Mechanisms
Geneva Wheel, Worm Gear, Screw Mechanism

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Geneva Wheel

- Originally invented by a watch maker to convert continuous rotational movement to intermittent rotational movement.
- One of the most commonly used mechanisms for intermittent rotation due its low cost and good performance.
- Three types: Internal, External, and Spherical
Geneva Wheel (External)

- Driver continuously rotates
- Drive Pin enters the drive slot and rotates output 90 degrees.
- Held in place by locking surface
Internal Spherical

Fig. 9-2. Four-slot internal Geneva.

Fig. 9-3. Four-slot spherical Geneva.

Drawing courtesy of MACHINE DESIGN Magazine; Dec. 25, 1965; p. 121 ff.
Video Demonstration
Geneva Wheel
Geneva Wheel advantages

**Advantages**
- Available in a wide variety of sizes.
- Maintains good control of its load at all times.
- Have little wear leading to a very long life span.

**Disadvantages**
- Limited number of dwells from 3 to 18 per rotation.
- Has a greater instantaneous change of acceleration than a cam mechanism.
- Very difficult to change timing once design is chosen.
Geneva Wheel
Film Projector

frame of film
sprocket
shaft
Maltese cross
cam
pin
gear
dwell phase
dwell phase
pull-down phase
dwell phase

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Geneva Wheel
Clock
Worm Gear

- Used when large gear reductions are needed.
- Changes axis of rotation
- Changes angular velocity
Video Demonstration
Worm Gear
Fishing reel

Fishing Reels Gears in Housing

- Base
- Worm Wheel
- Input Drive Worm Gear
- Output Drive Worm Gear
Machining Base
Screw Mechanism

• Converts rotational motion to linear motion by converting torque (rotational force) to linear force.
• Lead: the linear distance that is traveled after one full rotation.
• Pitch: The axial distance between the threads.
• Screws have a self locking property.
Video Demonstration
Screw Mechanism
Advantages

• Small rotational forces can exert large axial forces.
• Screws have a high mechanical advantage (ratio of output force to input force).
• Simple design that can be very cost effective.

Disadvantages

• Frictional energy losses due to the large contact area between the threads.
• Amount of work out is far less than the input work due to the work transformed into heat by friction.
• Jack screws typically only have 15%-20% efficiency.
Archimedes Screw

Used to transport water to higher elevations.
Vise