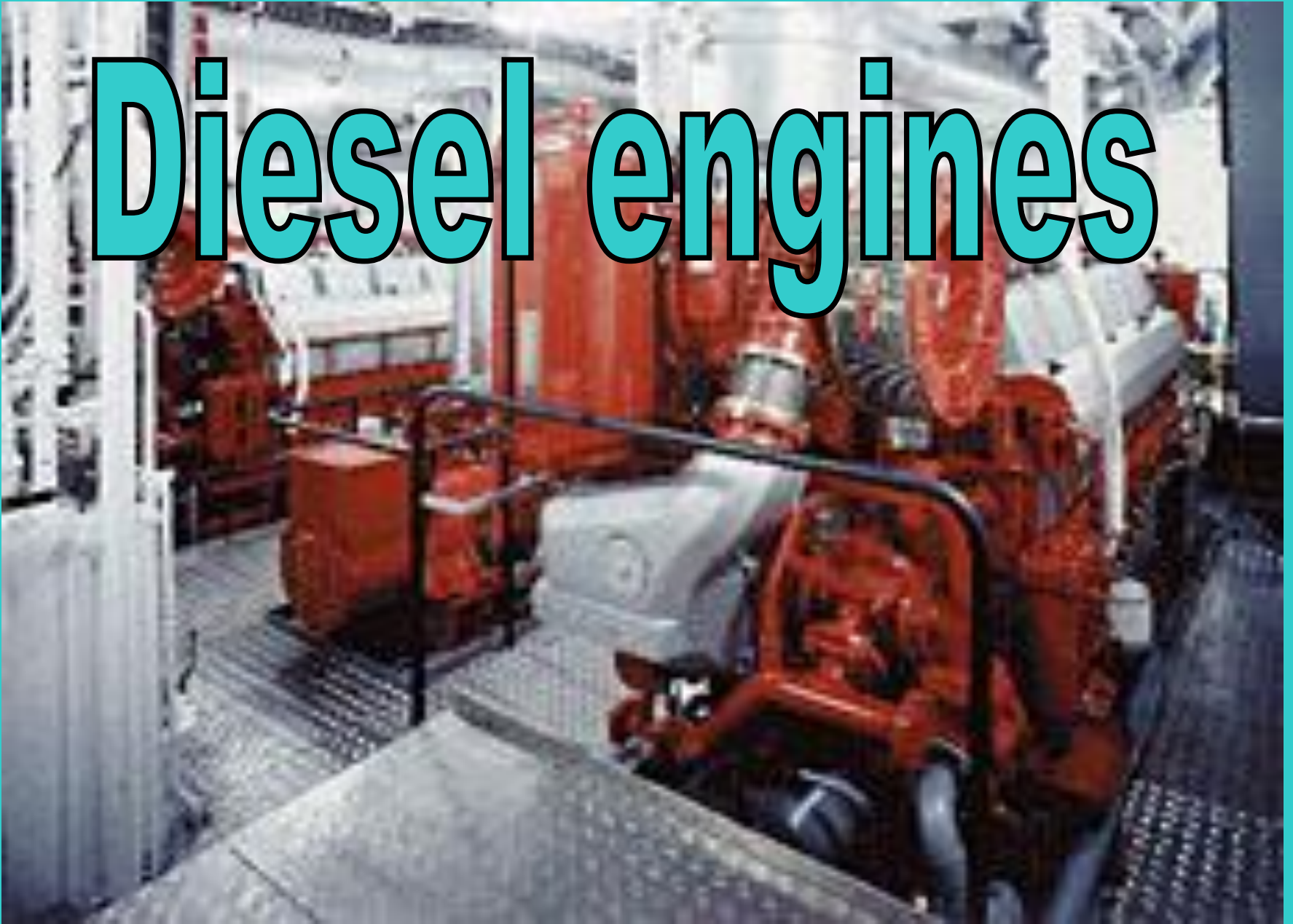
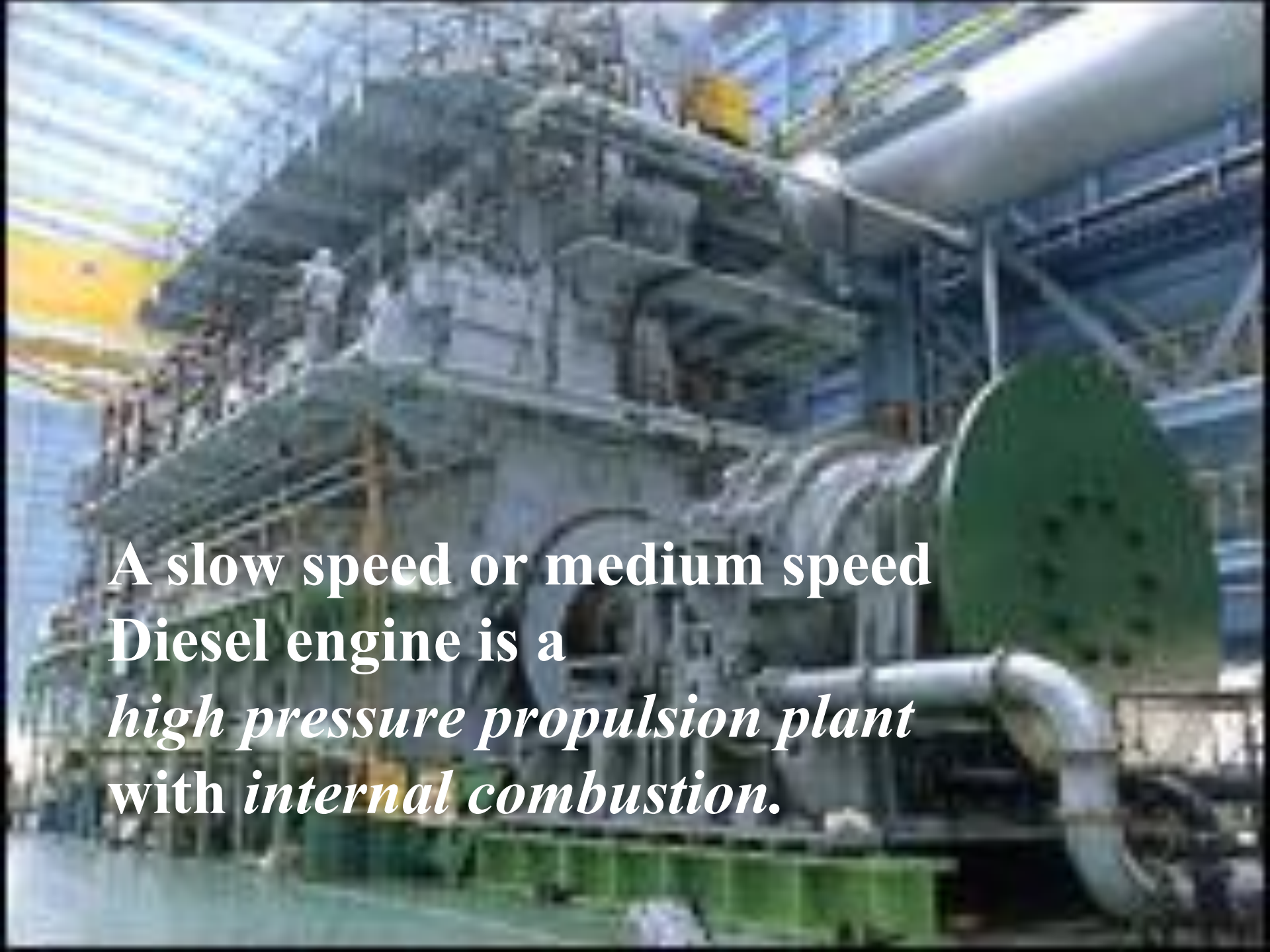


Diesel engines

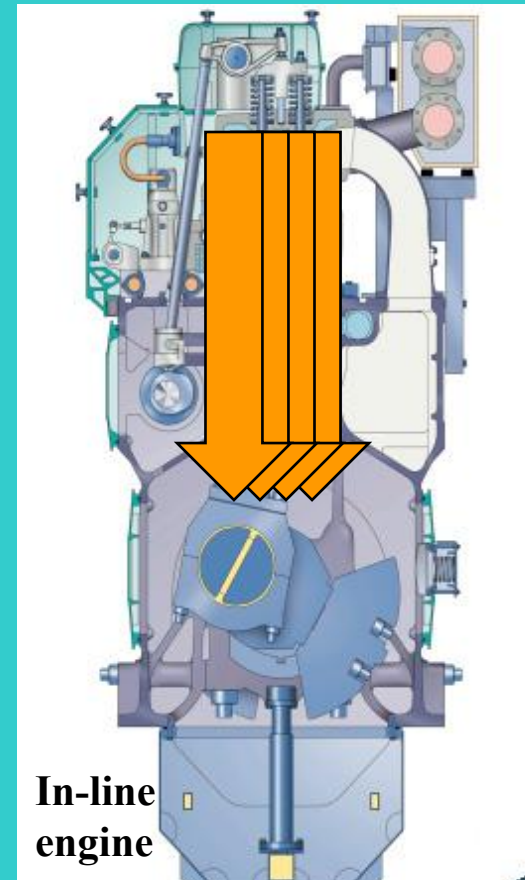
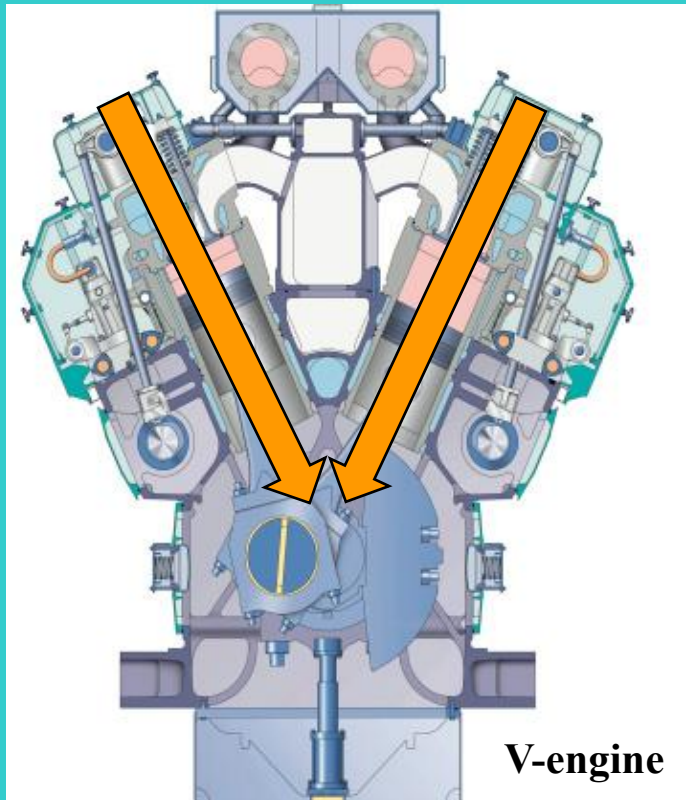


A large, complex industrial diesel engine is shown in a factory or workshop setting. The engine is a massive, multi-cylinder unit with various pipes, valves, and components. It is mounted on a green-painted metal base. The background shows a large industrial building with a glass facade and a yellow sky. The text is overlaid on the lower left portion of the image.

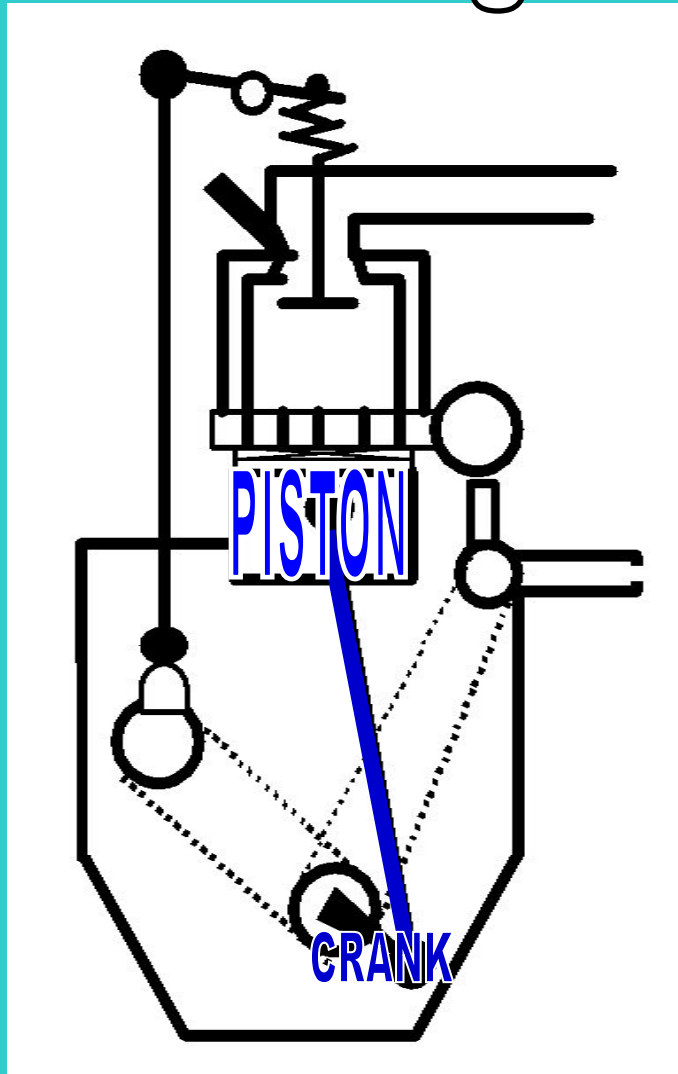
A slow speed or medium speed
Diesel engine is a
high pressure propulsion plant
with *internal combustion*.

V-engine and in-line engine

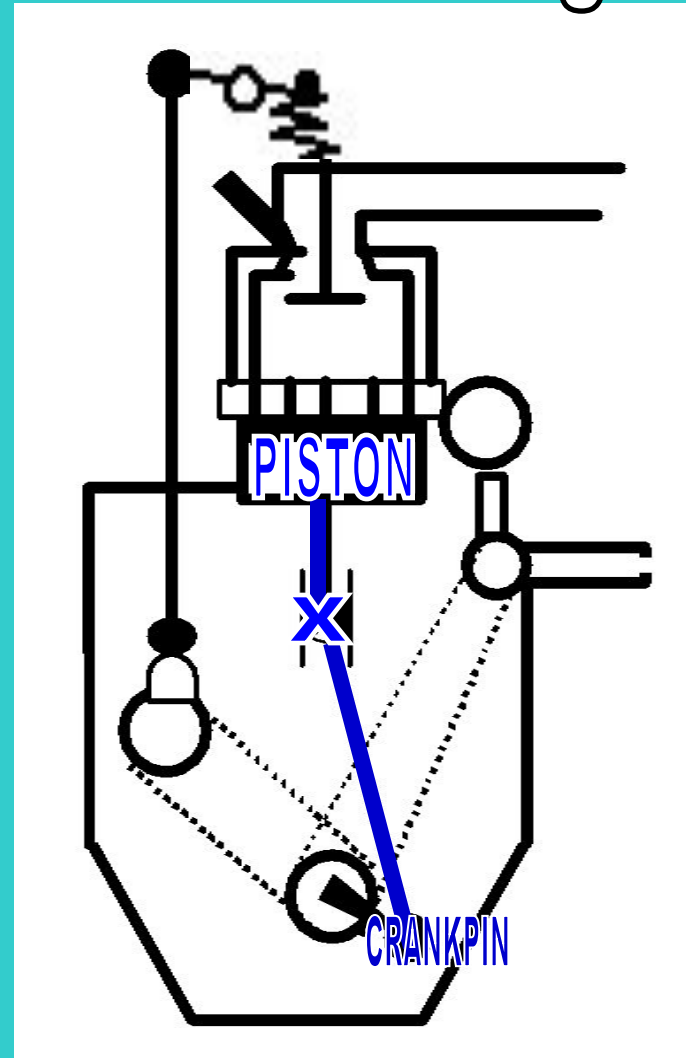
In a V-engine the cylinders are placed in an *oblique* (or *bevel*) position, unlike the *in-line engine*, where the cylinders are placed “*in line*”.



Trunk engine

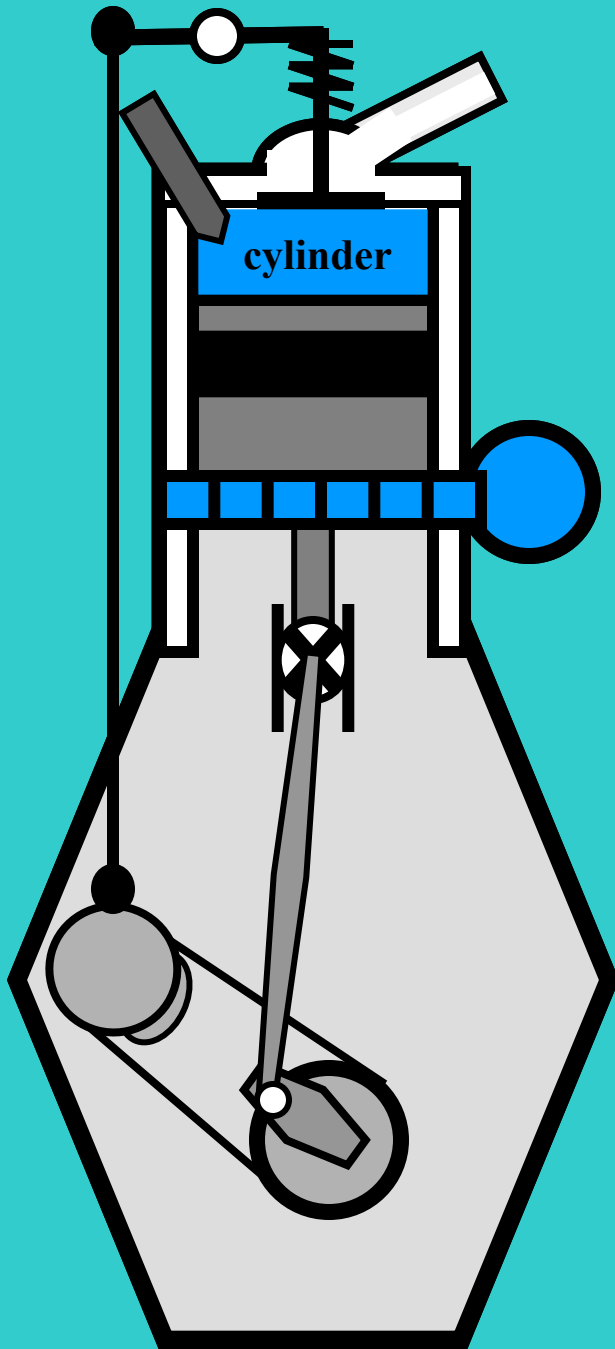


Crosshead engine



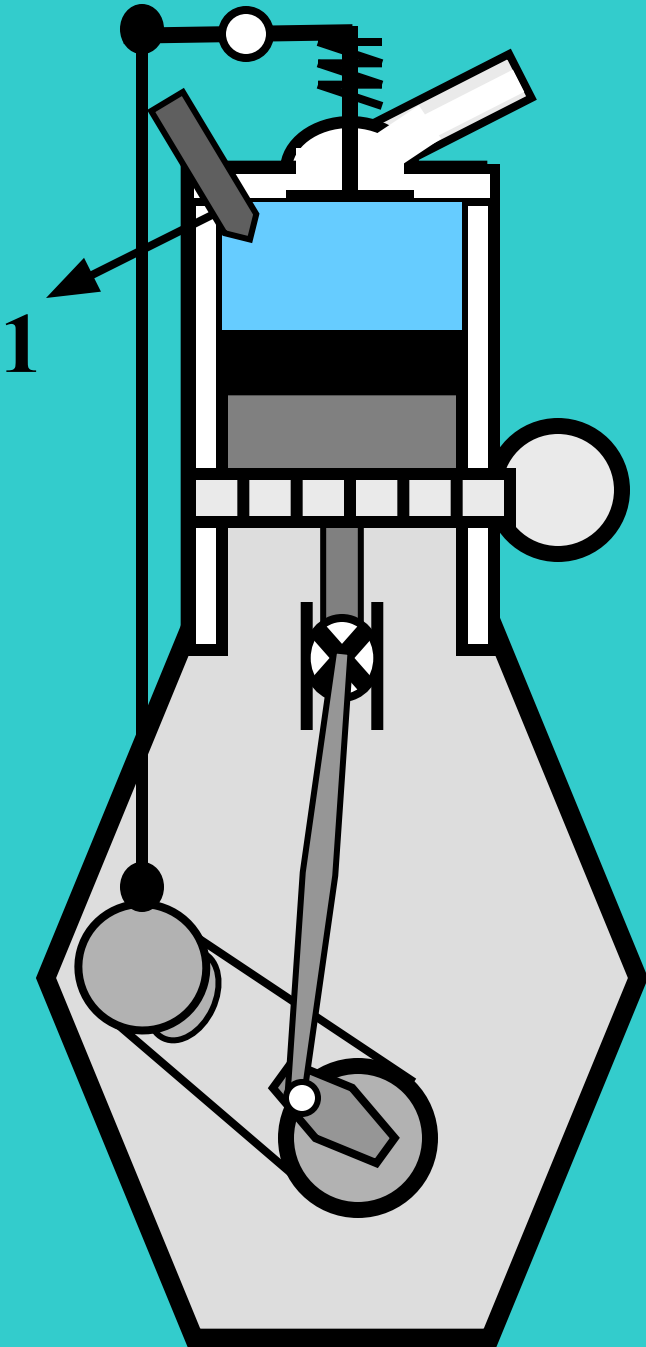
2-stroke crosshead engine





The cylinder is filled with **air**.

During the compression stroke the air in the cylinder is compressed.



The *atomizer* (1) sprays the **fuel** into the cylinder.

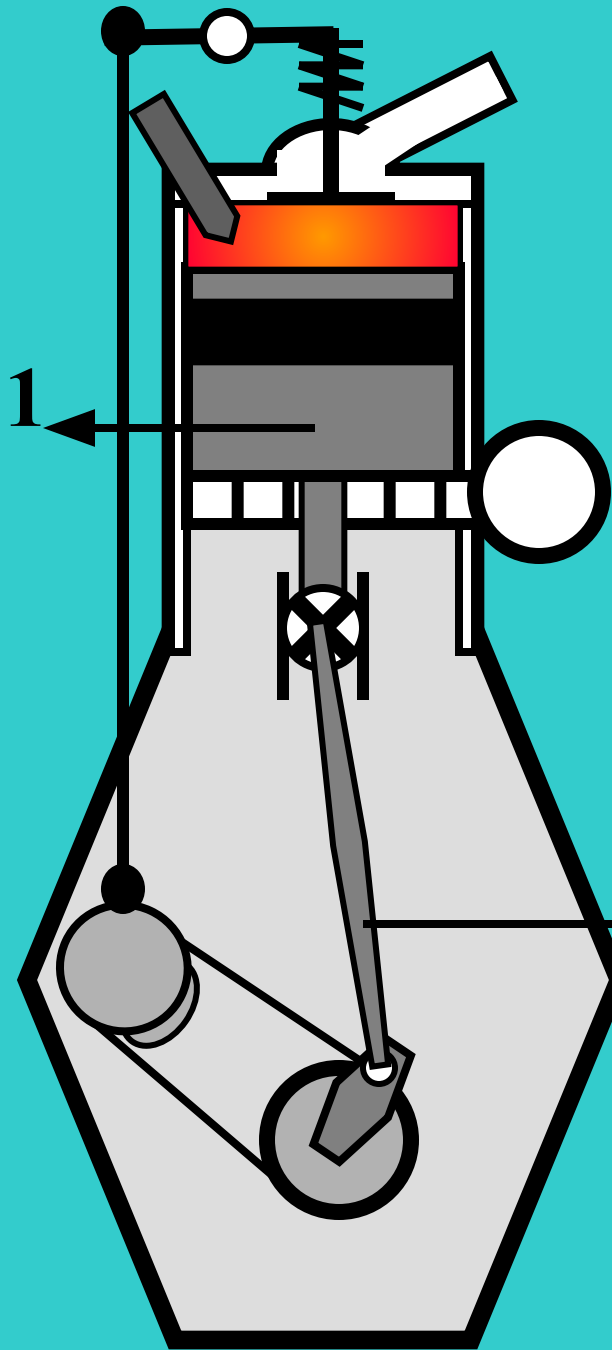
The *nozzle* divides the fuel into *small particles*.



atomizer

Tip of the atomizer (nozzle).

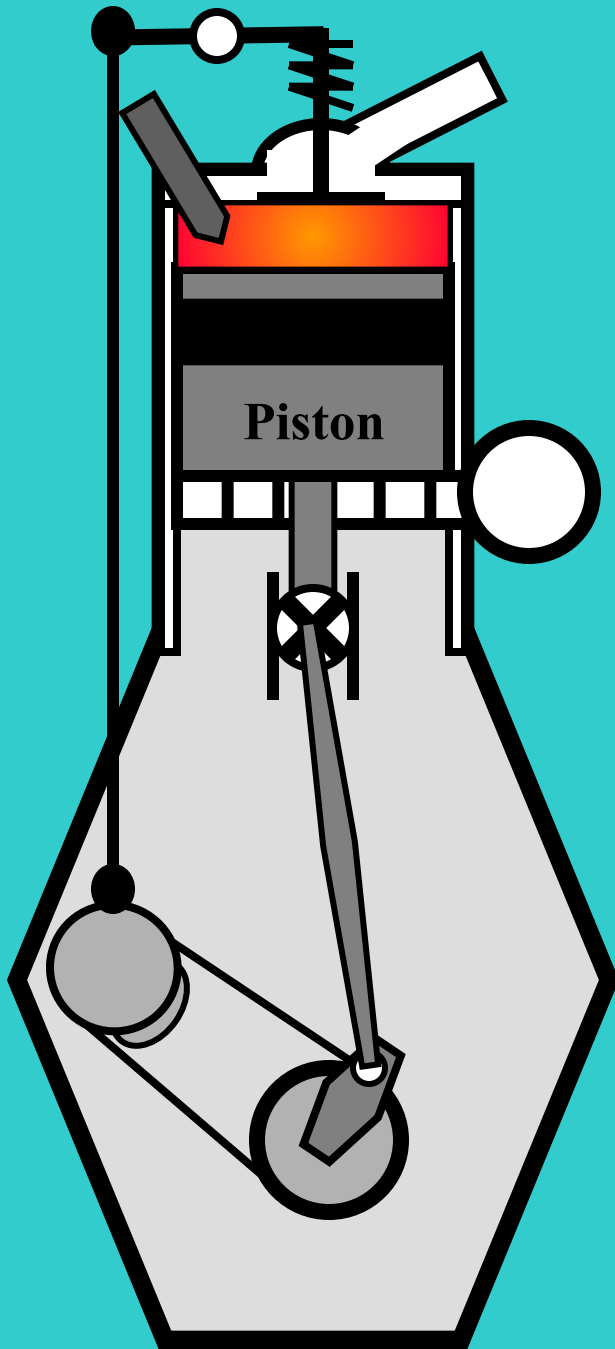




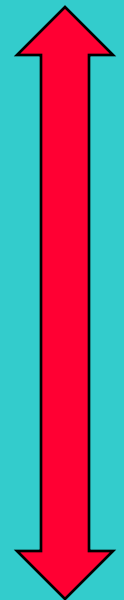
During the *power stroke* the fuel is injected and burnt.

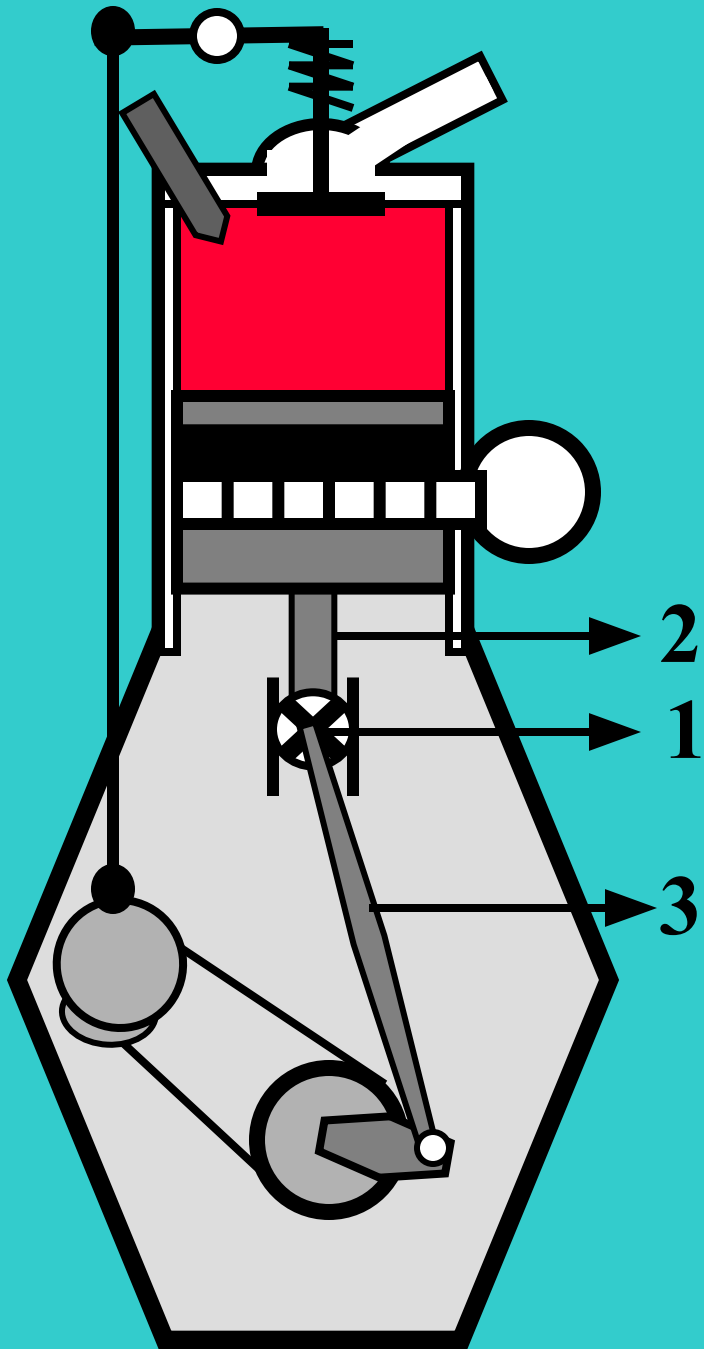
This *actuates* the piston (1) and connecting rod (2).





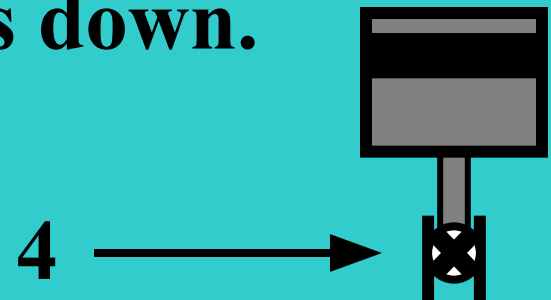
**The piston makes a
*reciprocating motion.***



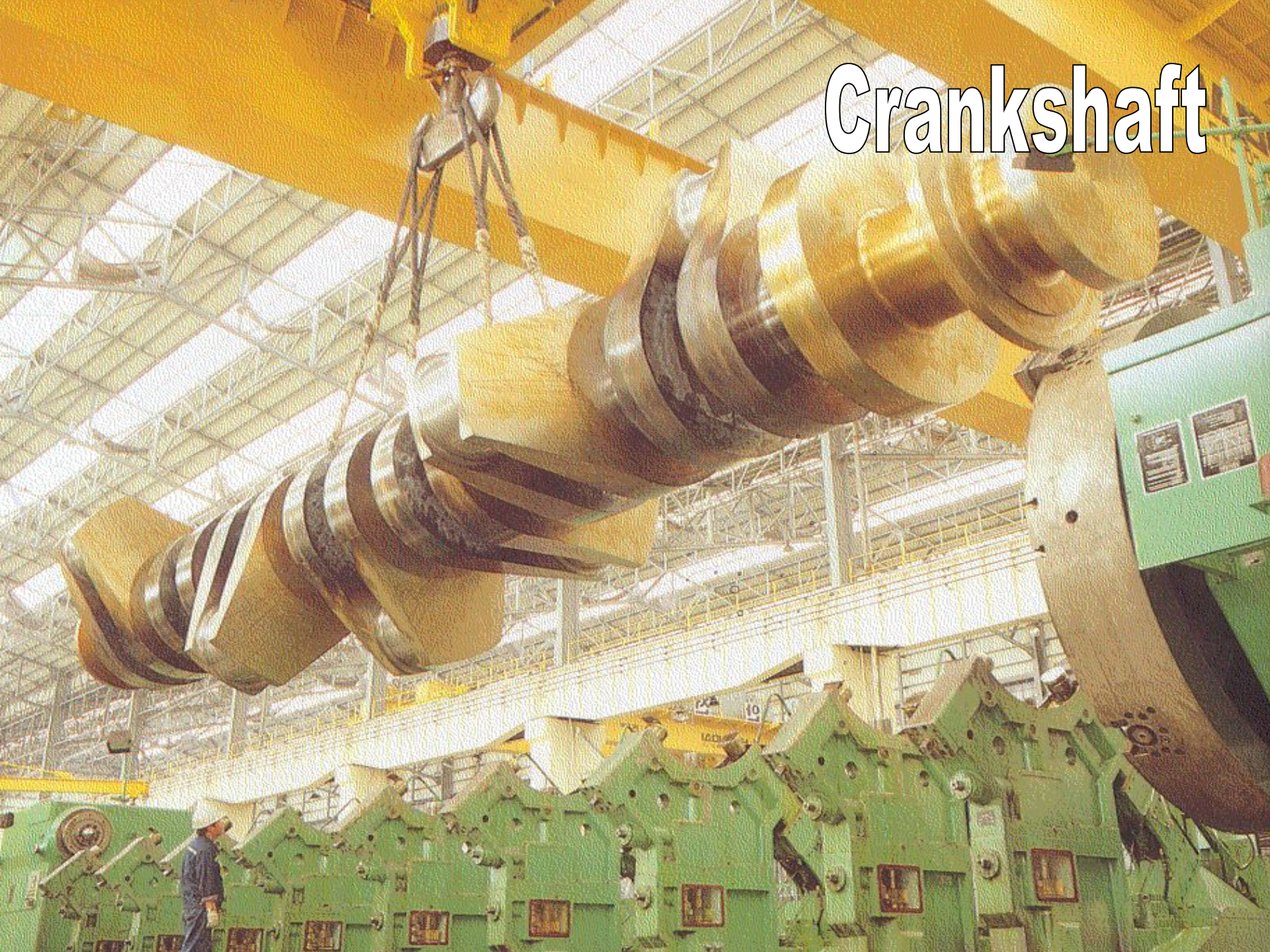


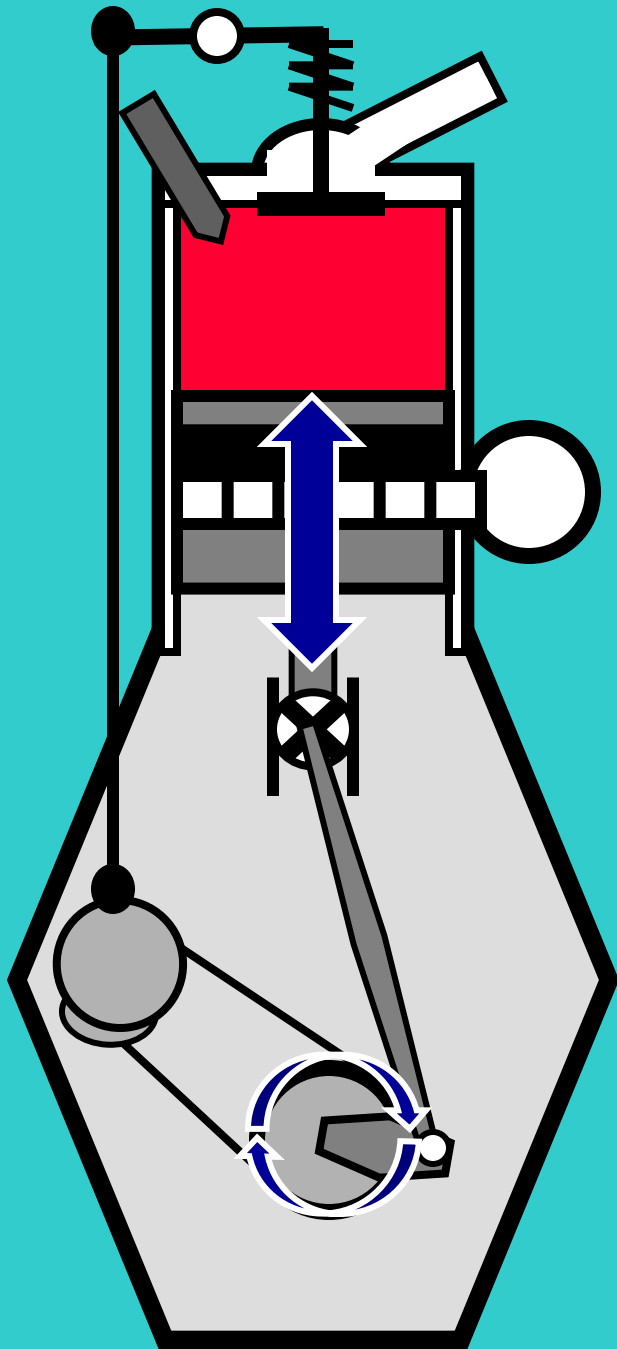
The crosshead (1) serves as a *hinging connection* between *piston rod* (2) and *connecting rod* (3).

Crosshead guides and *crosshead guide shoes* (4) absorb the forces onto the crosshead when the piston goes down.

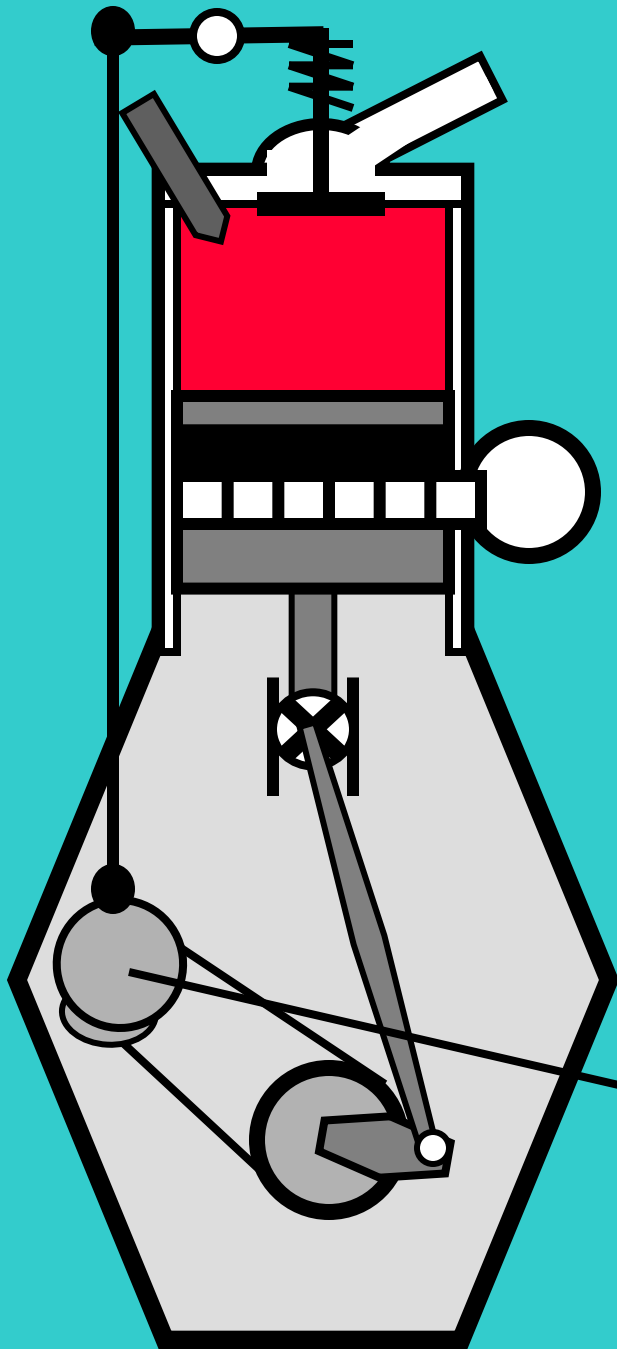


Crankshaft





The *crank* changes the *reciprocating motion* of the piston into a *rotary motion* of the *crank shaft* .

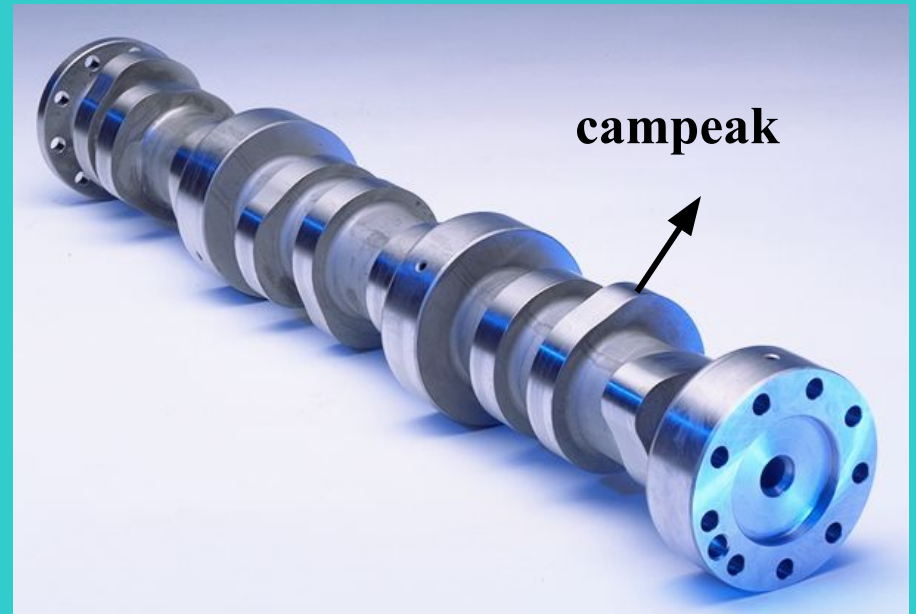
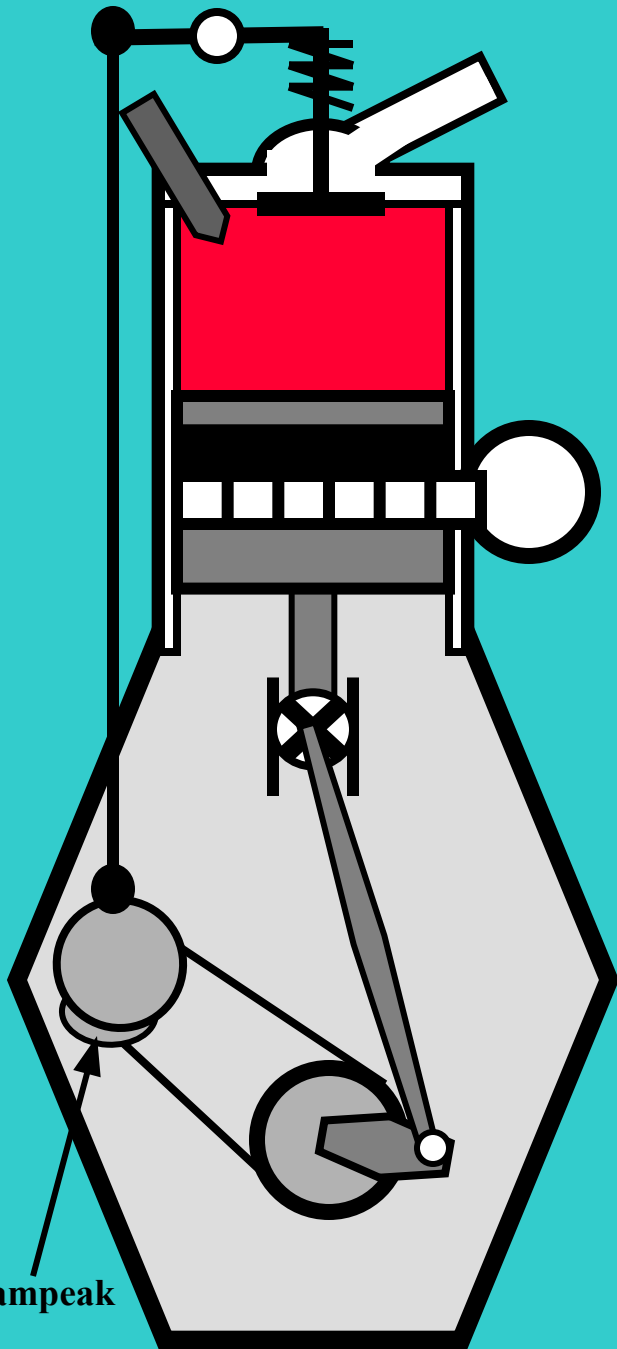


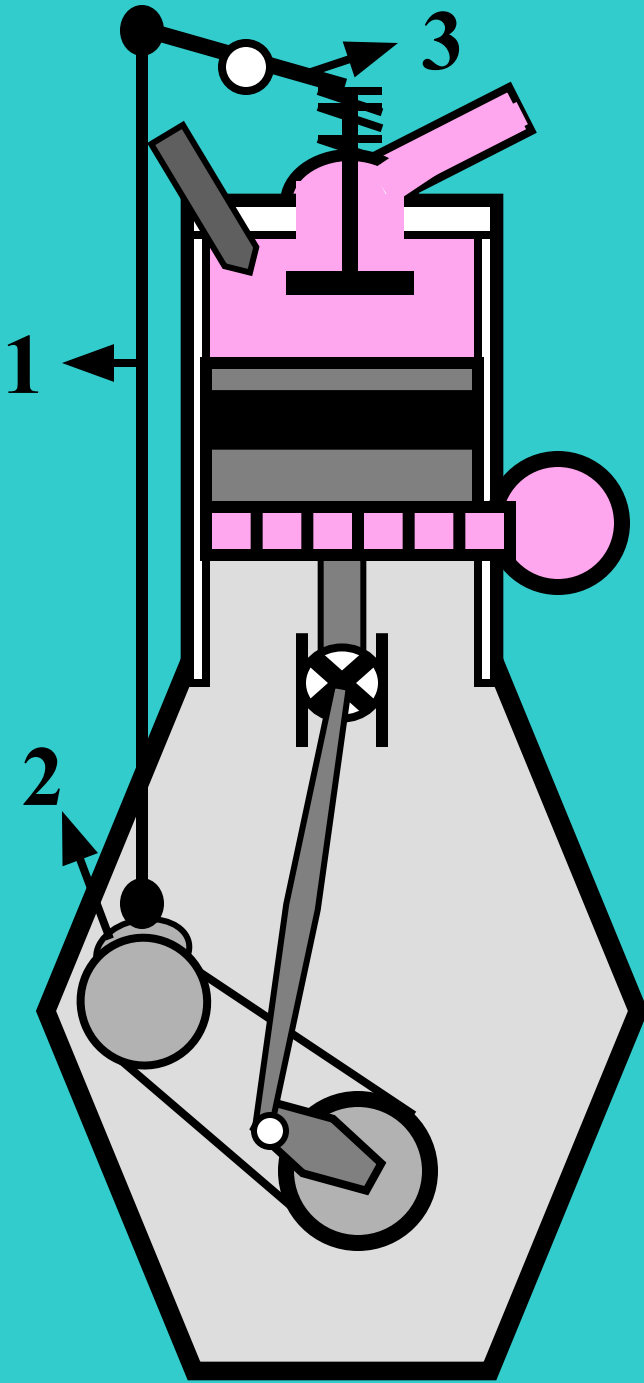
Gearwheels 
to drive the *camshaft*
are driven by chains
(“*chaindrive*”). 



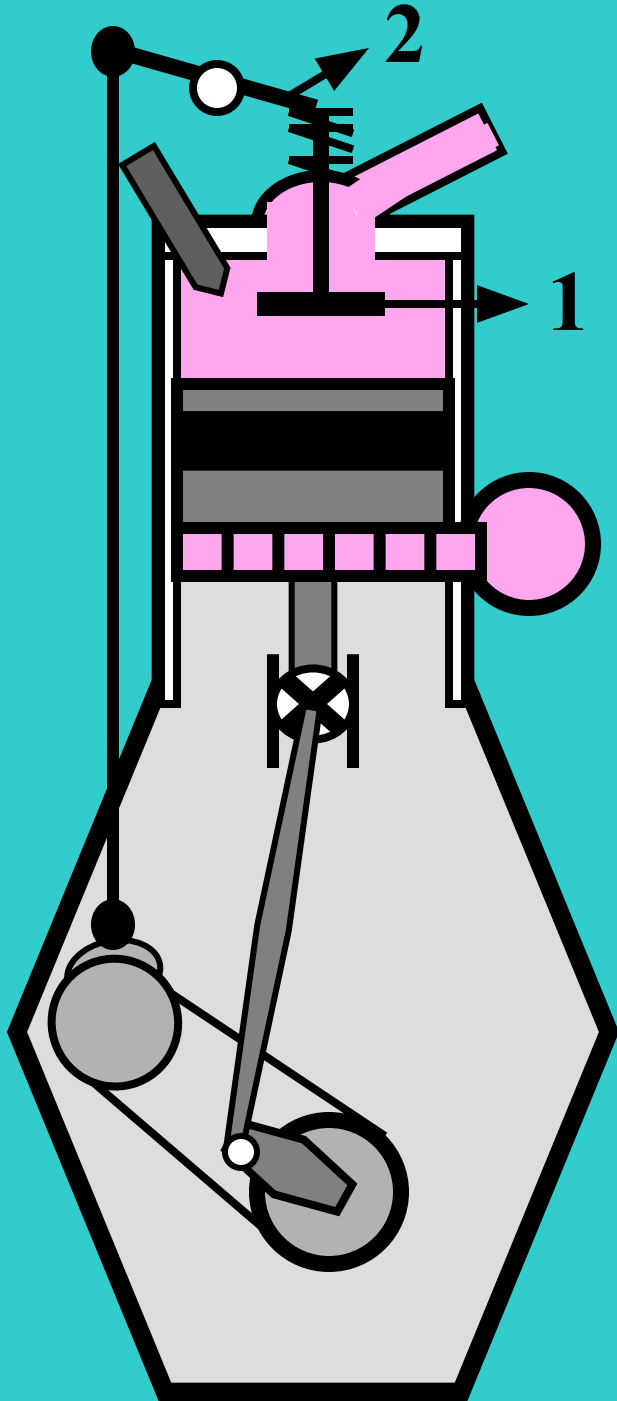
camshaft

The *campeak* is fixed to the *camshaft*.

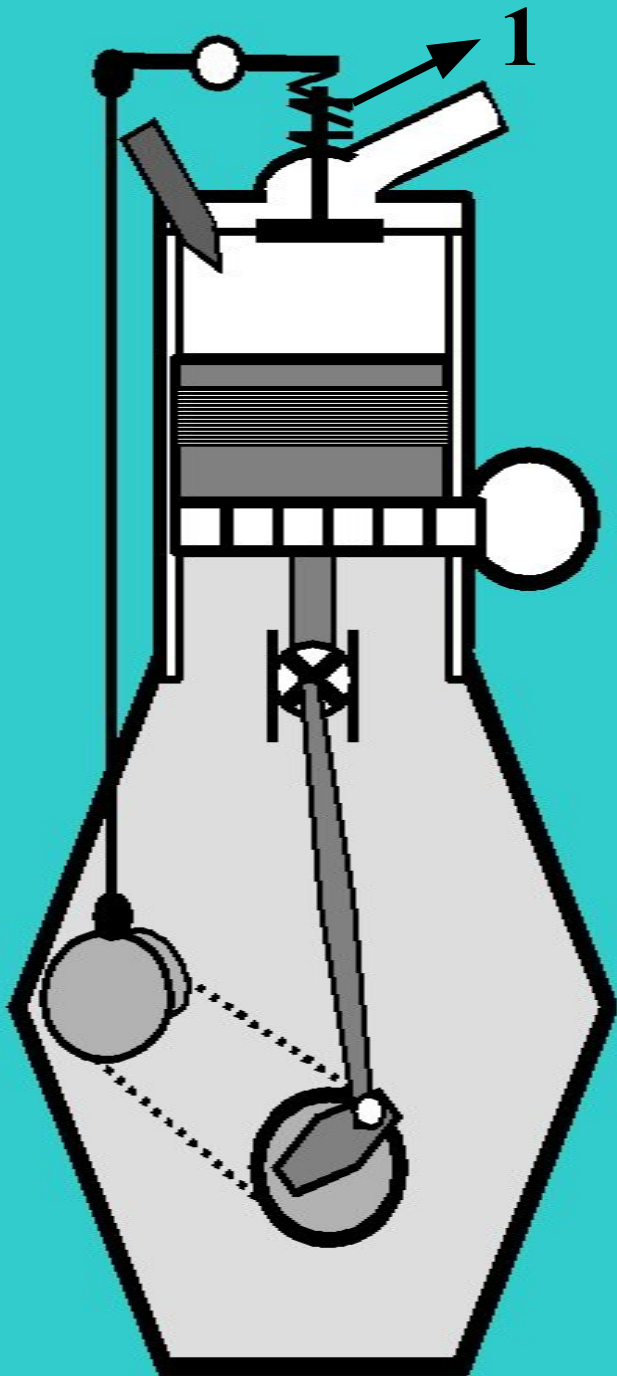




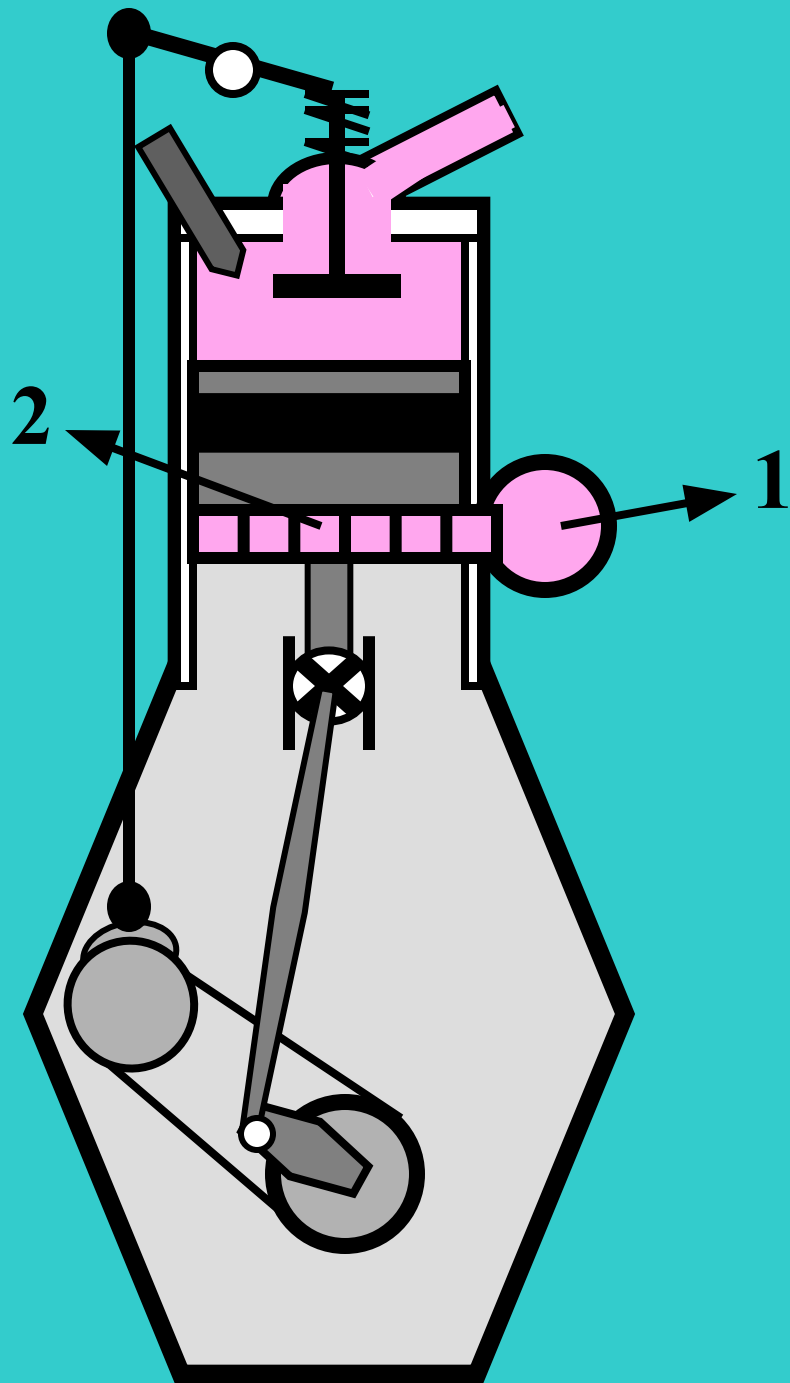
The *push rod* (1) may be used as a *distance piece* between *cam peak* (2) and *rocker arm* (3).



The *exhaust valve* (1) is *actuated* (opened) by the *rocking lever* (2) (*rocker arm*).

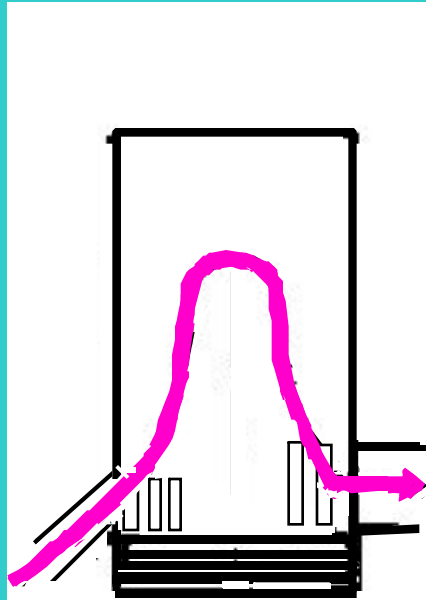


The exhaust valve is *actuated* (closed) by the *exhaust valve spring* (1).

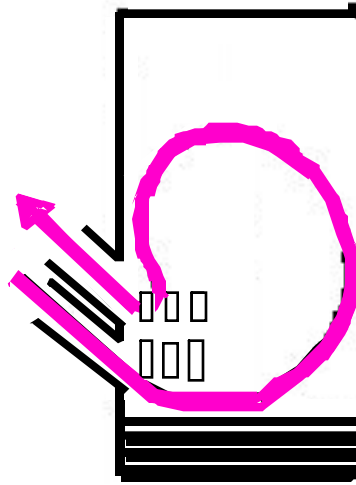


The *scavenging air manifold (1)* and *scavenging ports (2)* supply the *scavenging air* to remove the exhaust gases.

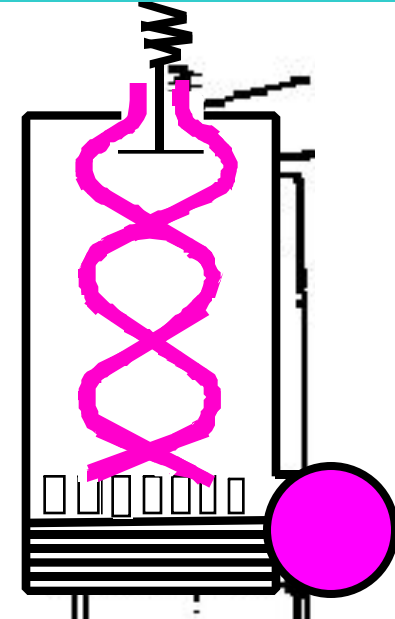
SCAVENGING SYSTEMS



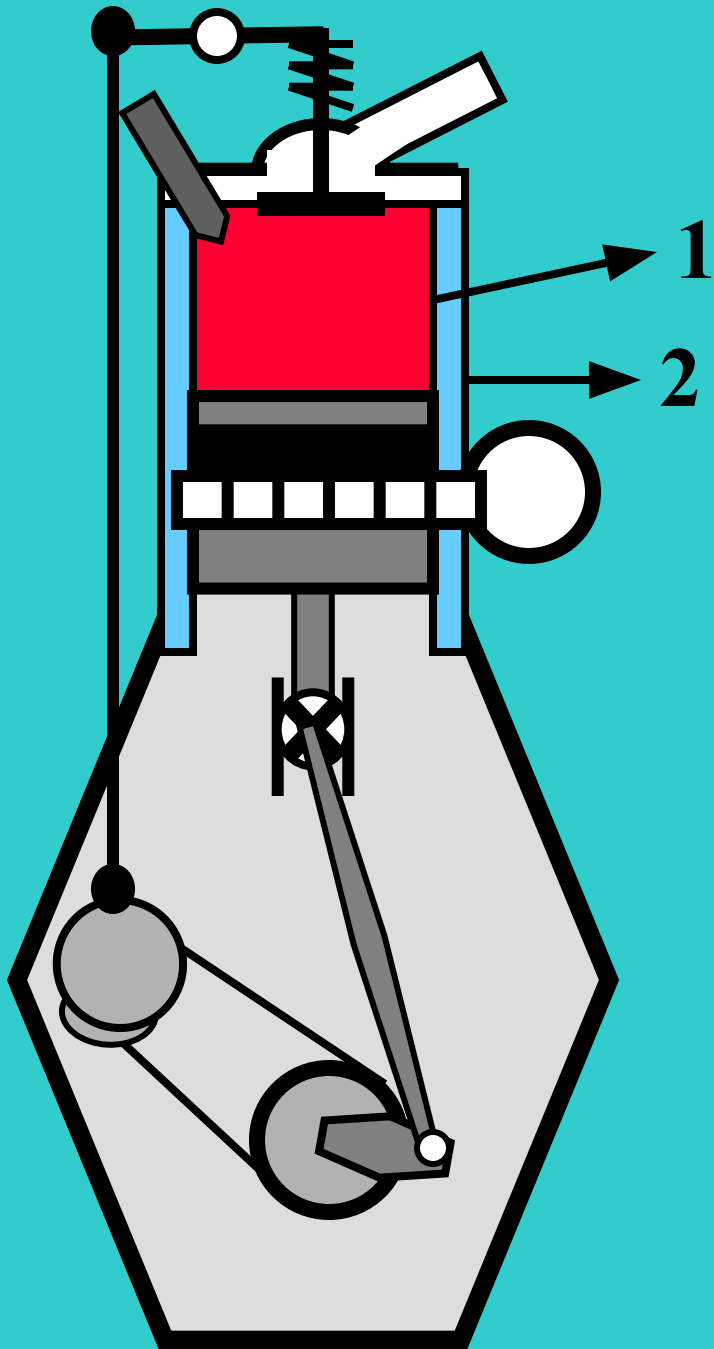
**CROSS
SCAVENGING**



**LOOP
SCAVENGING**



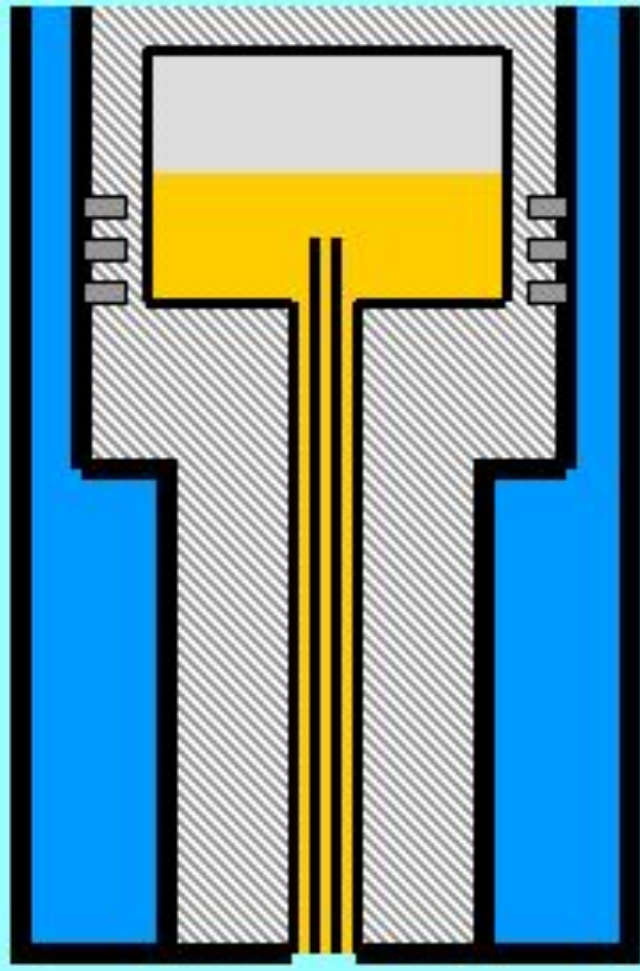
**UNIFLOW
SCAVENGING**



Cooling the cylinder:

The cylinder *liner* (1) and cylinder *jacket* (2) form the cylinder wall.

Cooling the cylinder:



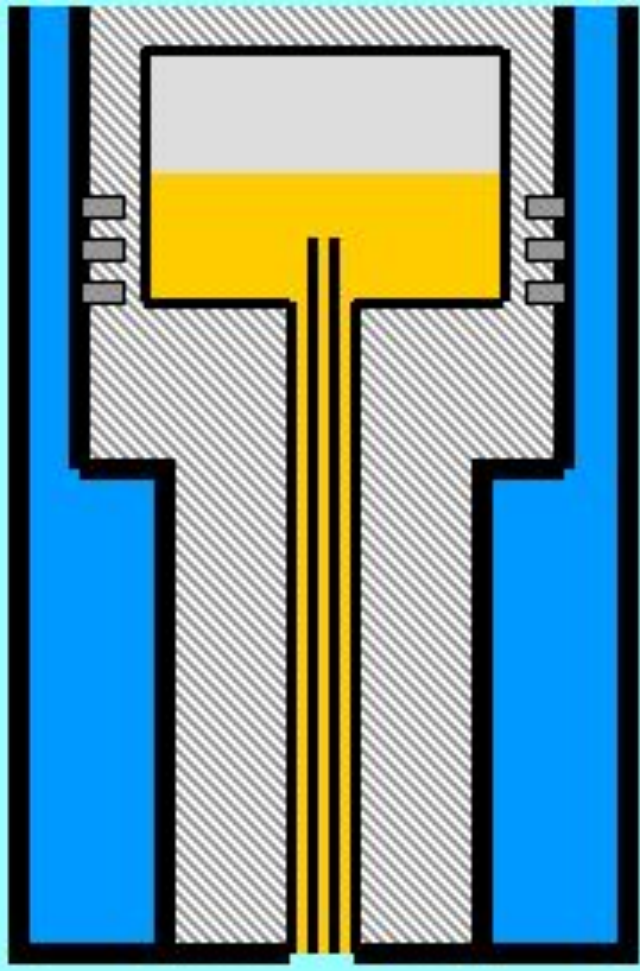
A coolant (fresh water) is injected between liner and jacket to cool the cylinder.

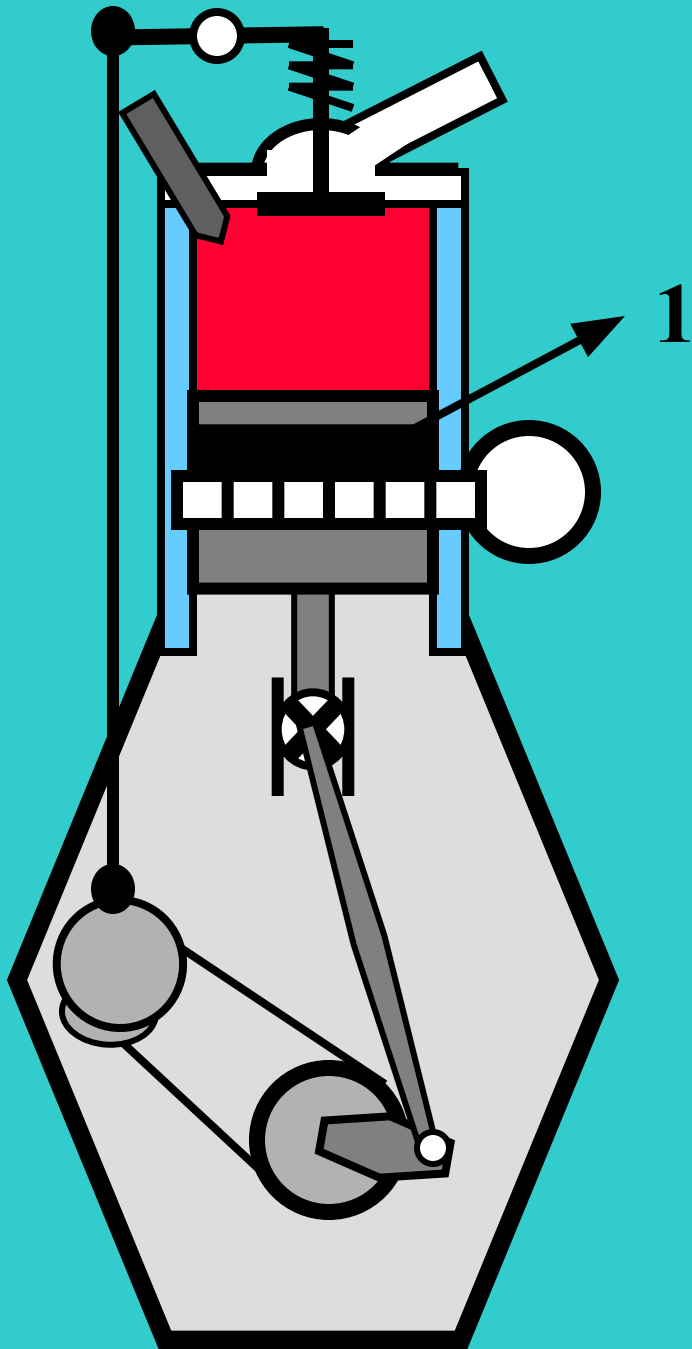
Cooling the piston:

The piston is cooled by **oil**.

The advantages of oil as a coolant are:

- . it reduces noise;
- . it purifies;
- . it forms a seal;
- . it lubricates;
- . it is anti-corrosive;
- . it has a higher resistance to heat.

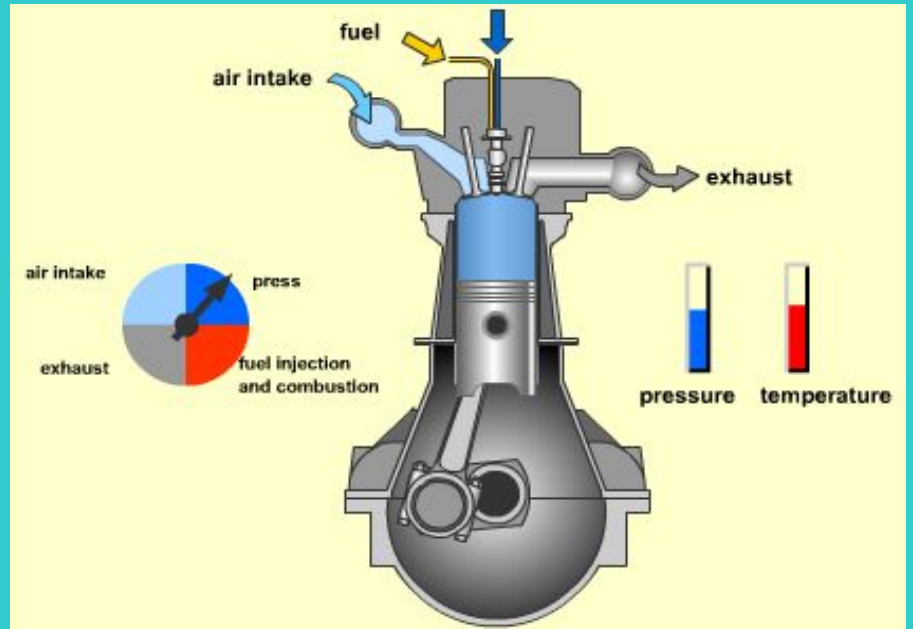
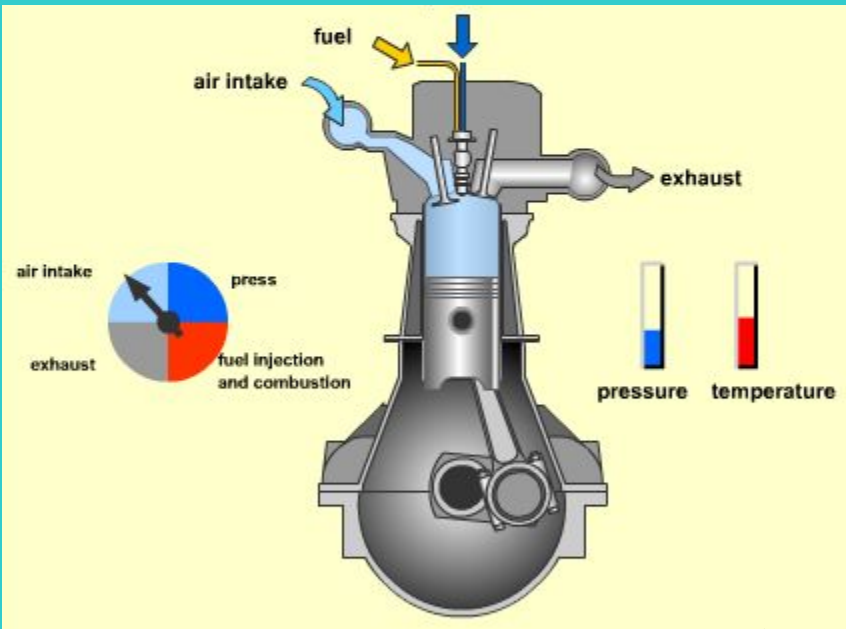




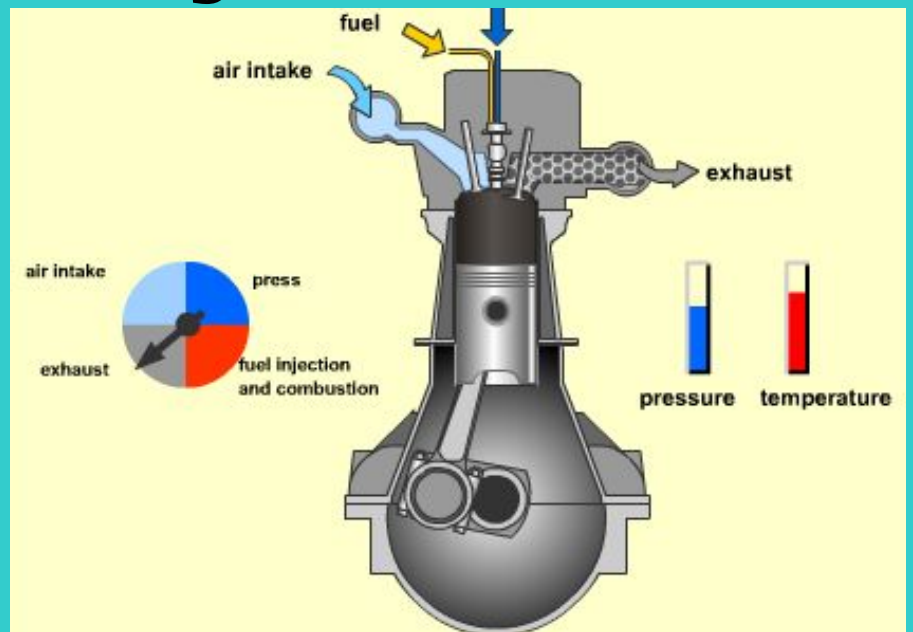
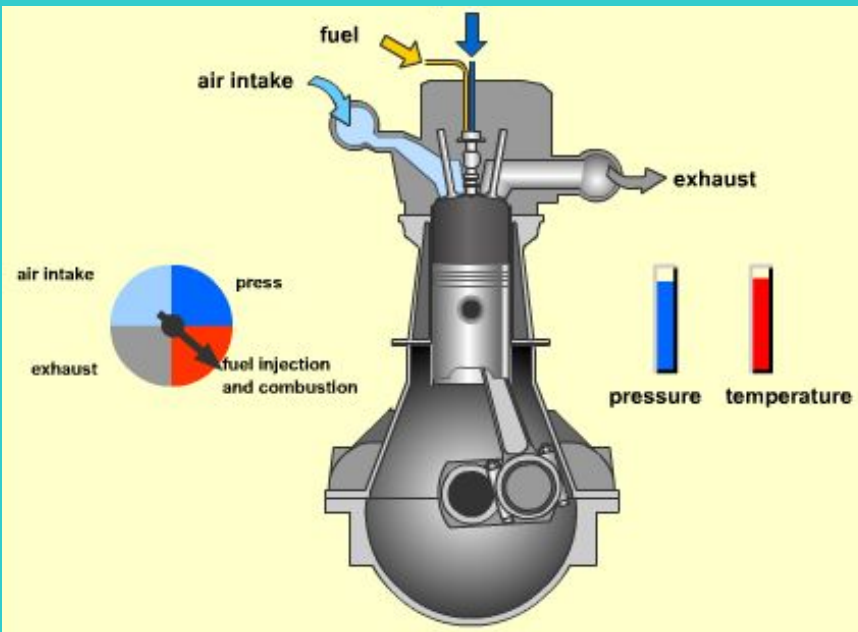
The *piston rings* (1) form a *seal* around the cylinder and carry away the heat.



Piston rings

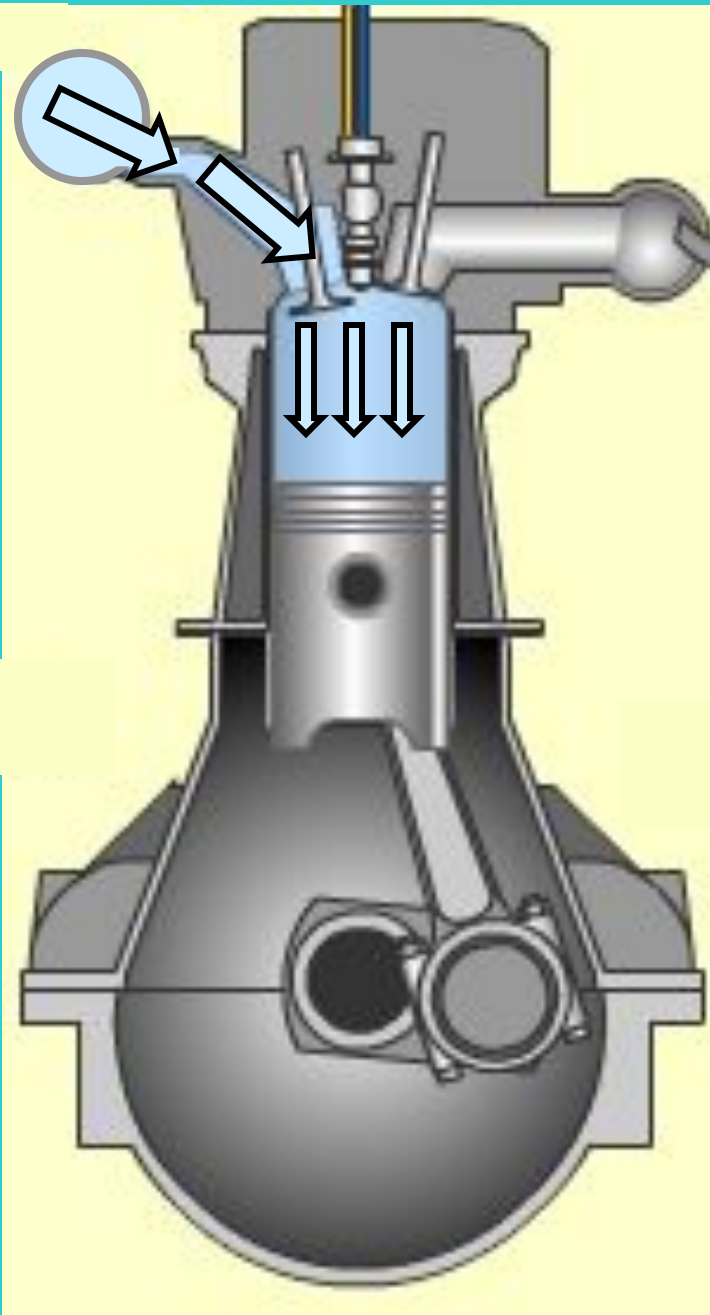


4-stroke cycle



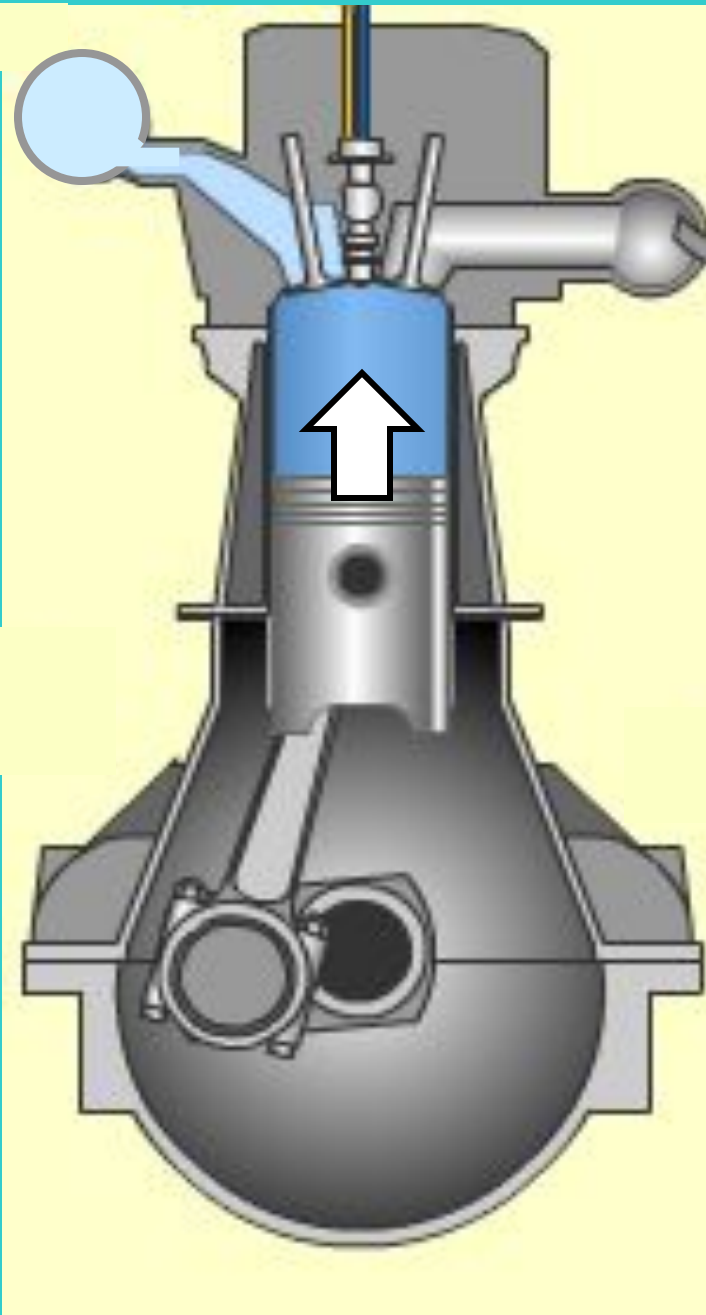
Suction stroke

During the
air induction stroke
(or *inlet stroke*,
or *suction stroke*)
air is drawn into
the cylinder.



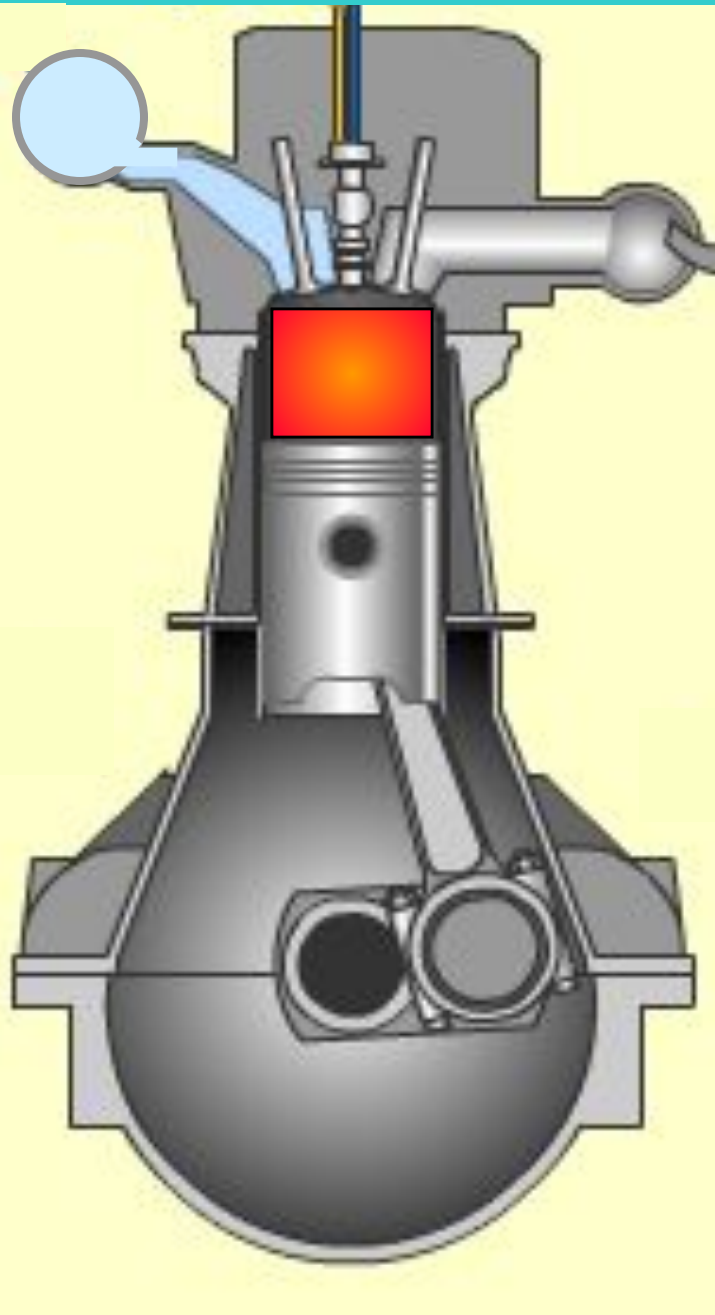
Compression stroke

During the compression stroke the air in the cylinder is compressed.



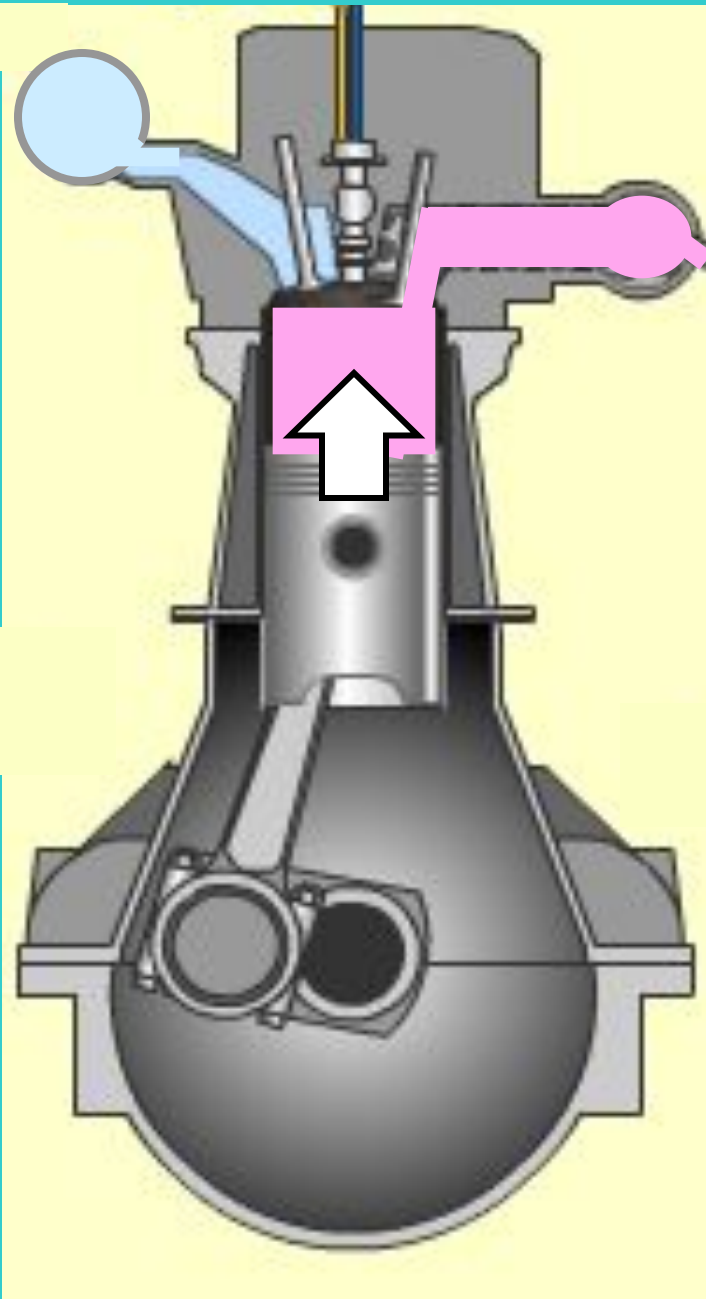
Power stroke

During the power stroke fuel is injected and burnt.



Exhaust stroke

During the exhaust stroke the exhaust gases are driven out of the cylinder by the piston.



© P.C. van Kluijven



SHIPPING AND TRANSPORT COLLEGE ROTTERDAM