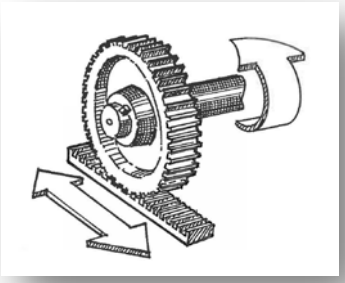
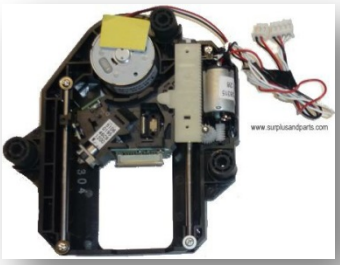
Mechanical Devices

Rack and Pinion

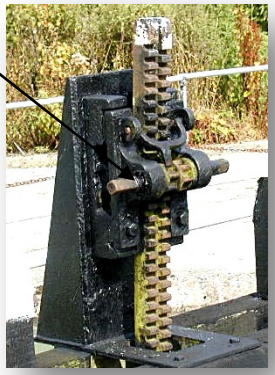
Camera tripods use rack and pinion gears for height adjustment.



A DVD player also uses a rack and pinion to drive the disk tray in and out.

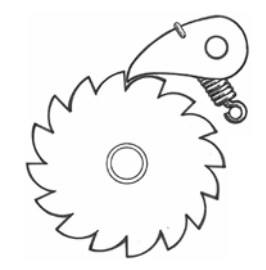


The sluice gate (which control water levels and flow rates in rivers and canals) is operated by attaching a crank or handle to the square end of the shaft which passes through the pinion. It is raised by rotating the **crank** clockwise and lowered by rotating the crank anti-clockwise.



Ratchet and Pawl

A ratchet and pawl mechanism is used to allow rotary motion in one direction only or to stop a mechanism from moving. The ratchet is a wheel with teeth like those of a saw around its edge. The teeth are specially shaped to prevent slippage. The pawl is a lever with a catch on the end, which meshes with the notches of the ratchet wheel. The movement of the pawl will usually be restricted by a spring, which will prevent uncontrolled movement of the wheel.



To allow the ratchet to be released the pawl is raised. A spring is usually used to keep the pawl in place against the ratchet.

Ratchet and pawls are commonly used in lifting equipment to prevent the load falling once it has been lifted. These mechanisms can also be used to produce a regimented stepped rotational movement. Slippage of the ratchet is prevented by the spring. If the spring is pulled back sufficiently to disengage the pawl from the wheel, the load will fall.

Ratchet and pawls are found on winches, car hand-brake levers, socket sets and fishing reels.