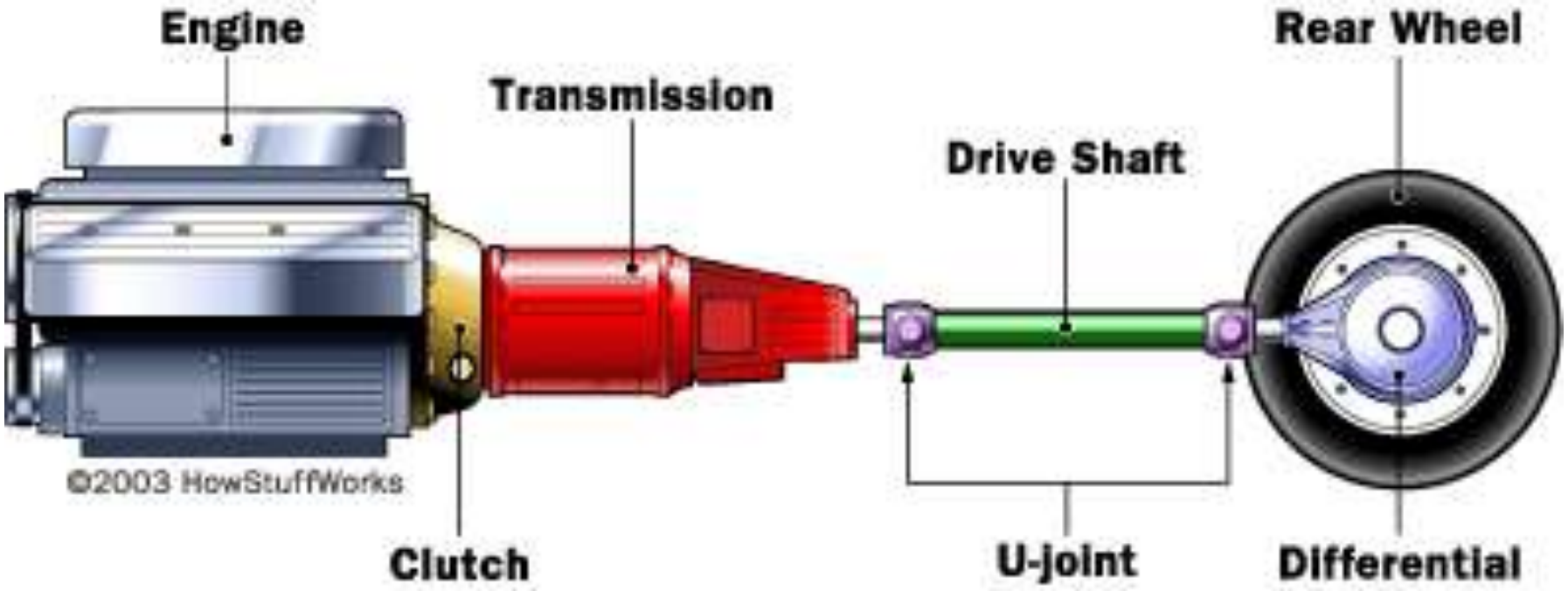
# Brakes and clutches and stuff

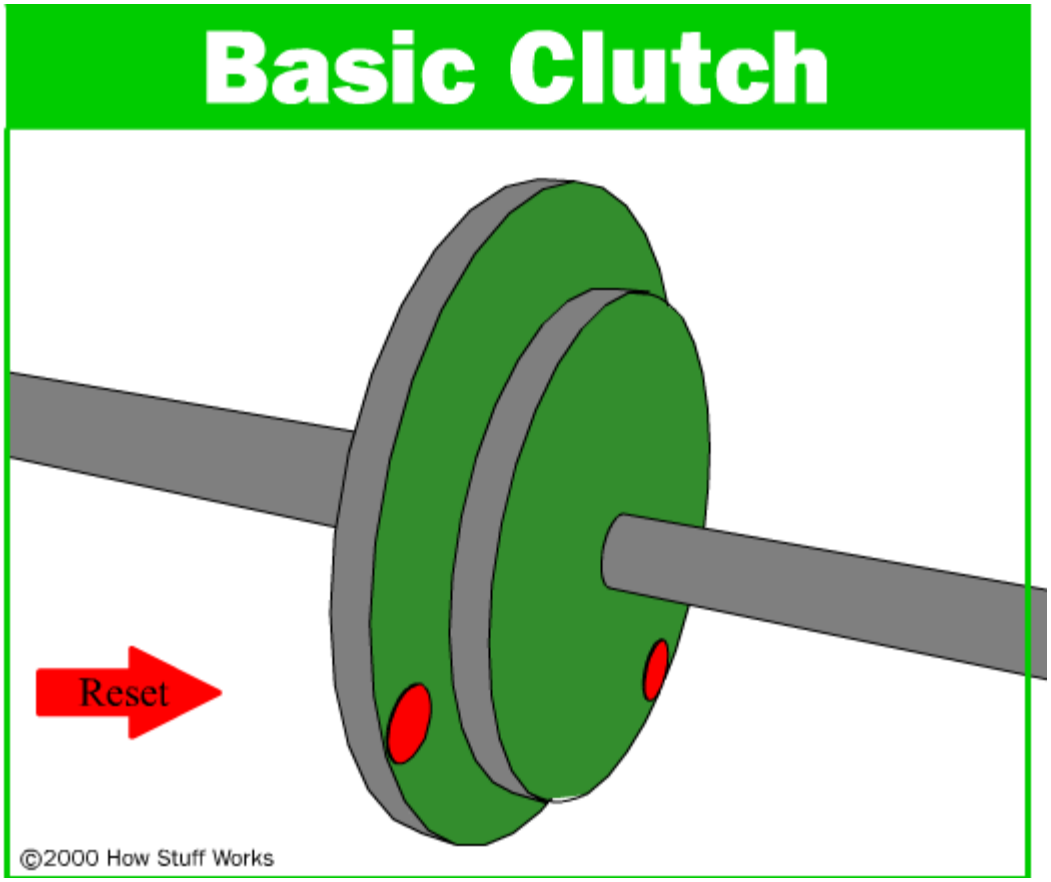

Engine
Transmission
Drive Shaft
Rear Wheel
©2003 HowStuffWorks
Clutch
U-joint
Differential

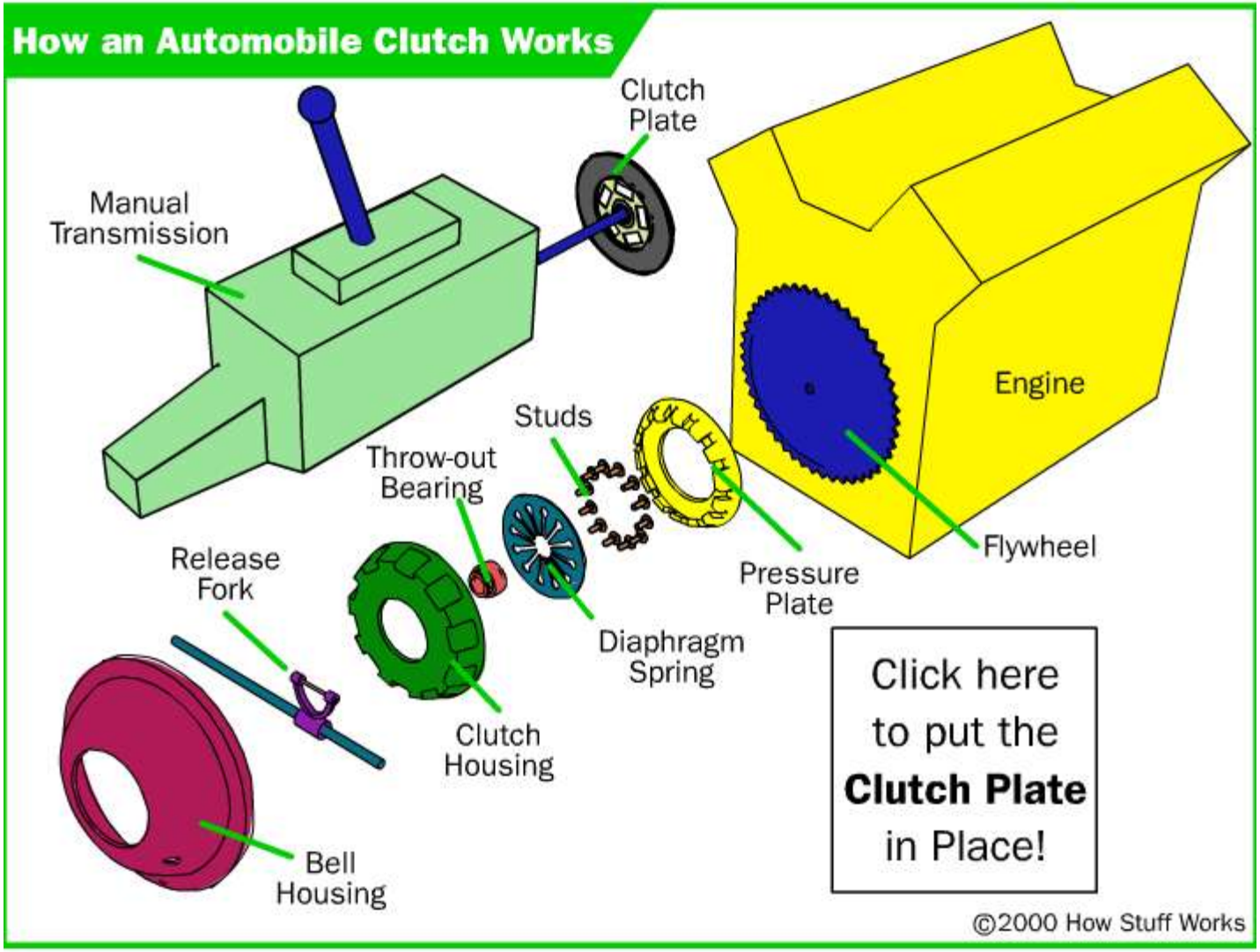
# Clutches

**The purpose of a clutch is to initiate motion or increase the velocity of a mass generally by transferring kinetic energy from another moving item. The mass being accelerated is generally a rotating inertial load . Using a friction type clutch the energy is generally transferred using surfaces lined with friction material... Using a positive clutch the energy is transferred using interlocking teeth or projecting lugs. However magnetic force or fluid viscosity is also used to transfer torque**

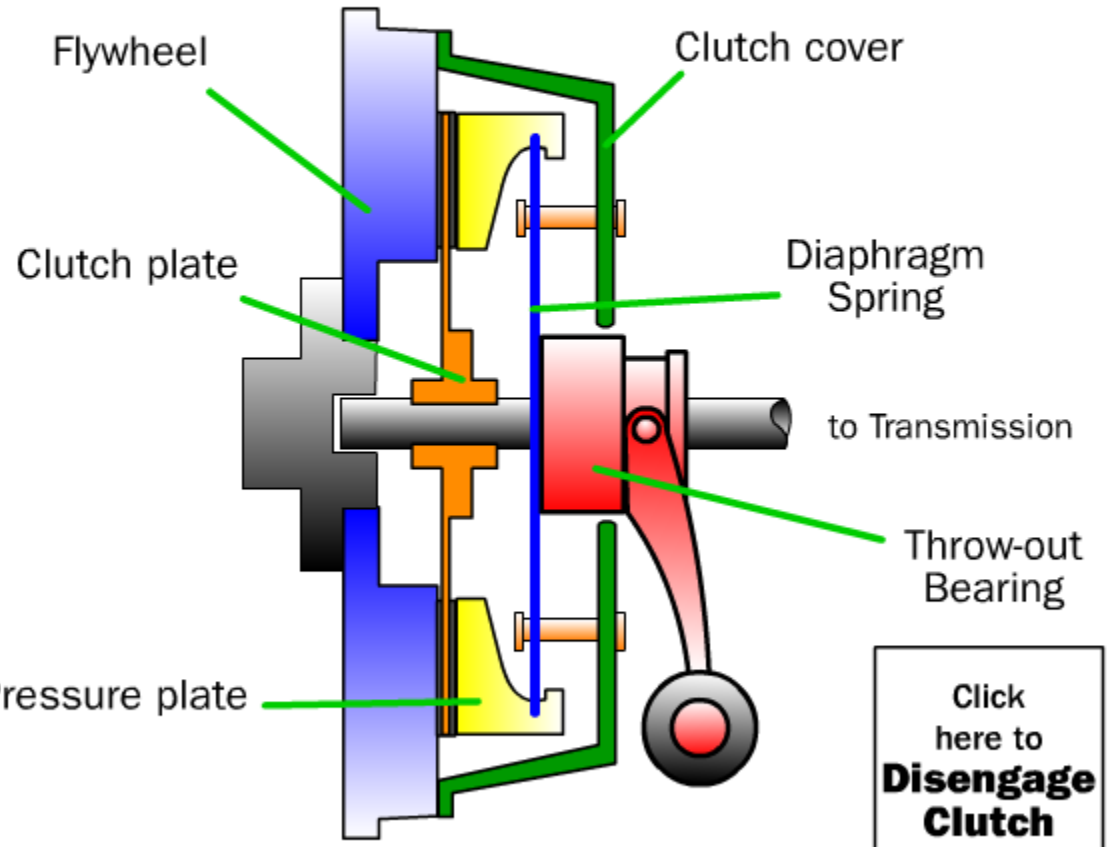
# PLATE CLUTCH

**Two types :single disc and multi disc. Discs generally have fabric linings on both sides to transmit torque from adjacent rotating discs when clamping forces are applied. Clamping force may be via springs.**




How an Automobile Clutch Works
Clutch Plate
Manual Transmission
Engine
Studs
Throw-out Bearing
Release Fork
Pressure Plate
Flywheel
Diaphragm Spring
Clutch Housing
Bell Housing
Click here to put the Clutch Plate in Place!
©2000 How Stuff Works

# Diaphragm Clutch





# Centrifugal clutch

The clutch consists of three parts:

An outer drum that turns freely - This drum includes a sprocket that engages the chain. When the drum turns, the chain turns.

A centre shaft attached directly to the engine's crankshaft - If the engine is turning, so is the shaft.

A pair of cylindrical clutch weights attached to the centre shaft, along with a spring that keeps them retracted against the shaft

There are several advantages to a centrifugal clutch:

It is automatic. (In a car with a manual transmission, you need a clutch pedal. A centrifugal clutch doesn't.)

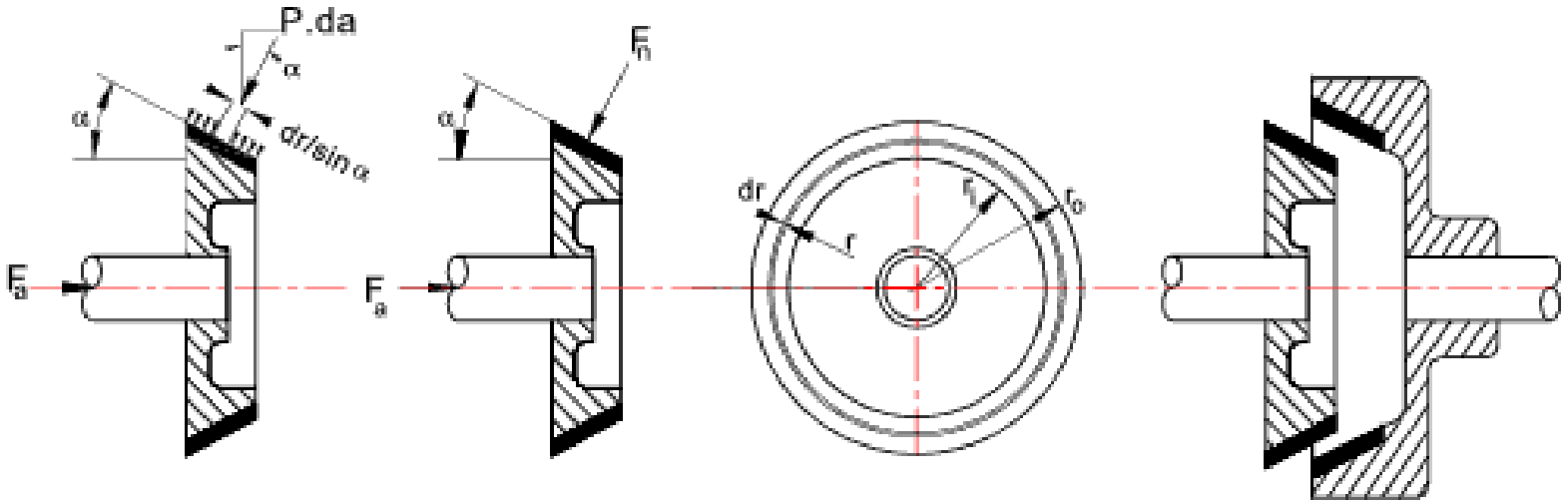
It slips automatically to avoid stalling the engine. (In a car, the driver must slip the clutch.)

Once the engine is spinning fast enough, there is no slip in the clutch.

It lasts forever. (almost)

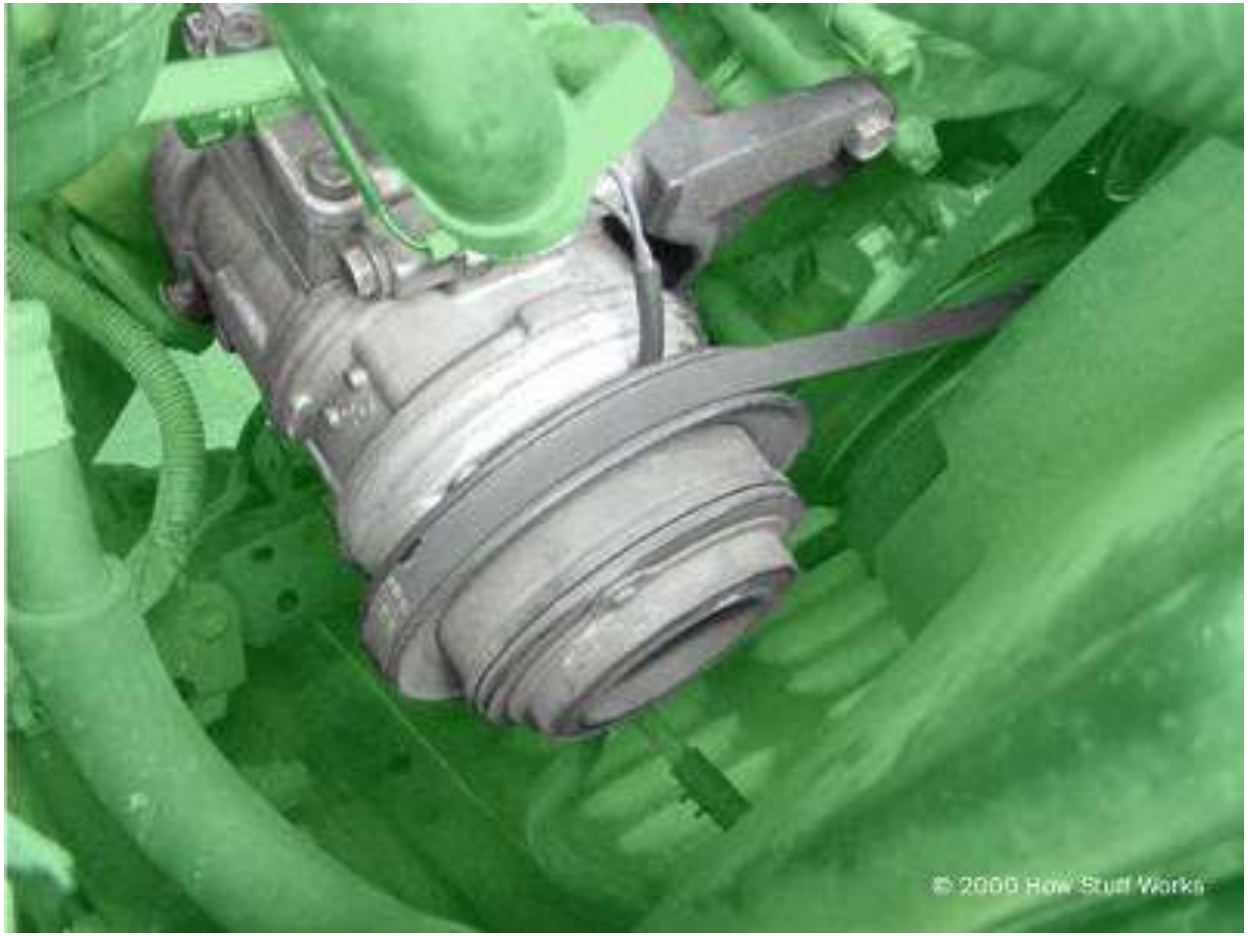
**Cone**

The clutch drives between internal and external cones instead of plates. The clutch is engaged when the inner cone(external) is forced into the outer (internal) cone. The cone clutch utilises the wedging action of the parts to increase the normal force on the lining. Thus an increase in the tangential friction and the torque results. The clutch has improved thermal properties over a plate clutch .



**Eddy Current**

**The torque is transmitted by electromagnetic attraction between the rotating members. Design allows remote control or torque and relative speed**



**Dog** A clutch in which projections on one part fit into recesses on the other part. This is a positive drive clutch. Old fashion design but very simple

**Fluid**

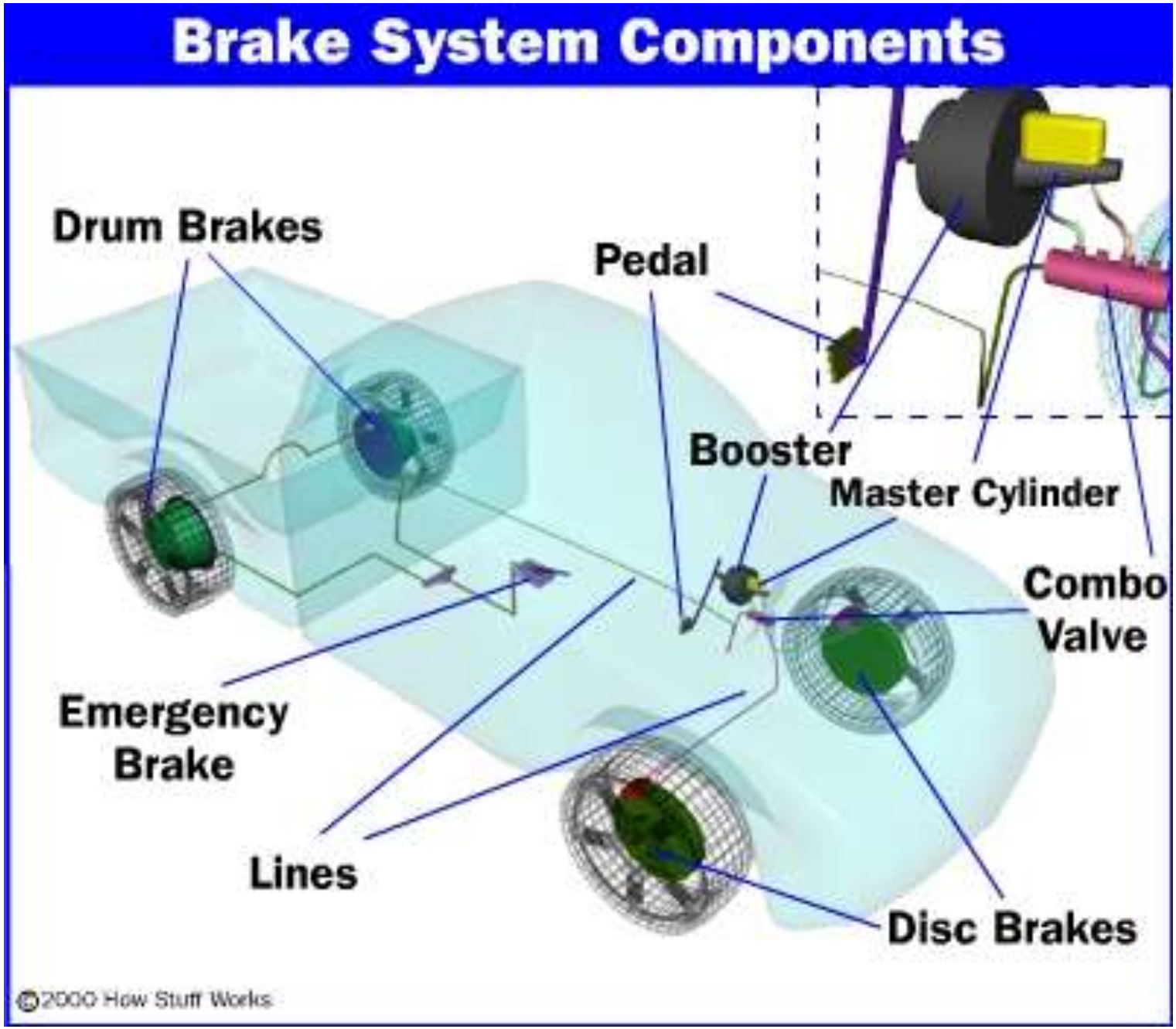
**This type of clutch transfers torque using a viscous fluid in a chamber. This system allows the speed on the driven side to progressively increase up to the speed of the driving side. Not very good for sudden changes of load**

**Sprag**

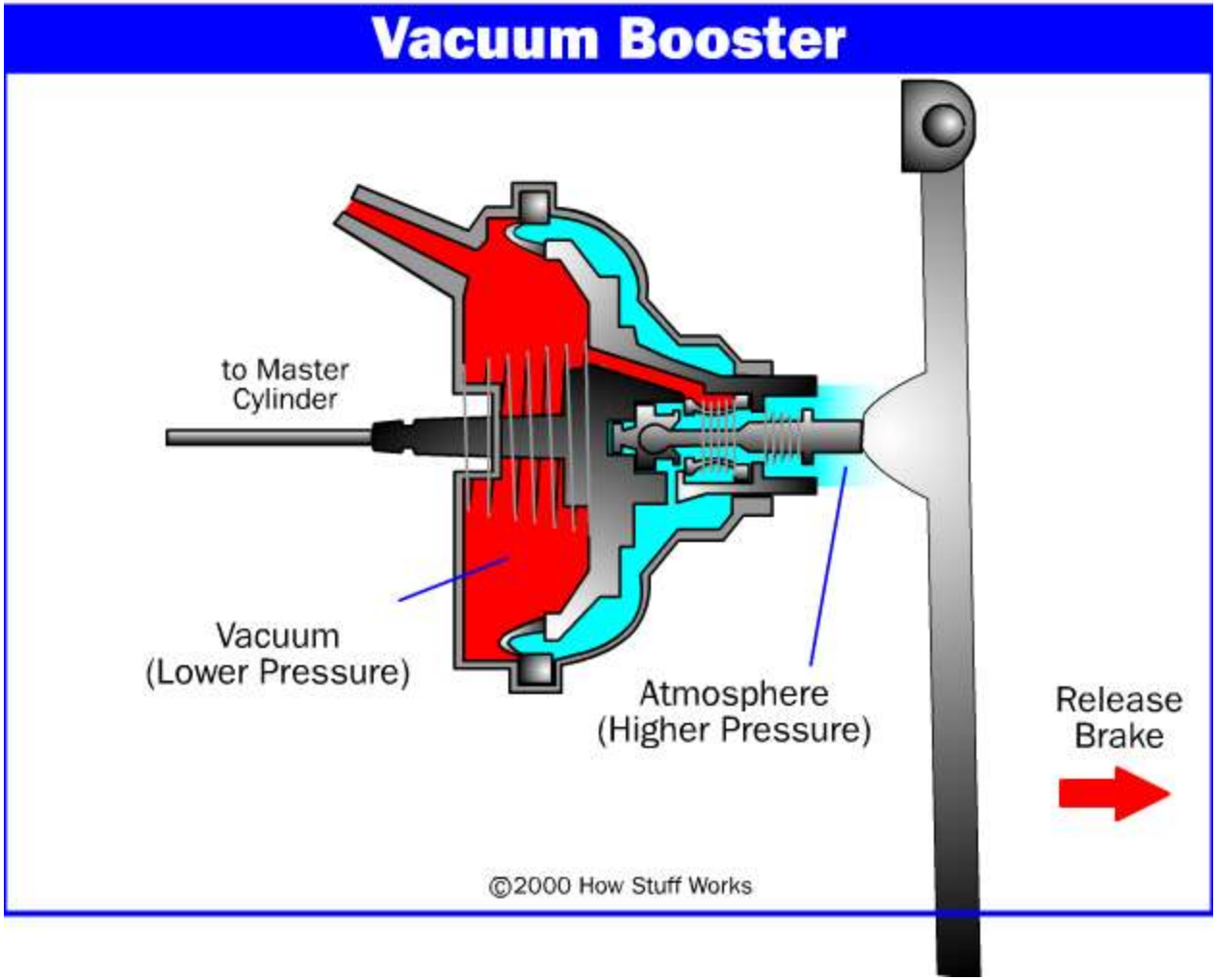
**This is basically an inner race and and outer race and the annulus between is occupied by a number of sprags .The sprags are steel blocks positioned and shaped such that if they will transmit power from one race to the other by a wedging action in the driving direction. Rotation in the othe direction frees the sprags and the clutch is disengaged. Either race can be the driver. This type of clutch can be used to allow simple over-running, indexing, or back-stopping**


## Brakes

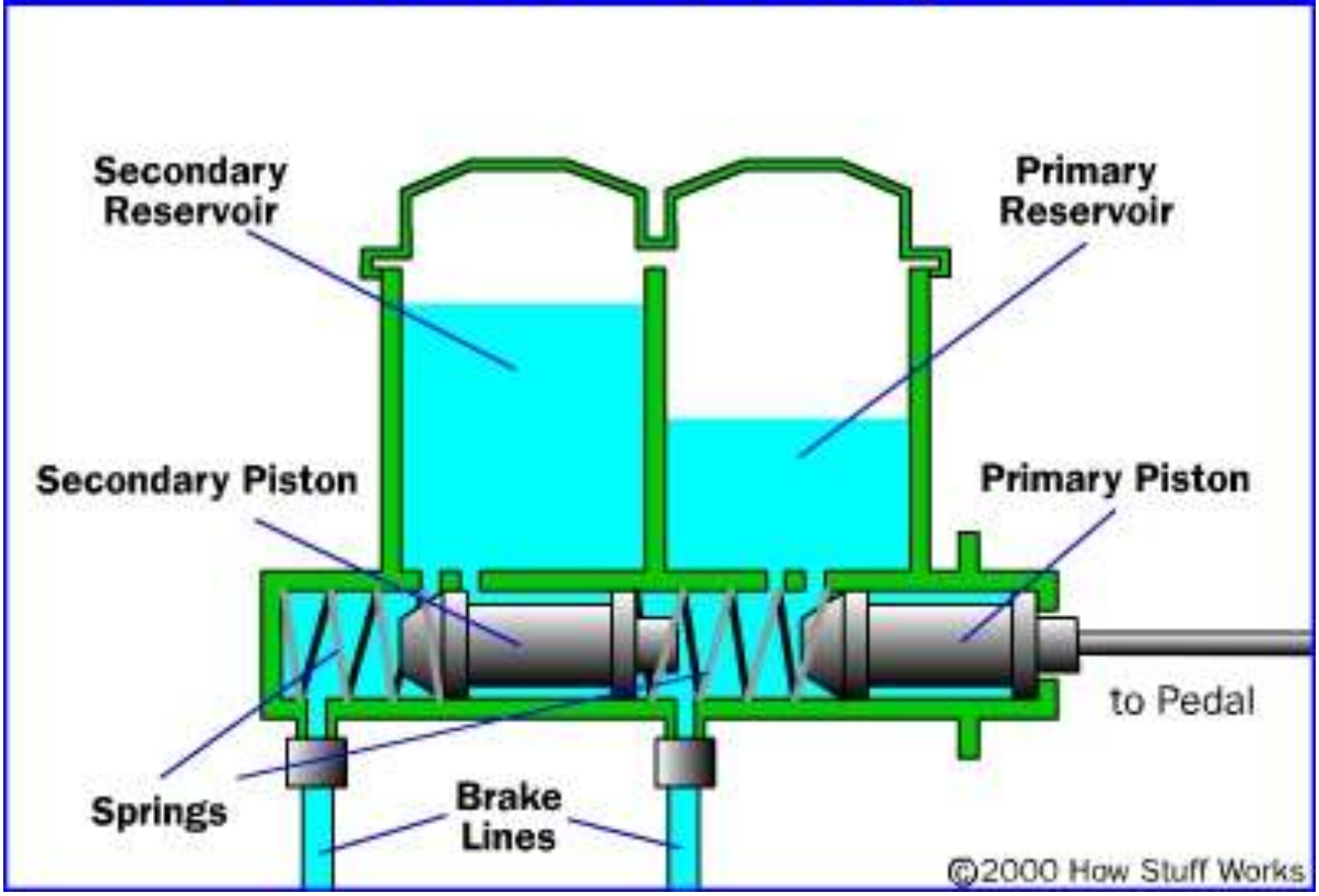
The purpose of a brake is to stop or slow down a moving mass generally by converting the kinetic energy into thermal energy using brake pads/shoes/discs etc. The brake surface for friction brakes is made from a material with high coefficient of friction, high strength and good thermal properties. The mass being retarded is generally a rotating inertial load and the brake material is attached to stationary members.


Brake System Components
Drum Brakes
Pedal
Booster
Master Cylinder
Combo Valve
Emergency Brake
Lines
Disc Brakes
©2000 How Stuff Works

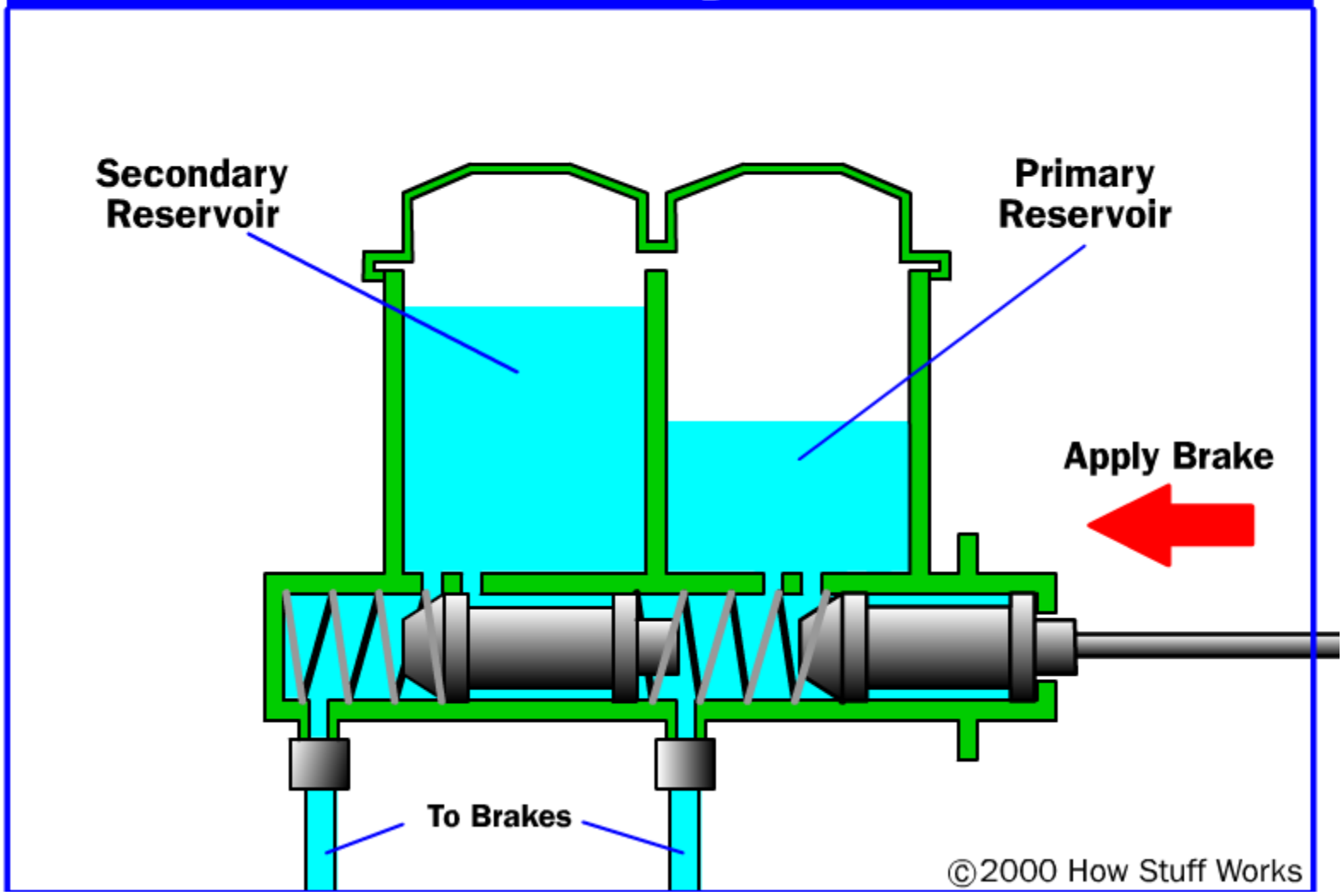
# Vacuum Booster

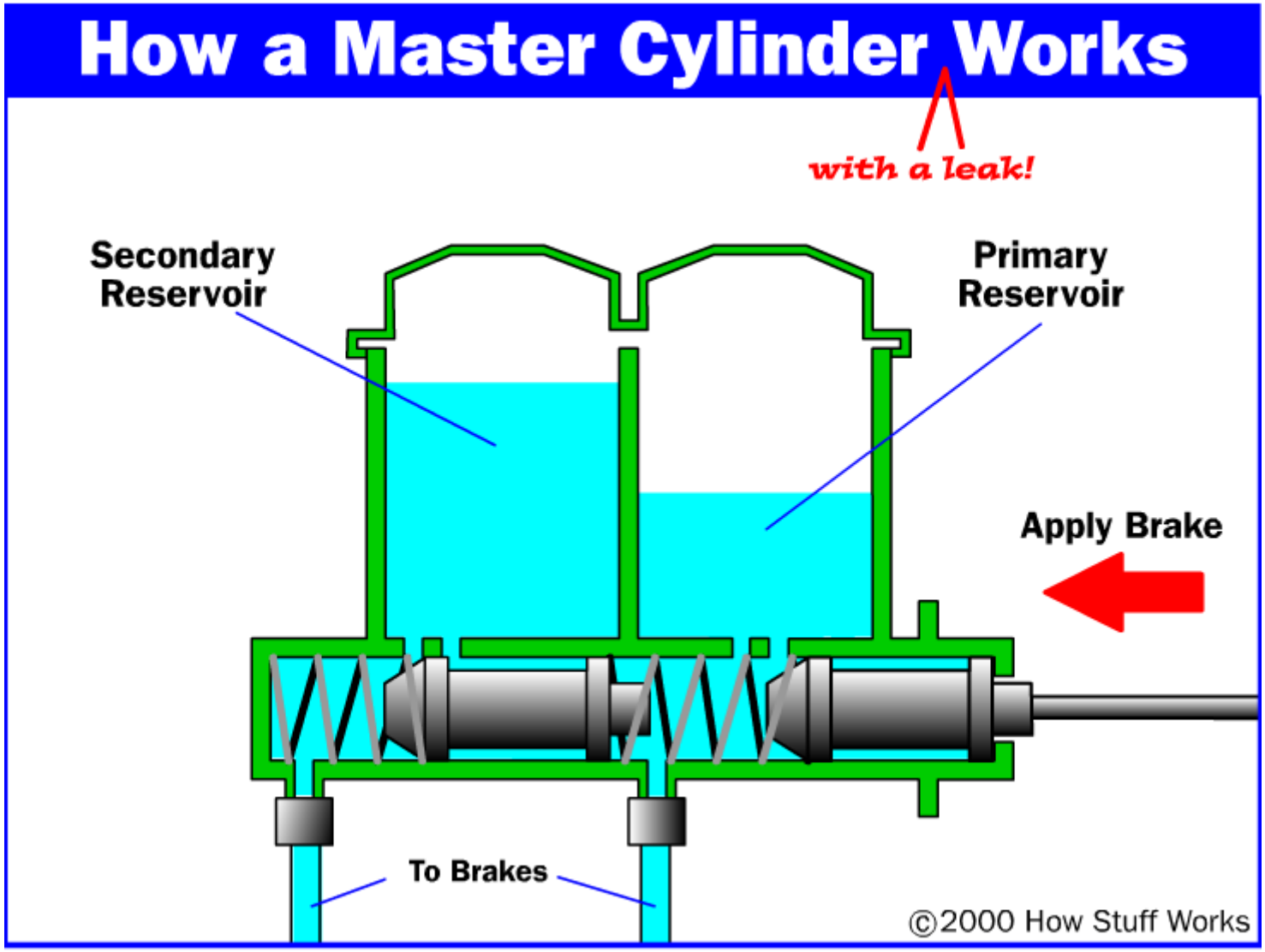


# Inside the Master Cylinder



# How a Master Cylinder Works

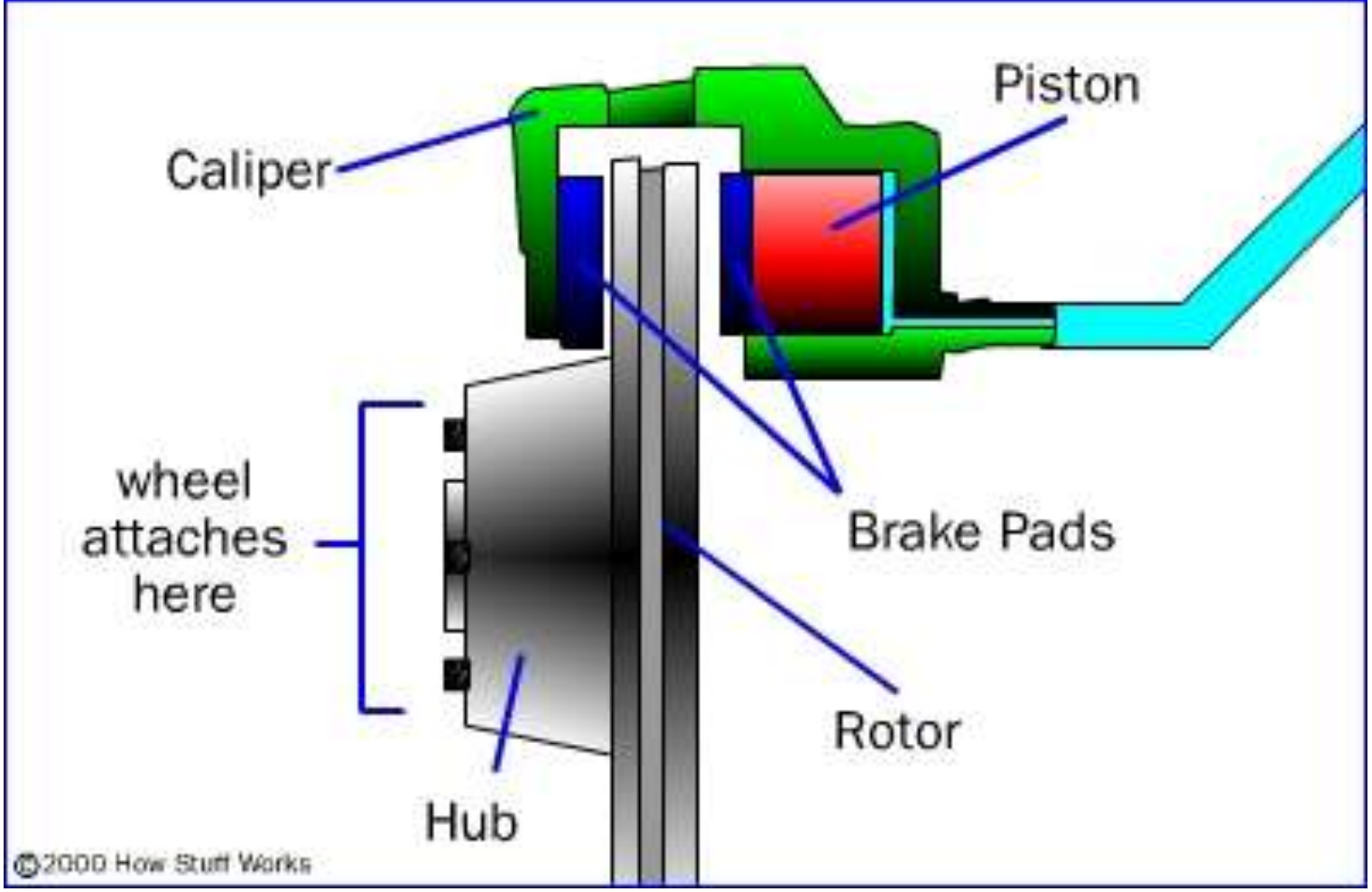



How a Master Cylinder Works
with a leak!
Secondary Reservoir
Primary Reservoir
Apply Brake
To Brakes
©2000 How Stuff Works

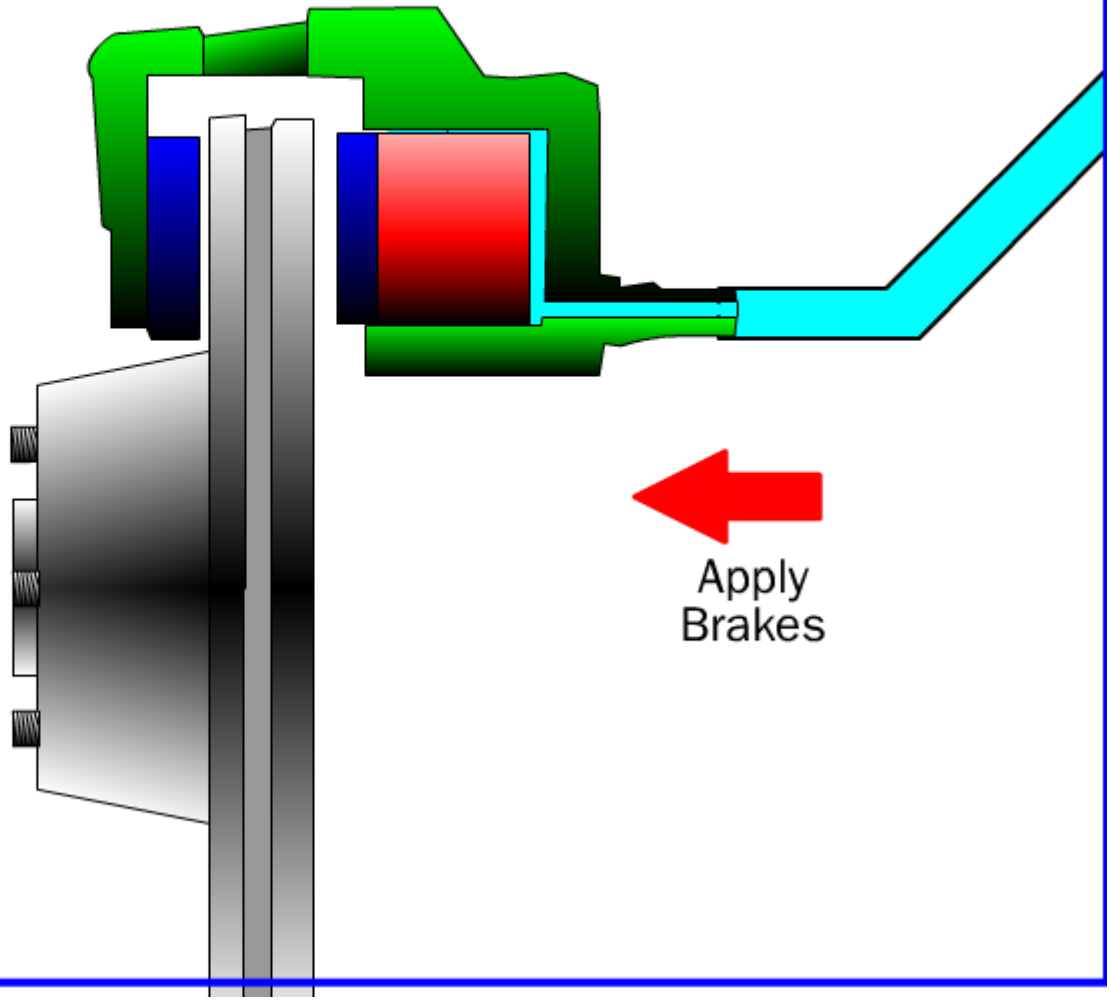
# Disc

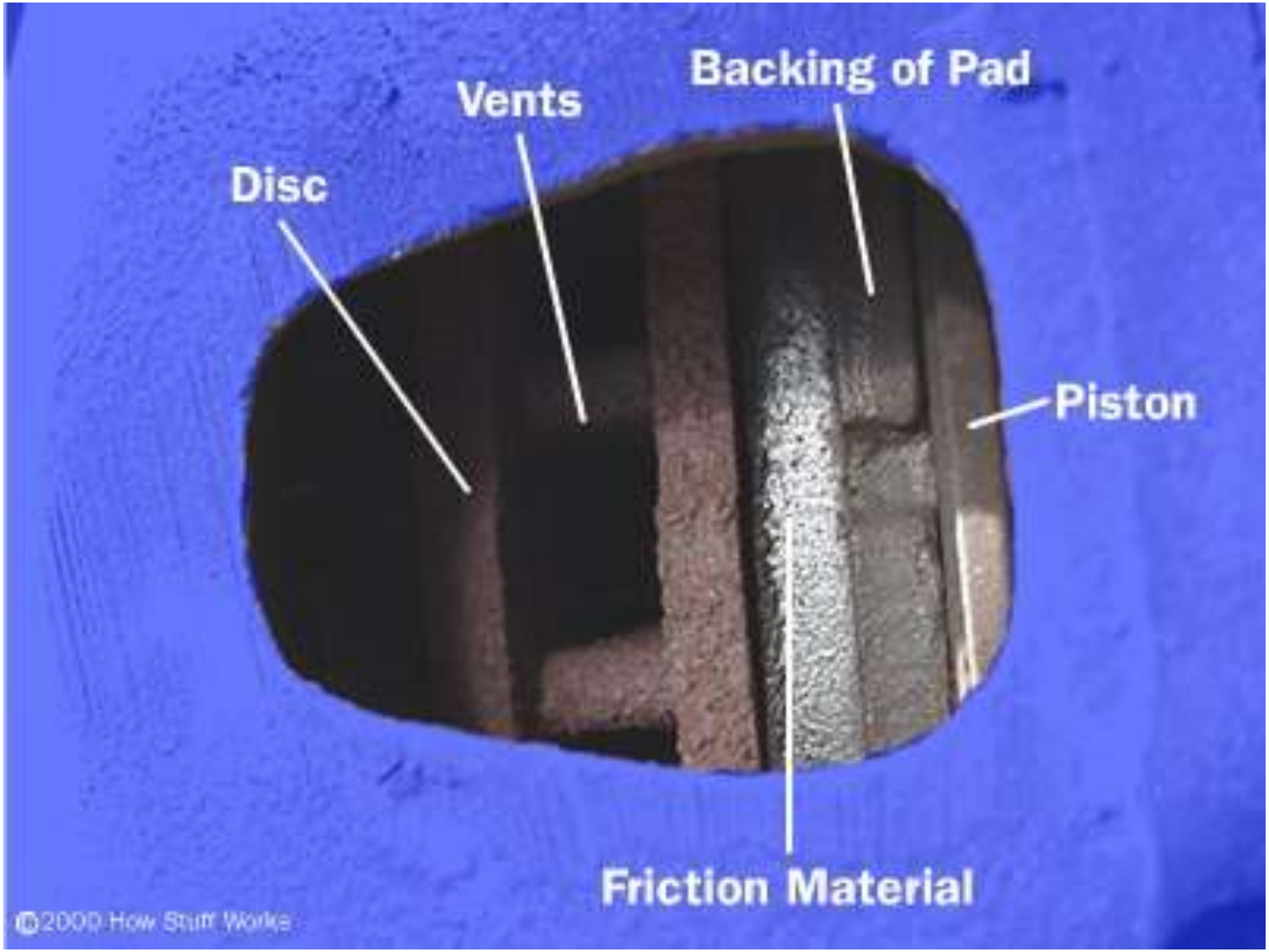
Disc brake consists of a disc rotating between two friction pads. When the pads are forced together under hydraulic, pneumatic, electrical or magnetic action then the disc is very effectively stopped.

# How a Disc Brake Works



# How a Disc Brake Works




Backing of Pad
Vents
Disc
Piston
Friction Material
©2000 How Stuff Works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Vents
©2000 How Stuff Works

# Drum

**Works by bringing curved metal plates, lined with friction material (brake shoes) against an external or internal rotating cylindrical surface.**


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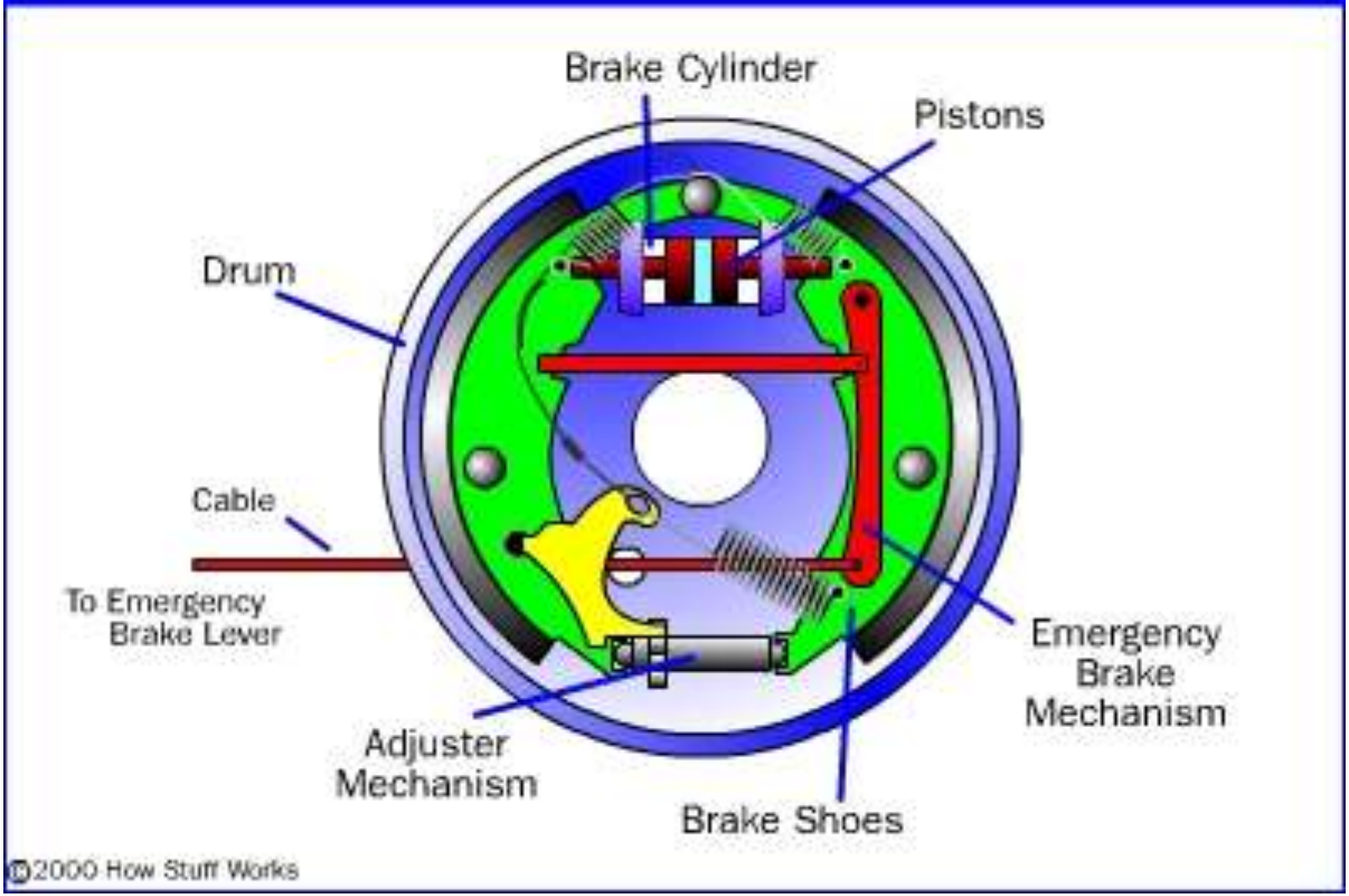
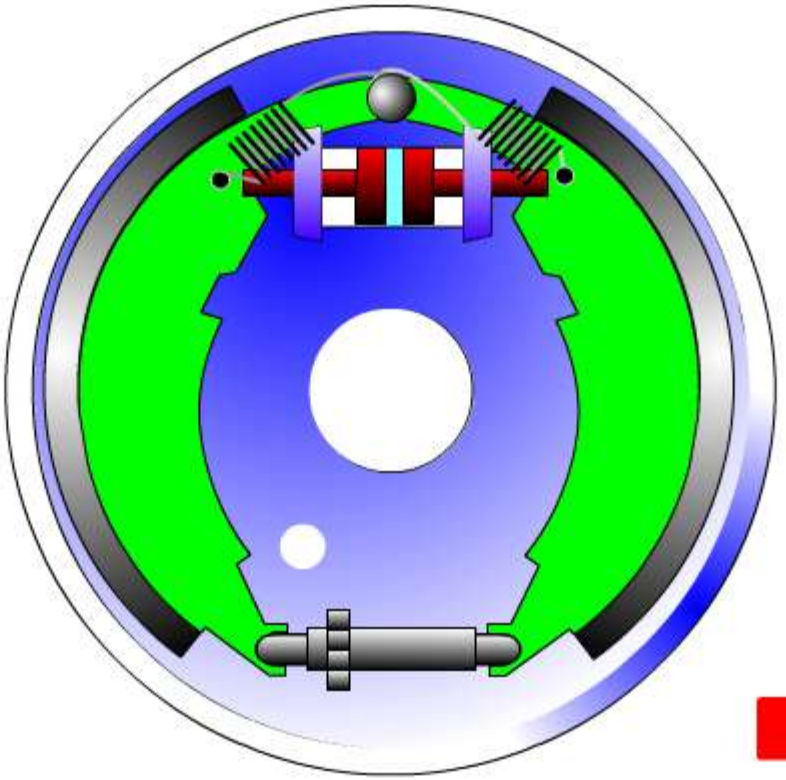
# Drum Brake

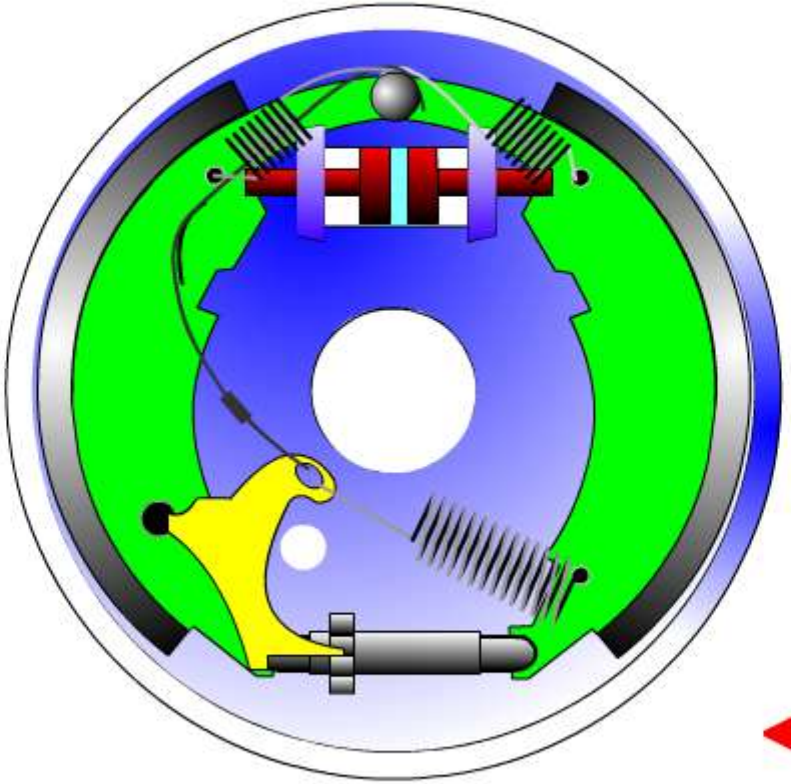

Brake Cylinder
Pistons
Drum
Cable
To Emergency
Brake Lever
Emergency
Brake
Mechanism
Adjuster
Mechanism
Brake Shoes
©2000 How Stuff Works

# How Drum Brakes Work



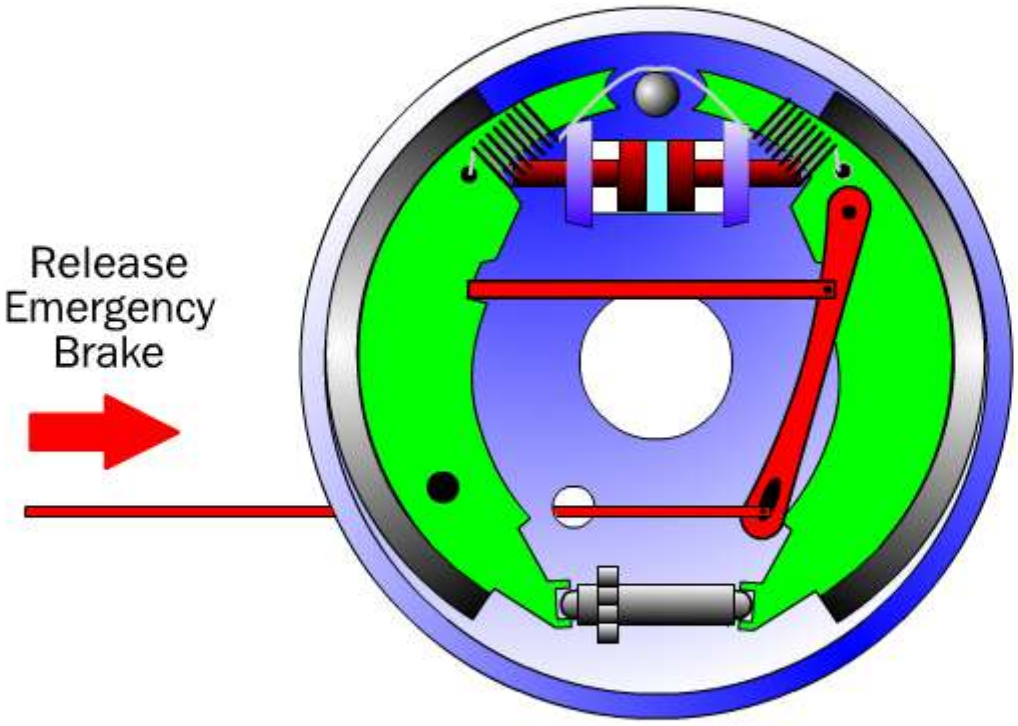
Play

# How Drum Brake Adjusters Work



Reset

# How an Emergency Brake Works



# Fluid

**A smooth progressive brake action resulting from rotating plates, or vanes in a retained fluid. When the fluid is prevented from flowing the viscous resistance retards the rotation.**

# Belt

**Operates by the action of a fixed belt over a rotating cylindrical surface (drum). Action not harsh.**

# Magnetic Particle

This type of brake includes a fixed cylinderical enclosure housing a coil wrapped around a fixed cylinder. Within the cylinder is a cylindrical rotor mounted on the rotating shaft. The annulus between the fixed cylinder and the rotor is filled with magnetic particles. If there is no current in the coil the rotor is relatively free to rotate. On applying a current the particles coalesce and prevent relative movement

# Electric Regenerative

Shafts driven by and electric motor often using regenerative braking. When the power to the motor is removed. The motor effectively becomes a generator driven by the shaft. The shaft is slowed as the kinetic energy is converted into electrical energy. The recovered energy is often stored when used in electric vehicles.