making a precision worm gear can only be done on a machinist's lathe, but that's not what I'm talking about here. If you employ pinwheel gears in your automata, or even coarse-tooth wooden gears, you can make functional worm gears mostly with hand tools. I'll show you two ways to do it in this two-part series.

A little theory

For a worm gear to function properly with its adjacent gear, the two must match, meaning that they must have the same pitch. For our purposes, "pitch" can be defined as the distance between the teeth. Since a worm gear has, in essence, only one tooth, the pitch means the dis-



In *Jasper Contemplates the Cosmos*, three different-size wheels are powered by three washer worms, causing each planet to rotate at a different velocity.

tance between the coils of the helix (**figure 1**).

So, if you're using pinwheel gears whose pins are 3/16" apart, as I am, the coils of the helix on your worm must also be 3/16" apart. The distance between the teeth is usually measured from the centerline of each tooth, or from the centerline of the coil on the helix.

As neither pinwheel gears nor wooden gears that were cut on a scrollsaw or bandsaw are precision gears, that gives us a little latitude in making our worms. However, it pays to be as accurate as you can, for smooth, trouble-free operation.

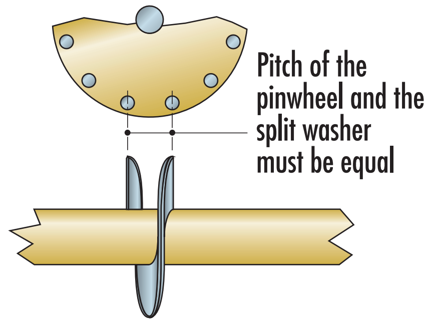
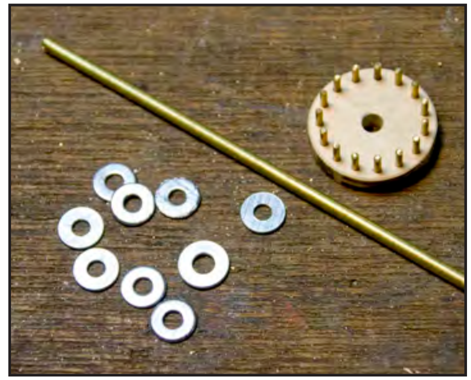
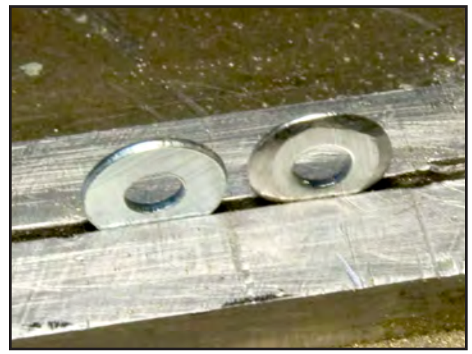


Figure 1—Gear pitch



1. Common washers can be transformed into worm gears to power your pinwheels.

2. The outer edge of the washer is filed on both sides.



3. The right-hand washer has been filed, its edge smoothed and thinned.

4. A jeweler's saw is being used to split the washer.

5. Pliers are used to bend the legs out.

The washer method

Probably the easiest way to make a worm gear is with a plain old washer. You can use just about any size that you like. For the purposes of this article, I'm going to use a #6 washer (**photo 1**). My pinwheel has 3/16" (4.76mm) pitch, which seems to work well for this size of washer. For those of you not on the American system, the #6 washer I used measures .387" OD (9.8mm) x .151" ID (3.8mm) x .038" thick (.965mm). I'm going to use a 1/8" (3mm) shaft, which also works well with a #6 washer.

The washer, which was punched from a piece of sheet metal, may have a fairly rough edge. The first thing to do is to file both sides of the outer edge, to decrease the thickness of the washer there and also to smooth the edge. I find this relatively easy to do by holding the washer in a corner of my vise jaws and filing around both sides as far as I can go with a flat file (**photo 2**), then rotating the washer until it is fully filed. The edge should be reasonably sharp, though not a knife edge. Also, the filing need not be perfect, but it should be relatively smooth. **Photo 3** shows two washers. The one on the right has been filed, while the other has not.

The washer must now be split. Hold it in your vise and cut through one side, toward the center (**photo 4**). I think a jeweler's saw is best for this, but you might use a cut-off disc in your rotary tool or even a hacksaw, if need be. Clean up the cut edges. Without moving the washer in the vise, spread the two legs with a pair of pliers (**photo 5**). **Note:** The direction that you spread the sides will determine the direction of rotation of the adjacent gear. For instance, a right-hand helix will cause the gear to go one way, while a left-hand helix will drive it the opposite way.

The legs will now be in a V shape. The cut edges need to be made parallel to each other. This can easily be done with a pair of small, flat-nose pliers (**photo 6**). The job need not be perfect, but try to get the legs spread and adjusted parallel symmetrically.

Once this is done, the pitch can be adjusted. Hold your washer up to a ruler. The two edges should just match the pitch of your pinwheel gear (**photo 7**). If they don't, simply bend them slightly with your pliers until they do. This is perhaps the most important step to ensure smooth operation. **Photo 8** shows the finished washer and **photo 9** shows it being offered up to the pinwheel gear to see if the pitch looks right. If it's slightly off, adjust it with the pliers. This isn't rocket science and there is some latitude for error. If anything, the gap between the legs of the washer should be a little too wide, rather than a little too narrow. If too narrow, your mechanism will bind. If a little too wide, the motion will be slightly jerky but things will still work.

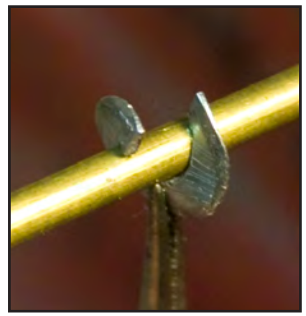
When all is well, the washer can be mounted on its shaft. As I mentioned above, a ⅛" shaft works well for the #6 washer. If your washer has a different-size

6. Legs are bent parallel to each other.

7. Pitch of the bent washer is checked against a ruler.

8. The finished washer.

9. Checking the pitch against the pinwheel teeth.



10. The washer being tried on the shaft.

11. Finished gear, with the washer soldered to the shaft.

12. Testing the mesh of the gears.

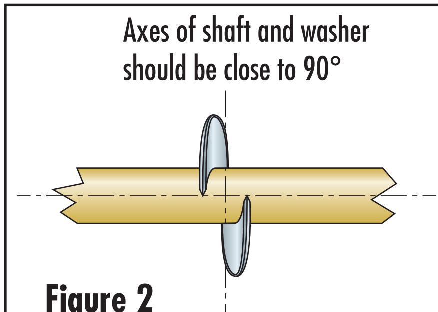


Figure 2
Mounting the washer

hole, you'll need to find a shaft to fit. If this is a problem, telescoping brass tubing can often be used to bring a smaller shaft up to size. A shaft can be turned to an exact fit if you have a metal lathe. However, this is not critical—close will be plenty good enough.

Photo 10 shows my washer being test fitted to its shaft. It's important for smooth operation that the centerline of the washer be close to 90° to the axis of the shaft (**figure 2**). I soldered the washer to the shaft (**photo 11**) with soft solder, using a torch, and that took a matter of seconds. Once that's done, you should be good to go.

Photo 12 shows the finished worm on its shaft, engaging the pinwheel. The two have been mounted in my lathe for demonstration purposes. When I switch on the lathe, powering the worm, the pinwheel revolves sedately. Again, there's some latitude in the placement of the worm in relation to the gear. Experiment to see what works best for your assembly.

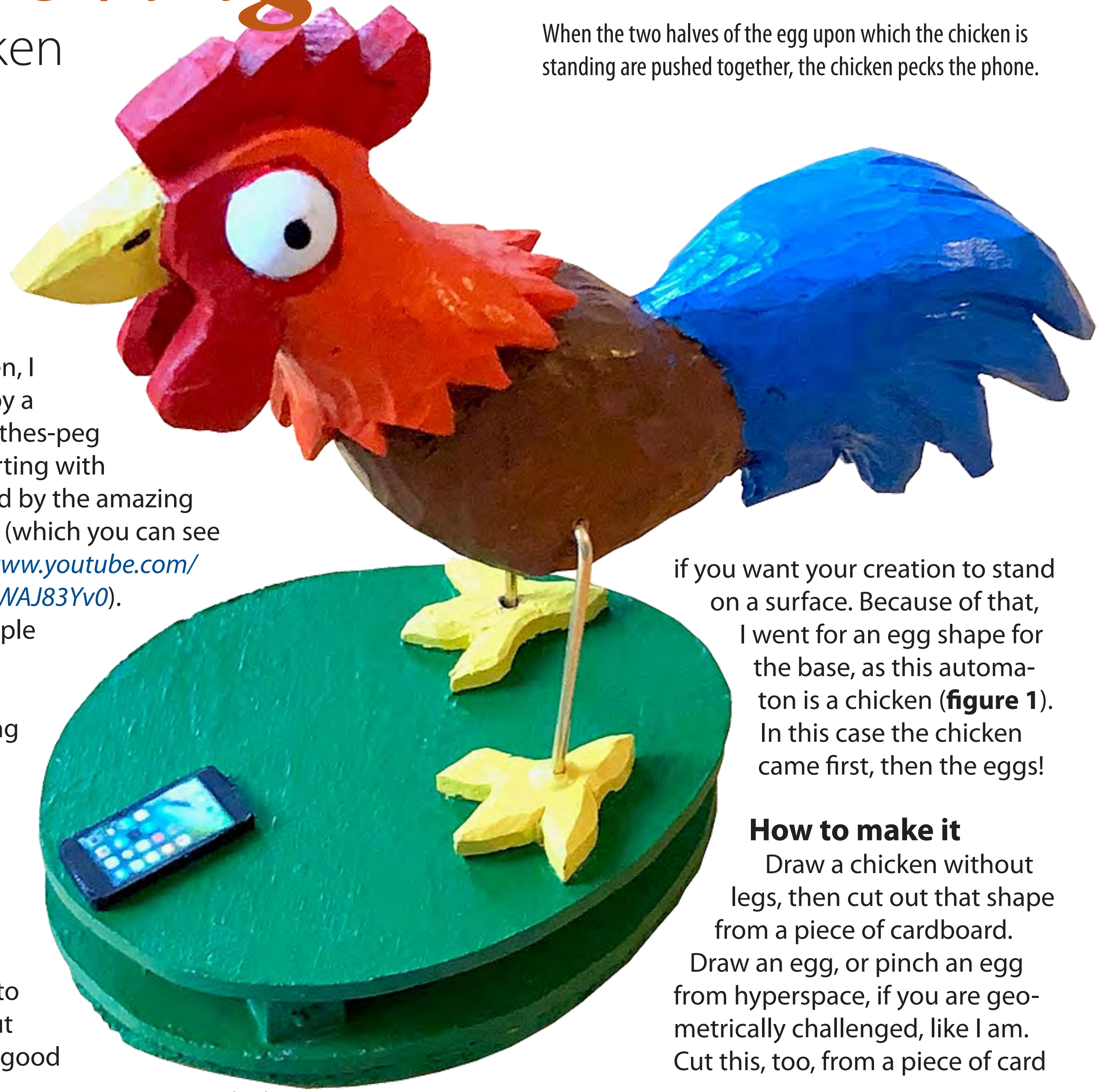
In Part 2, in the next issue, I'll describe a different method of making worm gears. If you give this one a try, I'd love to see some pictures of your project. AM

A brief video of the washer worm gear can be found on our website: *https://automatamagazine.com/videos-downloads/*

Get Moving

One smart chicken

by **Kim Booth** • Berlin, Germany
Photos by the author



When the two halves of the egg upon which the chicken is standing are pushed together, the chicken pecks the phone.

Here's the latest product from Berlin's booming startup scene—a touch-sensitive smart chicken! This is an extremely low-maintenance cockerel that operates on just the environmentally friendly pressure of one finger. No feed or batteries are required and the bird is guaranteed to be free from electromagnetic emissions and all unpleasant odors.

What does this cock-a-doodle do? Eternally patient, it pecks away at its state of the art, miniature smartphone. Dreadful anti-avian discrimination by the phone's developers means that every attempt with his beak is bleak. With feathers but no fingers, this bird of little brain will forever be barred from crowing onto the internet, which is probably no bad thing.

Design

In making this chicken, I was inspired by a number of clothes-peg automata, starting with a beautiful bird by the amazing Martin Lhotak (which you can see here: *https://www.youtube.com/watch?v=mkBWAJ83Yv0*). It's quite a simple mechanism. Squeezing against a spring causes two parts to move relative to one another. Clothes pegs are fine if you want to clip your creation to something, but they're not so good if you want your creation to stand on a surface. Because of that, I went for an egg shape for the base, as this automaton is a chicken (**figure 1**). In this case the chicken came first, then the eggs!

How to make it

Draw a chicken without legs, then cut out that shape from a piece of cardboard. Draw an egg, or pinch an egg from hyperspace, if you are geometrically challenged, like I am. Cut this, too, from a piece of card

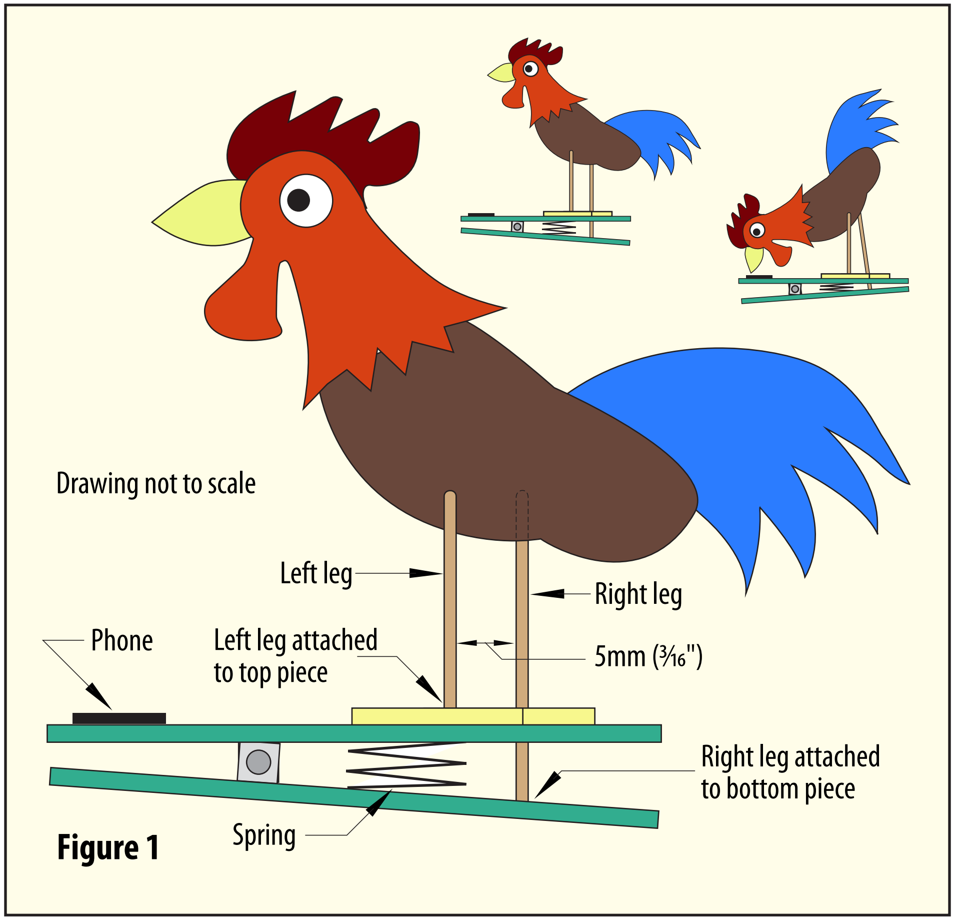


Figure 1

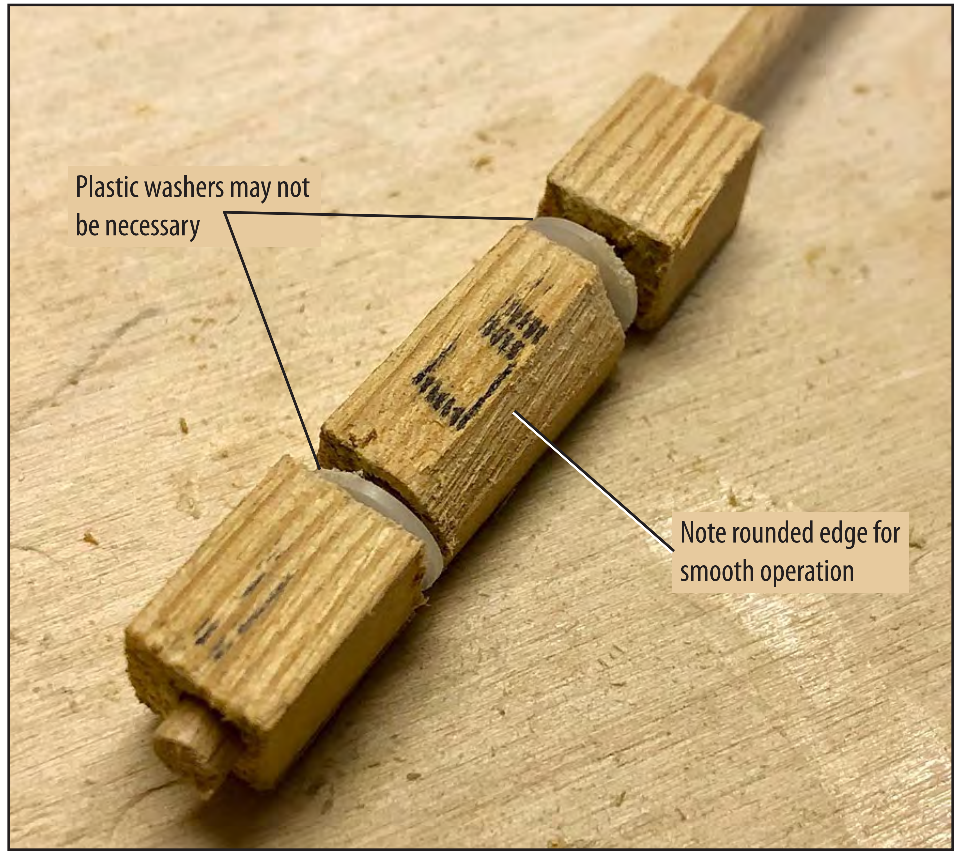
1. Cardboard templates for cutting out the chicken and its plywood base pieces.

2. The body of the chicken has been rough cut on the scrollsaw.

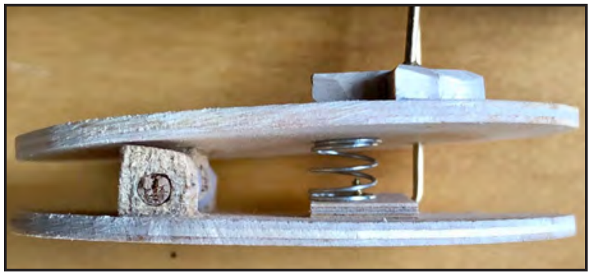
(**photo 1**). These are the templates with which to mark a piece of limewood for the body, and two pieces of thin plywood for the egg-shaped base.

Cut the body out on your scrollsaw (**photo 2**). Then cut the two egg shapes from thin plywood.

Make a wooden hinge to go between the two egg pieces; locate it toward the wide ends of the eggs. Make the hinge from three pieces of roughly 10mm x 10mm (3⁄8" x 3⁄8") strip, with a hole drilled through the middle of each to take a piece of dowel (**photo 3**). Between the pieces, I added a couple of plastic washers, which are probably not necessary, as the rotation of the hinge is minimal and friction is not an important issue. You will, however, have to round the cor-



3. The hinge, made of three pieces of wood, with a dowel as the hinge pin.



Watch this chicken strut its stuff at *https://tinyurl.com/smartchicken*

TOP LEFT: 4. The base, assembled with the hinge between the pieces.
TOP RIGHT: 5. After being carved, the chicken looks like this. Its eyes are small wooden hemispheres, glued to the sides of its head.
ABOVE: 6. A coil spring keeps the base pieces apart.
RIGHT: 7. The finished chicken, mounted to its base.

rect corners of all three pieces to allow enough rotation to get the cockerel pecking properly. **Photo 4** shows the base assembled.

Carve the body to make it look like a cockerel (**photo 5**). I glued small ready-made hemispheres onto the head for the eyes, giving the chicken a nice, popeye look.

Make two feet. Note that the chicken's left foot is a tight fit for its brass leg, while its right foot allows its brass leg to move freely.

The holes in the side of the body where the legs attach are at the same height, but the hole in the right side is about 5mm ($^3/_{16}$") further back from the left. The legs must be free to rotate in their holes. This offset means that, when the right leg is pushed up relative to the left, it makes the body tilt forward, and our cockerel starts pecking away.

Between the two eggs, the right leg is fixed to the bottom egg. A spiral spring between the eggs pushes them apart and keeps the chicken upright (**photo 6**). My spring pushed the eggs a bit too far apart, so I glued in another piece of 10mm x 10mm wood (not shown) in front of the hinge to correct that.

A small piece of plywood serves as the smartphone. As it was too small for me to paint, I printed out a little image of a phone and glued it onto the wood. **Photo 7** shows the chicken, sans phone, ready for paint.

BUILDING BLOCKS

The six simple machines: part 1—Lever, wedge, and wheel and axle

by Paul Giles • Sun City Center, Florida, USA
Drawings by Marc Horovitz

It might be hard to believe that every automaton—indeed, every mechanical device—is actually made of a combination of only six simple machines. Once these basic building blocks are understood, you can better turn the vision of your next project into reality. You can also do it in less time and have a lot more fun creating your first sketches.

These six simple machines are the lever, the wedge, the wheel and axle, the inclined plane (ramp), the screw, and the pulley (**figure 1**). To acknowledge all sides of the discussion, even engineers will sometimes argue about including the screw on this list. Their argument is that a screw is actually the combination of a wheel and axle plus an inclined plane.

The cam that we built in the last "Building Blocks" column was made of several of these simpler machine elements. We began with a circle (the wheel and axle). For that steady rise we added a ramp (inclined plane). Even the springs that were mentioned are simply a flexible ramp that circles up in a helix.

The lever

Of the six machines, the lever is probably the most basic machine. At its simplest, a lever could be

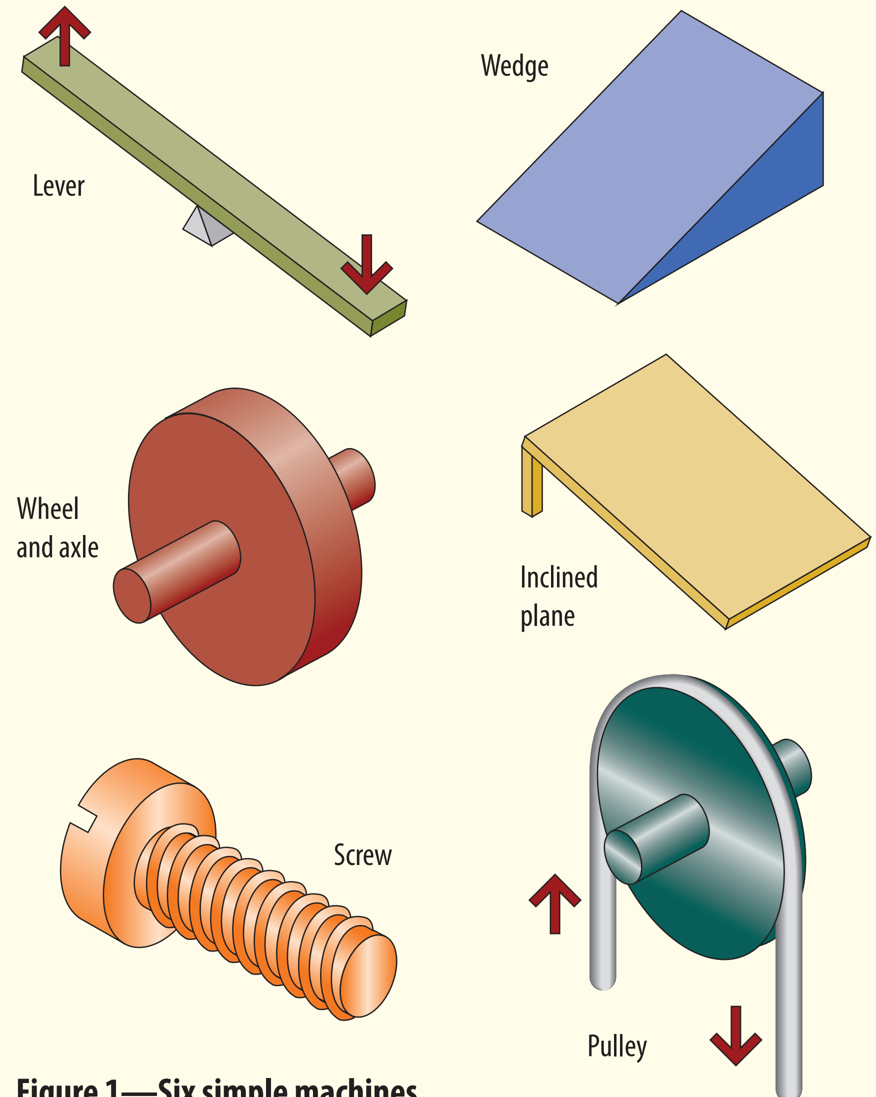


Figure 1—Six simple machines

nothing more than a stiff branch or rod, used to reach under something that we want to move. An example would be placing a bar under a large rock to be relocated.

When you picture how moving that rock would work, you realize that a lever must push against something—in this case the ground—before it can really do anything. A lever is the one tool that always needs help from another basic machine, but don't overlook its usefulness.

In our automata, levers can fill a variety of roles. Sometimes they appear on top of the model, perhaps to move an arm. Other levers might be hidden beneath, as part of the works that create motion. Levers can also be used to selectively start or stop a motion or sequence. An example would be a lever that pushes a driving gear into a second gear that may rotate a shaft (**figure 2**).

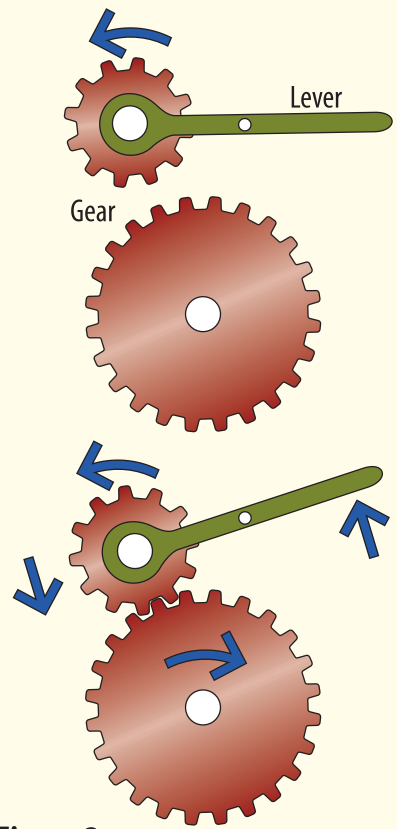


Figure 2
Lever engaging gear

The wedge

When I mentioned the lever pushing against the ground, I was actually describing a wedge. The ground just doesn't look like one. When used with a lever, the wedge simply gives the lever something to push against, enabling the lever to lift or move objects (**figure 3**).

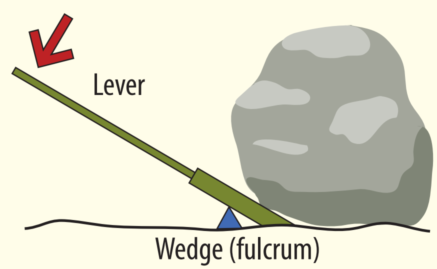


Figure 3
Using a lever to move a heavy object

A wedge can also block or stop movement. It's commonly used to hold a door open or prevent a cart from rolling. Wedges can be used to force open a crack, as when splitting firewood.

In our automata, we are most likely to combine a wedge with a lever, creating a fulcrum. In our projects, a fulcrum will likely be used to lift an object. If you think of children on a seesaw, you can visualize a fulcrum in action.

If the lever on the fulcrum is supported from above by a wire or rope, you can create a set of balancing scales. This combination is still considered to be the two simple machines of lever and fulcrum (**figure 4**). You might consider using this balanced-scale concept to support birds, angels, or even stars that might circle around some central figure.

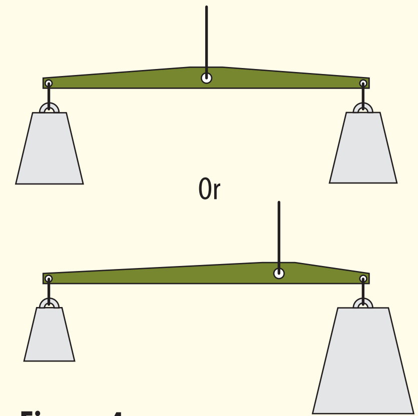


Figure 4
Lever supported from above

The wheel and axle

A wheel and axle is like a lever, in that neither is much good on its own. A wheel by itself will simply run away, while the lazy axle will just lie around all day. But when you bring them together, you have a match made in heaven.

A common example of the wheel and axle in action is the tire and axle on our automobiles or bicycles. Generally, a wheel-and-axle combination is used to move a load from here to there. If we combine a wheel and axle with a lever (actually two of them), we have created a wheelbarrow (**figure 5**).

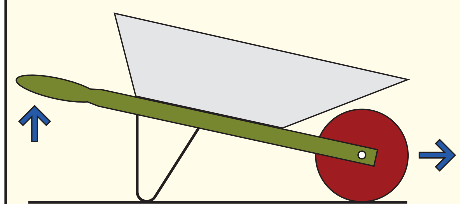


Figure 5
Lever and wheel combined to make a wheelbarrow

Getting back to automata,

remember that the axle does not have to be in the center of the wheel. We talked about that in an earlier "Building Blocks" featuring cams. Combining an offset axle with a wheelbarrow, we can envision a country bumpkin carrying home a load of fresh-cut flowers to his best girl, as his wheelbarrow seems to hit every bump in the road.

With just three of the six simple machines, we can make a fairly sophisticated device. Let's start with an inverted wheel and axle (**figure 6**).

Next, add a lever, connected to the wheel with a pin (**figure 7**). As the inverted wheel spins, you can imagine the lever moving back and forth.

The wheelbarrow can be attached to the other end of that lever (**figure 8**). Now there is something to push! The lowly wedge will create the "wow" that we want in our creations. Place the flat of the wedge in a position about half the length of our lever away from the wheelbarrow. Can you see the motion in your mind? As the inverted wheel spins, it moves the lever forward, which pushes the wheelbarrow forward until it hits the stop (the wedge). But we're not finished yet. The lever on the inverted wheel still has more forward travel. Because the barrow's wheel is blocked by the wedge, the lever will begin to lift the handles and dump the contents (**figure 9**).

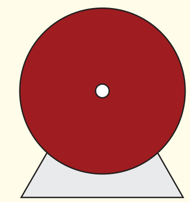


Figure 6—Inverted wheel

In this column, we're defining an inverted wheel as one that is supported from below, revolving in one place, and not rolling on the ground.

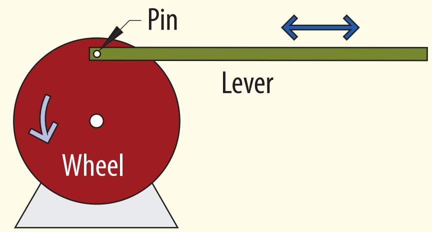


Figure 7
Wheel and lever

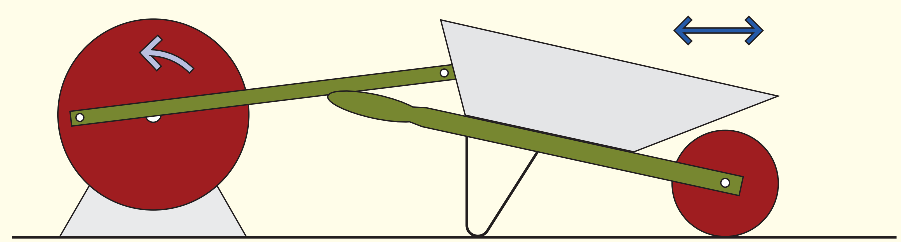


Figure 8—Lever connected to wheelbarrow

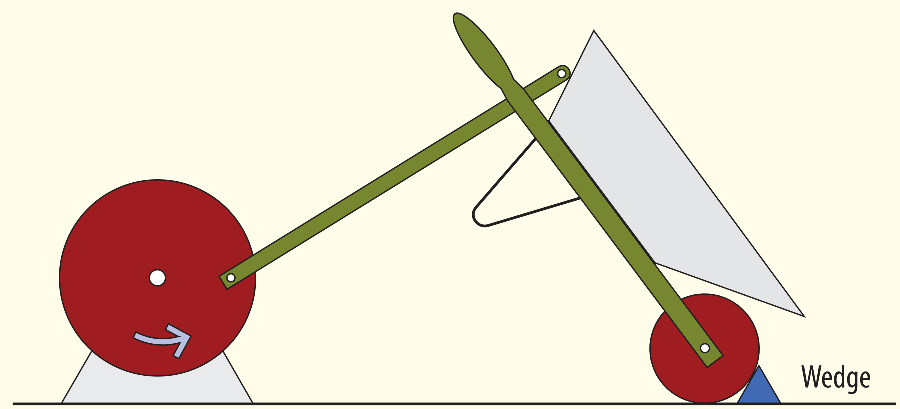


Figure 9—Wedge tips wheelbarrow

A fun character could push the wheelbarrow by simply attaching its hands to the handles. If its arms are pivoted, it will look like it's actually dumping the load.

Think about building a load into your imaginary model. Work on that mental exercise until the next "Building Blocks" column. You'll need a load to move, as well as a way of getting it back to the starting point—maybe a hopper. Finally, use some levers or cams to dump a new load into the wheelbarrow when it returns to the starting point.

In the next issue of *AM* we'll examine the other three simple machines: the inclined plane, the screw, and the pulley. We'll look at how they can be used in automata design. AM

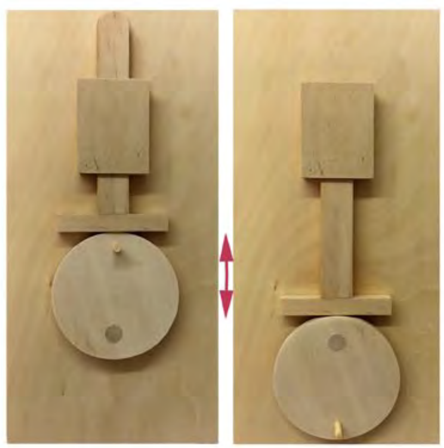
AUTOMATA FOR BEGINNERS

Captured cams and cranks

by Sarah Reast • Llanbrynmair, Wales, UK • Photos by the author

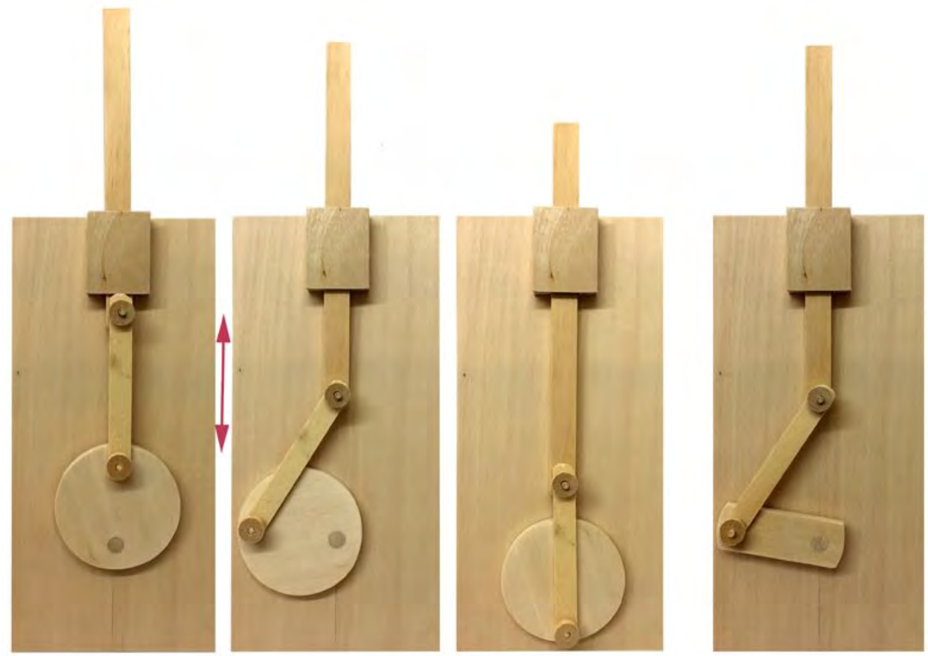
Perhaps the simplest definition of a cam is something that goes round and round and up and down. Captured cams and cranks do the same but become more useful when the demands are greater and more complex. In its simplest form, a cam can be a circular piece—with an off-center hole—that pushes a loosely guided follower up and down (**photo 1a**). In **photo 1b**, the cam has been turned into a crank, giving it a better range of motion. The captured cam takes that basic principle a stage further, as shown in **photo 2**. A captured cam may not be able to push or pull as far as a crank, but it can have more flexibility in its range of movements by using different shapes.

Making a frame around a cam is useful because it allows you to



The cam will push the follower up by the distance shown. The follower can only drop because of gravity.

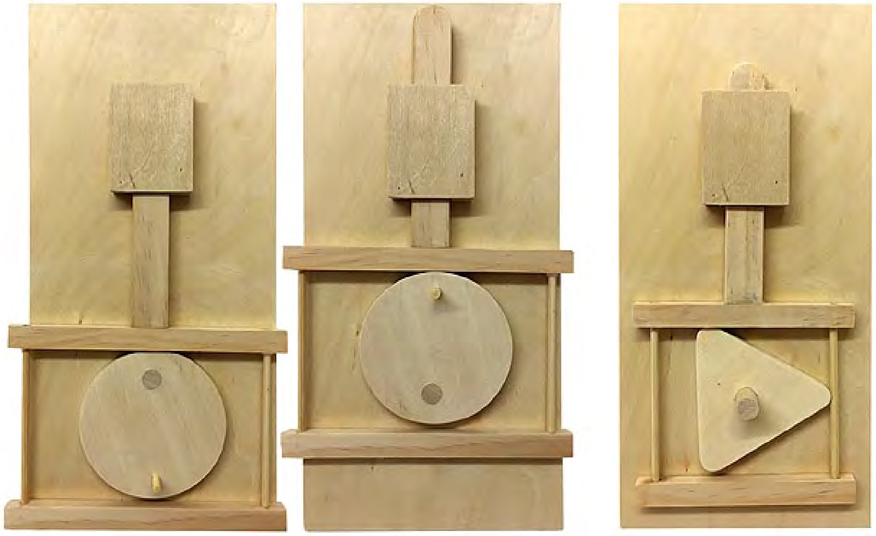
1a. Simple cam



This cam has been turned into a crank. It can use the whole diameter of the shape to push the follower a greater distance.

Here, the crank has been trimmed for greater economy of material, so it no longer resembles the original cam.

1b. Evolution of a crank

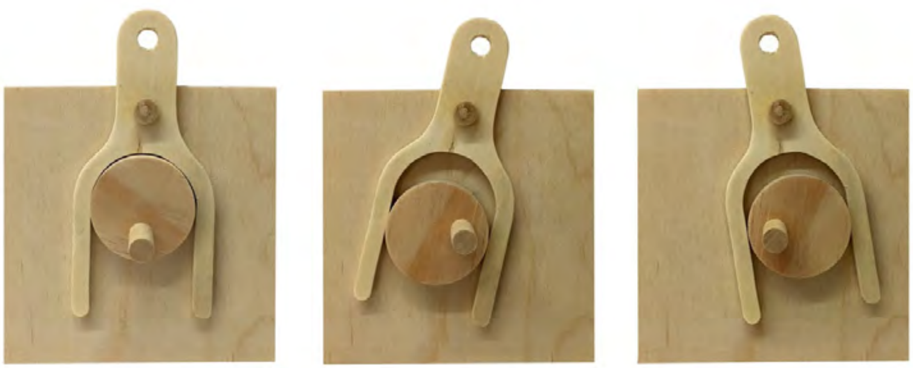


By capturing the cam in a frame or cage, it is forced both up and down and does not rely on gravity.

Here, a triangle will cause a rapid, jerky movement, whereas a round cam would cause a slow, smooth movement.

2. Evolution of a captured cam

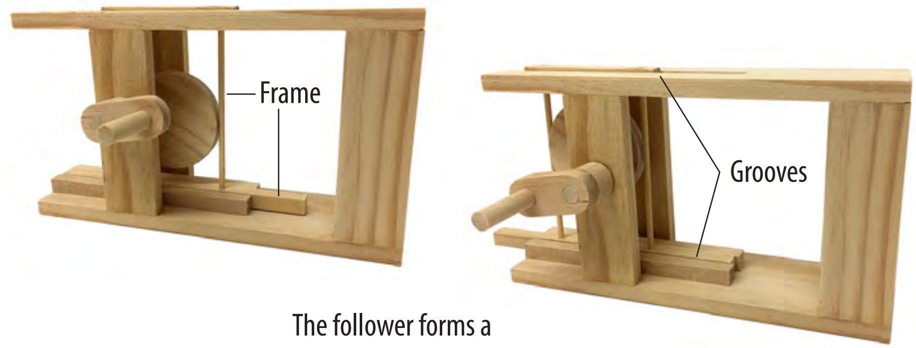
With a rigid follower on both sides of the cam, the frame is forced to rock as the cam rotates.



3. Rocking cam

4a. Single crank

This crank could be used in any position, as its follower is constrained by its frame.



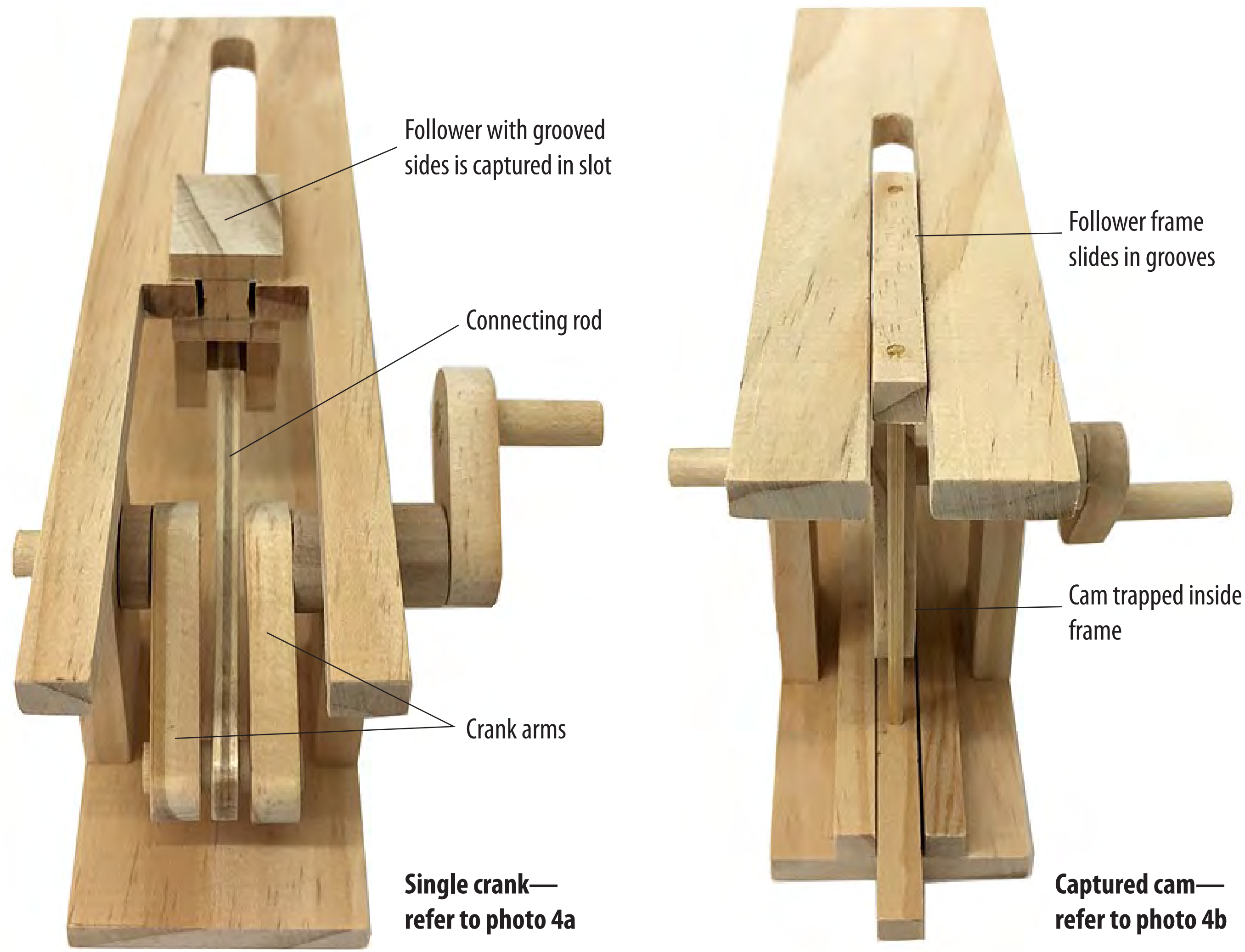
4b. Captured cam

The follower forms a frame around the cam and must follow the cam's movement, no matter the orientation. The follower is also constrained by the grooves in which it rides.

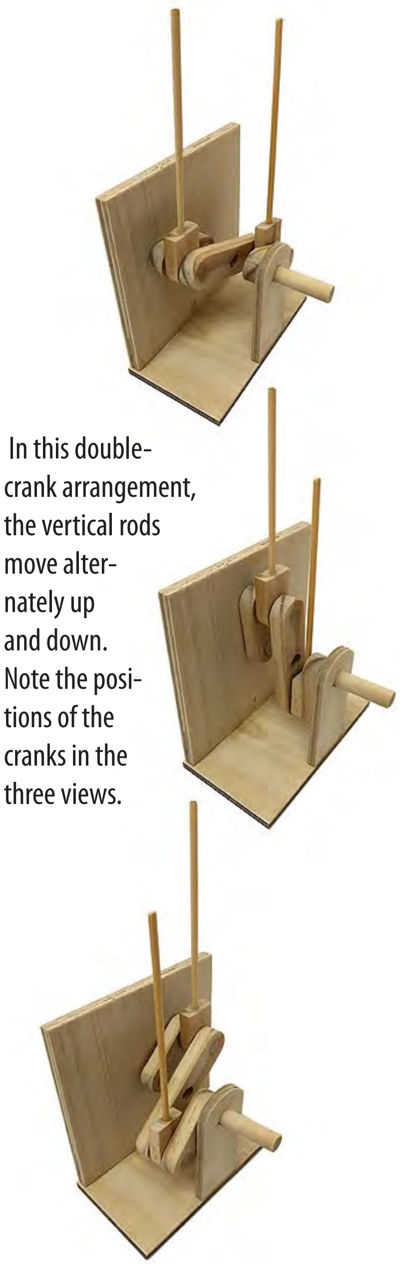
adjust tightness, but there are other things it can do. **Photo 3** shows a frame cut from a single piece of 6mm (¼") ply. It is pivoted onto the backboard so that the cam makes the frame rock from side to side.

One of the great advantages of captured cams and cranks is that they do not rely on gravity, so they can push and pull in any direction. **Photo 4** illustrates two sideways-motion examples.

When using captured cams and cranks, it's important to guide the followers positively (in all directions), as gravity cannot be relied on to neatly drop a component



5. Guides



In this double-crank arrangement, the vertical rods move alternately up and down. Note the positions of the cranks in the three views.

6. Double crank

where you want it. Two examples of guides are shown in **photo 5**. The crank-driven follower (left) is constrained by a grooved component sliding backwards and forwards in a slot, while the captured-cam frame (right) is simply sliding in grooves, top and bottom.

Like all mechanisms, cranks and captured cams can be arranged in multiples for additional function. The arrangement in **photo 6**, with

7a. Accordion player

7b. Dragon

two cranks, pushes parallel rods up and down in turn.

Photo 7 shows some examples of a captured cam and a crank in two of our Timberkits models.

Once you have grasped the basic principle, there are many variations and forms you can try. Just remember that making your components neat and accurate becomes more important now, and using solid materials gives you the best results. A1.

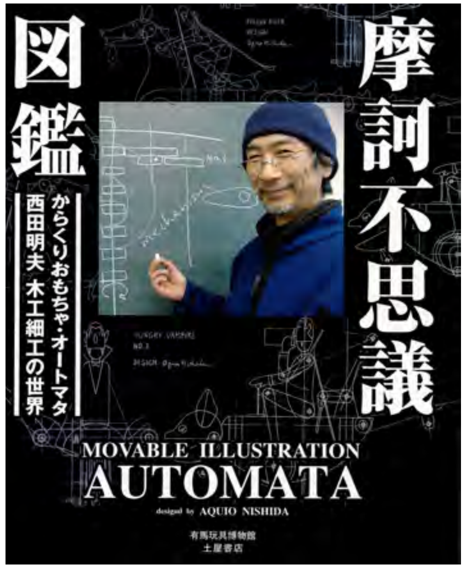
Contacting Sarah

If you have questions or comments for Sarah Reast, you can write to her in care of *Automata Magazine*: *automatamag@comcast.net* Just put "Message for Sarah" in the subject line.

Sarah is the designer and director of Timberkits Ltd., which creates wooden mechanical models sold in kit form. To learn more, visit *https://www.timberkits.com/*

REVIEWS

BOOK
Automata : Movable Illustration
by Aquio Nishida
Arima Toys & Automata Museum, Japan, 2009 (out of print)
8 1/4 x 10 1/2" (21 x 26.7cm)
136 pages, softbound
ISBN: 978-4-8069-1228-6



Aquio Nishida (1946-2009) was one of the greats of contemporary automata. A Japanese native, he was the founder of the Contemporary Automata Museum, in Japan, as well as being a prolific artist and teacher.

Nishida's book, *Automata: Movable Illustration*, is an unusual volume, being presented in both Japanese and English. It is a gallery of the author's work, a discussion of process, a minor treatise on mechanical movements, and an extensive and comprehensive project book, detailing how to replicate several of Nishida's designs.

The first quarter or so of the book is printed on glossy, coated stock. This is the gallery section, showing a wide selection of the author's work. Pieces vary from the elegantly simple to the amazingly complex. Each is accompanied by a paragraph describing the work. All of the photos are beautifully rendered in color.

Nishida's automata reflect his ingenuity, superb craftsmanship, and humor. Virtually all represent humans, animals, or humanized animals doing a variety of different things.

The remainder of the book is printed in black-and-white on heavy, uncoated stock. The first section in this part of the book contains practical and philosophical information about paint, design, mechanics, measuring, tools, and materials. None of these sections are extensive, and many appear to be there just to get the reader thinking about things in a different way, perhaps.

This section of the book is illustrated with the author's hand-drawn sketches. Sadly, there is no explanatory information concerning these, but a lot of information can be gleaned just by studying the drawings.

This is followed by a few pages discussing the making of specific parts—a disc, a washer, a crank, a gear, and various other pieces. Unfortunately, this section is only in Japanese. However, each part is illustrated by a series of photographs that are not too difficult to follow. Some of the part names are a little cryptic, though. One, for instance, is called a nasubi. I looked it up—it means eggplant!

In the next chapter, Nishida addresses a variety of topics in more practical terms: inspiration, design, and the making of automata.

Mechanisms come next. In this part, eight different basic mechanisms are briefly discussed. Each is accompanied by a single illustration—a photograph of a beautifully made wooden model of the mechanism described. It's up to the reader to figure out exactly how each one works, though.

The remainder of the book, about half, is devoted to creating replicas of the author's designs. Each begins with a brief paragraph, describing the action and sometimes making suggestions about color usage.

Full-size patterns for all of the parts are included, as well as beautiful exploded drawings that depict exactly how the piece is to be assembled. There are 15 projects in all, some relatively simple, some fairly complex. It would be quite feasible for a beginner to start on the simple automata and progress to the complicated ones, learning along the way. A couple of pages (again, only in Japanese) describe how to incorporate a music box into the piece.

The book wraps up with a purported history of automata but is actually more about the history of time keeping. It's interesting, nevertheless.

This is an excellent book. Not only is it stuffed with hard information (some of it not obvious on the first reading), but it also provides a fascinating insight into the mind of a master—someone who has given a great deal of thought to his art and craft. Aquio Nishida comes alive in the pages of this charming, entertaining, and enlightening volume.
—M. Horovitz

The End