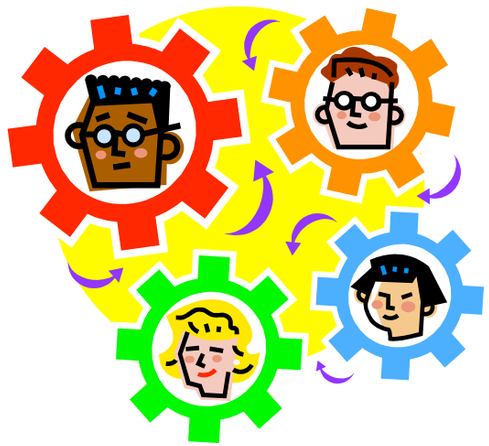
centre de
développement
pédagogique
pour la formation générale
en science et technologie

My animated object



THEORETICAL CAPSULE

August 2009

MECANICAL OBJECTS

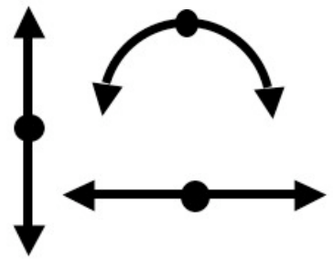


Application of a force

Examples of actions:
Push
Pull
Turn
Press
Electrical force
…

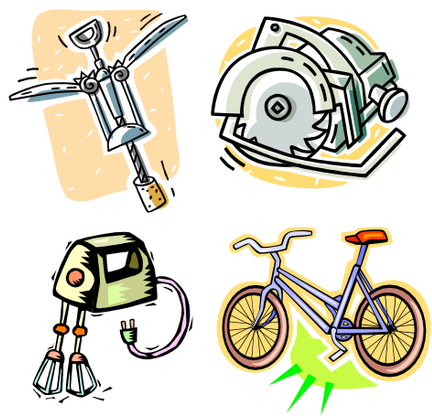
Production of movements

Examples of movements:
Turn (complete or partial rotation)
To move horizontally
(left-right translation or vice versa)
To move vertically
(up-down translation or vice versa)
To do both simultaneously (helical)



Obtaining a result

Examples of results:
Roll, move forward, move backward, throw, propel, whip, mix, cut, balance, oscillate, topple
…



Examples of transmission mechanisms:
Chain and cog wheels
Gears
Pulley and belt
Friction wheels
Wheel and worm gear
Cam and roller

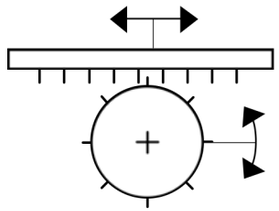
Transmission of movement:
IS THE COMMUNICATION OF THE SAME MOVEMENT FROM ONE PART TO ANOTHER WITH POSSIBLE VARIATIONS IN SPEED

Movements can be transmitted or transformed:

Transformation of movement :
IS AN ACTION THAT CHANGES THE NATURE OF THE MOVEMENT (rotation to translation or translation to rotation)

Examples of transmission mechanisms
Rack and pinion
Rod and crank
Cam and roller
Crank and slide
Screw and rack
Screw and nut

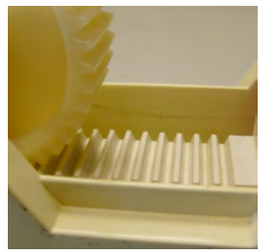
TRANSFORMATION OF MOVEMENT



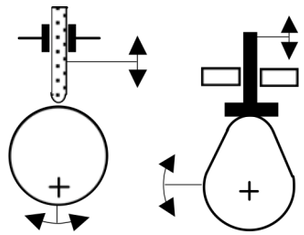
Rack and pinion



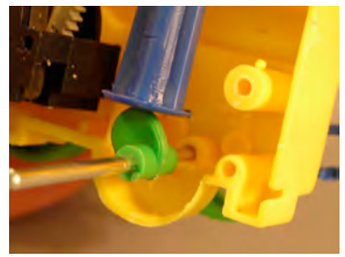
Cork-screw



French fry cutter



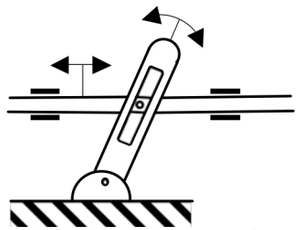
Cam and roller

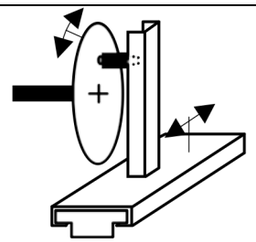


Toy train



Toy car

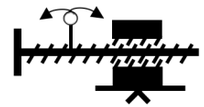




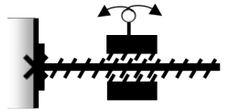
Crank and slide (may be found in transmission of movement)



Inside of a toy



Free screw and fixed nut



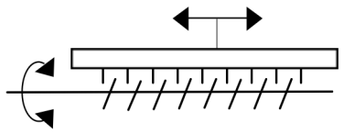
Fixed screw and free nut



C clamp



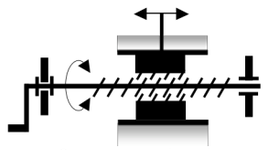
Bottle neck



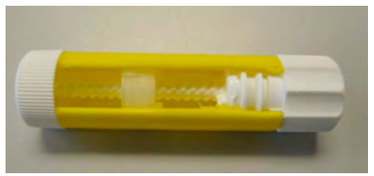
Rack and screw



Adjustable wrench



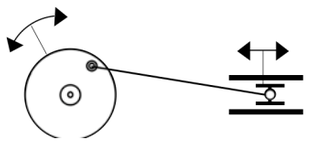
Screw and nut



Glue stick



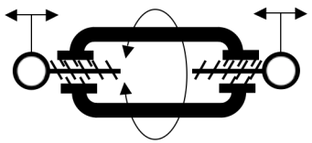
Vise



Rod and crank



Inside of a toy

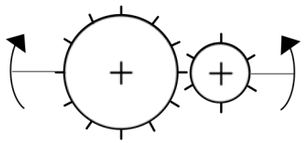


Screw and nut



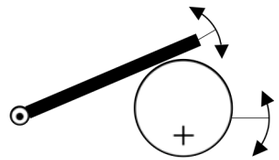
Eyelet tensor

TRANSMISSION OF MOVEMENT


Gears

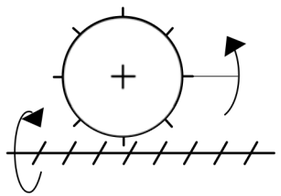

Toy hand mixer

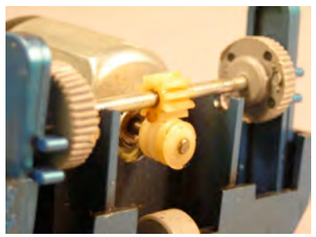

Correction ribbon


Cam and roller

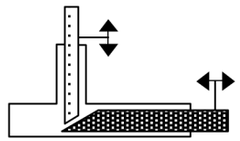

Inside of a toy

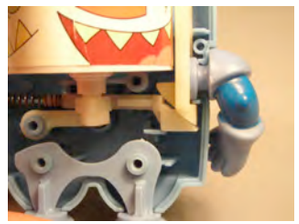

Articulated toy


Wheel and worm gear

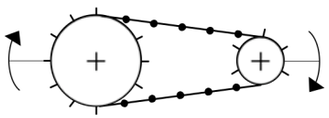

Toy robot


Guitar key


Wedge system

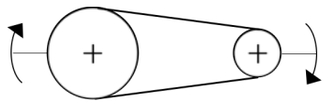

McDonald's toy


Toy mixer


Chain and cog wheels

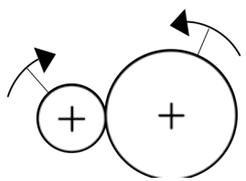

Bicycle

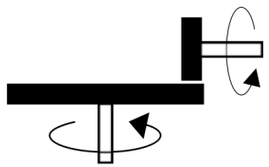

Vertical blind mechanism


Pulley and belt

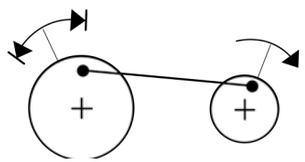

Press drill


Correction ribbon

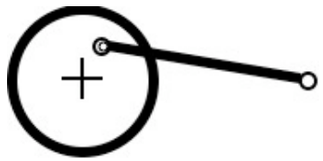
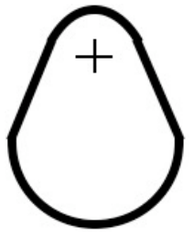
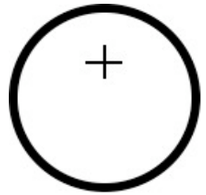
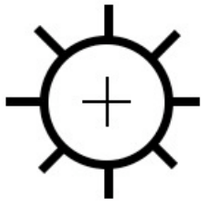
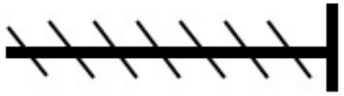
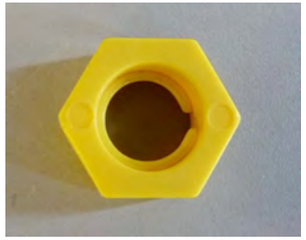
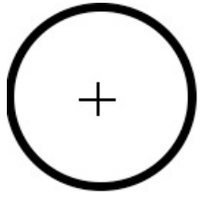
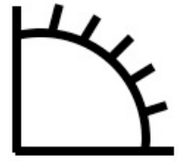
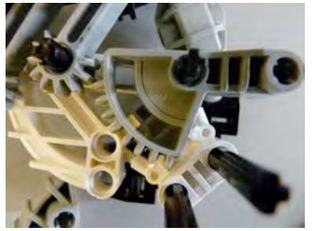

Friction wheels

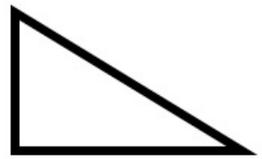

Horizontal and vertical friction wheels


Pipe cutter


Crank connecting rod crank


Articulated toy

 Rod and crank	 Toy train	 Oval cam	 Kinder surprise toy	 Round cam	 Inside of a toy
 Compressible spring	 Retractable pen	 Rack	 Ice cream scoop	 gear	 Hand mixer
 Extensible spring	 Spring in a stapler	 Screw or bolt	 Meccano bolt	 Nut	 Meccano nut
 Angular spring	 Paper holder	 Wheel	 Circular knife on the can opener	 Toothed section	 Part of a Lego Bionical

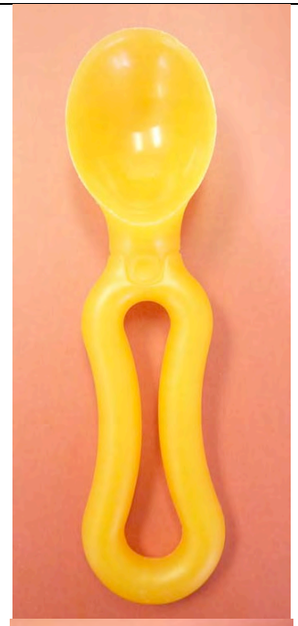
 Leaf spring	 Wind-up car	 Spherical articulation	 Articulated toy robot	 Inclined plane	 Toy mixer

COMPARISON OF 4 MODELS OF ICE CREAM SCOOPS

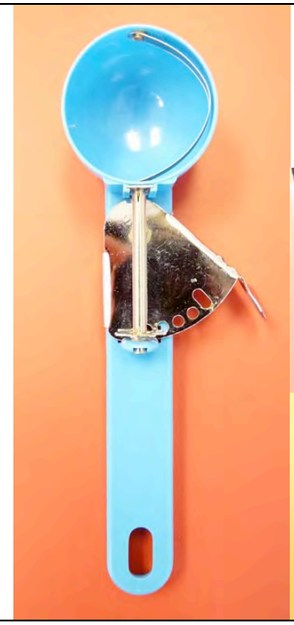


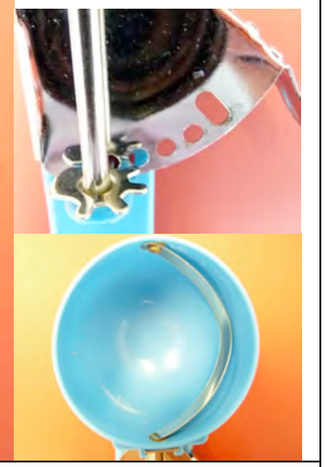


- Metal and plastic
- 8 metallic and 1 plastic part
- Angular action spring between the two handles to ensure they reopen
- Rack and pinion system to make the curved part inside the spoon move



- Plastic
- No mechanism
- 1 single part formed by moulding, because you can see the mould line
- Injection point at the end of the handle
- Form fitting handle
- Very lightweight





- 2 types of metal and plastic
- 6 metallic parts and 1 plastic part
- Spoon formed by moulding, for there is the presence of an injection point on the handle, unmolding points in the concave part and junction lines from the mould
- Hollow handle with X shaped reinforcement
- Angular action spring
- Gear system to make the curved part inside the spoon move
- All the metal parts are steel, for there are rust marks, except for the yellow coloured rivet, probably brass
- Lightweight



- 2 different types of metal
- No mechanism
- 5 obvious parts
- Spoon part probably moulded
- Extruded handle, possibly out of stainless steel because of the colour
- May be an assemblage by pressing

GLOSSARY OF MECANICAL TERMS

Terms and definitions
CAM: Shape animated with a rotation movement that acts by contact with another shape in order to communicate movement to it. A cam may be round (exocentric), oval, cylindrical or a curved shape.
EXOCENTRIC: Wheel whose axis of rotation is not the center.
PINION: Rod or bar with teeth.
GEARWHEEL: The smallest of the toothed wheels that makes up a gear system.
ROLLER: Shape pushed by the cam (rod, bar, lever, …)
ROD: Rod or bar linking two mobile parts in order to produce a movement
CRANK: Mechanical component that is used to imprint a rotation movement (wheel, angled rod, handle, …)
GUIDANCE: In objects, certain parts are used to direct other parts. For there to be guidance, there must be 2 parts.
LINKAGE: In objects, parts are linked to one another in order to allow or prevent the different parts to be disassembled. For there to be a link, there must be 2 parts.

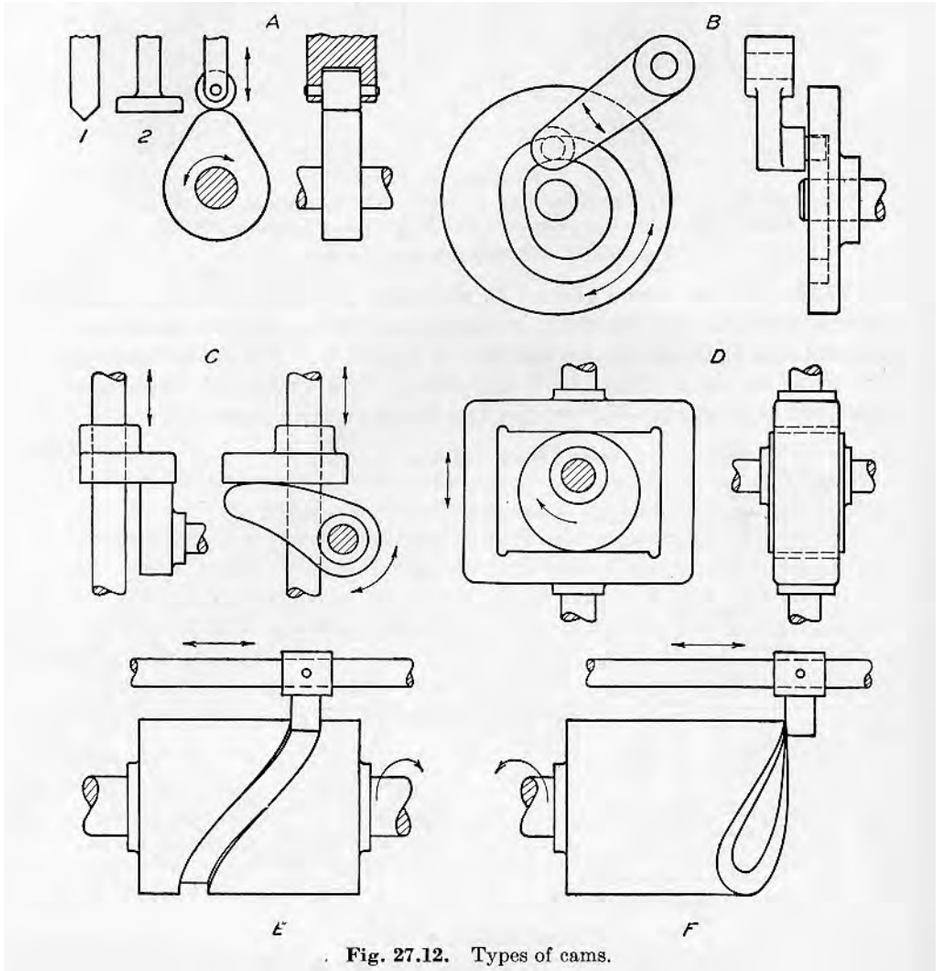


Fig. 27.12. Types of cams.

Types of cams

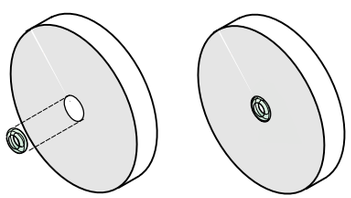
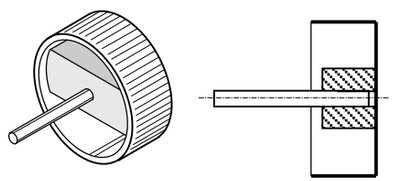
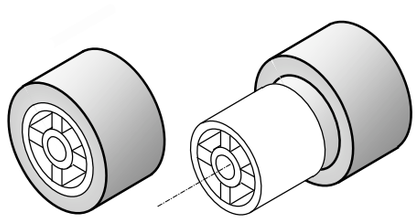
Images drawn from:
E. French Thomas and Charles J. Vick. A manual of engineering drawing for students and draftsmen, McGraw-Hill Company inc., 8e edition, 1953, p. 472.

BEGINNER HANDYMAN'S MANUAL

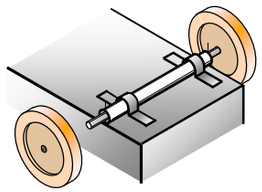
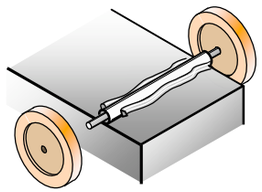
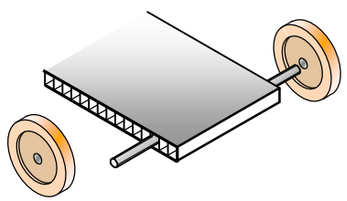
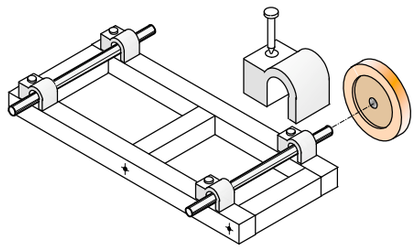
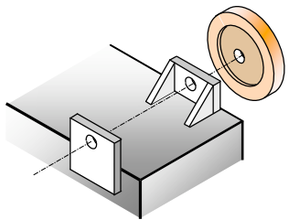
What can we use to make?

A wheel	**An axle or an axis**	**A handle**	**A pulley**	**A gear**
Bobbin from thread Styrofoam Bottle caps Cardboard Rigid cardboard tubing Foamcore	Wooden dowel Wood pencil Pencil tube Drinking straw	Cork Pen cap	Bobbin of thread	Styrofoam circle Two sides of corrugated cardboard or cut Coroplast Bottle caps Edges of corrugated cardboard or cut Coroplast

Wheel models

Doubled Styrofoam, Coroplast, Cardboard or Foamcore with necklace bead in the center.	**Hollow cap with a wooden part inside**	**Bobbin and pipe insulation**
		

How to link the wheels to the vehicle? By a fixed axle, a mobile axle, or without an axle.

Straw or tube with adhesive tape (mobile axle)	**Straw or tube with plasticine** (mobile axle)	**Insertion of a stem into Coroplast (Fixed or mobile axle, depending on the diameter of the stem).**	**Cable tacks** (mobile axle)	**Added plates with or without axle**
				

How to link an axle to the wheel to allow the wheel to rotate?

Blocking by a flexible tube and a washer	**Blocking by a nail or a pin**	**Blocking by a wooden bead**
