

# Like Clockwork

Automata Through the Ages

# Automata

**Accounts of automaton in China date from as early as the 3rd century bce, during the Han dynasty, when a mechanical orchestra was made for the emperor.** By the Sui dynasty, in the 6th and 7th centuries ce, automaton had become widespread, and a book titled Shuishi tujing (“Book of Hydraulic Elegancies”) was published.

- <https://www.youtube.com/watch?v=C7oSFNKIlaM>
- <https://www.youtube.com/watch?v=uzM32wVTbsY>
- <https://themadmuseum.co.uk/history-of-automata/>
- <https://www.history.com/news/7-early-robots-and-automatons>

# Ancient Greece

The Ancient Greeks were well-acquainted with sophisticated metal gearing mechanisms, such as [the analog computer](#) they used to predict the future paths of the sun, the moon, and the planets.

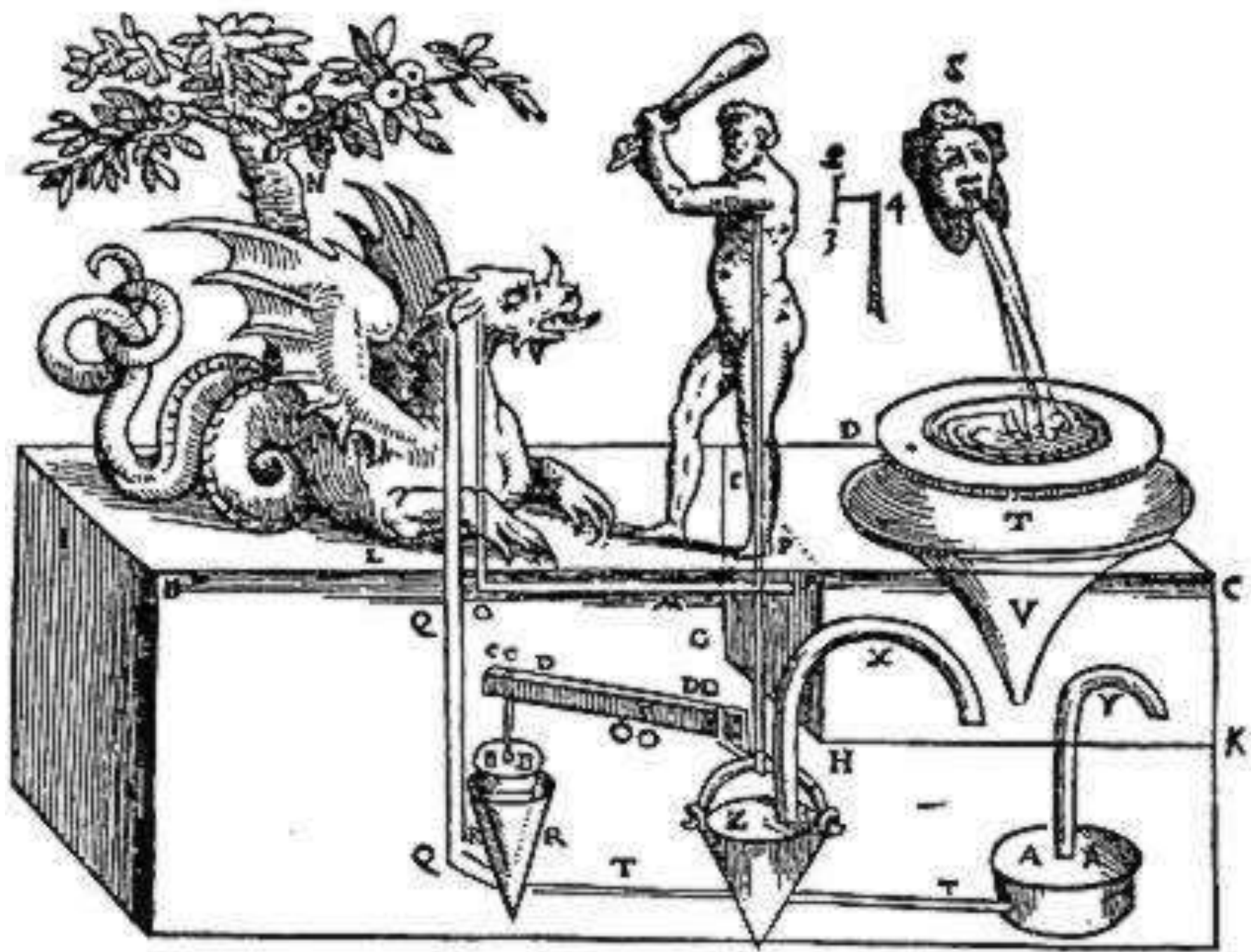
Their engineering skills with gears and valves enabled them to produce a surprising variety of machines.

Most of the inventions below were described by Hero of Alexandria, who lived in the first century AD. However, there is evidence that the Ancient Greeks were actually producing some of the machines Hero described in the third and second centuries BC. Hero described machines in two works – the *Pneumatica* and the *Automata*.

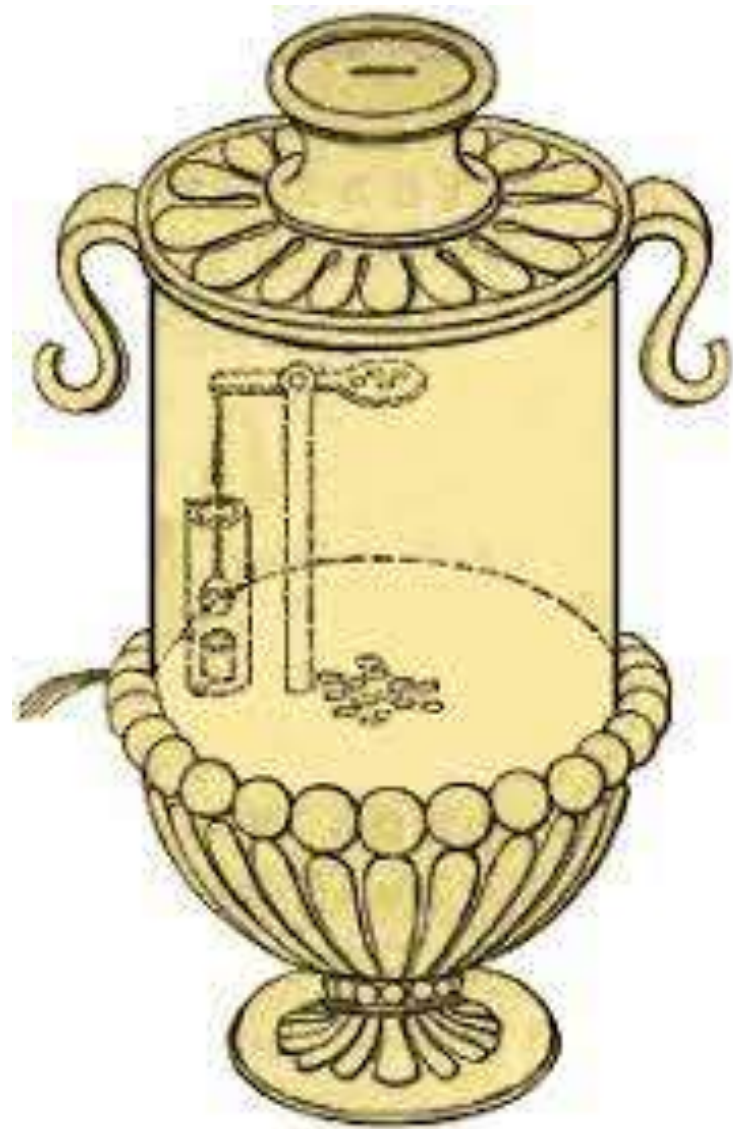
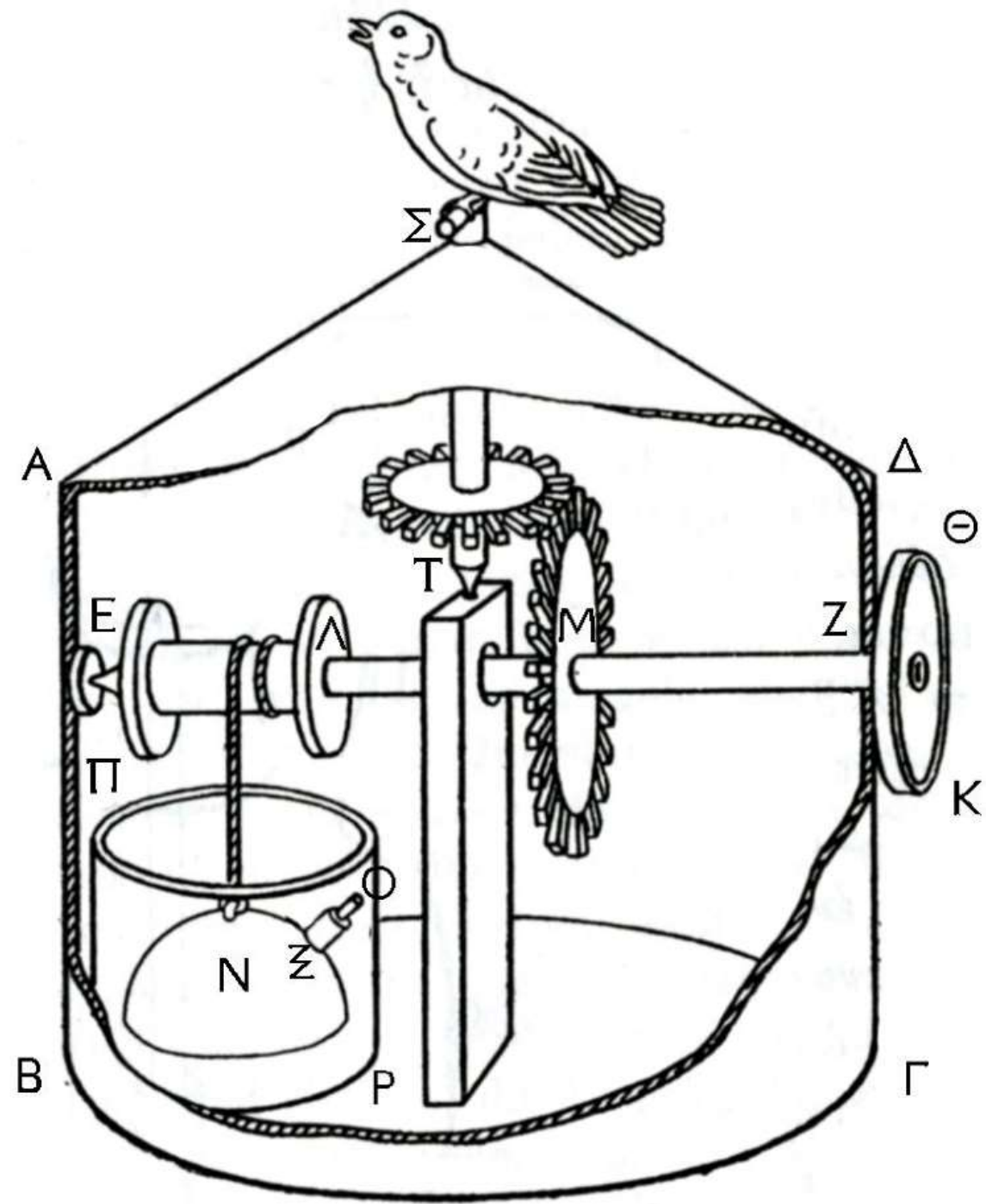
- <https://www.youtube.com/watch?v=0QGkf13fVs4>

# ANCIENT AUTOMATA









# Ismail Al-Jaziri

Al-Jazari **built automated moving peacocks driven by hydropower**. He also created automatic doors as part of one of his elaborate water clocks, and invented water wheels with cams on their axle used to operate automata.

Al-Jazari was born in the area of [Upper Mesopotamia](#) in 1136. Sources state his exact location is unknown, but they speculate he could have been born in [Jazirat ibn Umar](#), where he got the name Jazari from or Al-Jazira which was used to denote Upper Mesopotamia. The only biographical information known about him is contained in his *Book of Knowledge of Ingenious Mechanical Devices*.<sup>[7]</sup> Like his father before him, he served as chief engineer at the [Artuklu Palace](#), the residence of the [Mardin](#) branch of the [Artuqids](#) which ruled across [Upper Mesopotamia](#) as [vassals](#) of the [Zengid dynasty](#) of [Mosul](#) and later of [Ayyubid](#) general [Saladin](#).<sup>[8]</sup> Little is known about his ethnic background, so he has been variously described as [Arab](#),<sup>[9][10]:21 [11][12]</sup> [Kurdish](#)<sup>[13]</sup> or [Persia](#).

<https://www.youtube.com/watch?v=qz7soHvy-Pw>

<https://www.youtube.com/watch?v=qlLg6PmCo-Q>

<https://www.youtube.com/watch?v=ryYgUvrDcPM&t=4s>

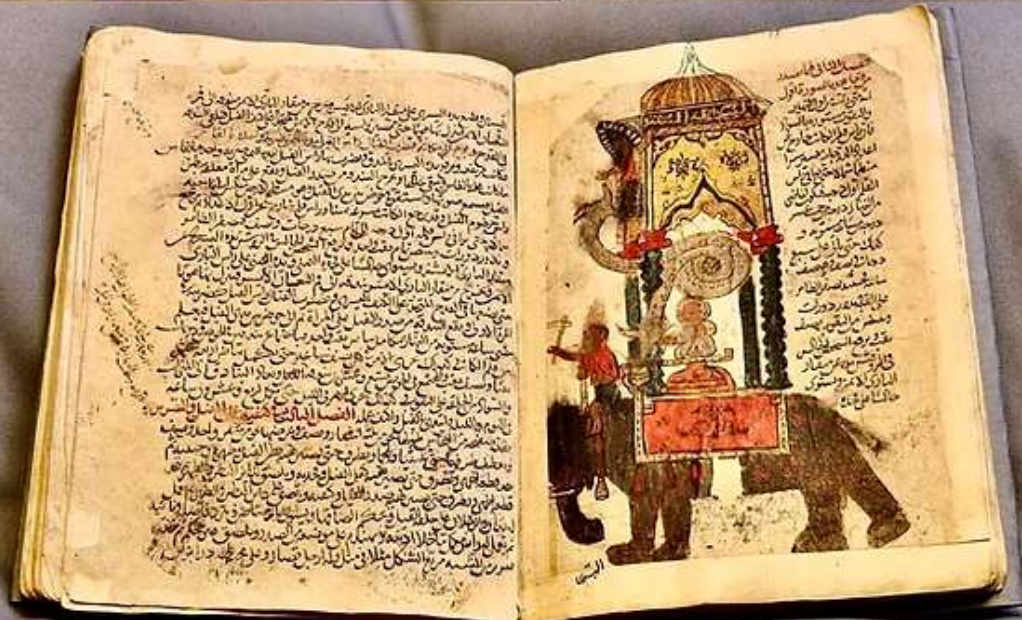
<https://www.youtube.com/watch?v=MCW wp0dgF4>

<https://www.youtube.com/watch?v=9q9G0S8fADQ&t=25s>





٢٥٦  
 وليبقى راس المجداف ايضا بارض الزورق وليكن طرف ذيل القميص انزل من حافة الزورق  
 شي يسيرا واذا الخرز ذلك تنقب ارض الزورق وتخذ على القميص خروزة من جرز  
 تنقب ارضه ويوضع الزورق على سطح الماء وتعتبر بطر حمار معج او باله ارتفاع ويضع  
 في تنقب الخروزة حتى يدخل فيها الماء ثم ترفع ساعده ما يري الزورق حتى يعبر وامش  
 صورة الزورق





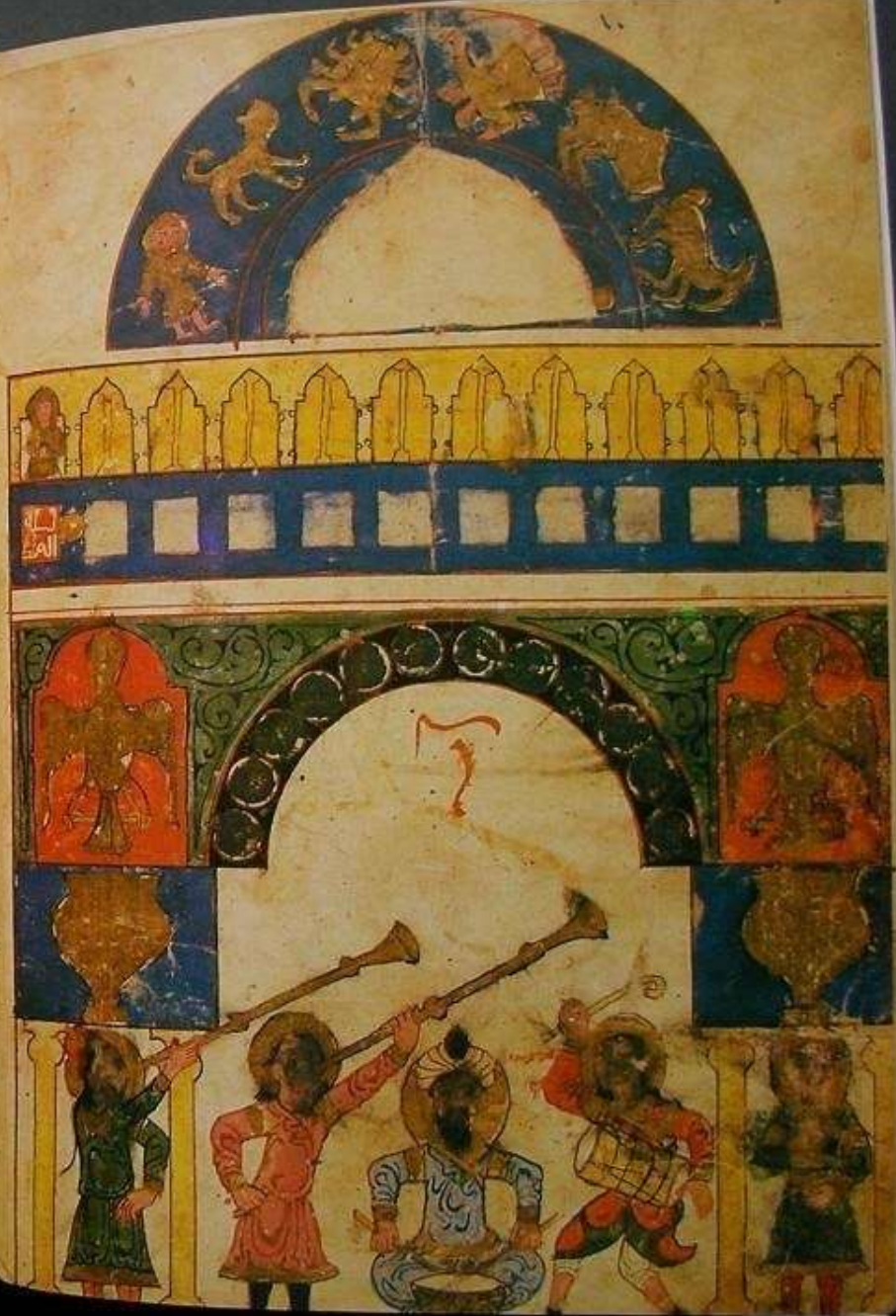




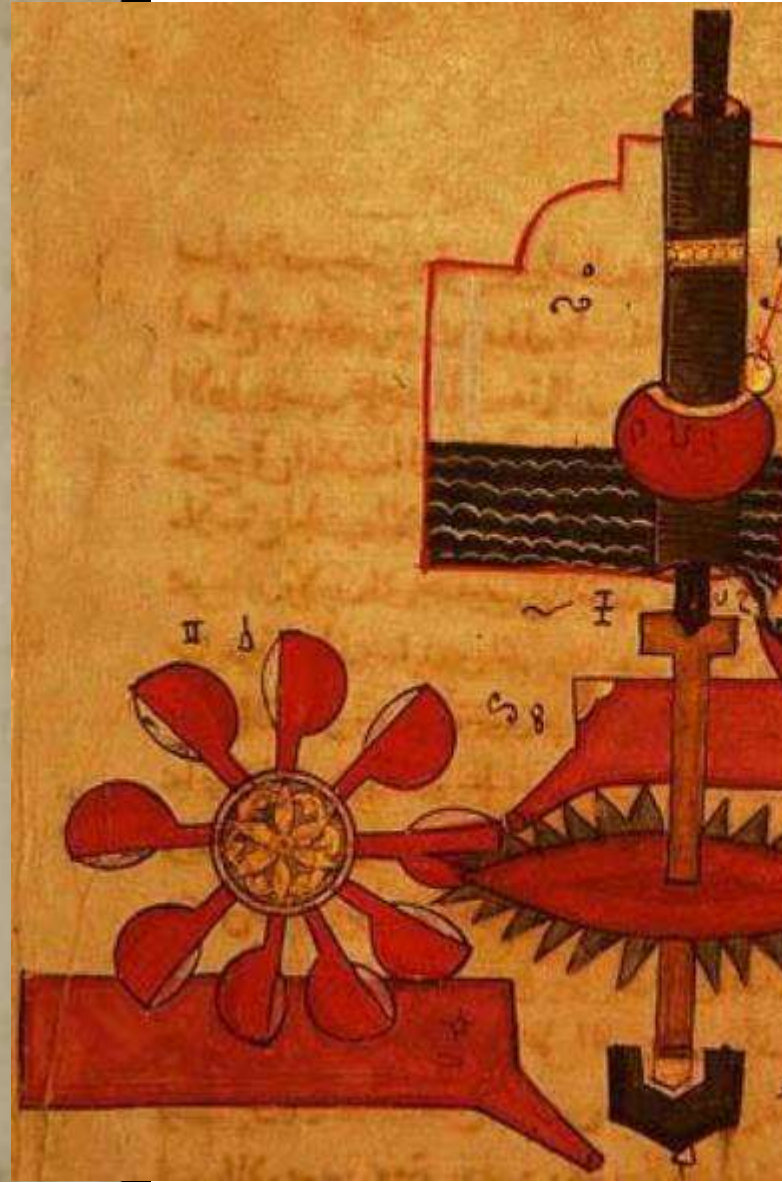
## الفصل الثاني في كيفية صورة خزانة الكعبة

يتم خزانة من الحاس مستطيلة الارتفاع نحو من ستة اشبار وسعتها نحو من شبر وثلاث  
شبر وثلاث مئيت ما خرج ذلك الماحيعة في ثقب واحد من اسفلها الى مضلة بها من مائة  
ساعات طولها نحو العرض المجدله وافرض ان في الاقليل ربع وساعات طولها نحو  
ساعات وافضلها من الما في في النهار ساعة مستوية ١٠ اكلها لما الذي  
يخرج في ساعة مستوية اخر النهار ١٠ اكلها ثقب واحد واذا اعيد لما الى الخزانة من  
اقصاة في ليلة ذلك اليوم وساعاتها في كل كان مقدار ما خرج من الما في مدة ساعة مستوية  
في اول الليل فقد لما الذي خرج في ساعة مستوية في اخر الليل في كفية عمل الخزانة وما  
لحاج اليد من الات لما وابتدي بعمل الحايه وهي الخزانة وعمل الطفاقة وعمل الفتور  
المنقل الحايه وعمل الربع وعمل العمامة بخذ الحايه اربع قطع من الحاس المضروب  
وتطرق حتى يغور كل واحد كالقدر وكيل الغلات قايمه الحب راسها اسفلها  
سعه واحد ونحوها نحو من شبر ونصف وربع وسعتها نحو من شبر وربع وهذه صورة لها  
وستنقى صانعها في تصحيحها بان سدها قوام من خشب صحيح الاستدارة ونحوها  
فقدرا بالنظر بين والنشويده ثم

لخط عليا بها من اخلها اربعة خطوط  
مقابله كل خط من زاوية الى  
اعلاها مستقيمة وقسم كل خط  
منها نحو من ١٠ اقلها متساوية في نصيب









# The Monk

Though its origins are shrouded in mystery, one legend proposes that this marvel was made after a relic of the Franciscan brother Diego de Alcalá miraculously cured the young Spanish prince Don Carlos. The prince's father, Philip II, vowed “a miracle for a miracle” and commissioned this automaton representing the monk, who was canonized as a saint (San Diego, namesake of the California city). The king's comparison of clockwork to a miracle references the contest between human clockmakers and the divine, a popular concept in the Renaissance. Sensitively carved and painted in human likeness, the monk figure walks slowly and steadily. He beats his chest in penitence and regularly lifts his left hand toward his lips. As shown in this video, the figure once wore the robes of a Franciscan friar and probably kissed a miniature cross on a rosary (now lost).

- <https://www.youtube.com/watch?v=jiVKnIXcDDg>

# Pierre Jaquet-Droz

Pierre Jaquet-Droz was a watchmaker of the late eighteenth century. He was born on 28 July 1721 in La Chaux-de-Fonds, in the Principality of Neuchâtel, which was then part of the Kingdom of Prussia.

The Writer was built in the 1770s using 6,000 moving parts by Pierre Jaquet-Droz, his son Henri-Louis, and Jean-Frédéric Leschot

Designed in the late 1770s this incredible little robot called simply *The Writer*, was designed and built by Swiss-born watchmaker [Pierre Jaquet-Droz](#) with help from his son Henri-Louis, and Jean-Frédéric Leschot. Jaquet-Droz was one of the greatest automata designers to ever live and *The Writer* is considered his *pièce de résistance*. On the outside the device is deceptively simple. A small, barefoot boy perched at a wooden desk holding a quill, easily mistaken for a toy doll. But crammed inside is an engineering marvel: 6,000 custom made components work in concert to create a fully self-contained **programmable** writing machine that some consider to be the oldest example of a computer.

- <https://www.thisiscolossal.com/2013/11/the-writer-automata/>
- <https://www.youtube.com/watch?v=WofWNcMHcl0&t=3s>
- <https://www.youtube.com/watch?v=ux2KW20nqHU&t=12s>





# David Roentgen

David Roentgen, was a famous German cabinetmaker of the eighteenth century, famed throughout Europe for his marquetry and his secret drawers and poes and mechanical fittings. His work embraces the late Rococo and the Neoclassical styles

David Roentgen (1743--1807) took his royal patron by surprise when he delivered this beautiful automaton to King Louis XVI for his queen, Marie Antoinette, in 1784. The cabinetry for this piece is very much a neoclassical masterwork, and the mechanism behind it is truly extraordinary: the figure strikes the strings in perfect rhythm with two small metal hammers held in her hands, which move with great precision.

- <https://www.youtube.com/watch?v=nITEU4fsqCU>



# The Silver Swan

The Silver Swan is an automaton dating from the 18th century and now housed in the Bowes Museum, Barnard Castle, Teesdale, County Durham, England. It was acquired by John Bowes, the museum's founder, from a Parisian jeweler in 1872.

The [swan](#), which is life-sized, is a [clockwork](#)-driven device that includes a [music box](#). The swan sits in a "[stream](#)" made of glass rods and surrounded by silver leaves. Small silver fish can be seen "swimming" in the stream

When the clockwork is wound, the music box plays and the glass rods rotate giving the illusion of flowing water. The swan turns its head from side to side and also [preens](#) itself. After a few moments the swan notices the swimming fish and bends down to catch and eat one. The swan's head then returns to the upright position and the performance, which lasts about 32 seconds, is over. To help preserve the mechanism, the swan was only operated once each day, at 2pm. The museum was closed during 2020 and 2021 so the daily display did not take place; when the exhibit was being prepared for reopening in May 2021 the clockwork mechanism was found to have seized up and it was withdrawn from display for further conservation.<sup>[2][3]</sup>

The mechanism was designed and built by the [Low Countries](#) inventor [John Joseph Merlin](#) (1735–1803) in conjunction with the London inventor [James Cox](#) (1723–1800) in 1773.<sup>1</sup>

- <https://www.youtube.com/watch?v=ECuS6HDa-9Y>
- <https://www.thisiscolossal.com/2013/11/the-writer-automata/>



# Floutiste—by Alexandre Theroud

The Morris Museum, in Morristown, NJ, is proud to present "Guinness Collection Highlights", a newly created series of video shorts, to share some of the amazing mechanical or "Living Dolls" of the Murtoth D. Guinness Collection of Automatic Musical Instruments & Automata. The collection consists of over 750 objects, 150 of which are exquisitely displayed to the public in an immersive, educational & interactive gallery space, featuring live demonstrations at 2pm each day. For directions (only 1 hr. from New York City), hours of operation, wide range of exhibits & available programming, please visit our website: <https://www.morrismuseum.org>

- <https://www.youtube.com/watch?v=1TxrjpWGRXU>

















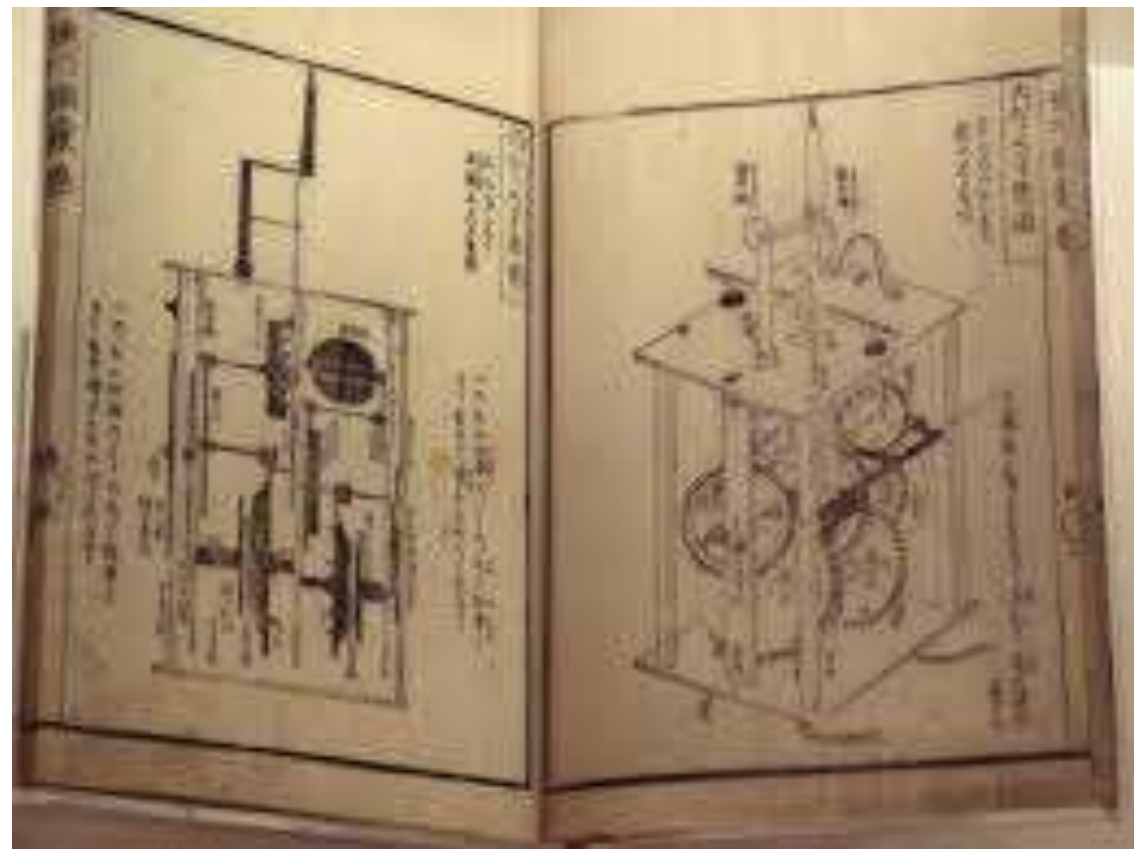
# Karakuri Automata

The "Karakuri" automata is the traditional handcraft of Edo period(1603-1868). Their movements are caused by the power of springs. Japan boasts to the world the ultimate reproduction of "Karakuri" automata. The "Karakuri" automata that bend arrow has been achieved by Hisasige Tanaka, the first president of Toshiba.

<https://www.youtube.com/watch?v=7L6eOu4OvZI>

<https://www.youtube.com/watch?v=mSJ7vKhyJpY>

<https://www.youtube.com/watch?v=i5zYK9FxORI>





超絶技巧が生んだ  
「江戸のロボット」、  
現代に蘇ります。

弓曳屋子 (1998年)



弓曳小早舟 (2009年)





Chahakobi Ningyo (Tea Serving Doll)



# Mechanical Salesman

A rare 1920s automaton built by the Character Display Company in Chicago Illinois. Stored away and forgotten for about 60 years, this Mechanical Salesman is in amazing condition, still works like new and has his original shipping/storage case. Written & Narrated by Kurt Reichenbach

- <https://www.youtube.com/watch?v=XqrFtW5KpUg>





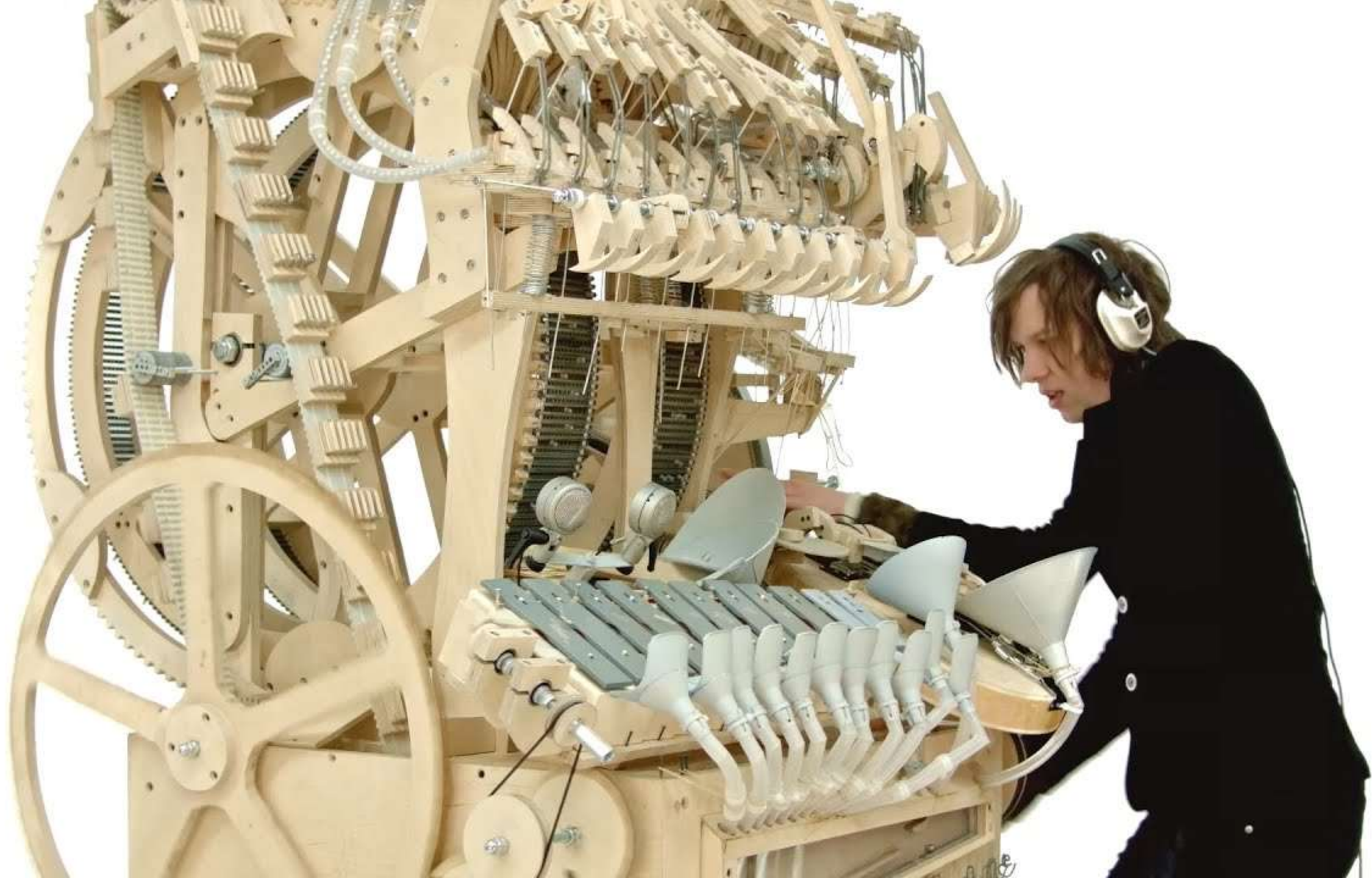
# Wintergatan - Marble Machine (music instrument using 2000 marbles)

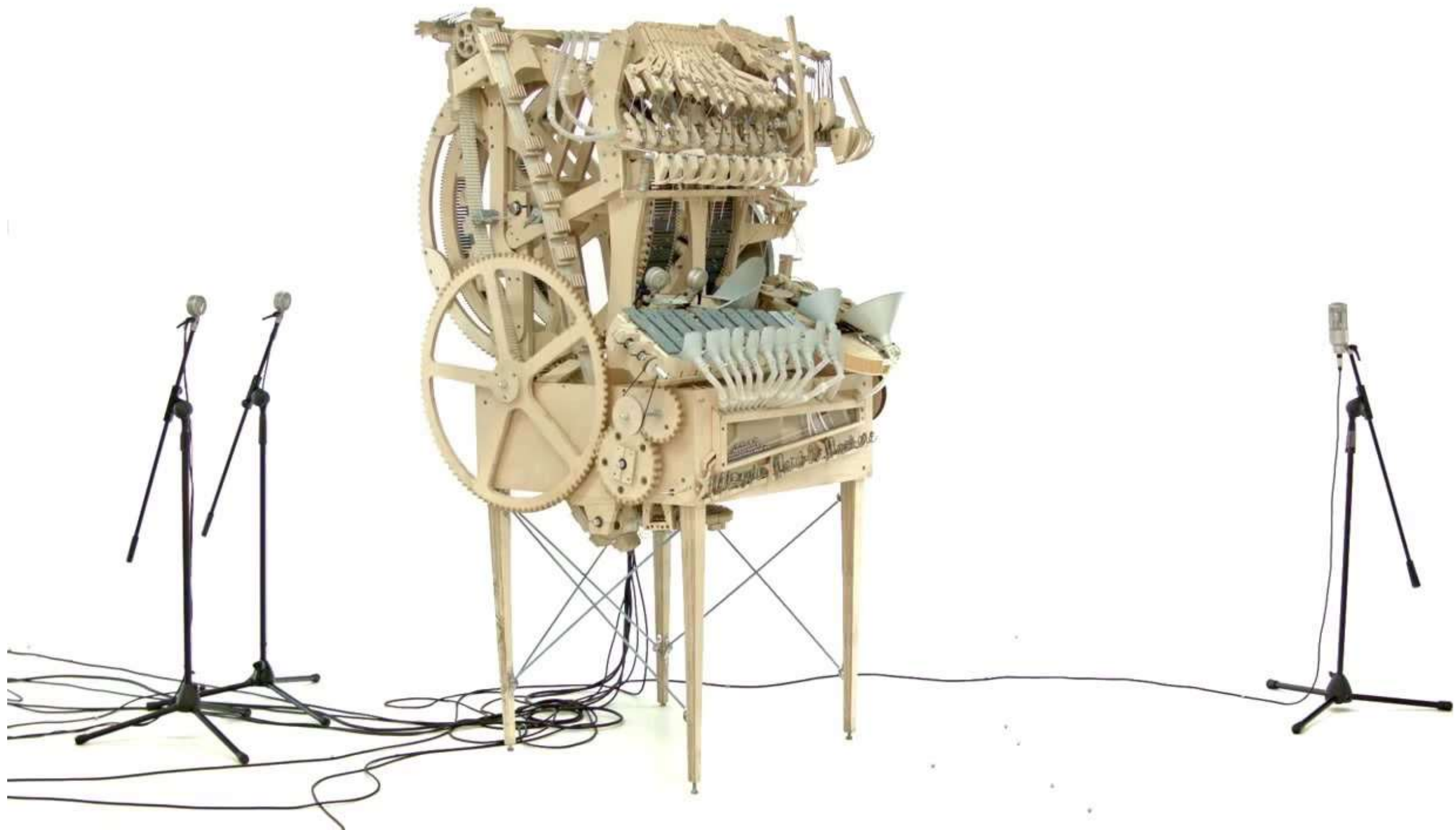
Swedish band Wintergatan may be [widely known for its Marble Machine music video](#) (which featured a machine dropping marbles to play drums, a bass, and other instruments).

Between December 2014 and March 2016, the band uploaded several [YouTube](#) videos featuring Martin Molin documenting the construction of a [music box](#) that uses [marbles](#) to play instruments. The machine is powered by a hand-crank, and works by raising steel marbles through the machine into multiple feeder tubes, where they are then released from height via programmable release gates, each marble falling and striking a musical instrument below. Instruments played by marbles striking them include a [vibraphone](#), [bass guitar](#), [cymbal](#), and emulated [kick drum](#), [high hat](#) and [snare drum](#) sounds using [contact microphones](#). The music score is stored on two programmable wheels that utilize [Lego Technic](#) beams and stud connectors to trigger armatures to release the marbles. A final [music video](#) showing the machine in use was released in 2016, and has been viewed over 230 million times.

- <https://www.youtube.com/watch?v=lvUU8joBb1Q>
- <https://www.youtube.com/watch?app=desktop&v=uog48viZUbM>
- [https://www.youtube.com/watch?v=p0Guq7vZb\\_E](https://www.youtube.com/watch?v=p0Guq7vZb_E)









# Paul Spooner

Mastermind Paul Spooner only lives up the road, yet the first place I recall seeing the name was on a piece of his work, at the science Science museum in London. After a while exploring his collections I started to realize quite how many of them were familiar to me. His fireplace for example, is decorated with two child figureheads; these were cast molds for a demonstrative piece in Eden Project. I stood in awe as a kid, watching that mechanical 'plant takeaway' unfold, until the stage reset and it all went round again. I maybe didn't realize how much I admired these comedic puppets and their delicately automated displays of bizarre life and blunt humor. What I mean to say of course is that I admire Paul for his genius creations - the machines have characters of their own so I rather think I ought to give them some credit. I thoroughly enjoyed filming this interview and I am ever so looking forward to sharing this episode of Characters of Cornwall.

- <https://www.youtube.com/watch?v=D2HzUZyo-wM>
- <https://www.youtube.com/watch?v=Vlbamqy-jG0>













# Chris Millar

Worlds within worlds emerge from the kaleidoscopic visions of Canadian artist [Chris Millar](#), whose meticulous sculptures encompass a range of materials, mechanisms, and sound. Using clockmaking components along with cast resin, electronics, styrene, acrylic paints, and other materials, he constructs science fiction-inspired microcosmos in which enigmatic narratives unfold.

Through painstaking attention to detail, Millar creates each piece entirely from scratch. “Eclipse at Arc Valley,” the artist’s first exploration into work accompanied by music, took one-and-a-half years to complete and includes a handmade music box, bells, and gongs. “‘ADIT 42’ was started when I moved to Montreal and took two-and-a-half years to complete,” he tells Colossal. “It’s a kinetic sculpture that opens a vault door to reveal an entryway to a phantasmagorical otherworld.”

Spurred by ideas around portals and secret gateways, magic, and non-linear storytelling, Millar describes his approach as “kenophobic,” or characterized by an aversion to empty spaces. He densely fills tiny vignettes, platforms, and compartments with gem-like shapes, cameo portraits, architectural features, lighting elements, clocks, dials, and miniature landscape paintings. He says, “My practice has evolved into a highly detailed, high-craft process that pushes materiality and an excess of imagery to the limits of saturation.”

- <https://www.thisiscolossal.com/2023/07/chris-millar-sculptures/>
- <https://www.youtube.com/watch?v=i3OgC7-j2W4&t=12s>
- <https://www.youtube.com/watch?v= ParOQvT9Zw&t=162s>



















# Blair

Take a peek into Blair's bizarre and beautiful world. In a remote corner of New Zealand's South Island, tucked away among the last remaining tracts of native forest, lies a little-known place of wonder. It is the life's work and extraordinary creation of inventor, artist and self-confessed tinkerer, Blair Somerville. For over ten years Blair has single-handedly owned, operated and ceaselessly expanded the Lost Gypsy Gallery, his wonderland of homegrown wizardry and a playground for kids and adults alike. Using only recycled materials, Blair takes DIY to artistic extremes. His creations are ingenious, interactive, and often hilariously impractical. They take many shapes and forms and share an uncanny ability to amaze, entertain and inspire.

<https://www.youtube.com/watch?v=raU6749Cczw>











THEATRE OF SORTS  
\$5 ENTRY

GALLERY FREE  
ENTRY





# Fernando Palma Rodríguez

Originally trained as an engineer, the artworks of Fernando Palma Rodríguez blur the boundaries between nature, technology and art. In the words of the artist, "Nature has been replaced by the transistor". In this video, enter the artist's home and studio in Milpa Alta, formerly a separate rural community but now subsumed into the ever-expanding Mexico City. Rodríguez introduces us to his family, the Mexican landscape that is so influential to his work, and to his alter ego: the coyotl.

- [https://www.youtube.com/watch?v=-hlw0aL\\_OGM](https://www.youtube.com/watch?v=-hlw0aL_OGM)
- <https://www.youtube.com/watch?v=88KgCimMTGI>

















# Keith Newstead

Keith Newstead was an English automata maker. He was considered one of the most pre-eminent makers of automata in the United Kingdom. His work was exhibited globally, including the Exploratorium, the Eden Project, and the Tokyo Toy Museum.

- <https://www.youtube.com/watch?v=TohzmVhsUTc>









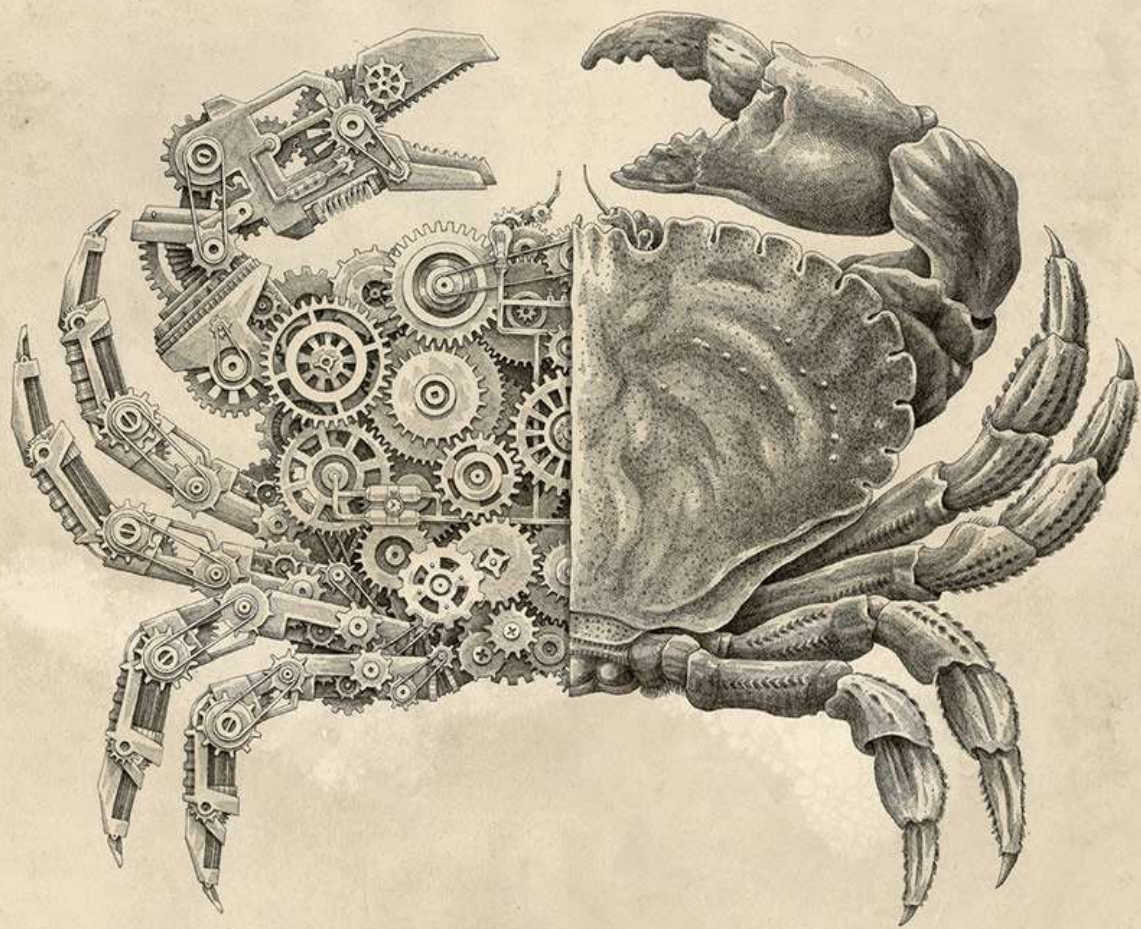


# Steevan Salvat

French artist [Steeven Salvat](#) has long been fascinated by the clarity and exactitude found in old biological studies. His portfolio is brimming with such renderings, usually with a modern twist such as this stunning series of [decorative drawings on skateboard decks](#). For this new series titled [Mechanical / Biological \[Crustacean Study\]](#), Salvat imagined intricate clockwork mechanisms that might animate the rigid exteriors of crabs, lobsters, and crayfish. The 10-piece collection was drawn entirely with a 0.13mm Rotring technical drawing pen, the process of which he captured in a video below.

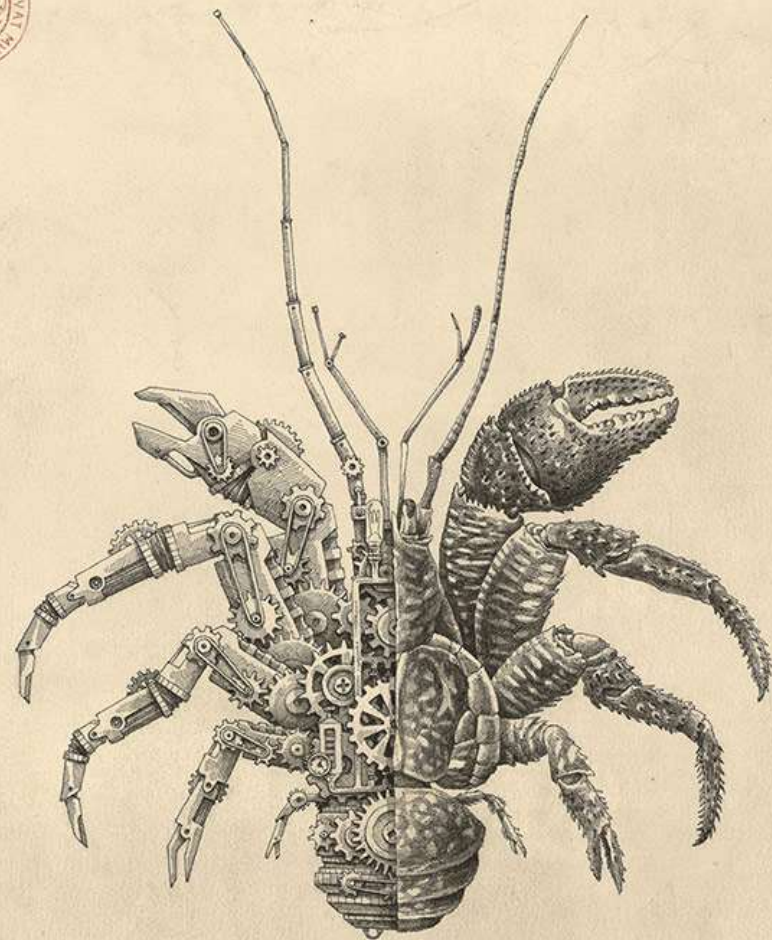
- <https://www.thisiscolossal.com/2017/02/mechanical-crustaceans-with-clockwork-insides-illustrated-by-steeven-salvat/>
- <https://www.cartoonbrew.com/artist-of-the-day/steeven-salvat-149198.html>





Studied by Salvat Steeven

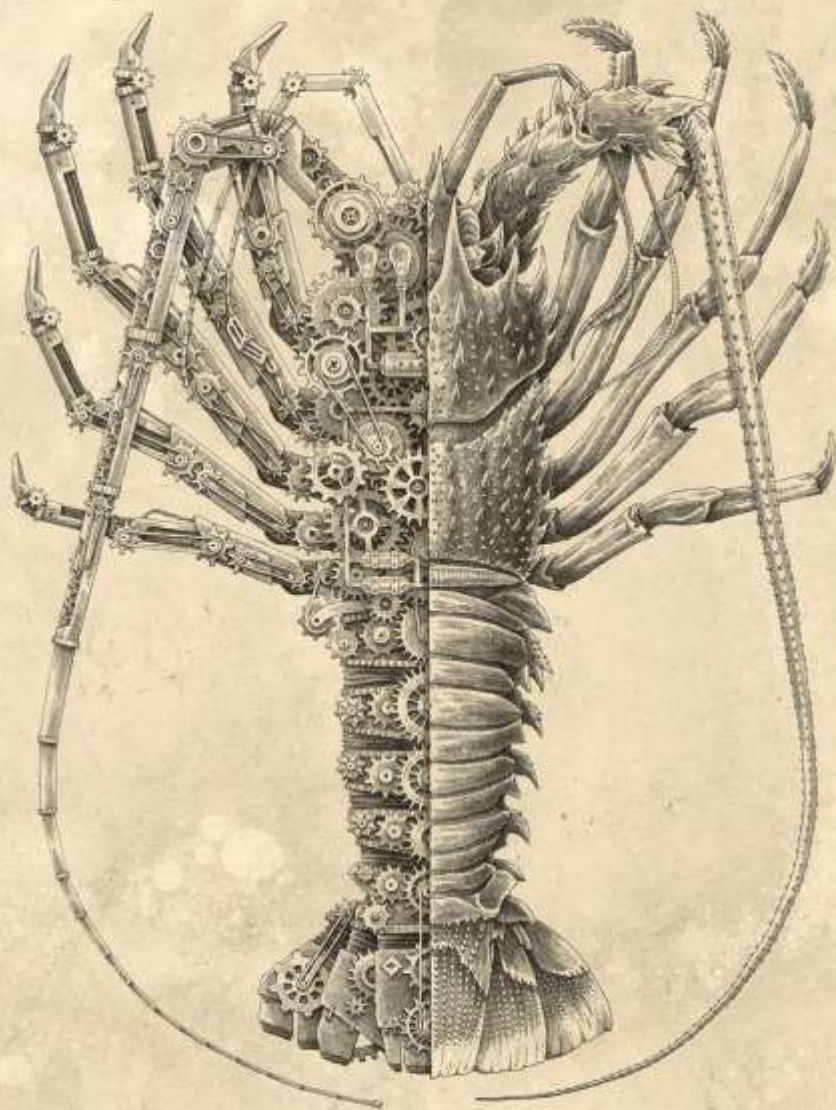
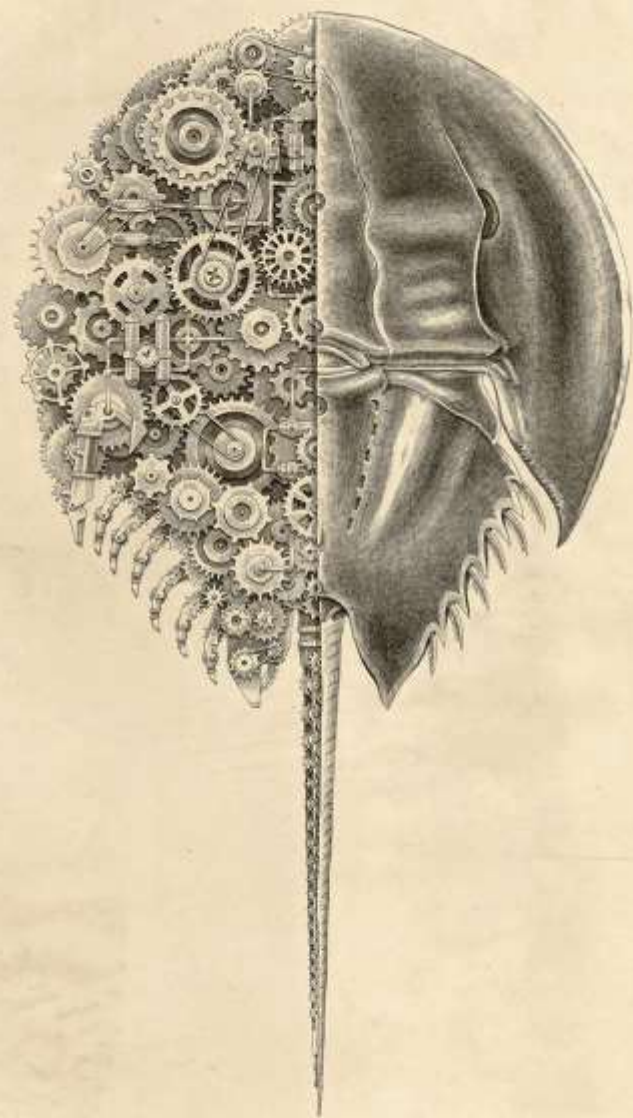
*Cancer Grigalini*



Studied by Salvat Steeven

*Macrobrachium*

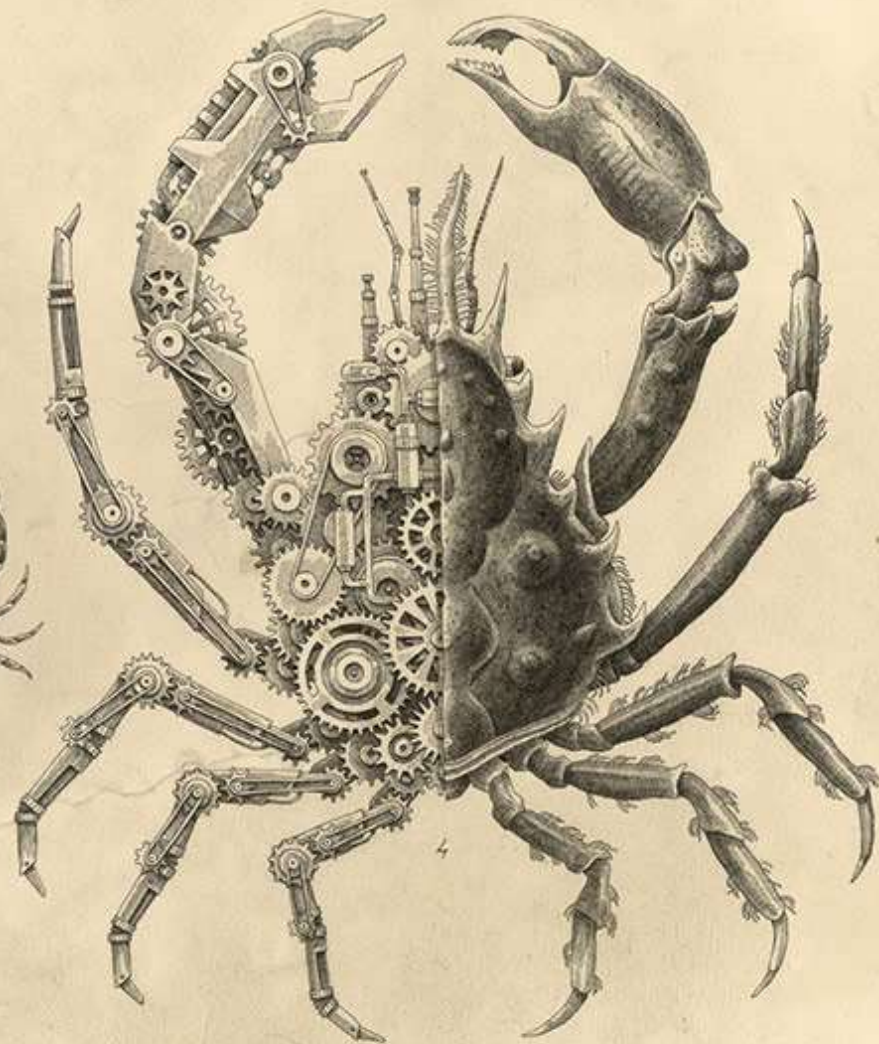
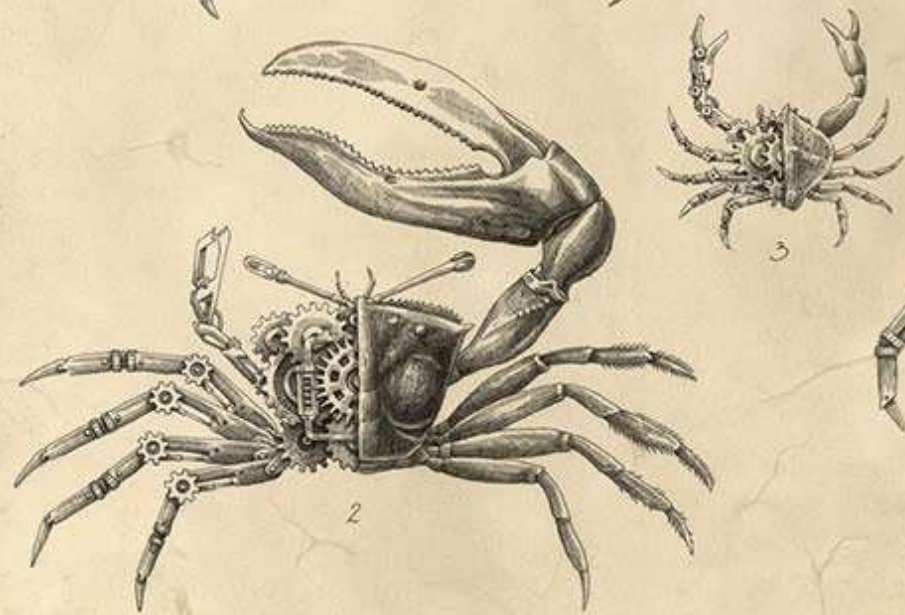
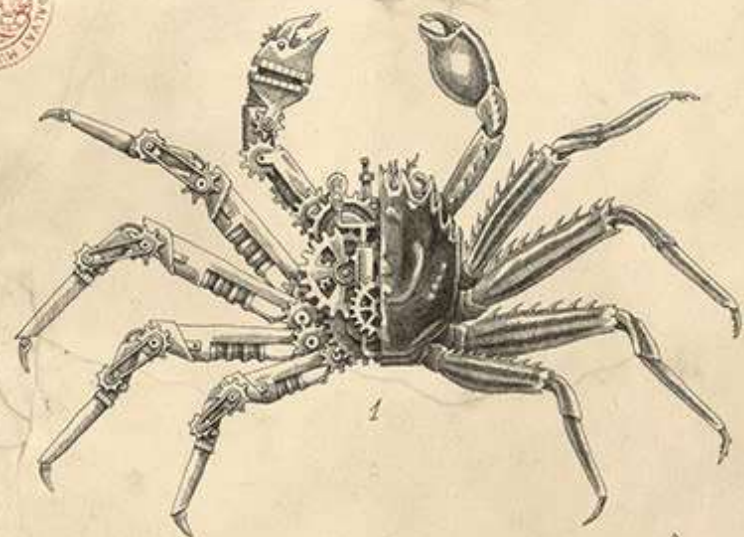








*Mentonagodes* { 1. *Dylante Chenur* 3. *Visibo de Guillode*  
2. *Oypode Micastel* 4. *Tetraodon Amoroy*



*Studies by Salvat Steeven*

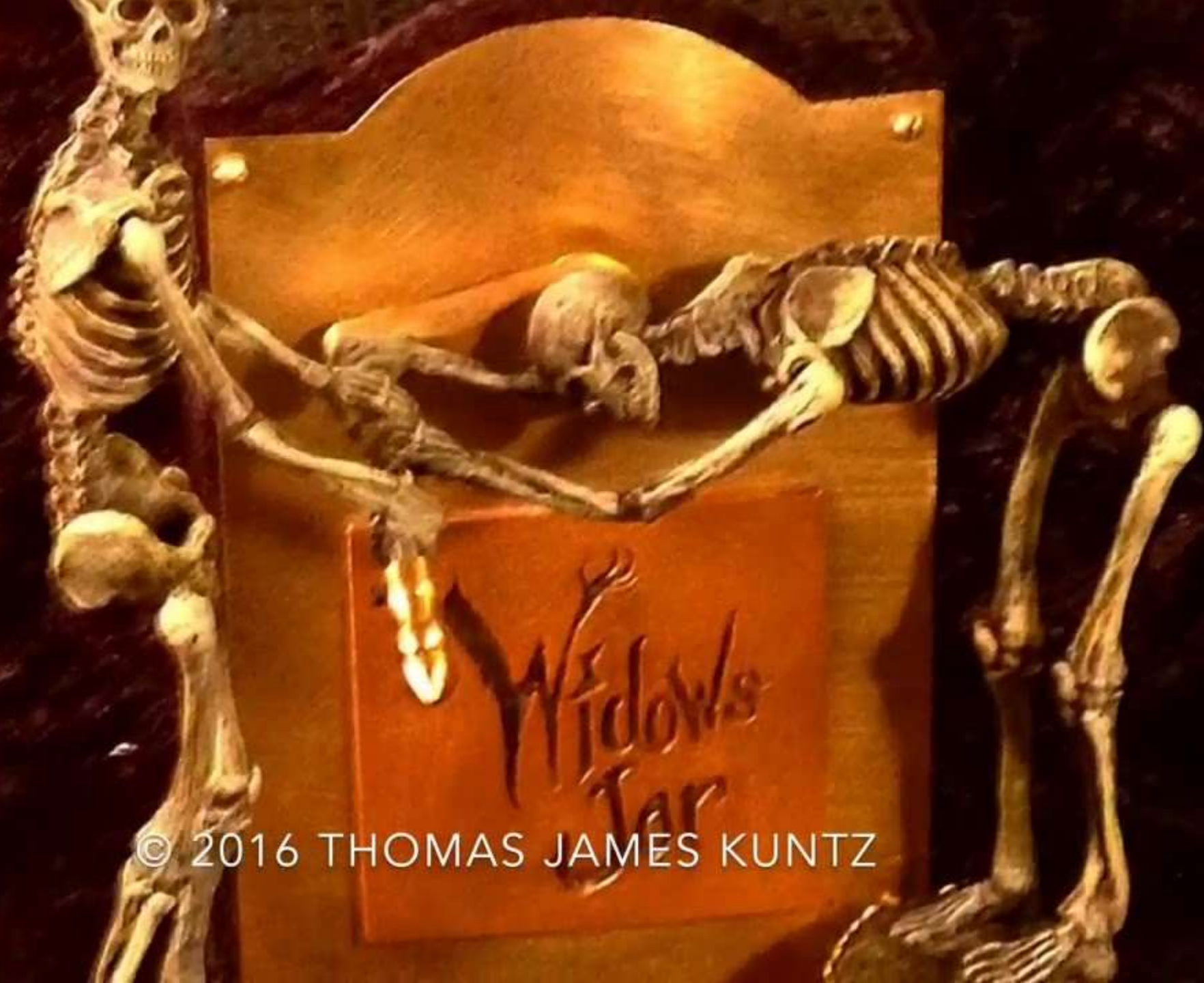
# Thomas Kuntz

Thomas Kuntz is an American multi-media artist notable for his contemporary automata. He has devoted a lifetime to acquiring the skills of a designer, sculptor, mechanic, automatist, animator, model-maker, painter and conceptualist.

<https://www.youtube.com/watch?v=drofW-ELc-0>

<https://www.youtube.com/watch?v=obq9QQwfowl>





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# Kazuaki Harada

With the push of a button or the crank of a handle, these whimsical wooden automata by Japanese woodworker [Kazuaki Harada](#) spring to life, with figures that bounce and dance across a miniature stage like puppets. Harada is a prolific designer of mechanical designs fashioned from wood both large and small, from tiny single-crank pieces to giant [labyrinthine playscapes](#) in galleries and museums. The delight in many of his automata is derived from their simplicity, but lately he's explored increasingly elaborate devices like a [dot matrix printer](#) and longer sequences akin to a [Rube Goldberg machine](#).

- <https://www.thisiscolossal.com/2018/02/the-quirky-wooden-automata-of-kazuaki-harada/>

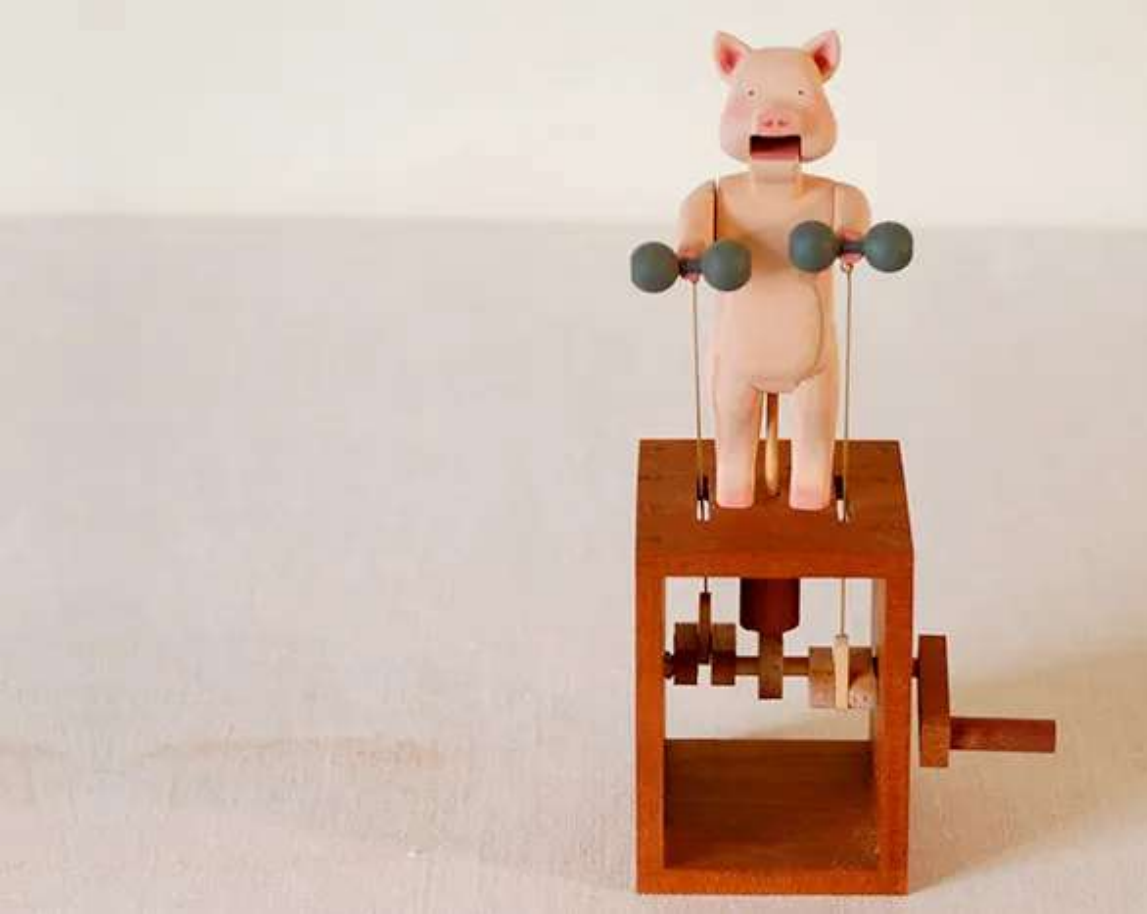












Friday Props







# Ross McSweeney

**I design wooden automata that you can cut and build yourself at home! I'm always open to hearing your ideas.**

- <https://www.youtube.c>
- <https://parametrichouse.com/kinetic-wave-sculpture/om/watch?v=8co11-KGfW4>
- <https://www.youtube.com/watch?v=yjbUA0qdggs>











# Assignment Suggestions...

- Create something that works with a crank
- Create an artwork that incorporates images of gears and other mechanical devices