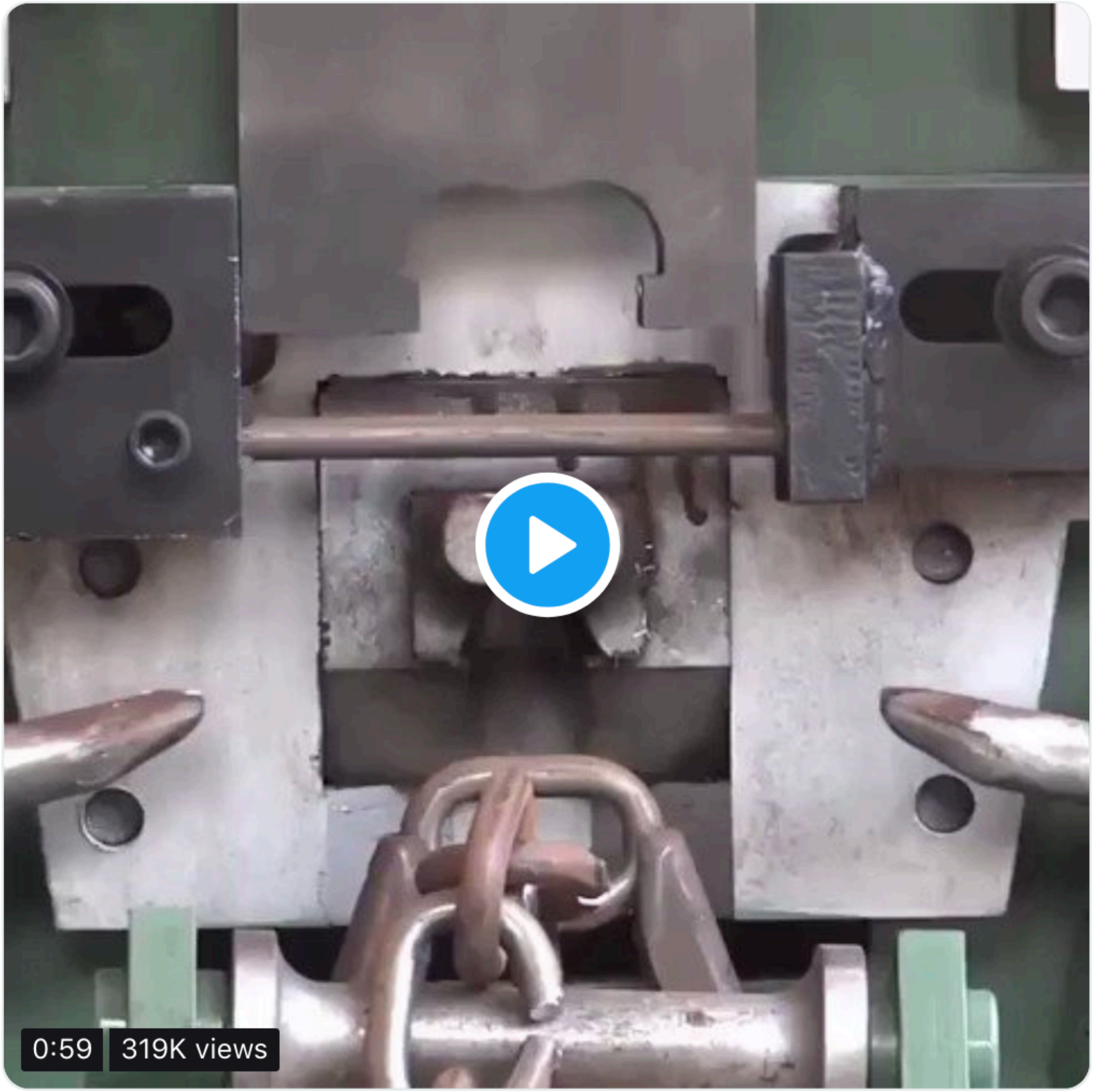
Machines and Mechanisms

https://www.amazon.com/addi-990-2-addi-Express-Professional-Knitting/dp/B000XT3OPG

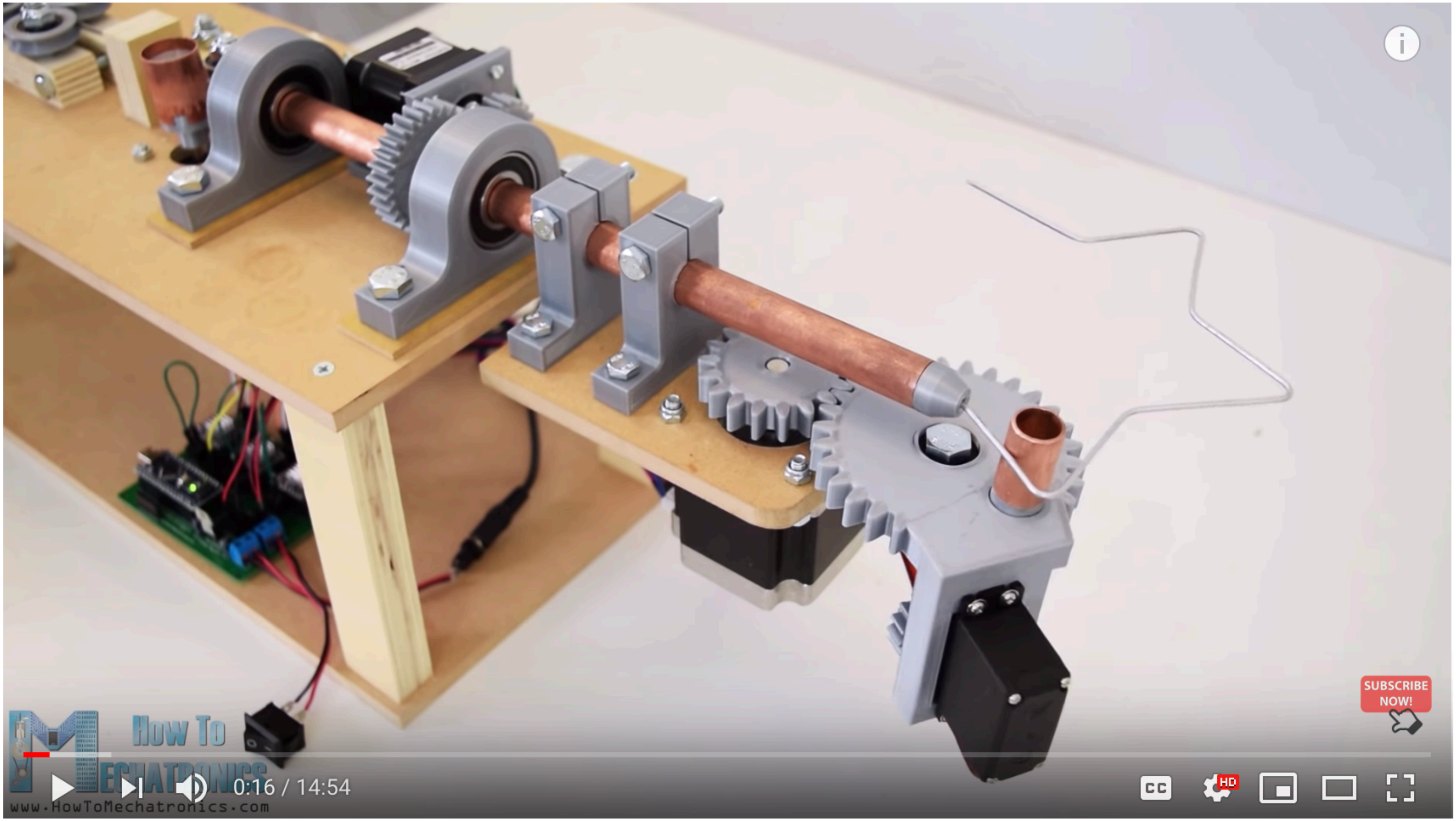
Dobby Loom

Machine Pix @MachinePix · 12 Dec 2018

Chain bending machine.

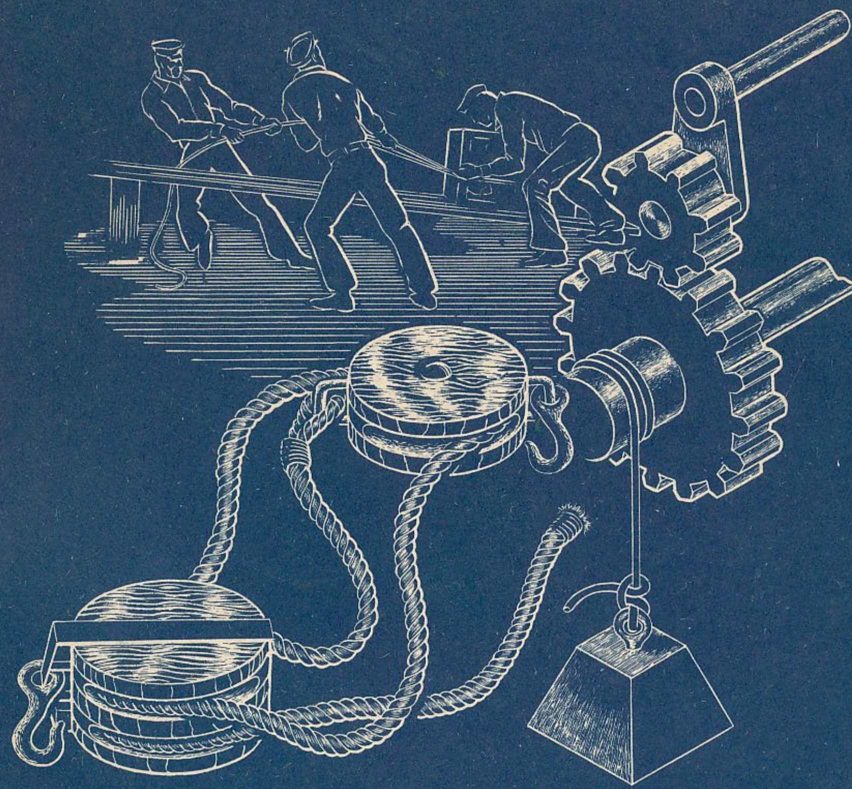


98 2.2K 7.1K



https://www.youtube.com/watch?v=HPQbKTJPsU4

What is a Machine?

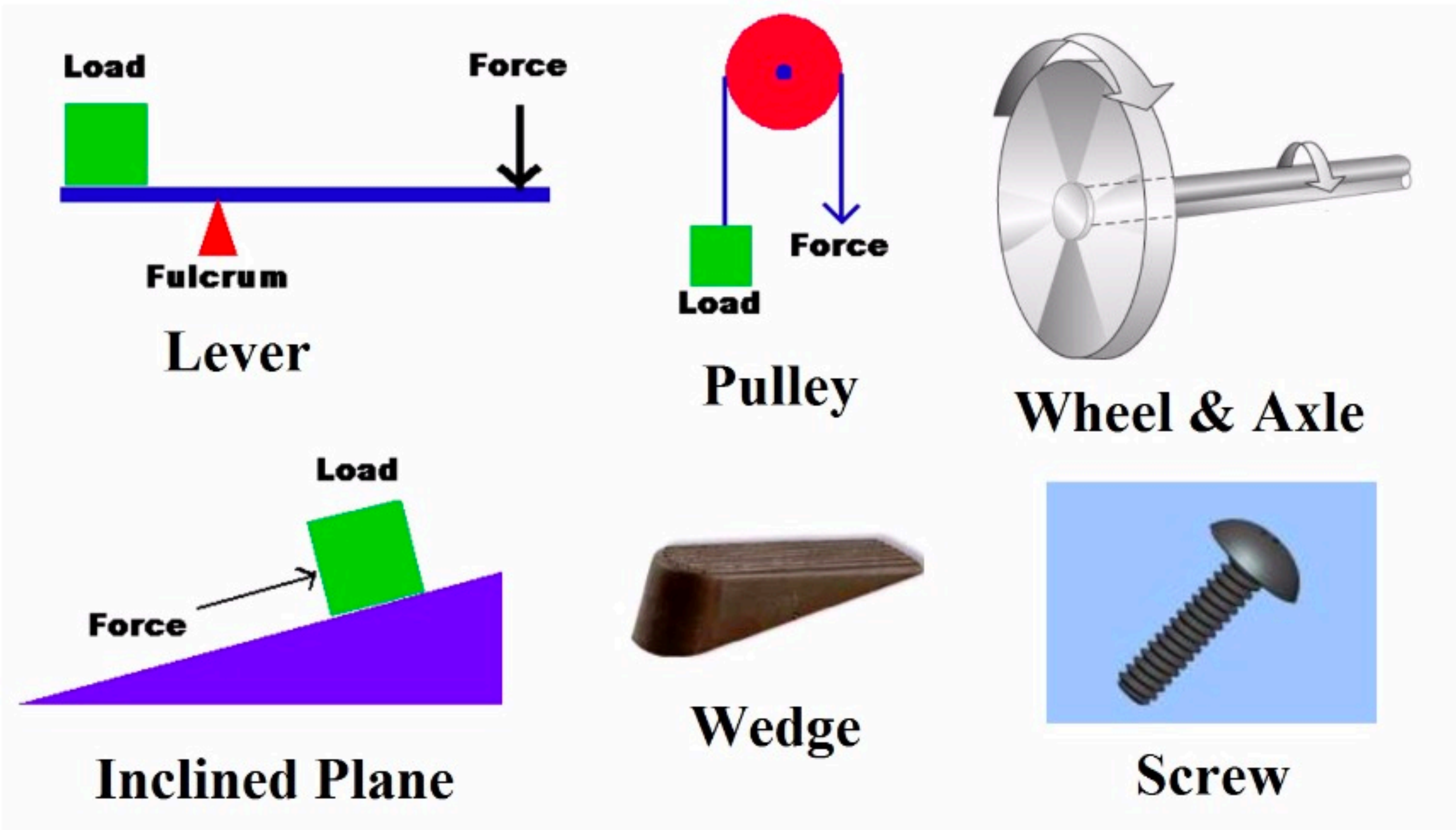


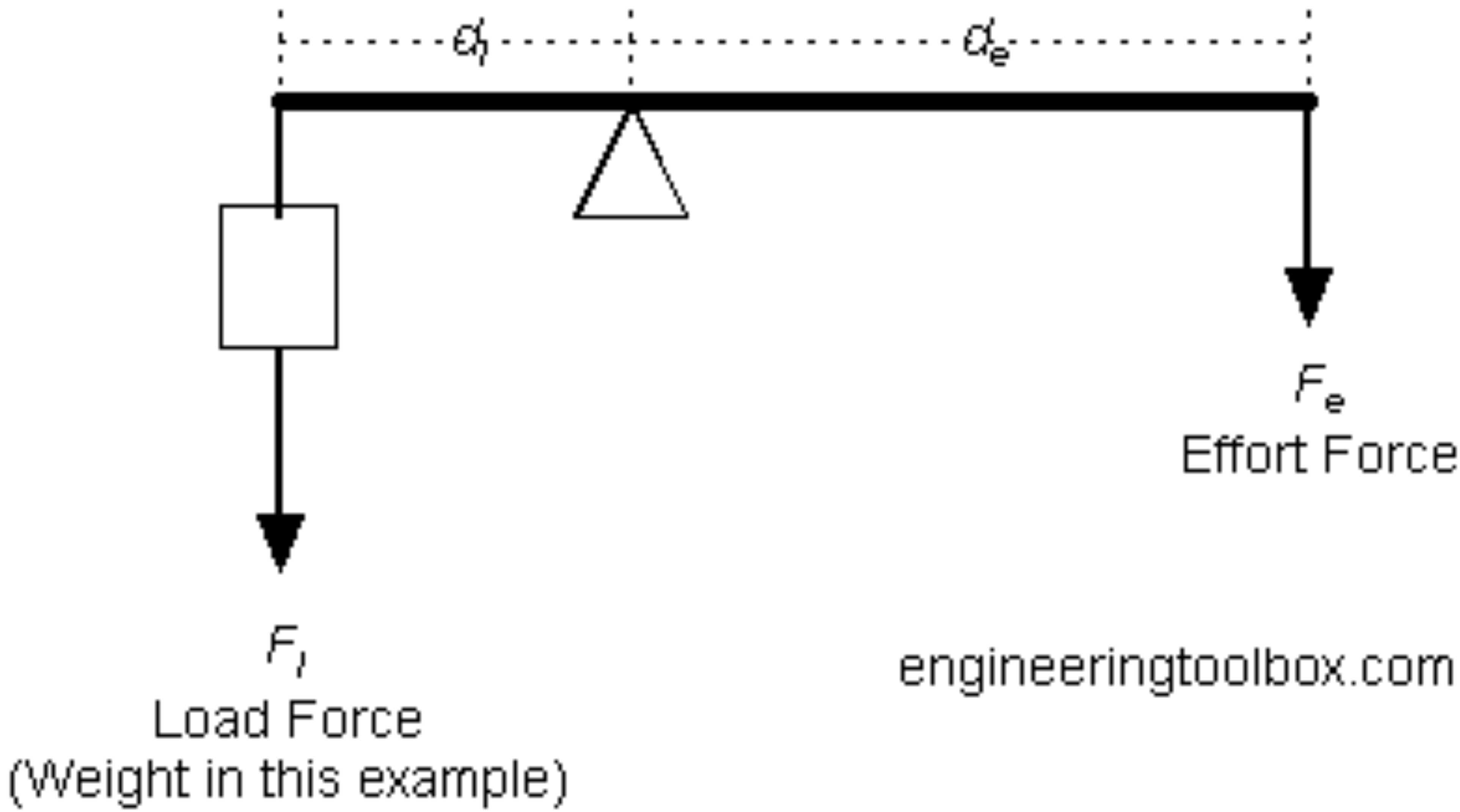
BASIC MACHINES

BUREAU OF NAVAL PERSONNEL

NAVY TRAINING COURSE NAVPERS 10624-A

Basic` Machines





d_l
d_e
F_e
Effort Force
F_l
Load Force
(Weight in this example)
engineeringtoolbox.com

$$F_l \;\; d_l = F_e \; d_e$$

Work and Energy

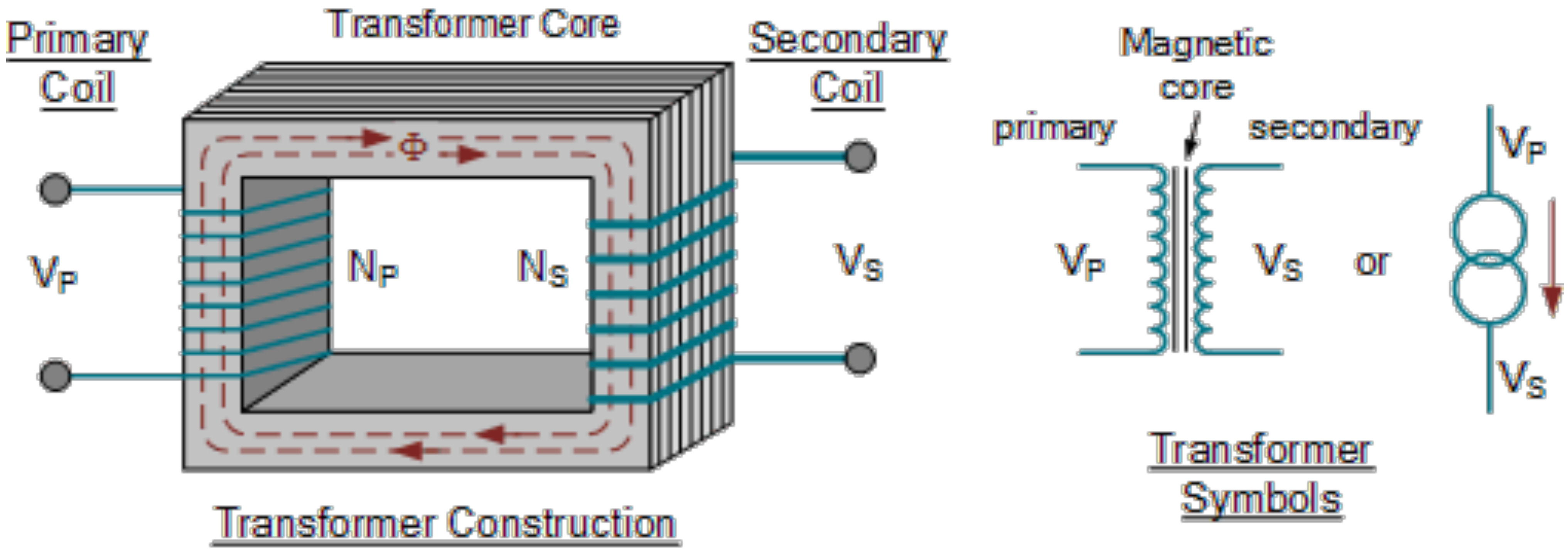
Energy converted to work

- Force x Distance
- Torque x Angle

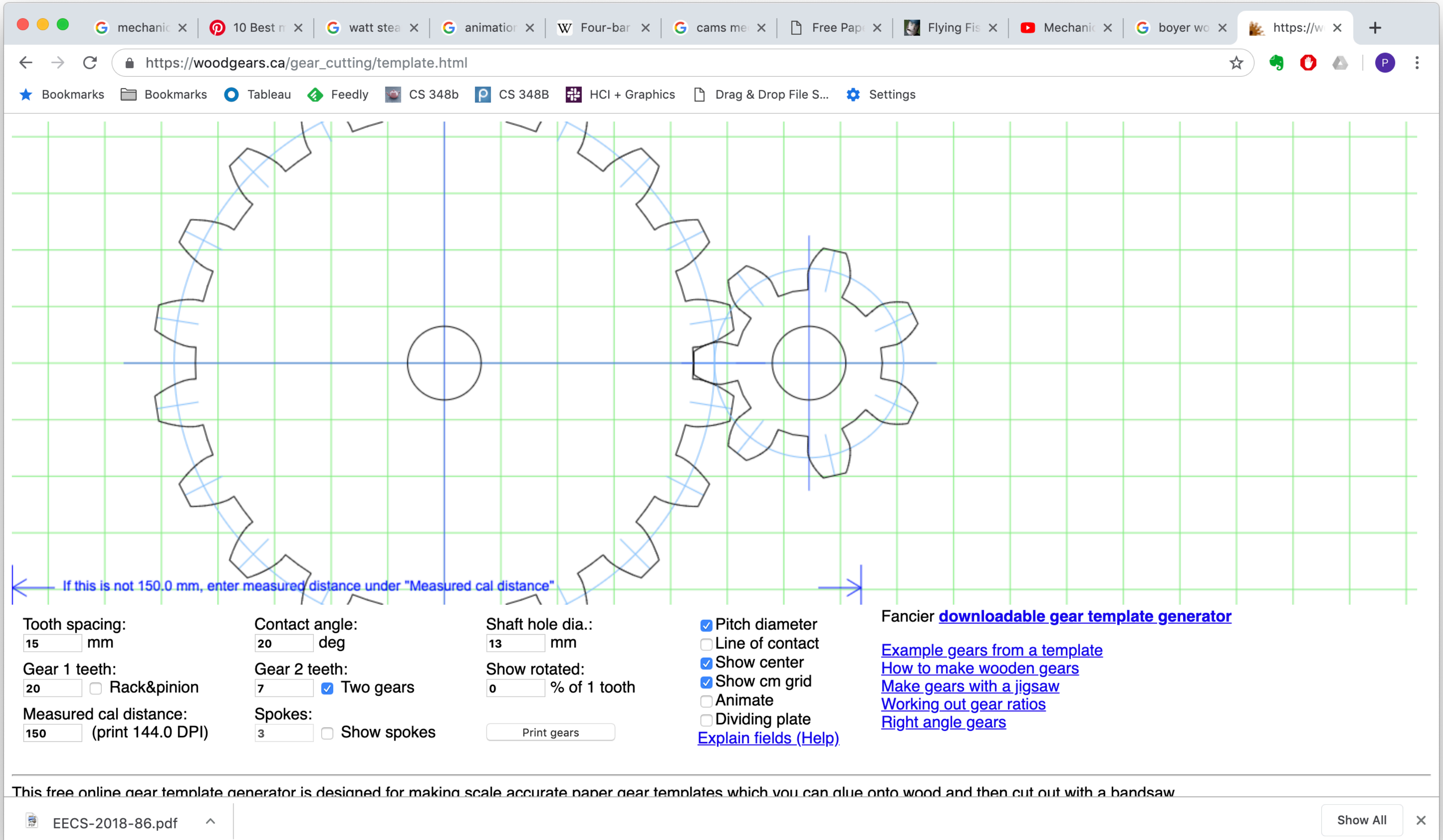
Transforming power

- Change force: Fout / Fin
- Change distance or speed: dout / din

Mechanical advantage



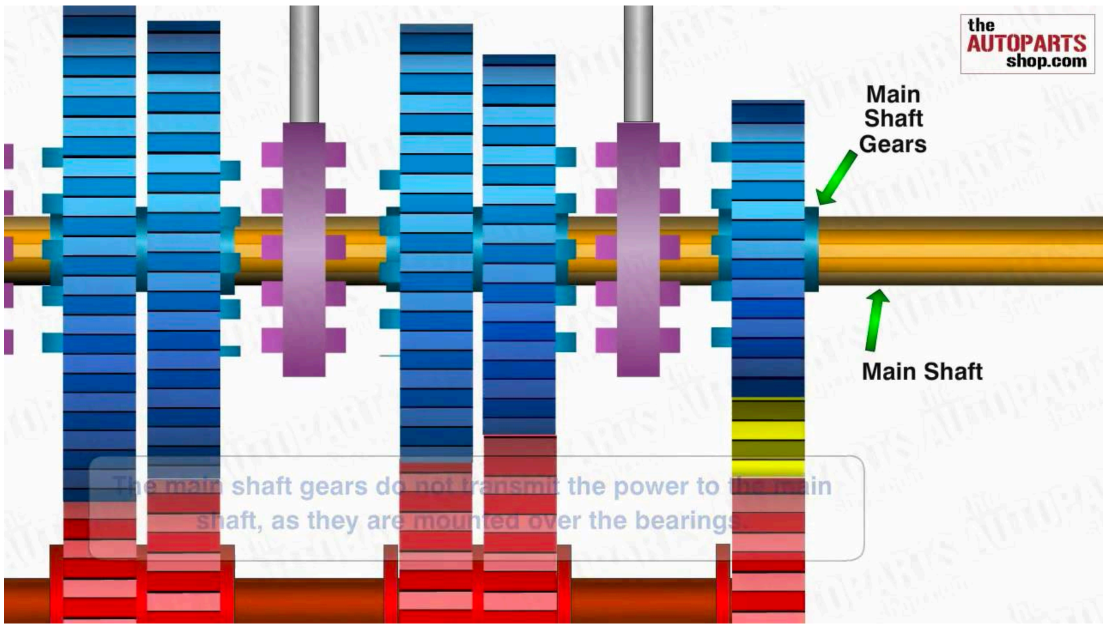
$$I_S \ V_S = I_P \ V_P$$
$$V_S = N_S/N_P \ V_P$$



https://woodgears.ca/gear_cutting/template.html
Bookmarks
Bookmarks
Tableau
Feedly
CS 348b
CS 348B
HCI + Graphics
Drag & Drop File S...
Settings
If this is not 150.0 mm, enter measured distance under "Measured cal distance"
Tooth spacing:
15 mm
Gear 1 teeth:
20
Rack&pinion
Measured cal distance:
150 (print 144.0 DPI)
Contact angle:
20 deg
Gear 2 teeth:
7
Two gears
Spokes:
3
Show spokes
Shaft hole dia.:
13 mm
Show rotated:
0 % of 1 tooth
Print gears
Pitch diameter
Line of contact
Show center
Show cm grid
Animate
Dividing plate
Explain fields (Help)
Fancier downloadable gear template generator
Example gears from a template
How to make wooden gears
Make gears with a jigsaw
Working out gear ratios
Right angle gears
This free online gear template generator is designed for making scale accurate paper gear templates which you can glue onto wood and then cut out with a bandsaw.
EECS-2018-86.pdf
Show All

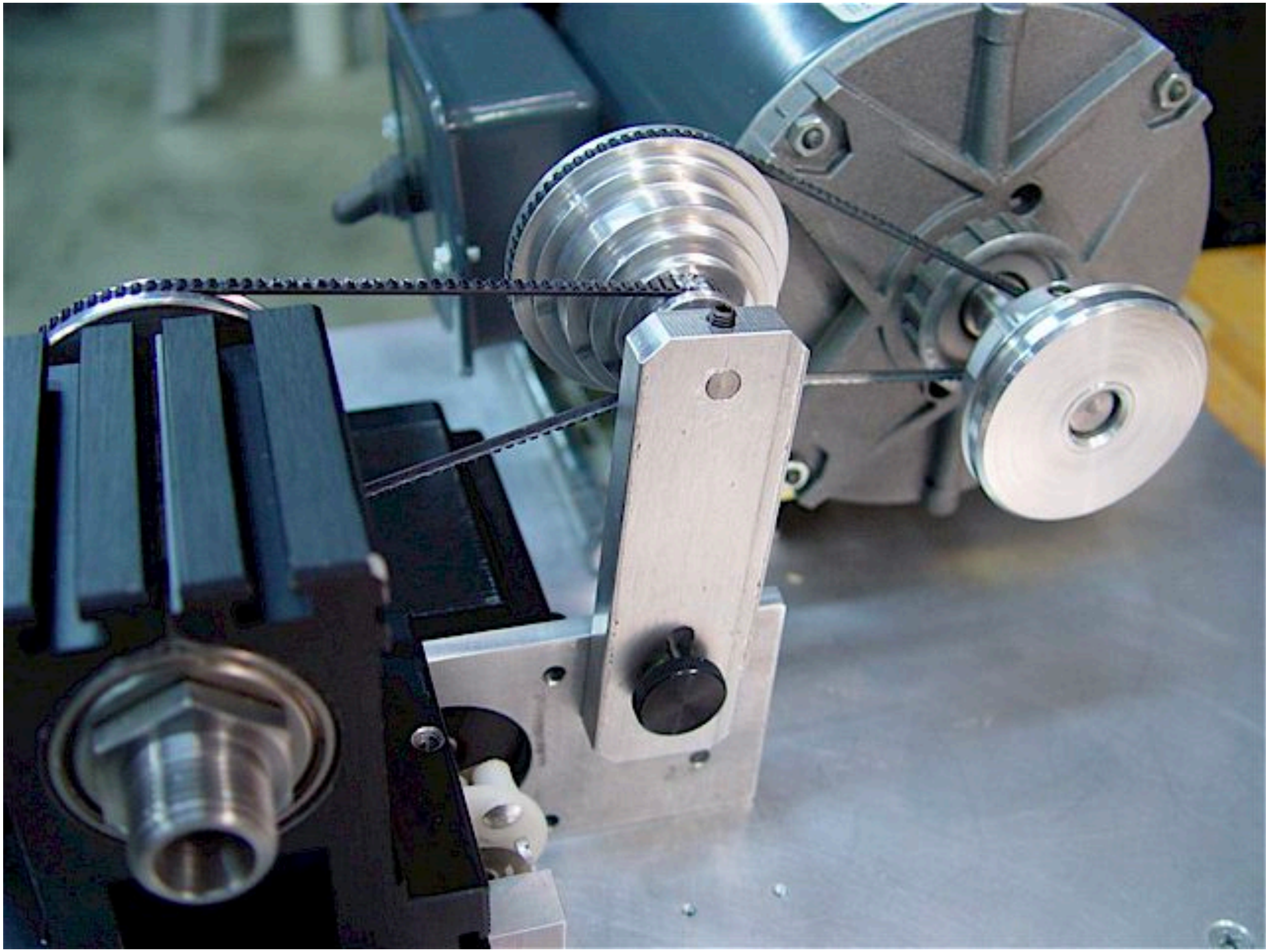
Gears

Clock
Change rate of motion



Transmission
Change speed and power

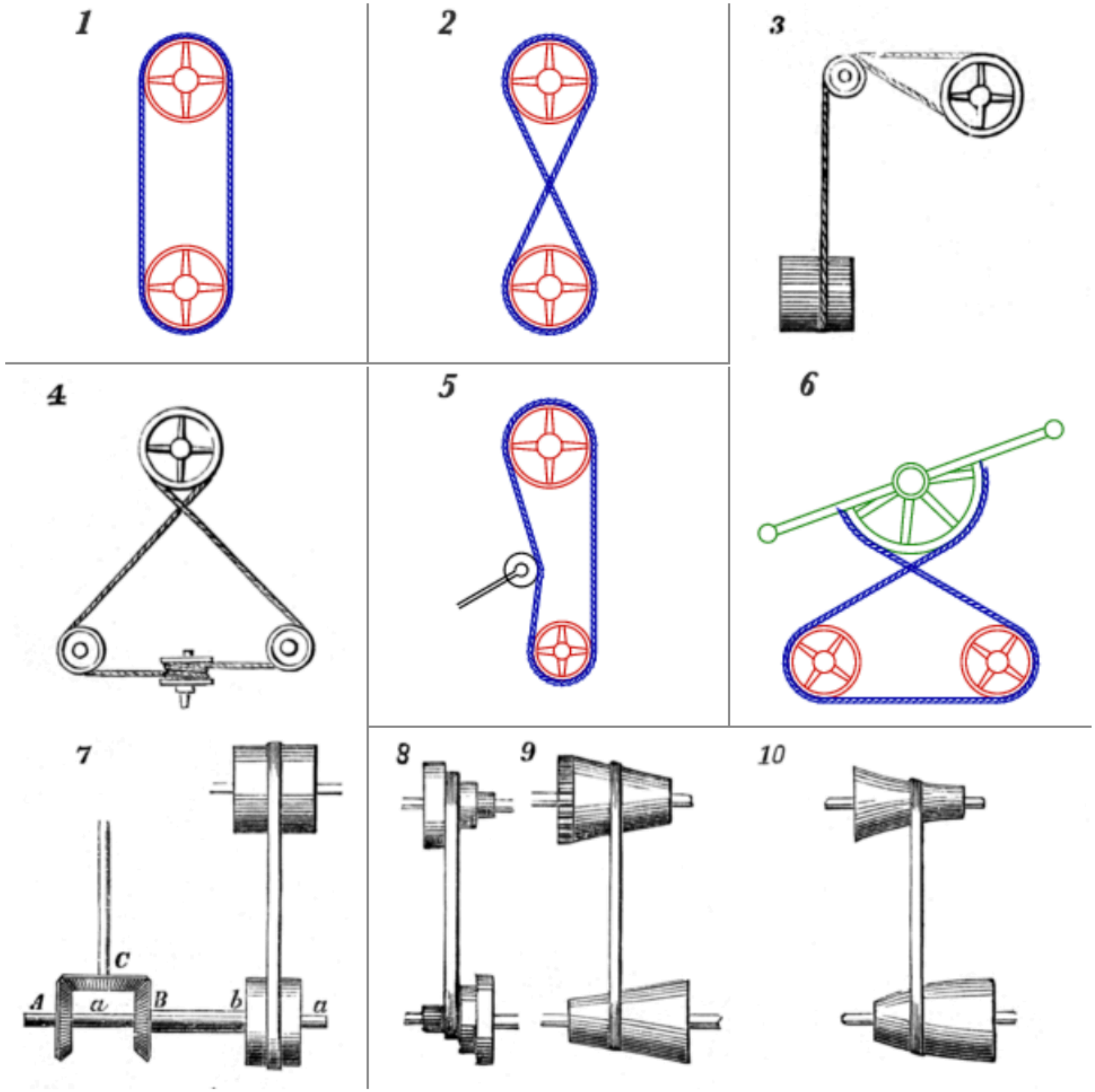
Pulleys



Lathe - Change cutting speed

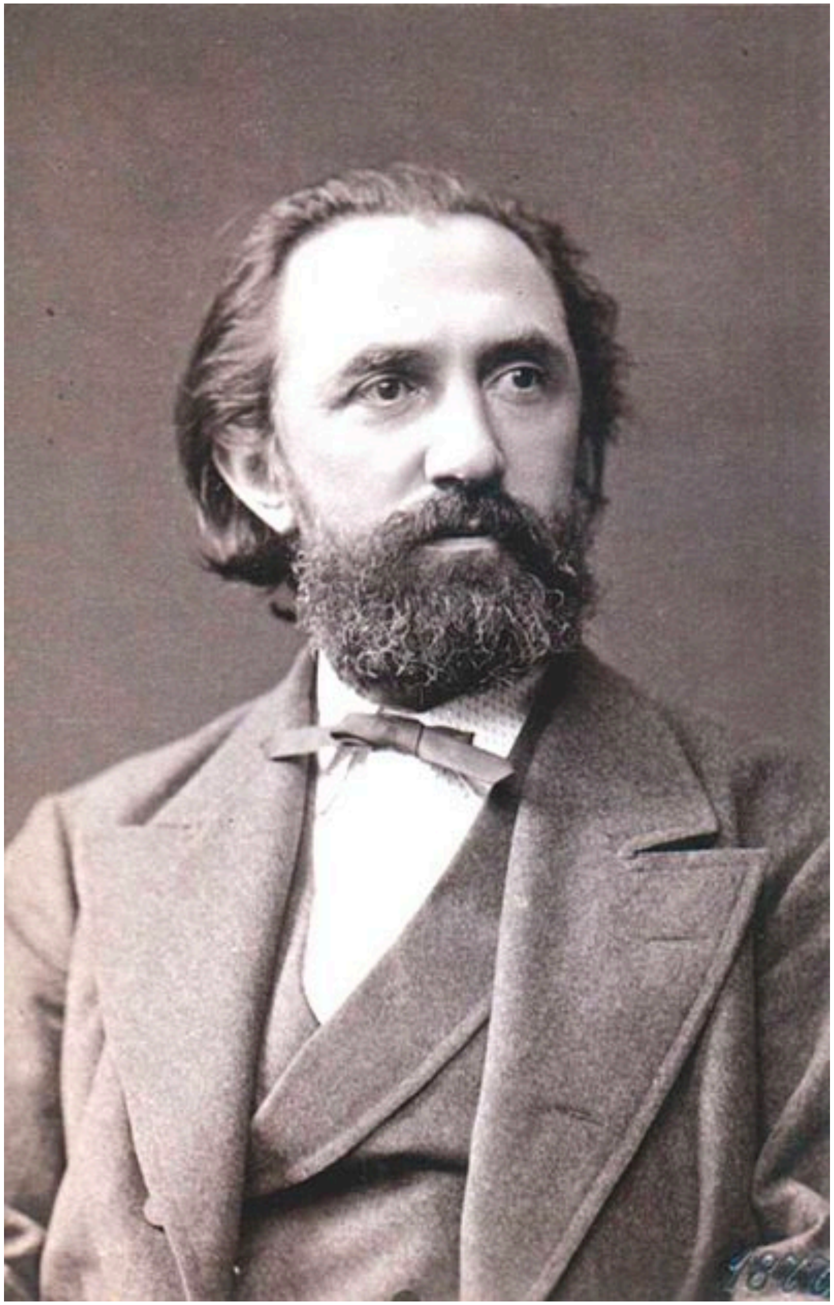
FIVE HUNDRED AND SEVEN

Mechanical Movements



Kinematic Chains

Linkages and Mechanisms



Franz Reuleaux (1829-1905)

Reuleaux believed that machines could be abstracted into chains of elementary links called kinematic pairs. Constraints on the machine are described by constraints on each kinematic pair, and the sequence of movements of pairs produces a kinematic chain.

Converting Motion

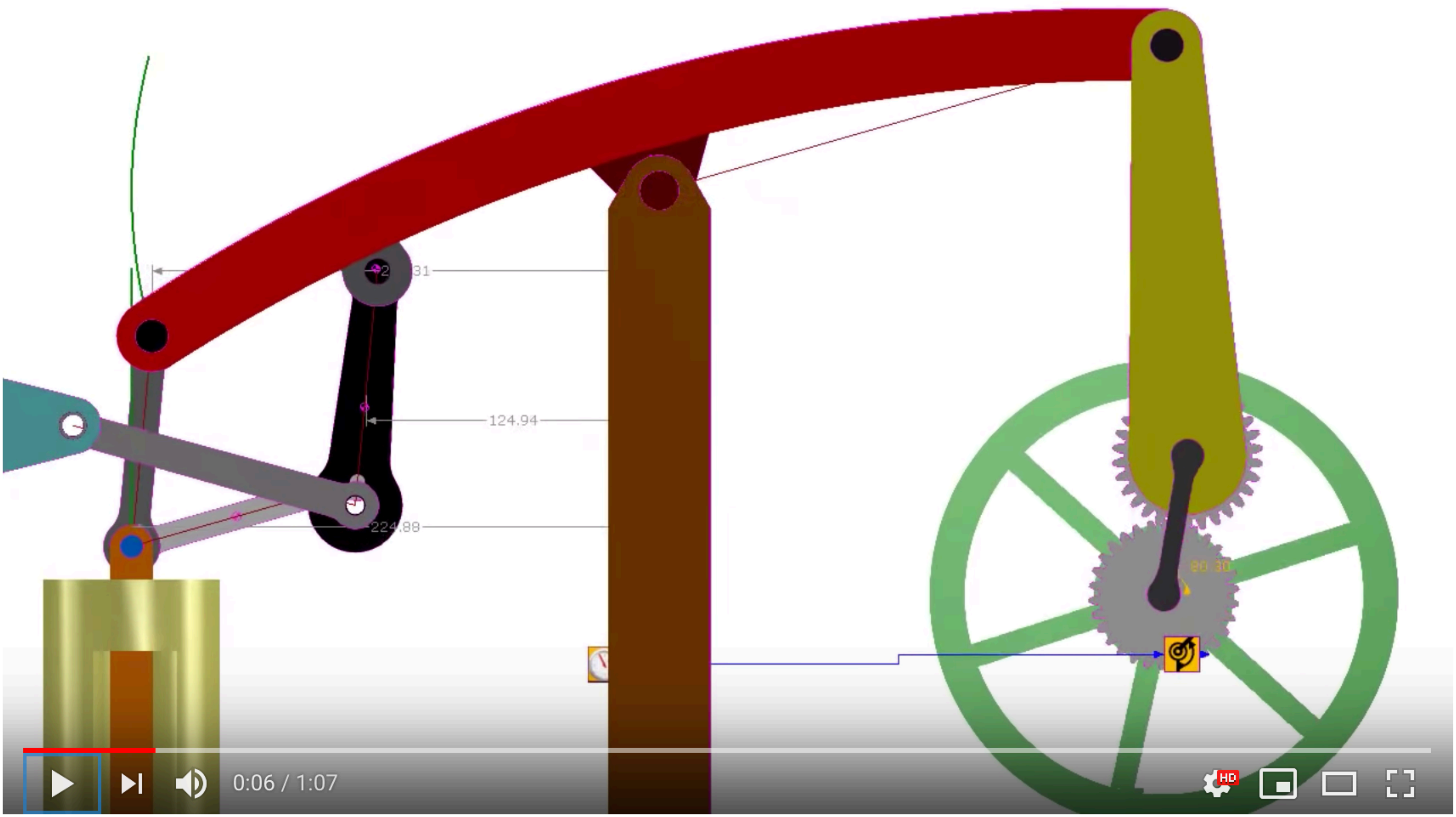
Linear to rotary

- Windmill
- Water wheel
- Steam/Combustion engine

Linear to rotary

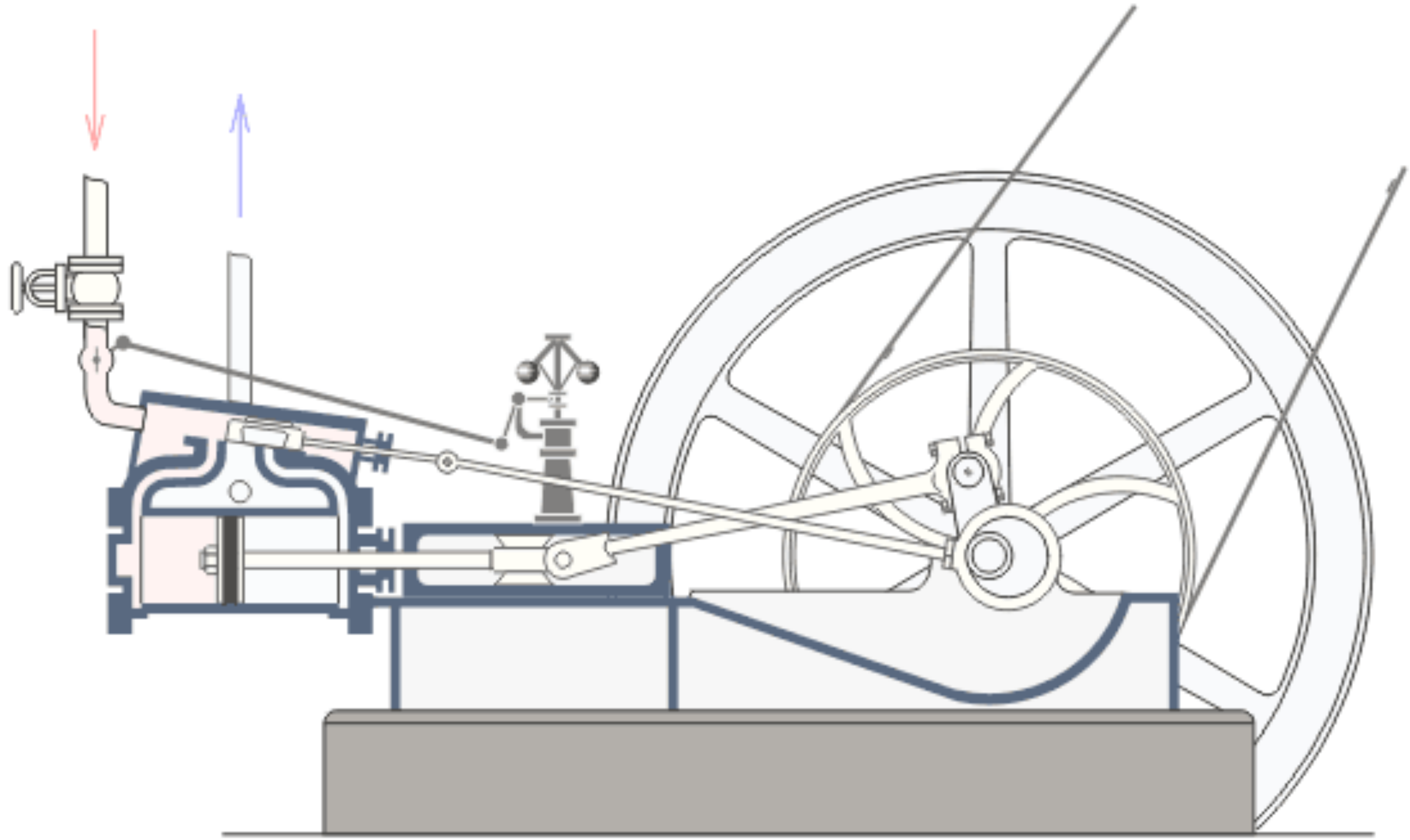
- Piston and engine crank

https://en.wikipedia.org/wiki/Watt%27s_linkage

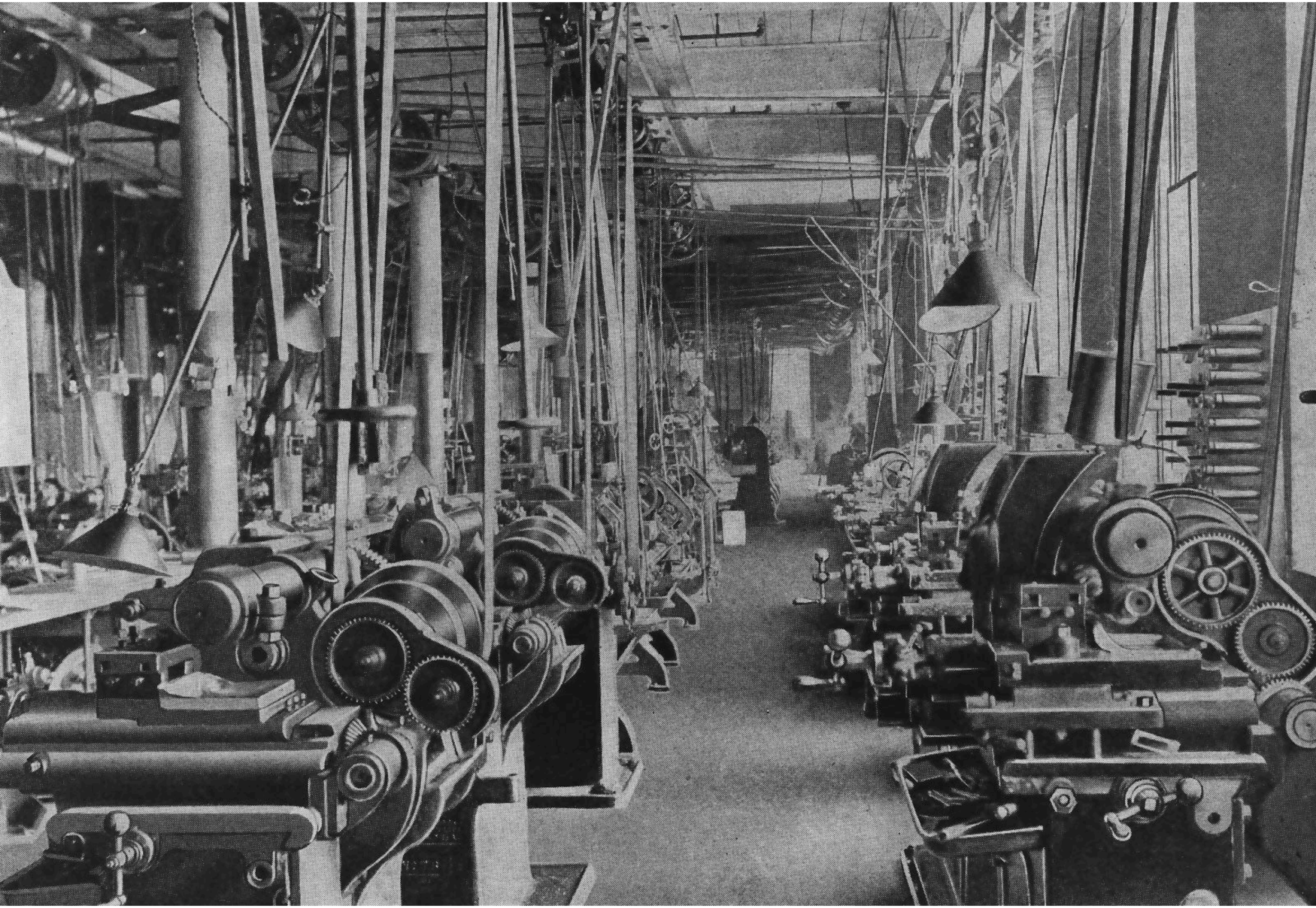


Boulton-Watt Steam Engine

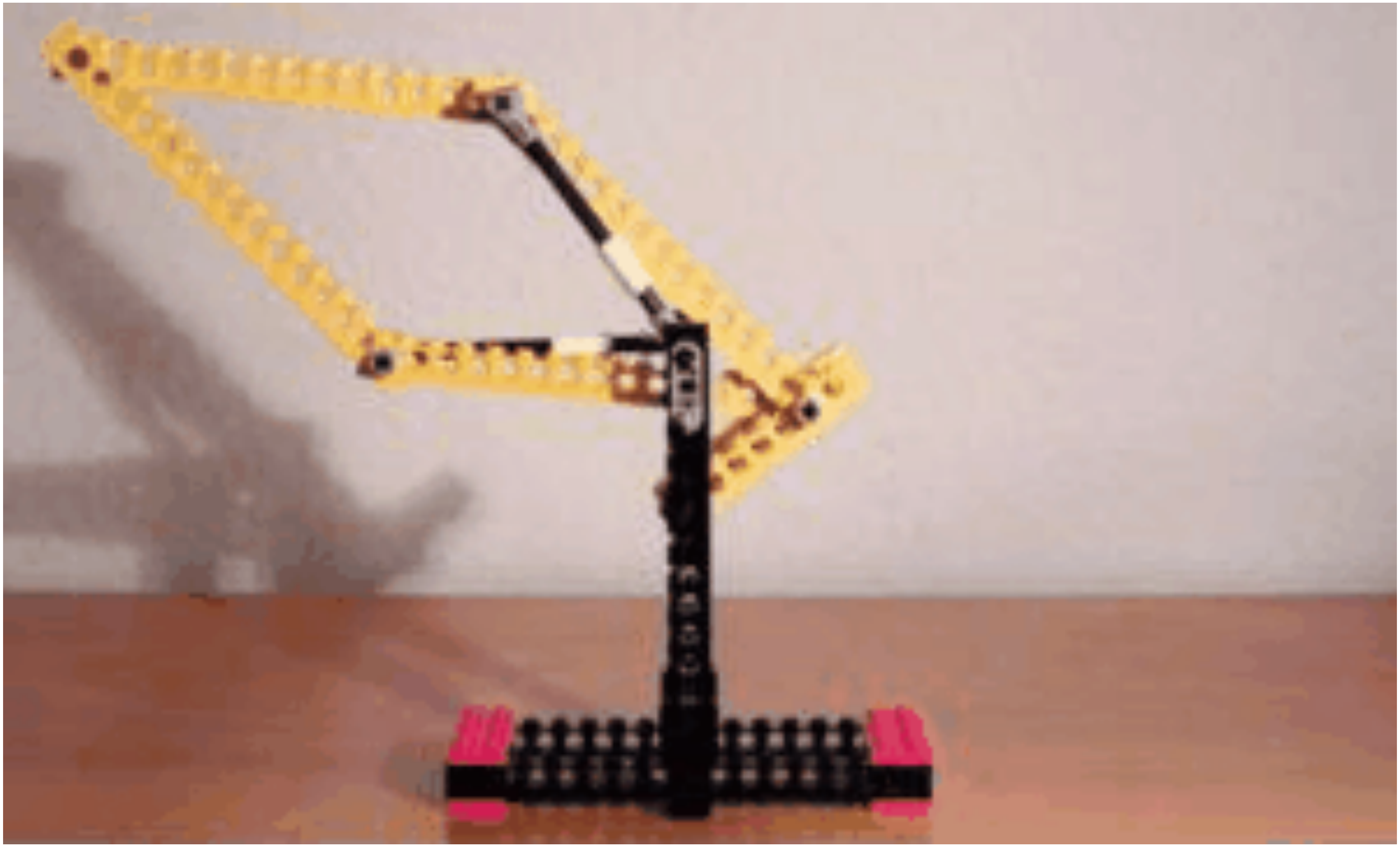
Slider Crank

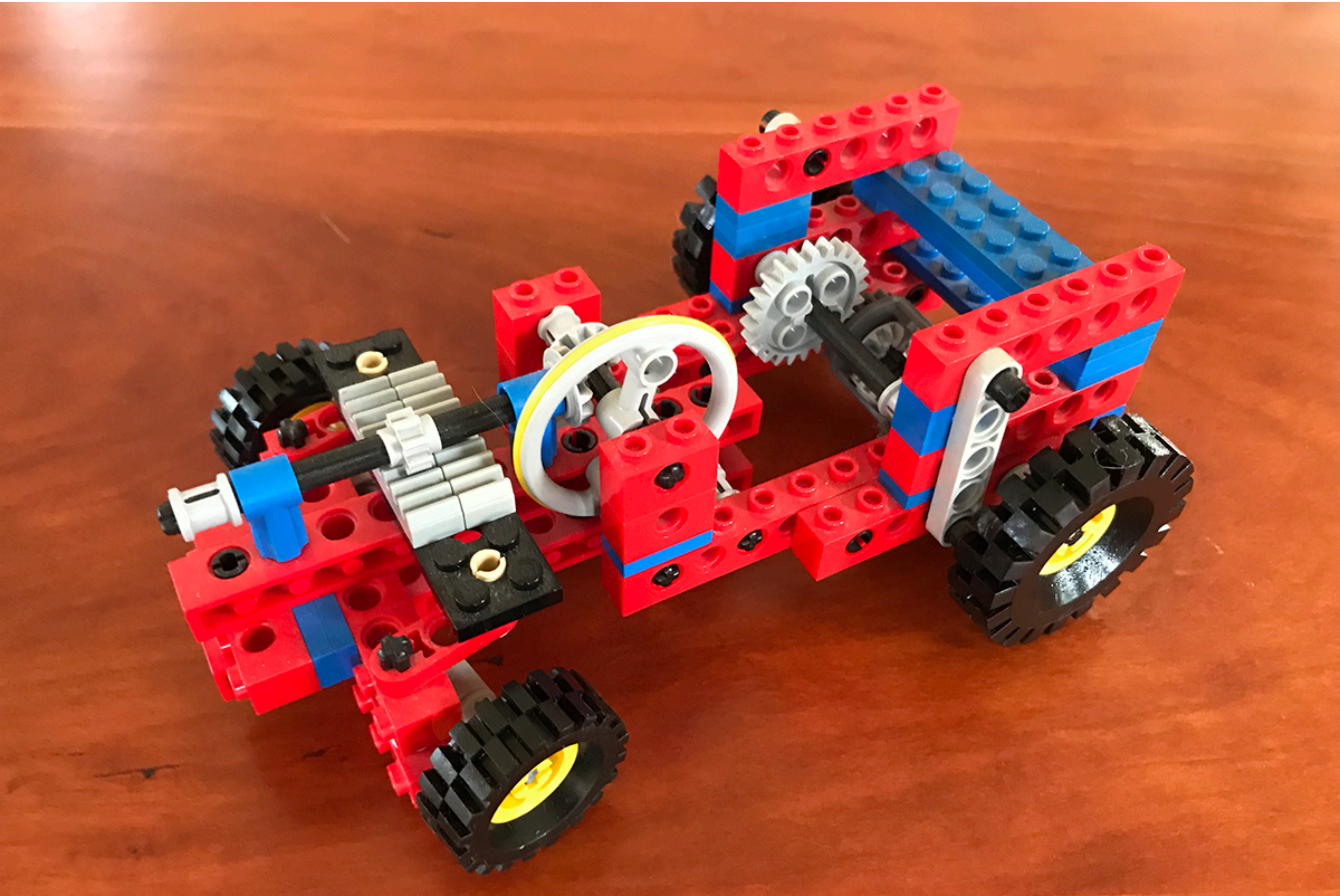


Three revolute joints (R) and one prismatic joint (P)



Leo Dorst's Lego Peaucellier Cell



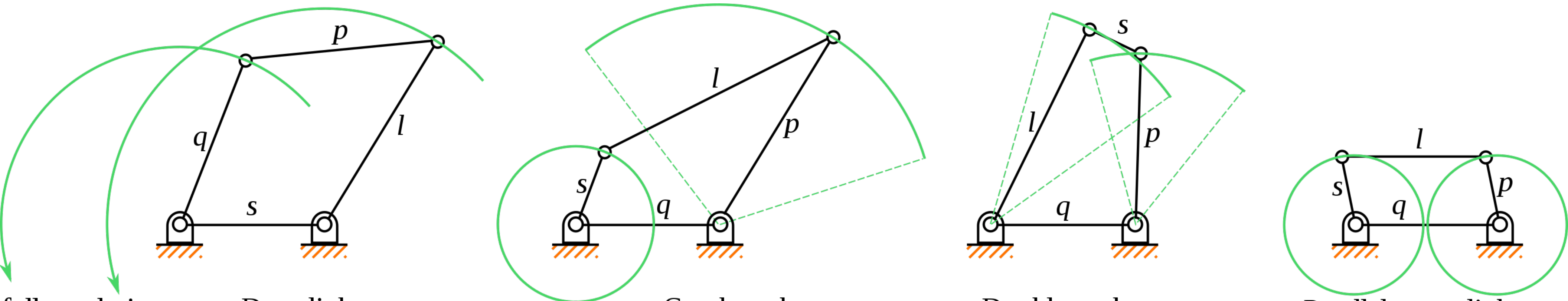


Michael Gasperi's Lego Rack and Pinion Steering

Pantograph


Woodgears.ca
Woodgears.ca

Four-Bar Linkage



Drag-link
$s+l < p+q$
(continuous motion)

Crank-rocker
$s+l < p+q$
(continuous motion)

Double-rocker
$s+l > p+q$
(no continuous motion)

Parallelogram linkage
$s+l = p+q$
(continuous motion)

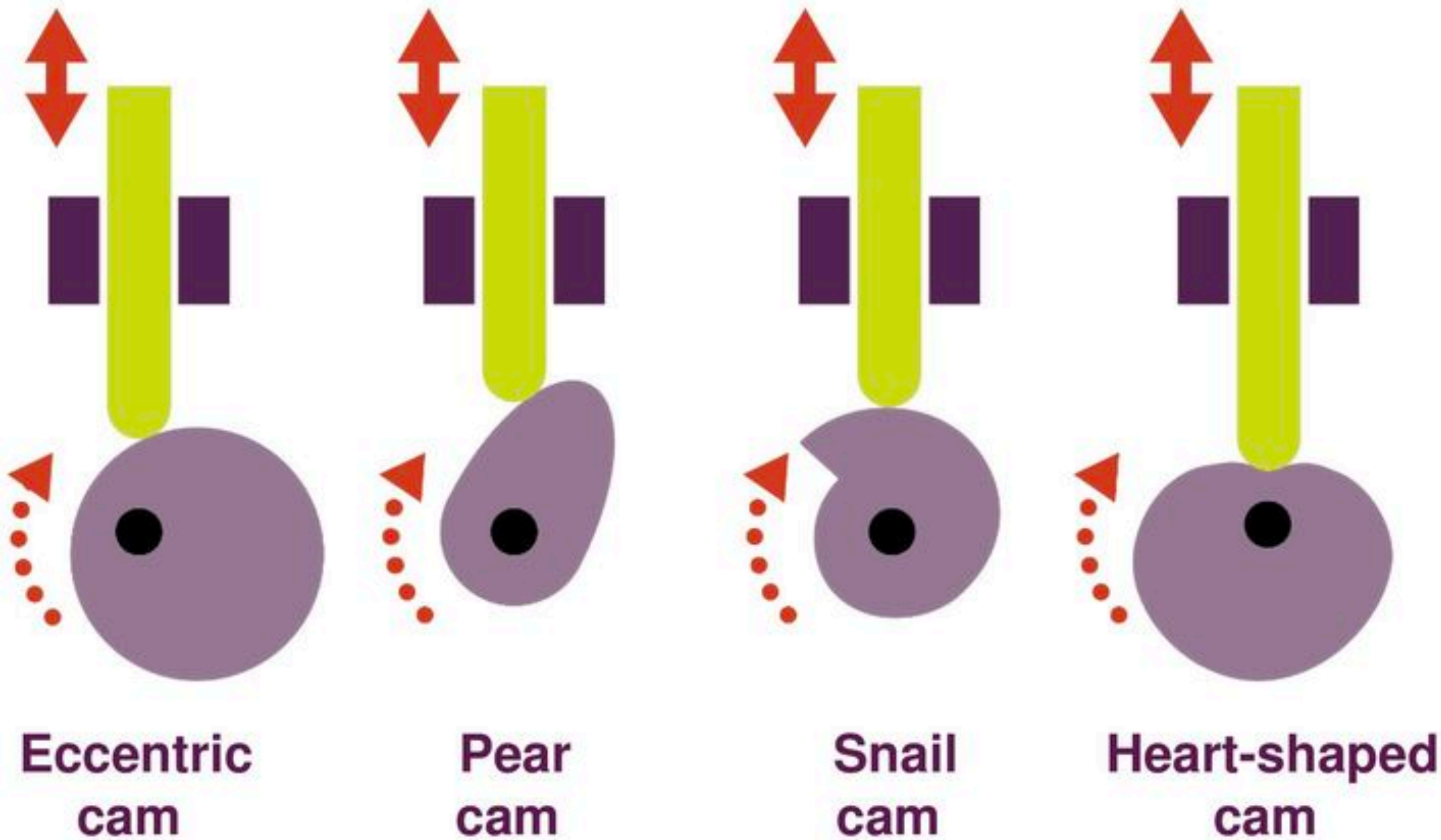
https://en.wikipedia.org/wiki/Four-bar_linkage

Thang's 2700 Animated Mechanical Mechanisms

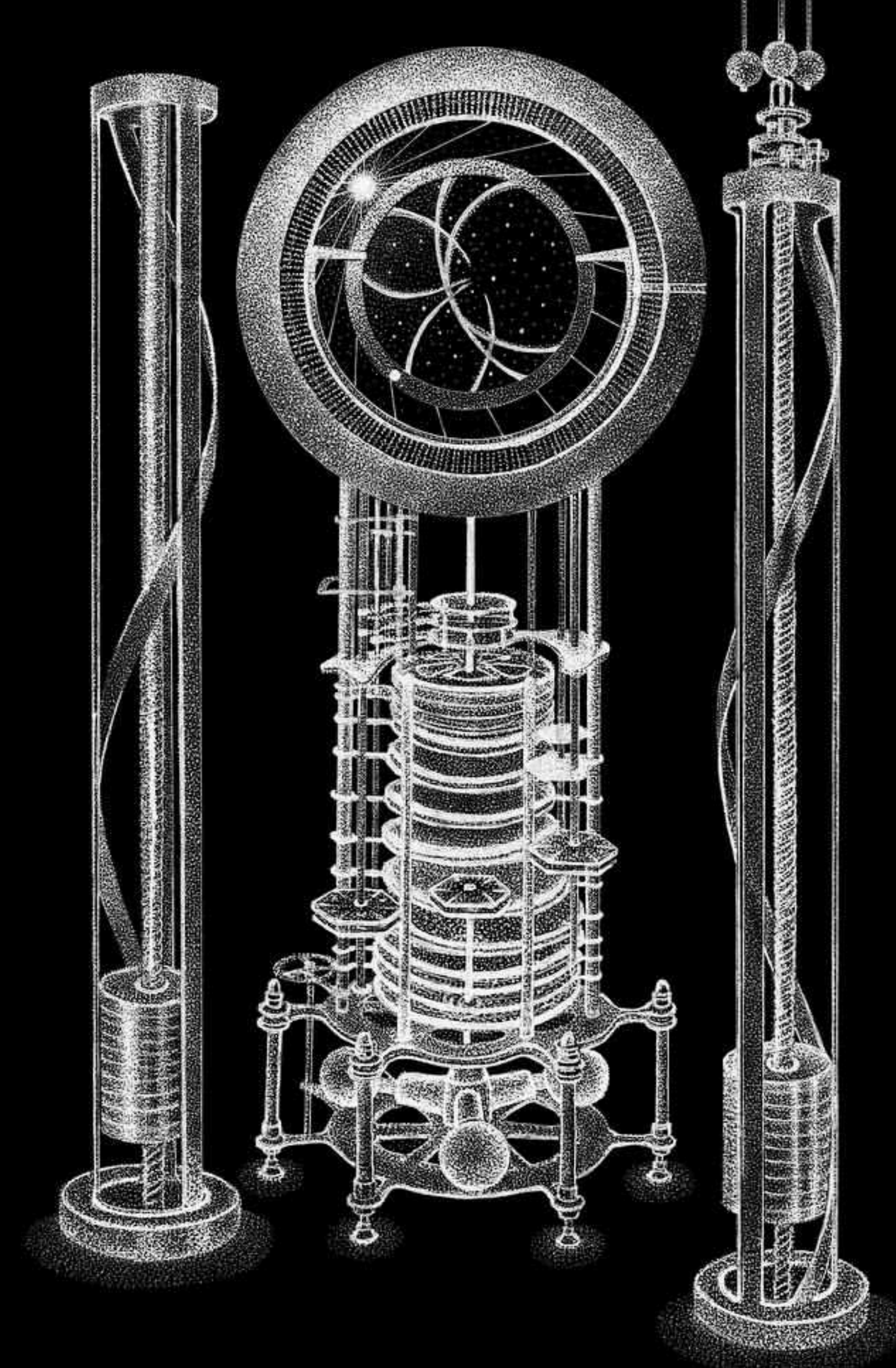
Table of Contents

Types of cams

- Different shaped cams are used for different tasks:



Clock of the Long Now Foundation



Automata

Computational Design of Mechanical Characters

Stelian Coros*[1] Bernhard Thomaszewski*[1] Gioacchino Noris[1] Shinjiro Sueda[2] Moira Forberg[2]
Robert W. Sumner[1] Wojciech Matusik[3] Bernd Bickel[1]

[1]Disney Research Zurich [2]Disney Research Boston [3]MIT CSAIL

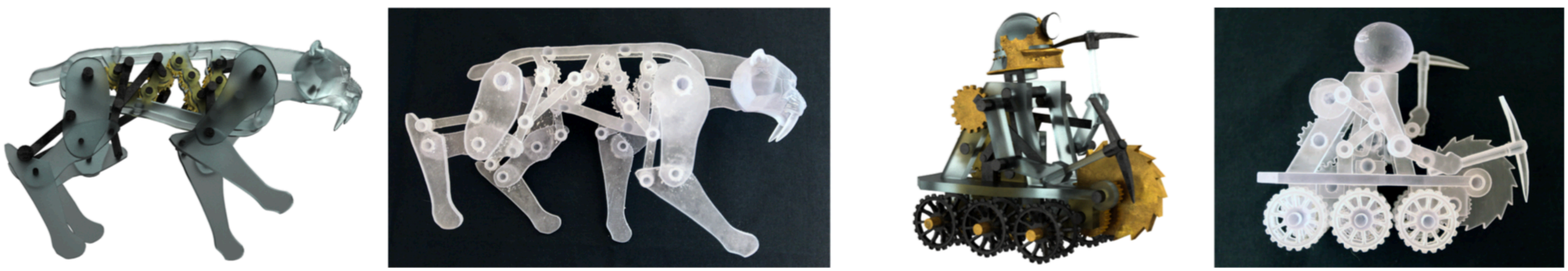


Figure 1: *The interactive design system we introduce allows non-expert users to create complex, animated mechanical characters.*

Abstract

We present an interactive design system that allows non-expert users to create animated mechanical characters. Given an articulated character as input, the user iteratively creates an animation by sketching motion curves indicating how different parts of the character should move. For each motion curve, our framework creates an optimized mechanism that reproduces it as closely as pos-

1 Introduction

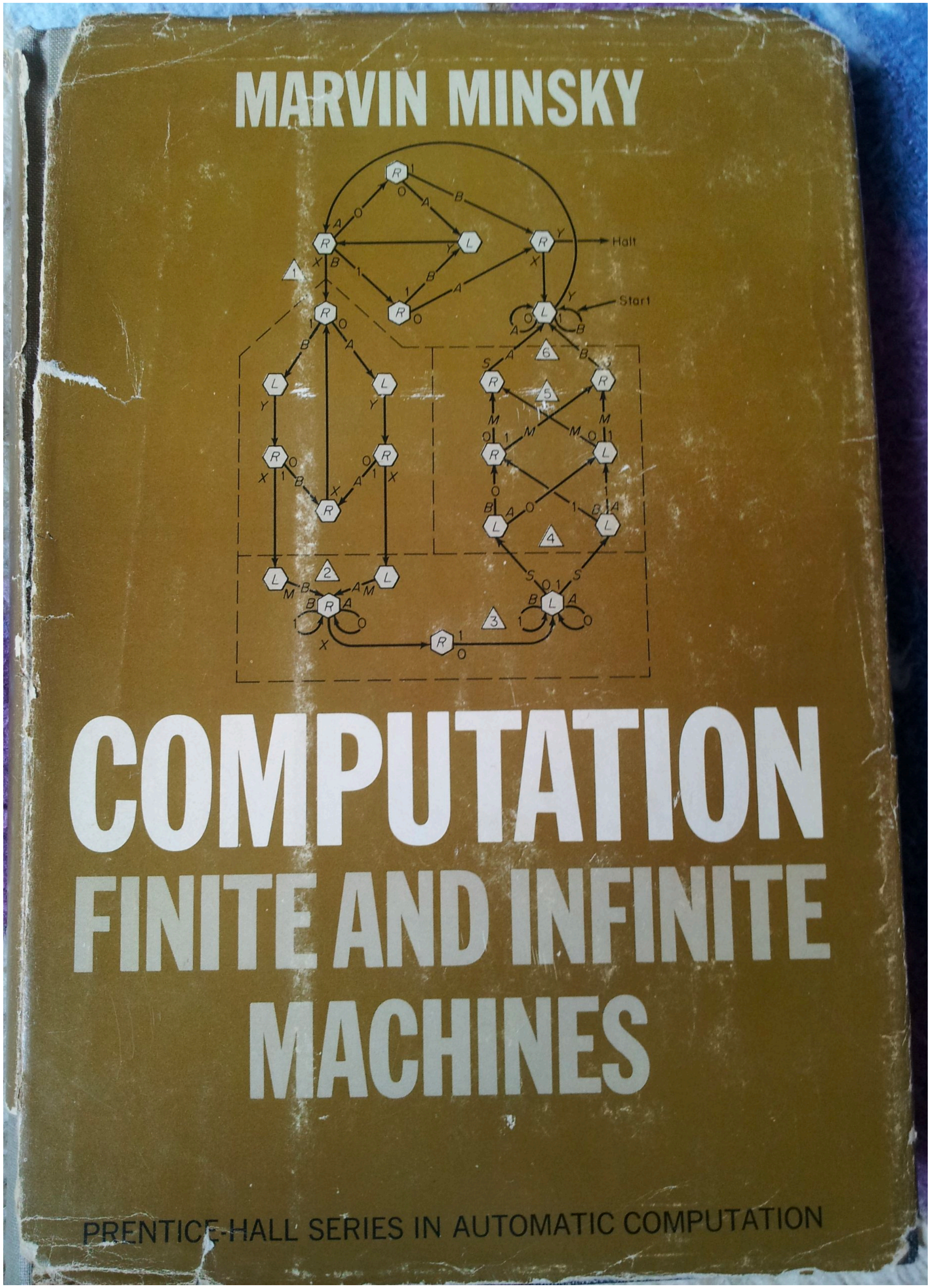
Character animation allows artists to bring fictional characters to life as virtual actors in animated movies, video games, and live-action films. Well-established software packages assist artists in realizing their creative vision, making almost any digital character and movement possible. In the pl l, animatronic figures play an equivalent role in theme parks and as special ef-

Cylinder Music Box

Washing Machine Sequencer (1970ish)

https://en.wikipedia.org/wiki/Cam_timer


BASIC MECHANISMS
IN
FIRE CONTROL
COMPUTERS
Part 1
0:05 / 6:14



What is a Machine?

Finite-State Machine

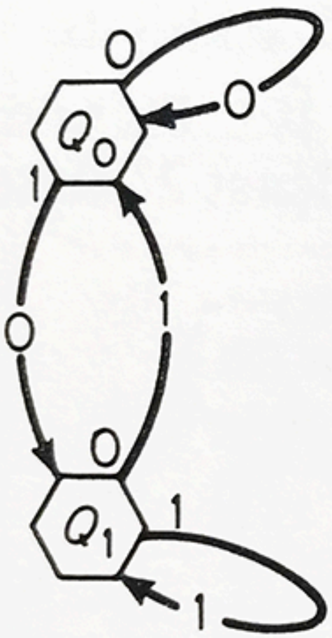


Fig. 2.3-1. Memory machine.

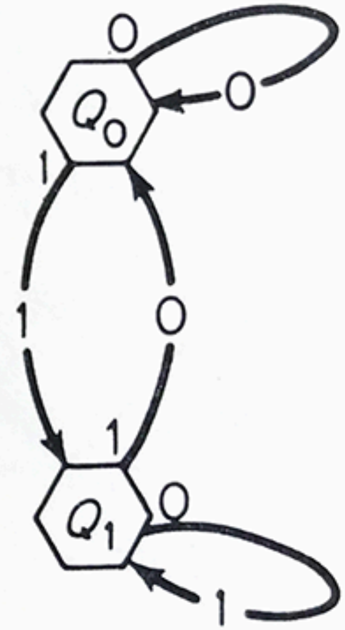


Fig. 2.3-2. Parity machine.

From: Computation: Finite and Infinite Machines

References

Basic Machines, NAVEDTRA 14037

Computation: Finite and Infinite Machines, M. Minsky

Videos

- Mechanical computers

Web sites

- http://507movements.com
- Thang's animations