

Auxiliary Engines

A photograph of a ship's engine room, showing a large, complex mechanical system. The room has a red floor and a curved metal structure. The engine is a large, green, cylindrical unit with a large white coil of rope or cable wrapped around it. Various pipes, valves, and electrical components are visible. The labels are overlaid on the image in white text with a blue outline.

Pumps

Winches

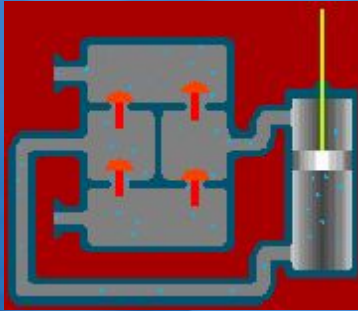
Steering engine

Boilers

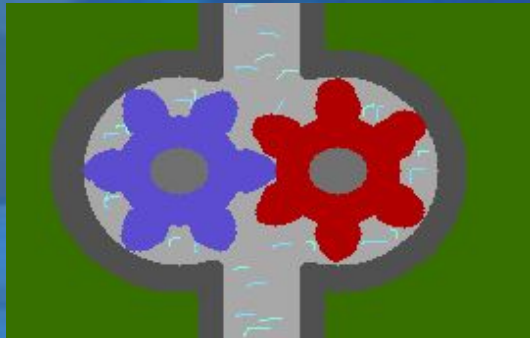
Generators

Electric motors.

Marine Pumps



Reciprocating pump
(double-acting piston pump)

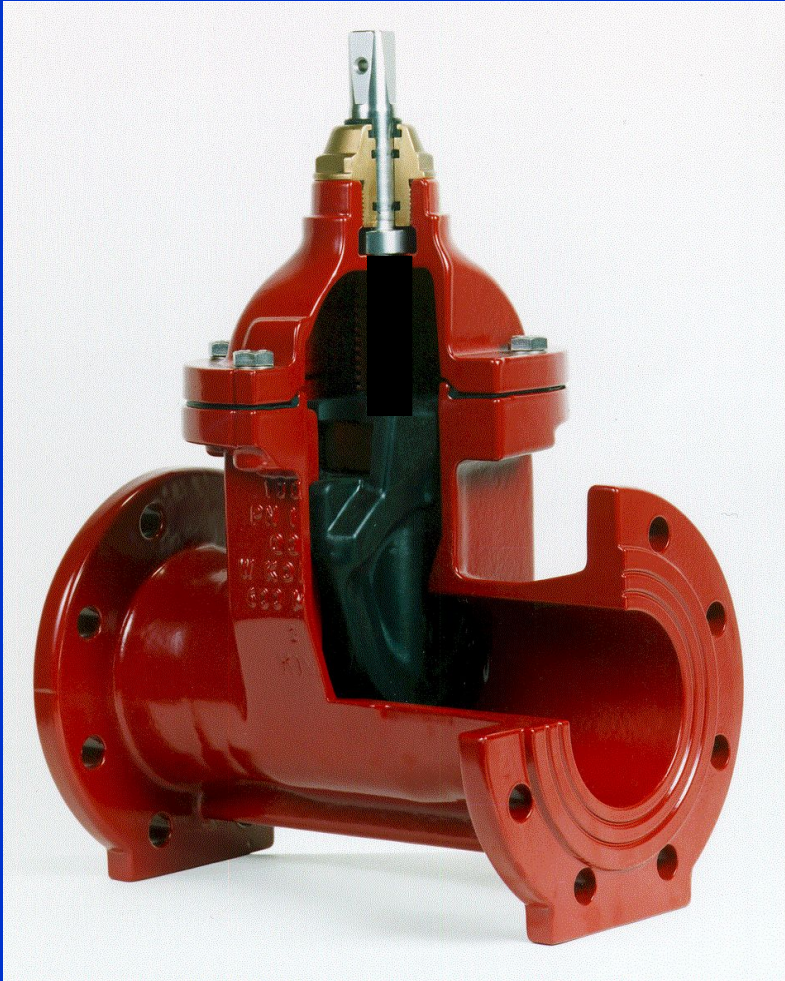


Gearwheel pump



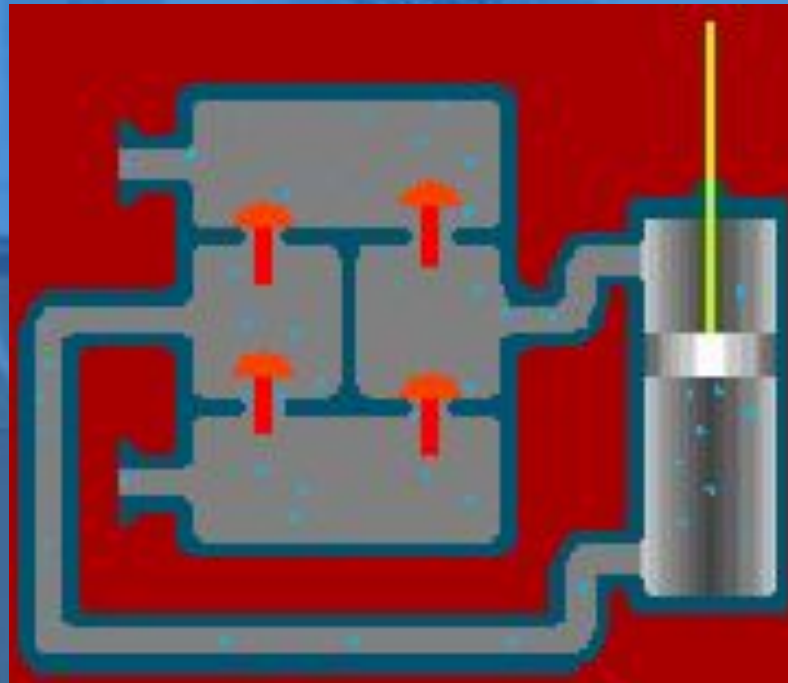
Centrifugal pump

NON-RETURN VALVES

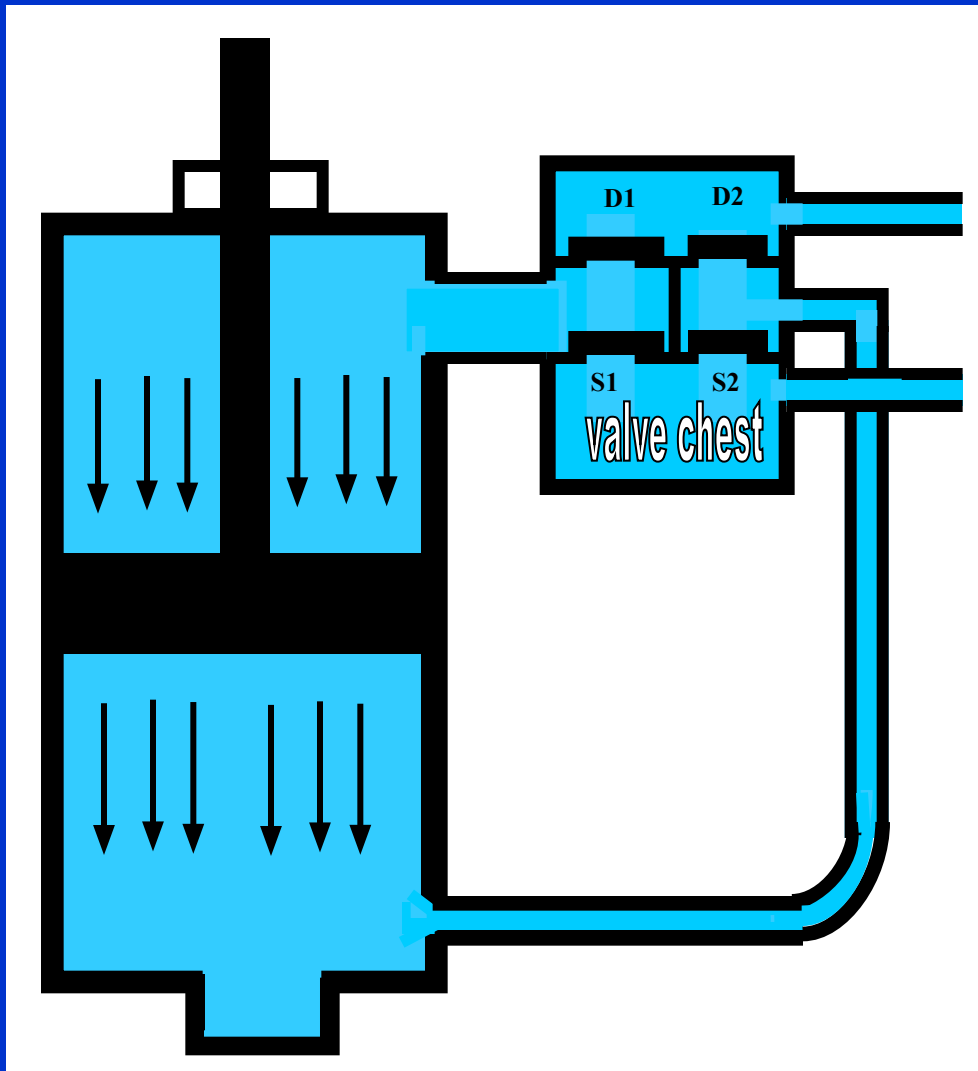


Delivery lines and discharge lines to and from the pump are often fitted with non-return valves to prevent the liquid from flowing back.

Double-acting displacement pump

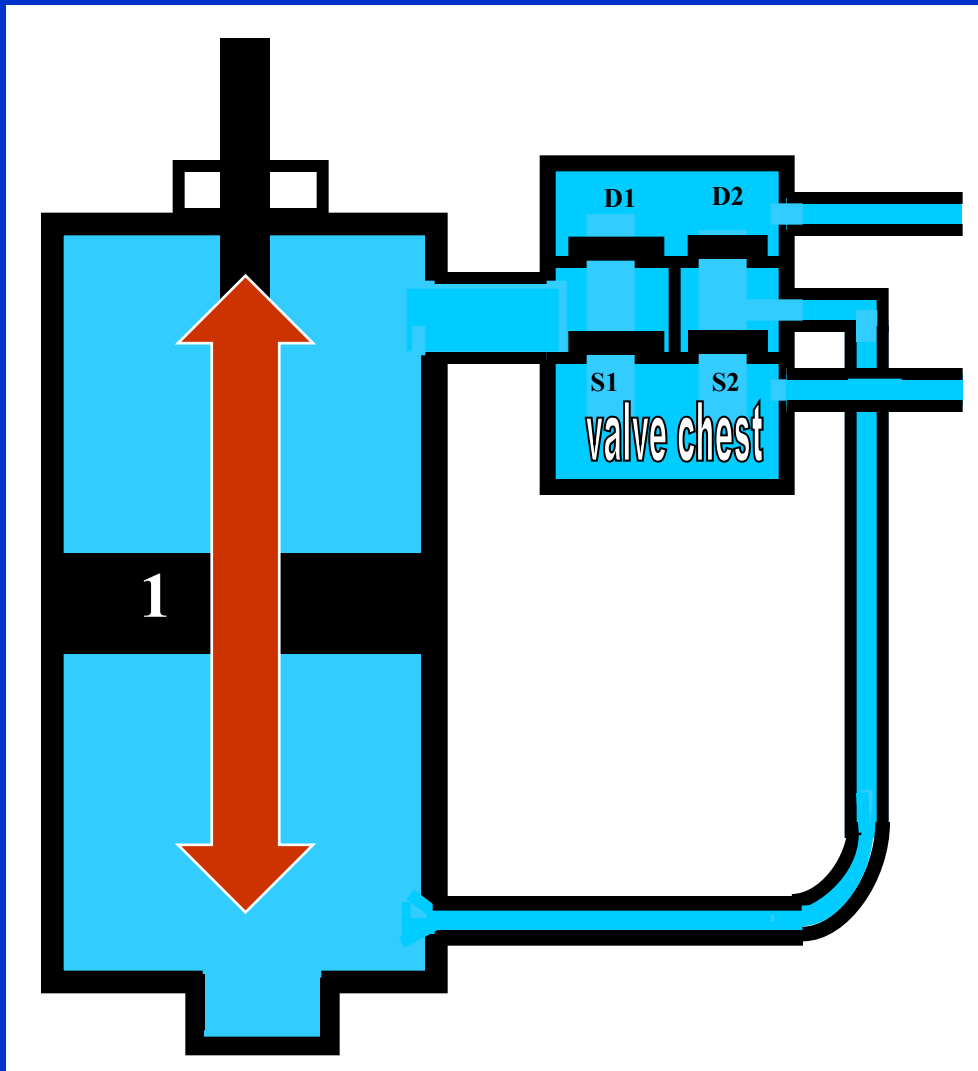


DOUBLE-ACTING DISPLACEMENT PUMP



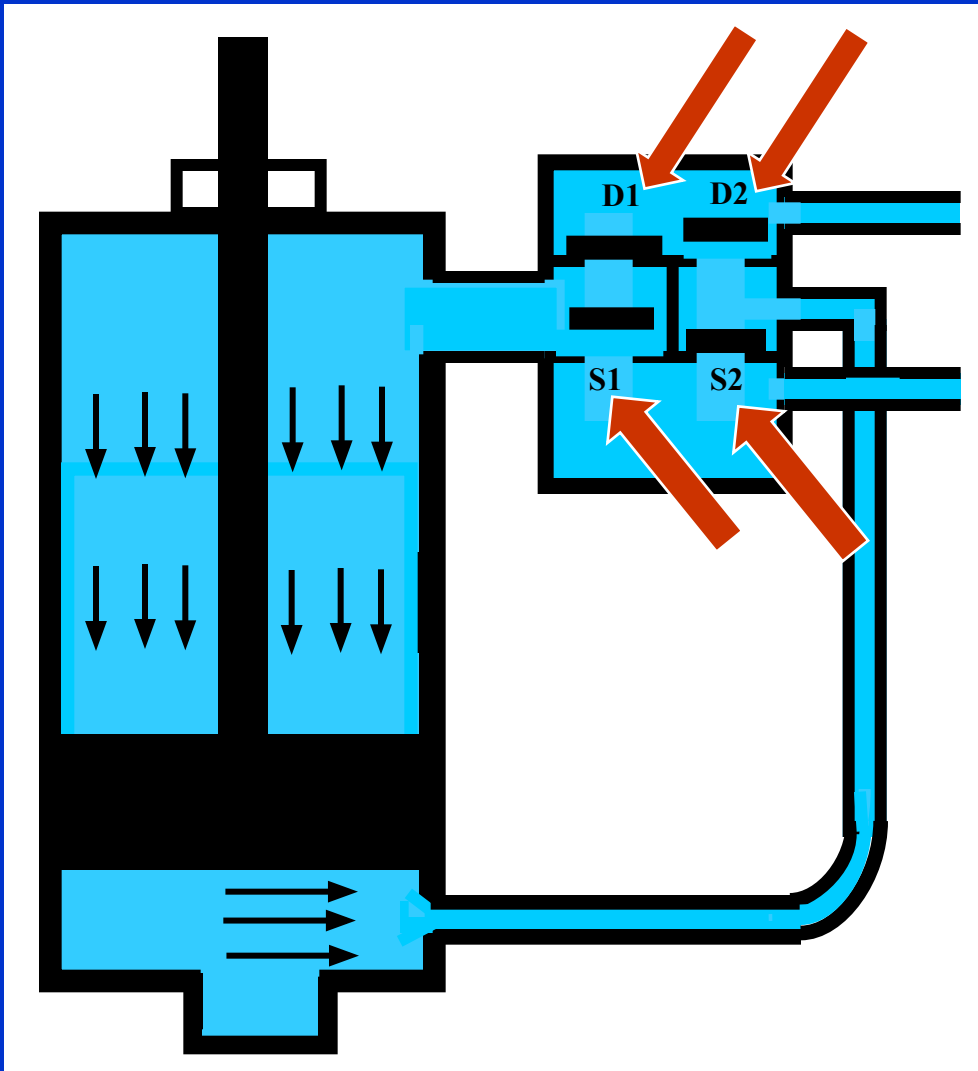
The double acting displacement pump has a *simultaneous suction action and discharge action.*

DOUBLE-ACTING DISPLACEMENT PUMP



The volumes of the pump chambers are increased and decreased by the *reciprocating motion* of the piston (1).

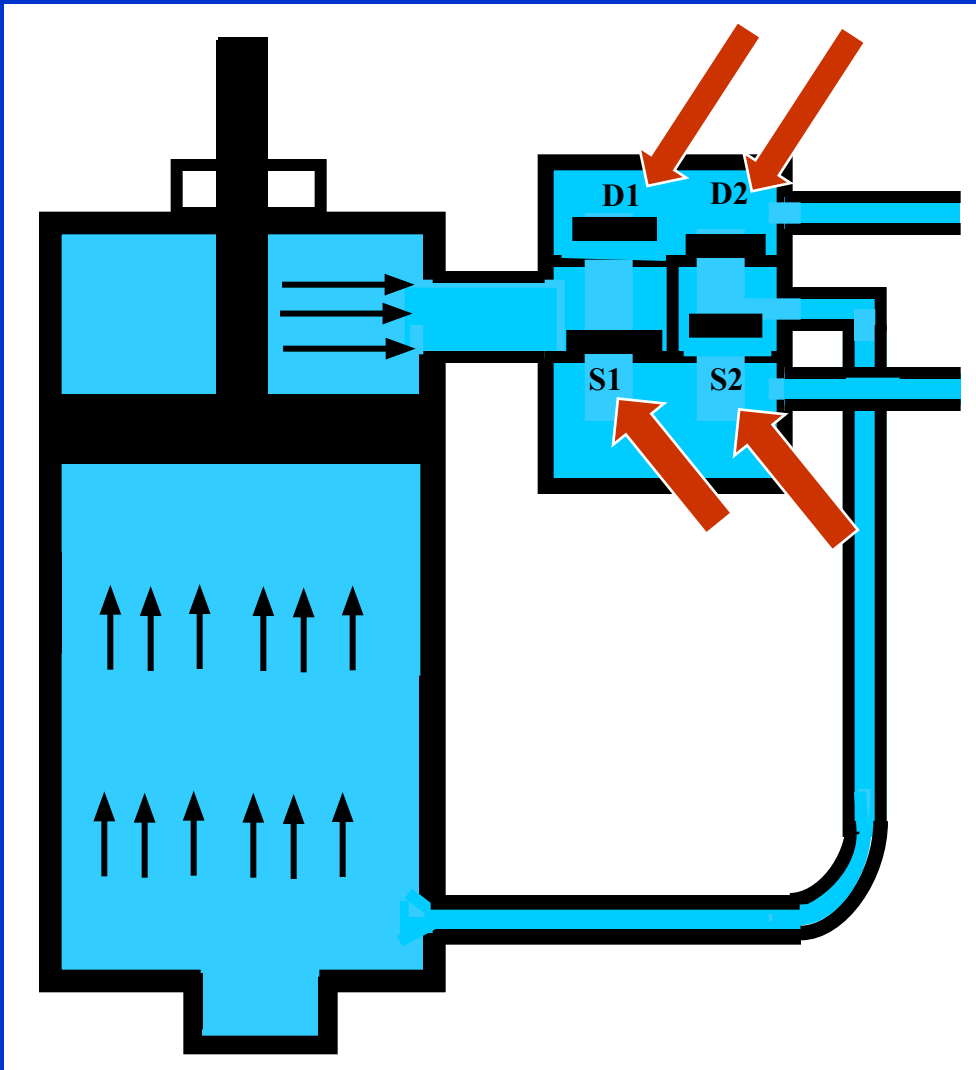
PISTON GOES DOWN:



discharge valve 1
is closed by
suction;
suction valve 1
is opened by suction.

discharge valve 2
is opened by the
pressure of the
liquid;
suction valve 2
is closed.

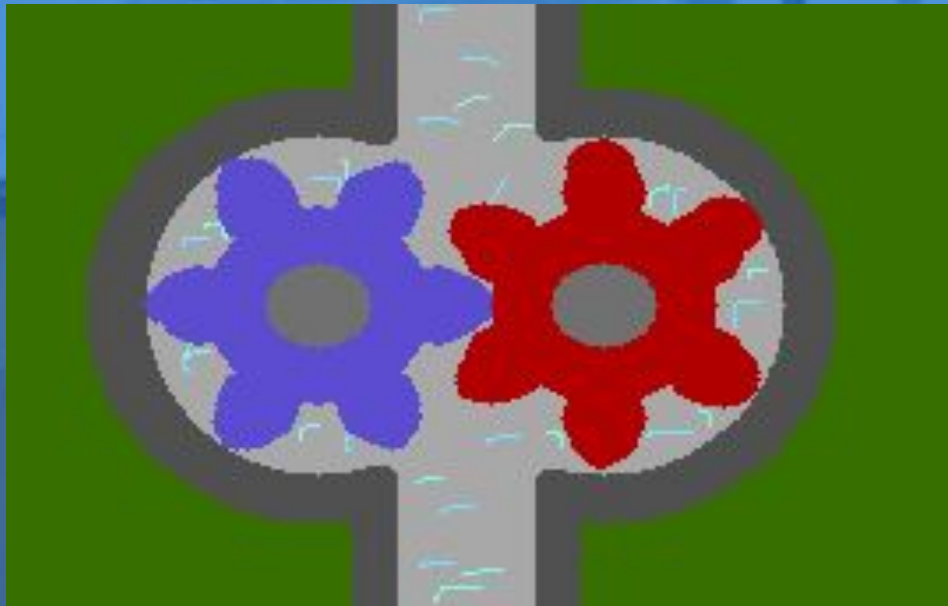
PISTON GOES UP:



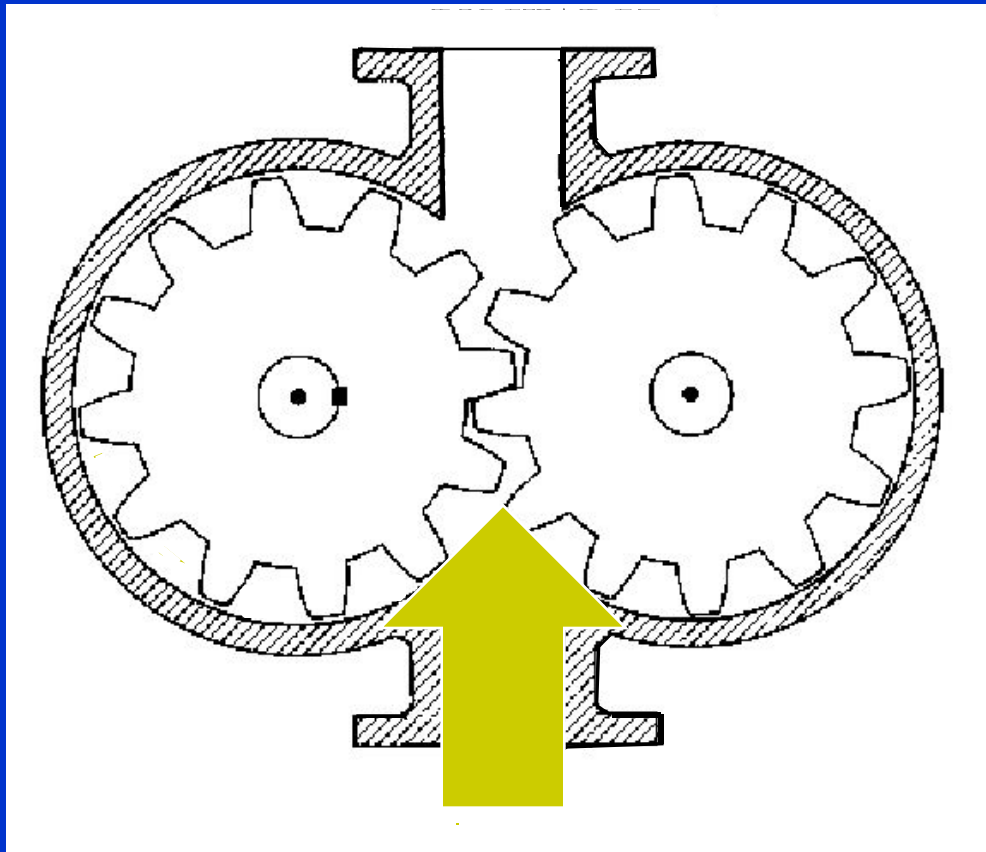
discharge valve 2
is closed by
suction;
suction valve 2
is opened by
suction.

discharge valve 1
is opened by
pressure;
suction valve 1
is closed by pressure.

Gearwheel pump

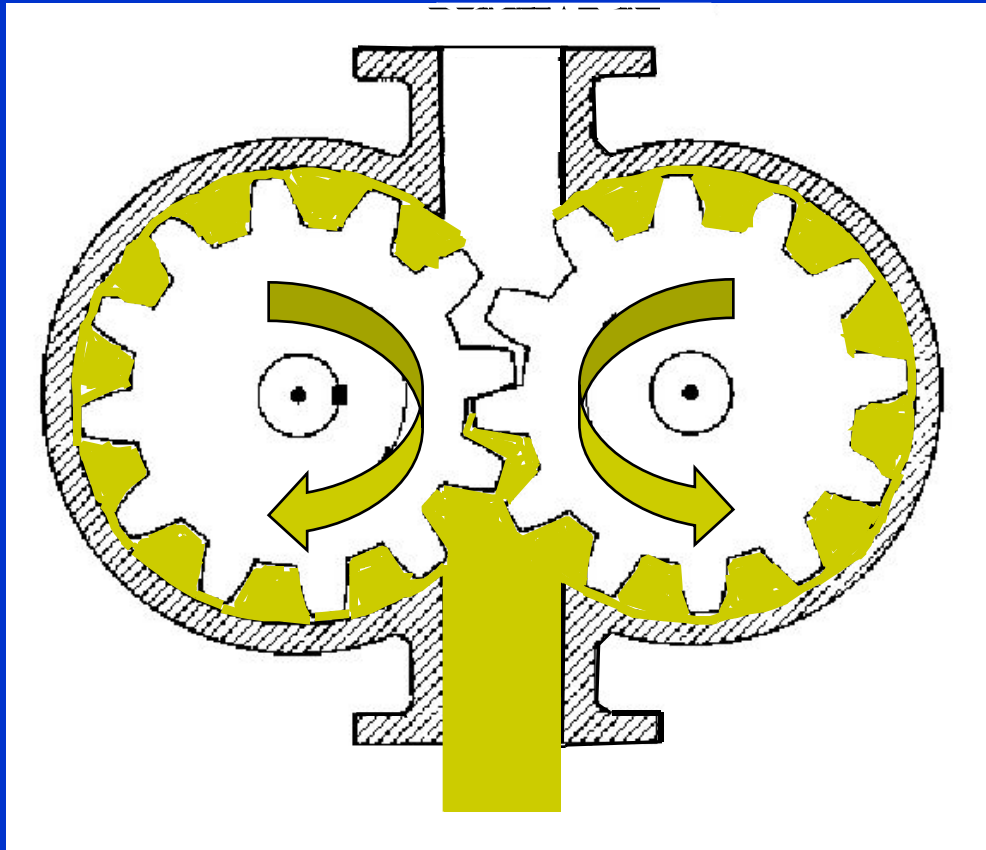


GEARWHEEL PUMP



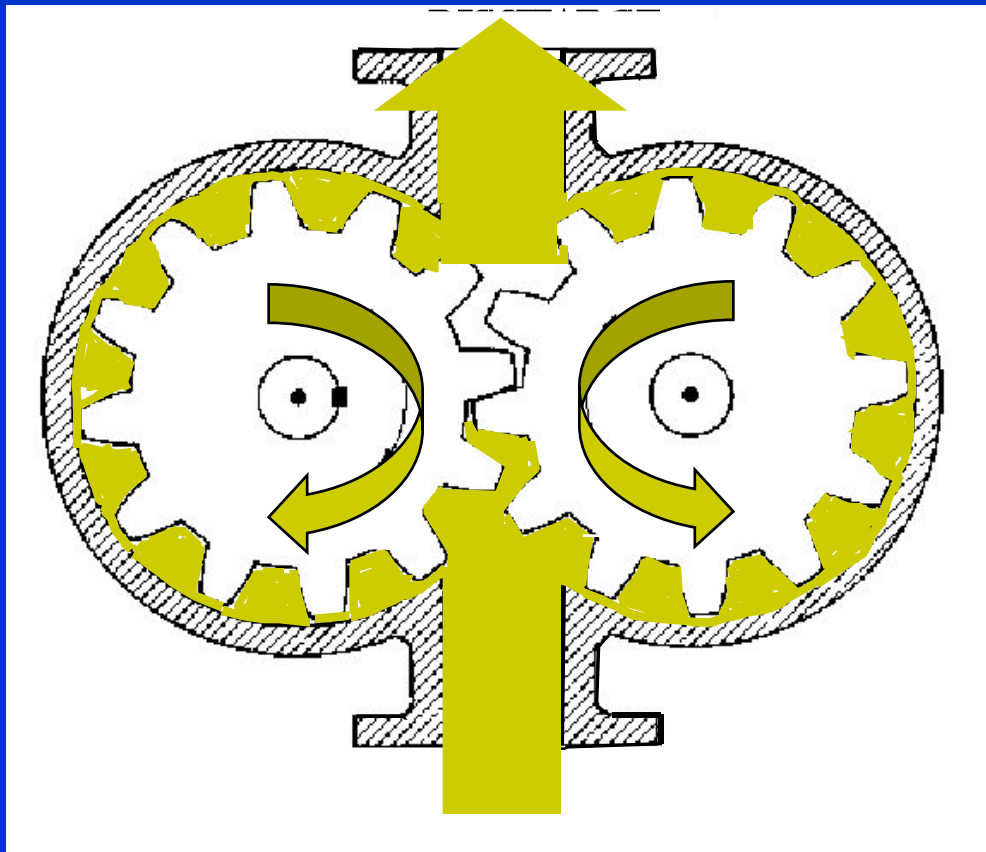
The liquid enters the pump-housing on the *suction side*.

GEARWHEEL PUMP



The liquid is carried around between the teeth of the gearwheels.

GEARWHEEL PUMP

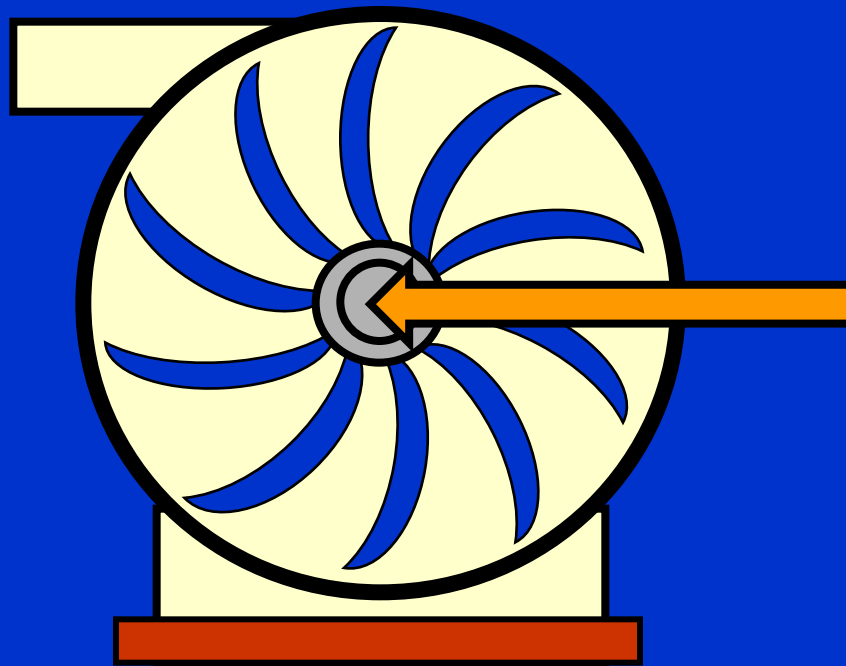


The liquid is *discharged* through the *discharge* line .

Centrifugal pump

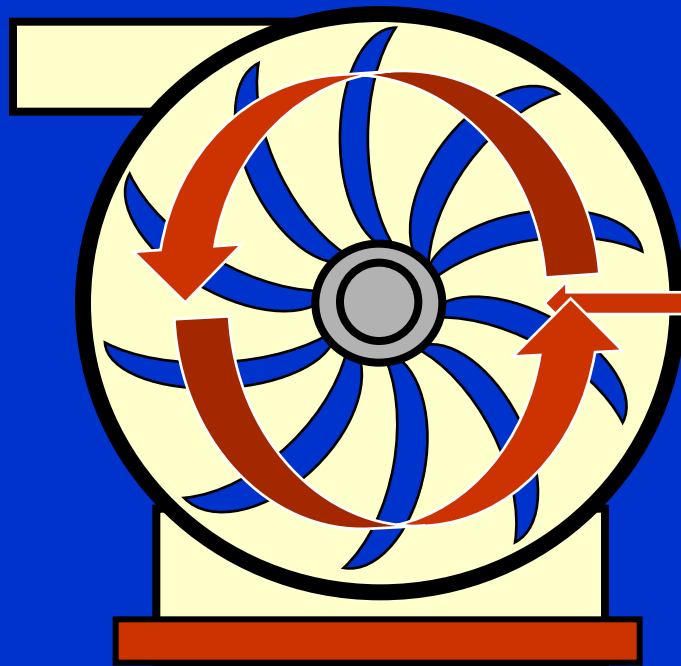


CENTRIFUGAL PUMP



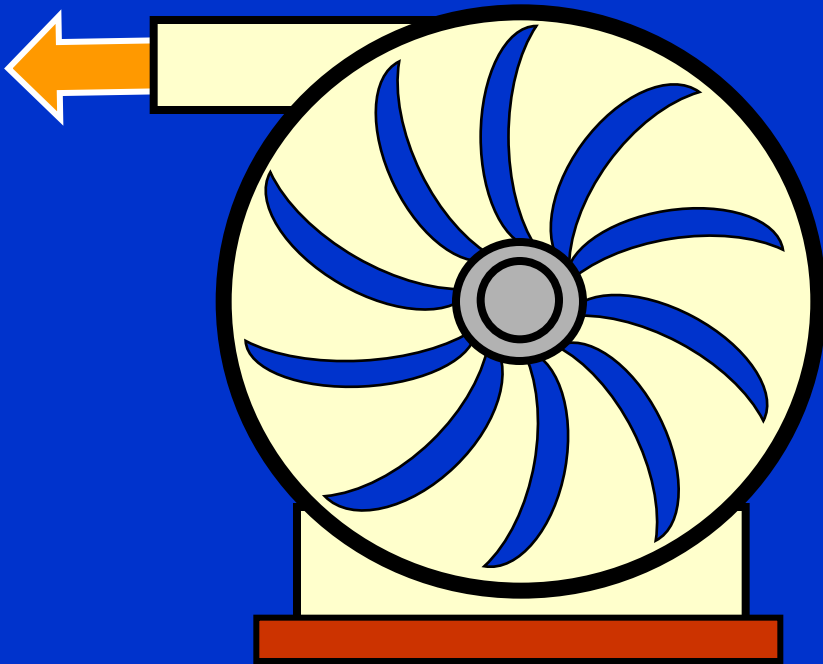
The liquid enters the pump house through the *suction intake* .

CENTRIFUGAL PUMP



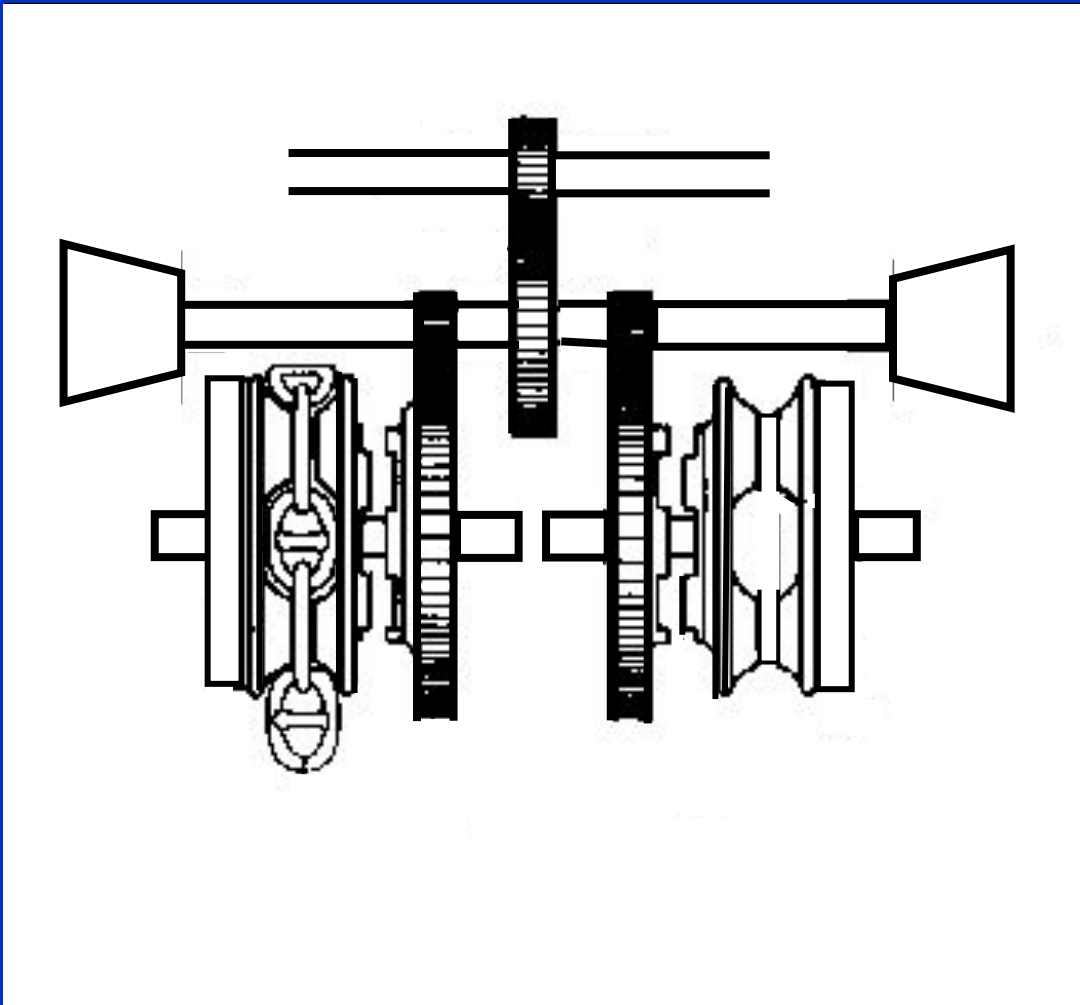
The rotating *impeller* causes a centrifugal force.

CENTRIFUGAL PUMP



The liquid is
discharged
through the
discharge line.

The Anchor Winch



shafts

cable lifters

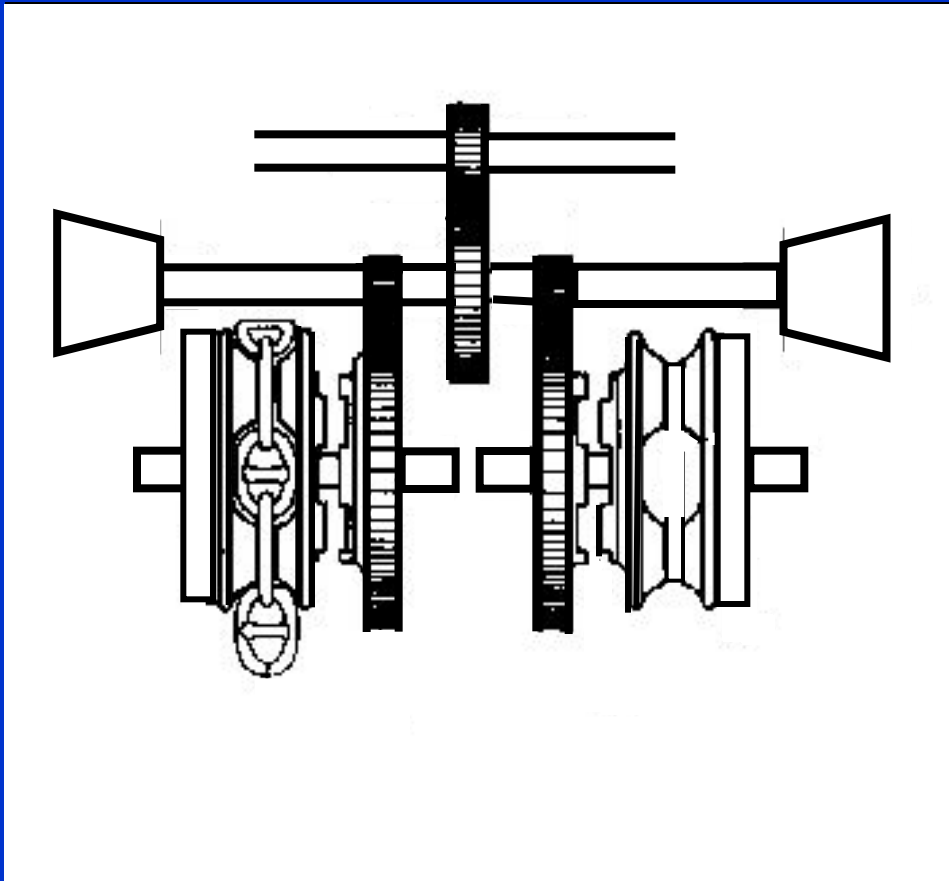
band brakes

warping drums

gearwheels

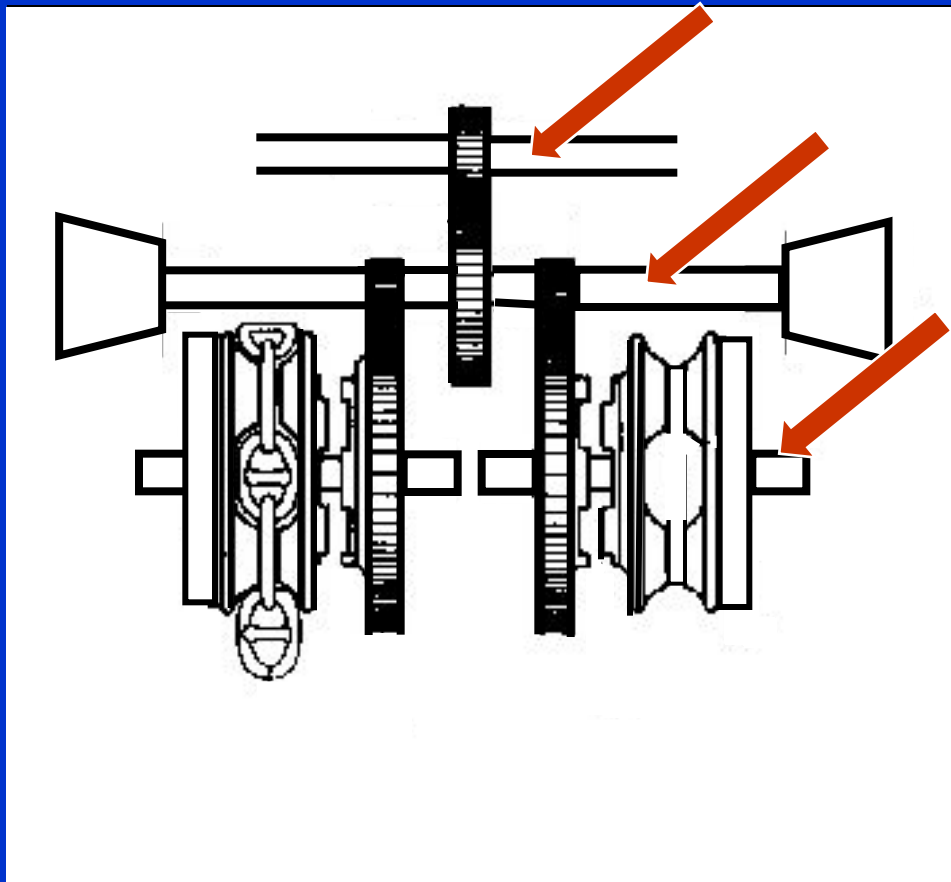
dog clutches

THE ANCHOR WINCH



The anchor winch, or *windlass*, is used to drop and *heave in* the anchor through the hawse pipe; the anchor chain is stored in the *chain locker*.

ANCHOR WINCH SHAFTS

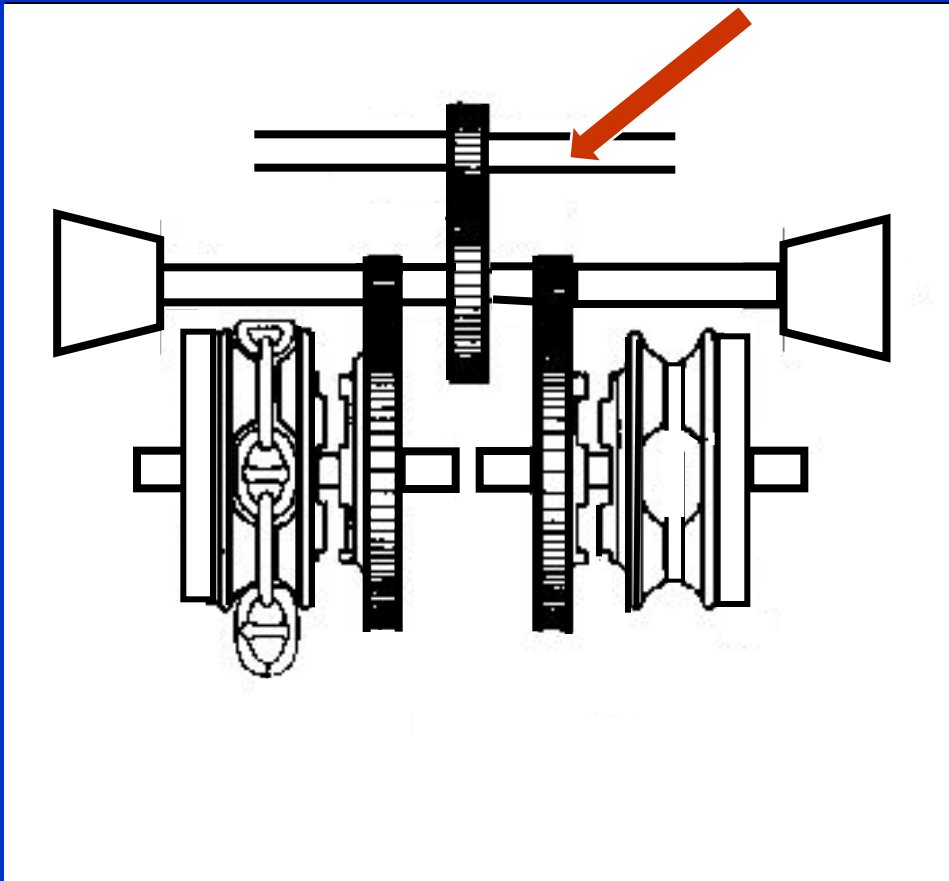


Driving shaft

Intermediate shaft

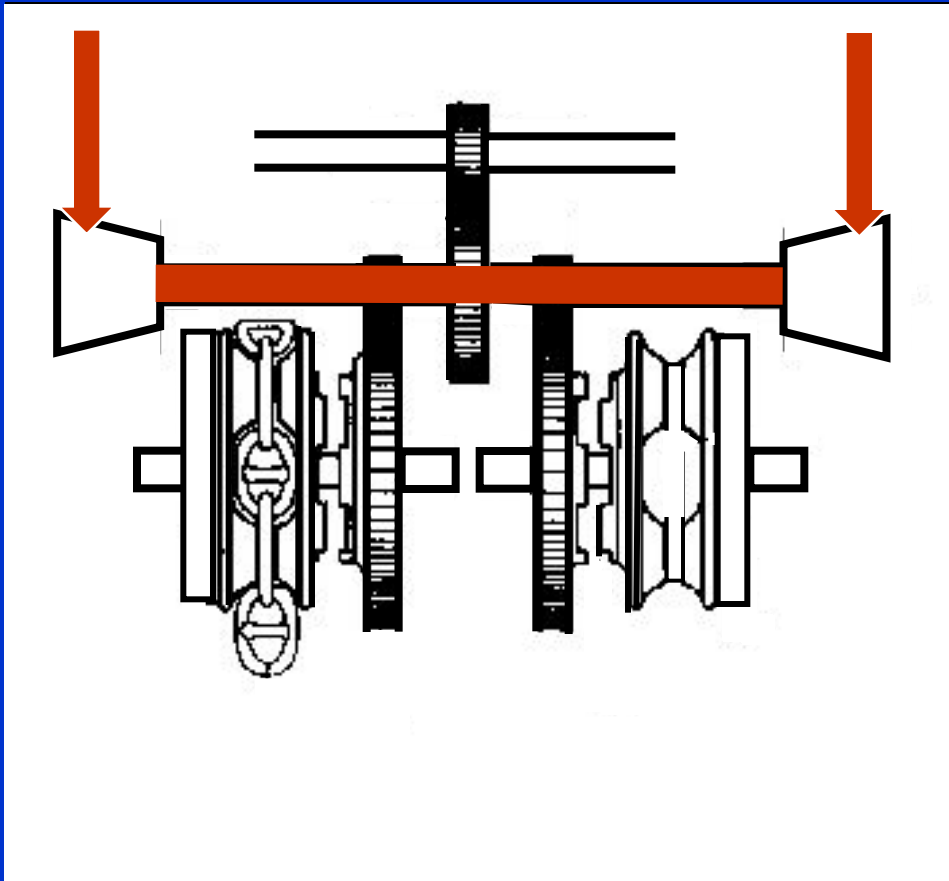
Main shaft.

DRIVING SHAFT



**An electric motor
(or electric-hydraulic
motor)
drives the primary
shaft (driving shaft).**

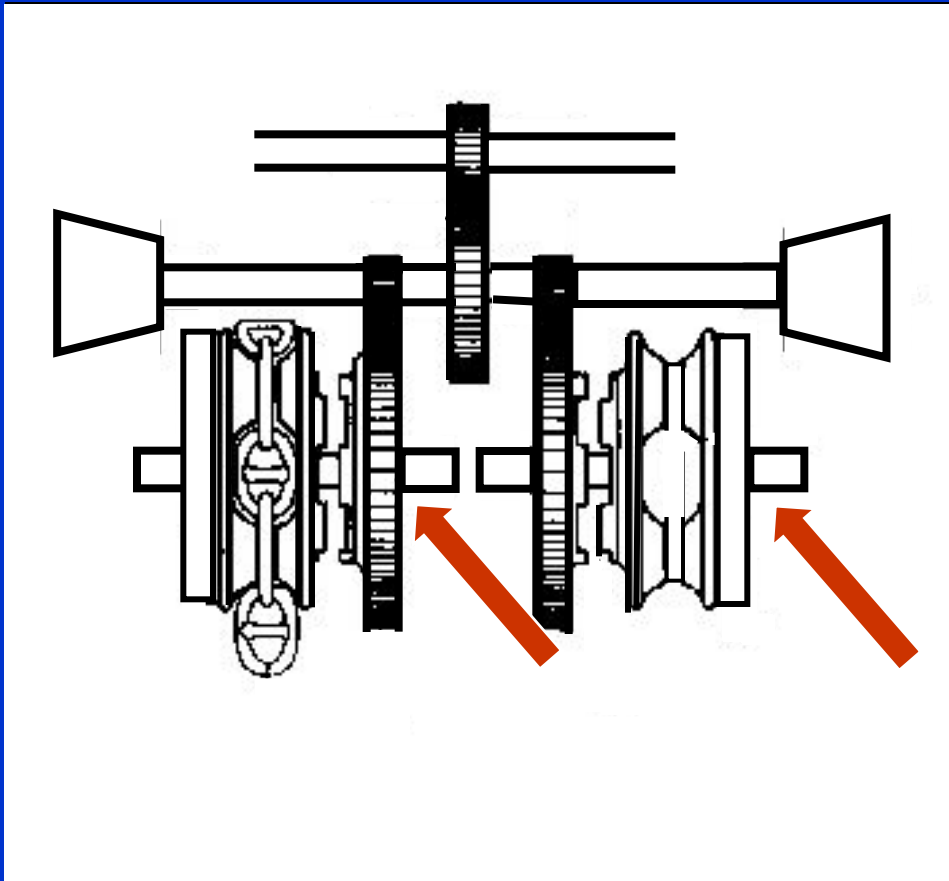
INTERMEDIATE SHAFT



At the *extremities* of the intermediate shaft are the *warping drums*.

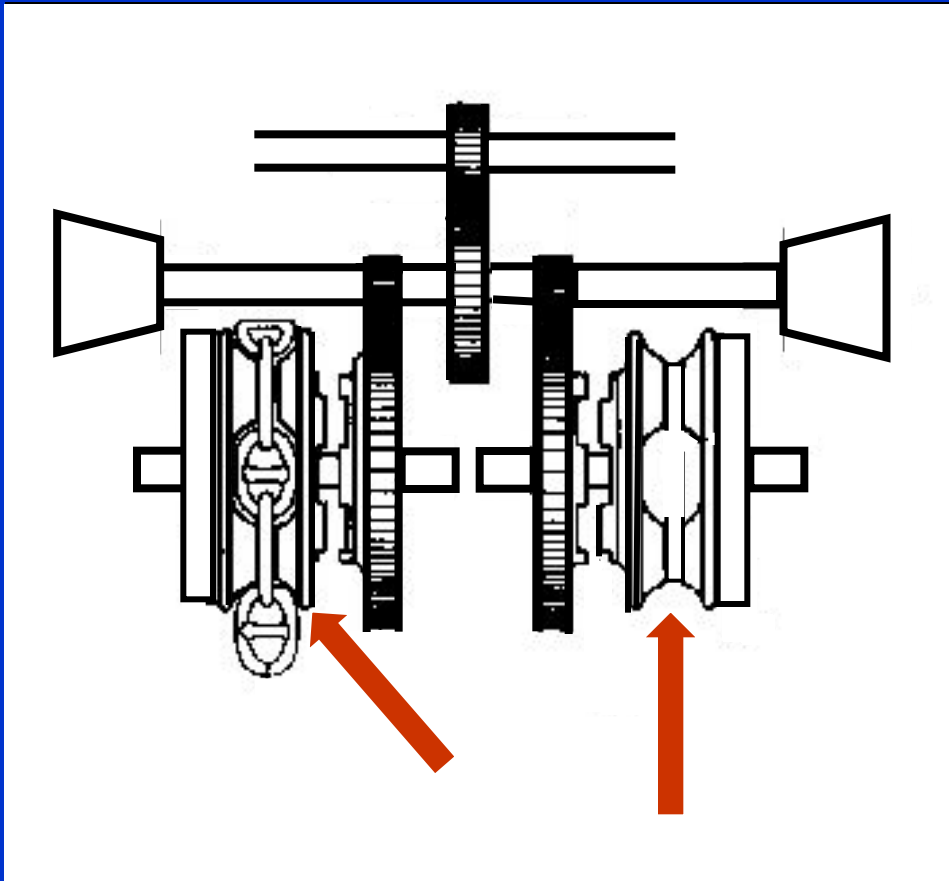
Warping drums are used to heave the lines tight; they are also used for *shifting berth*.

THE MAIN SHAFT



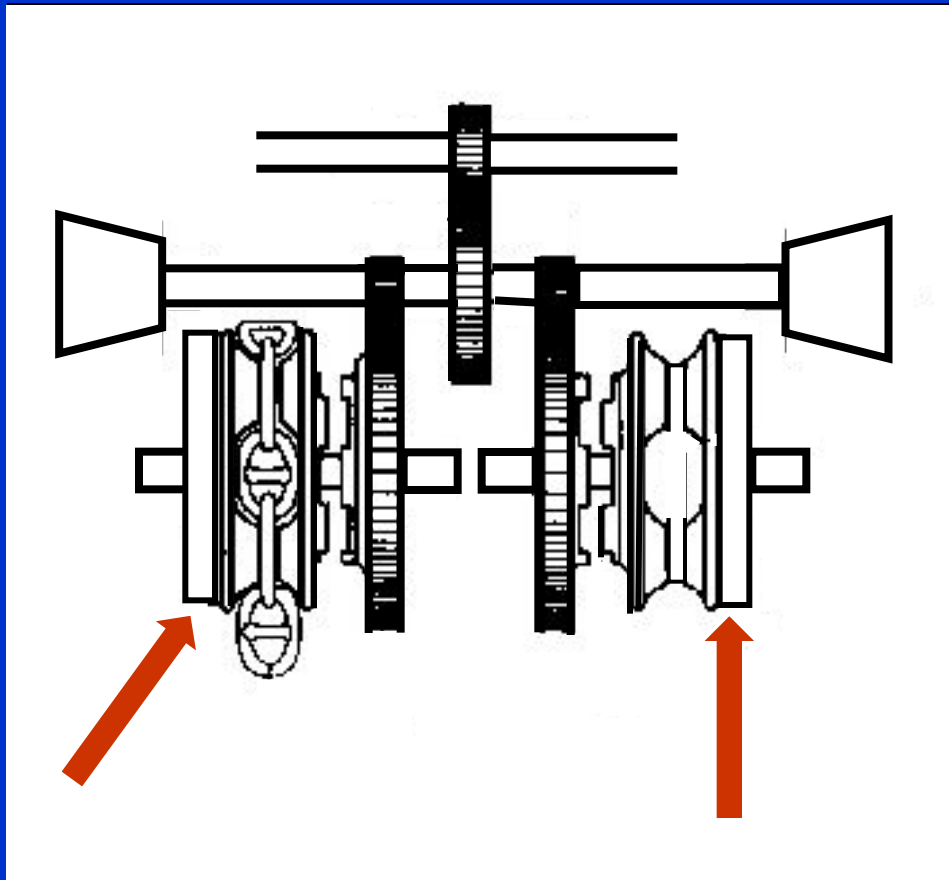
The main shaft is divided into starboard and port sections.

CABLE LIFTERS



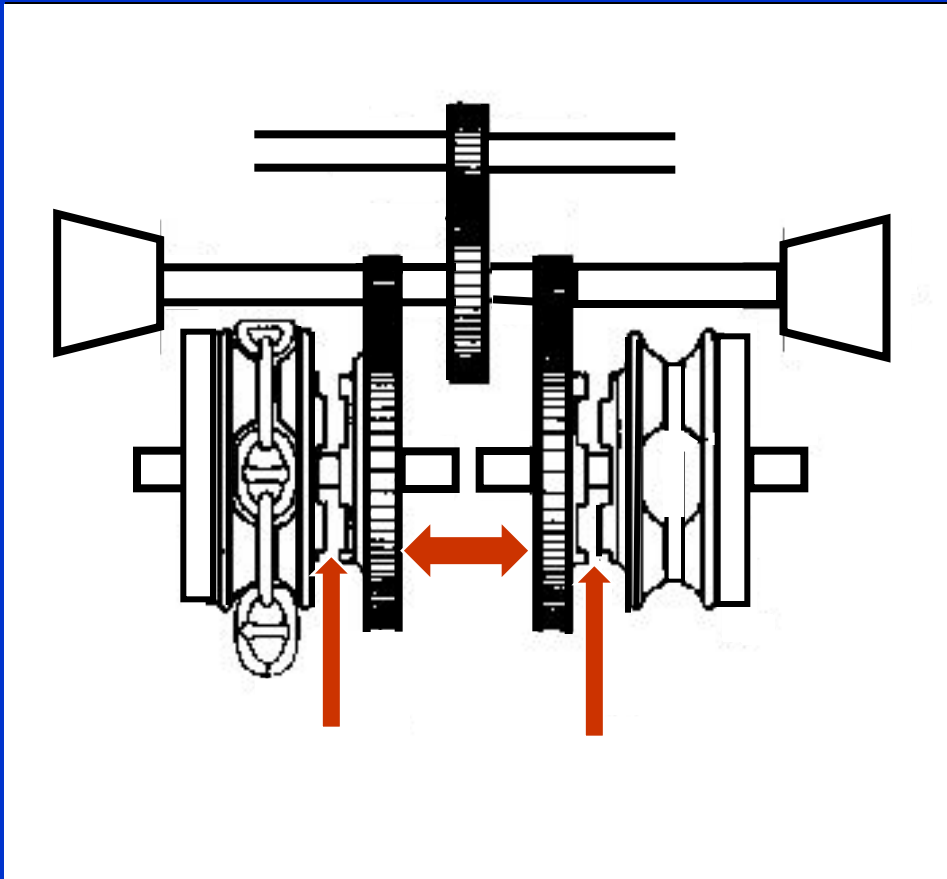
The anchor chain is wound around the *cable lifter*.

BAND BRAKE



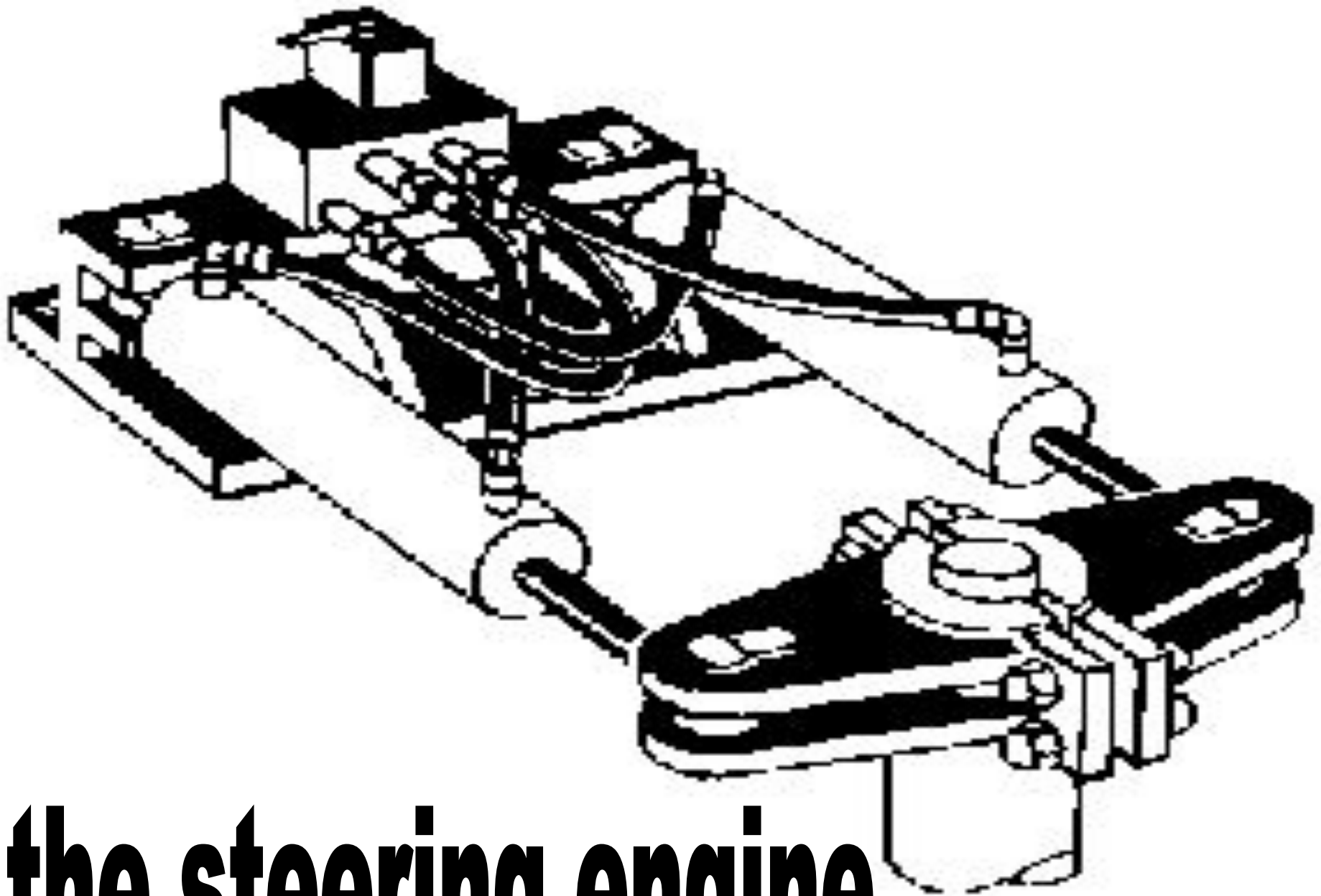
Band brakes control the *dropping speed* of the anchor.

GEARWHEELS AND DOG CLUTCHES



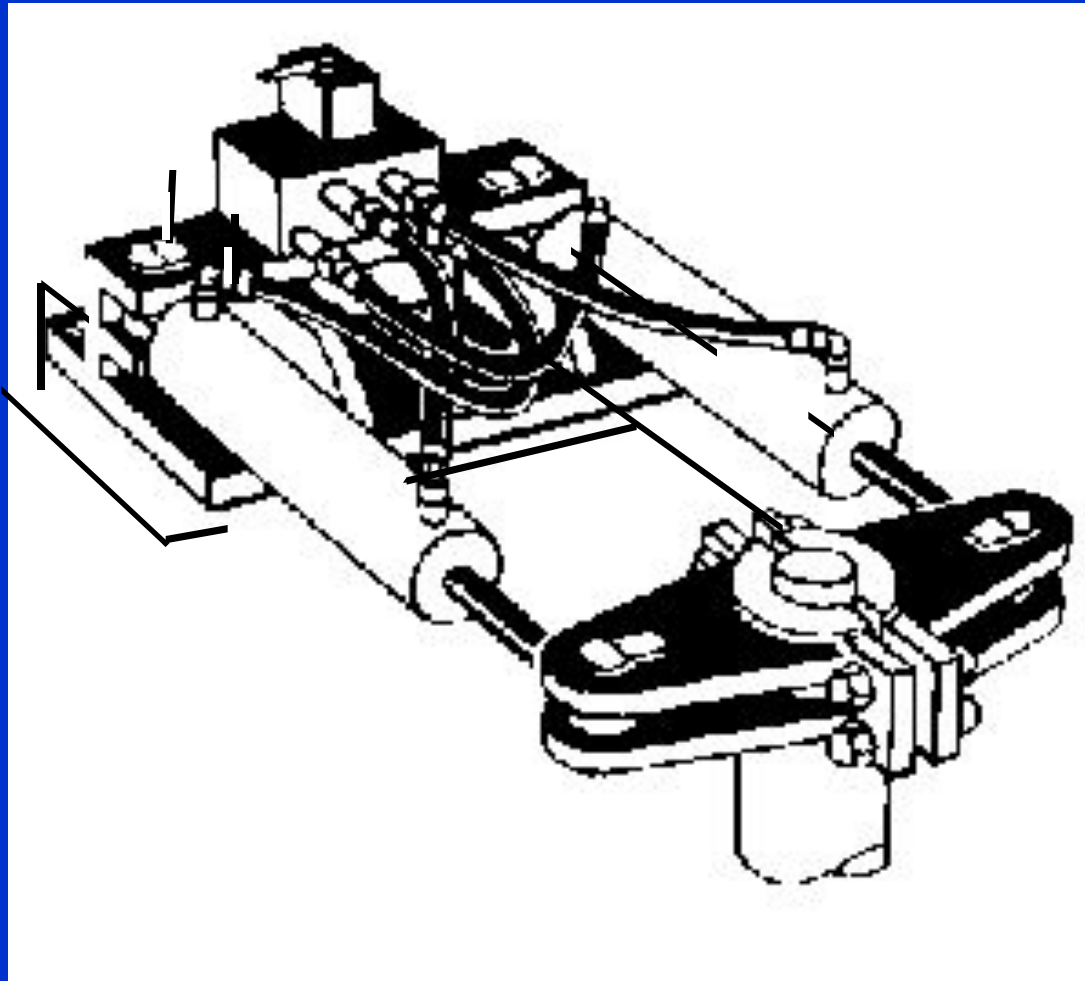
Main gearwheels
can be shifted to
port or starboard.

Dog clutches engage
the cable lifters.

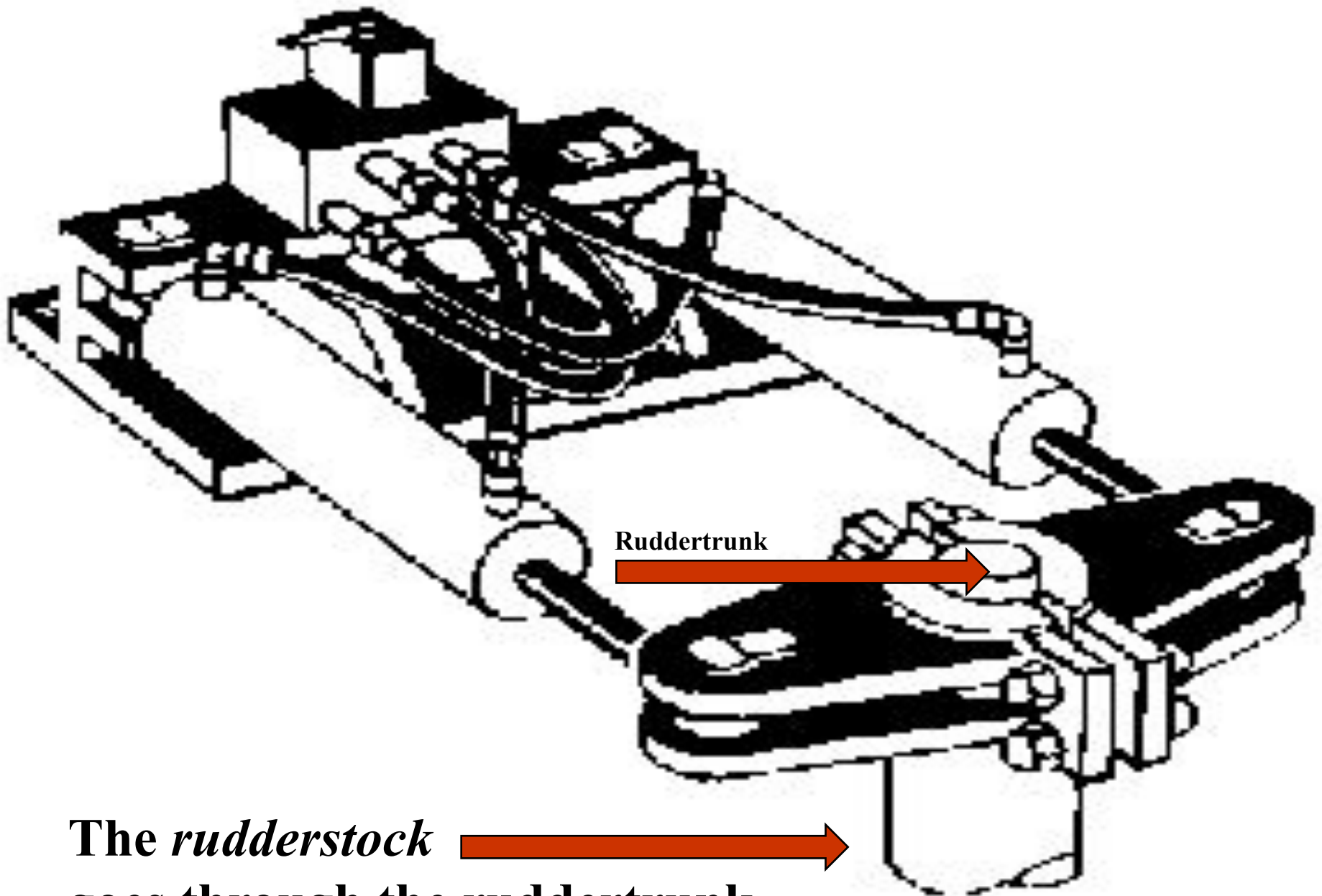


the steering engine

THE STEERING ENGINE

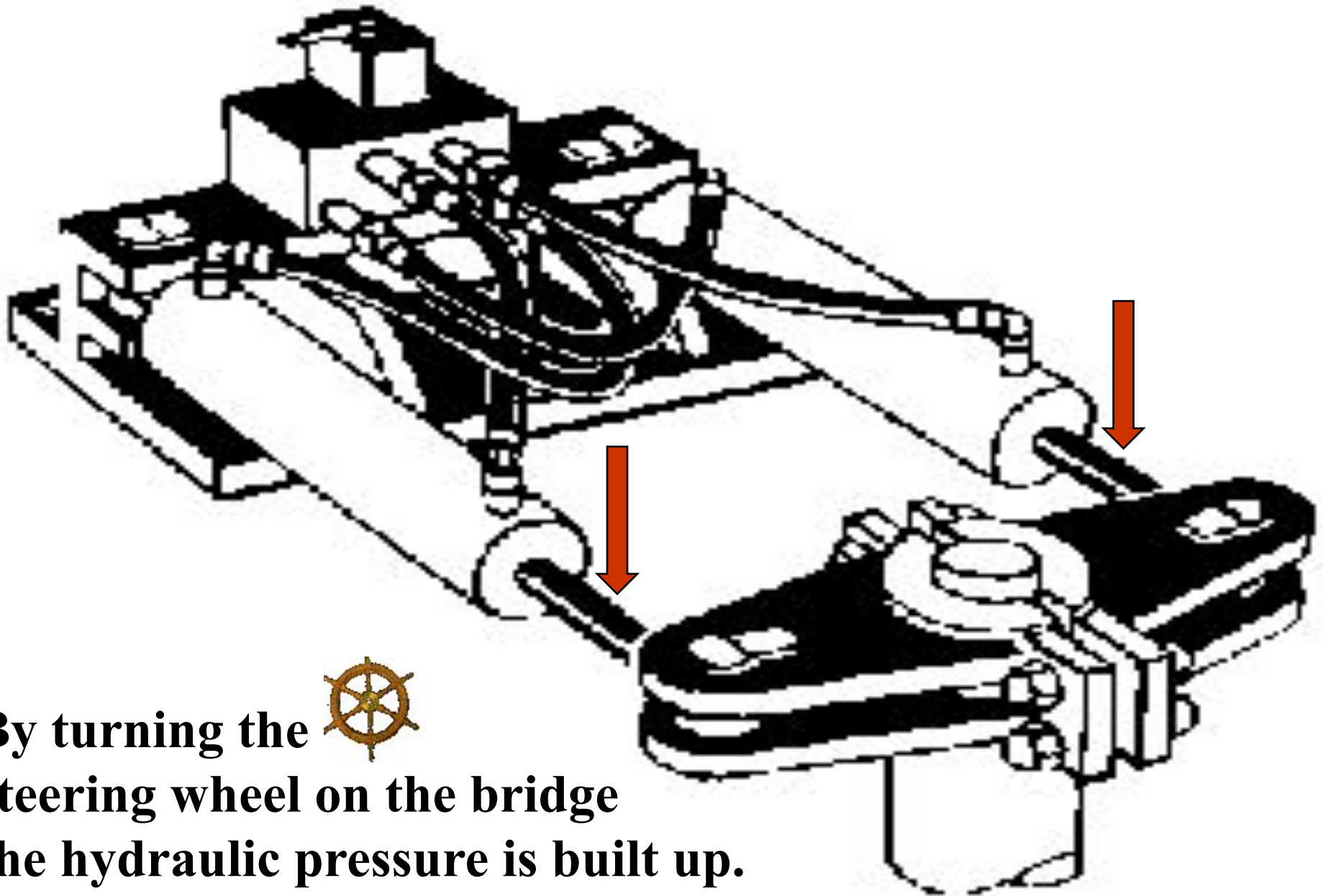


The steering engine is a *remote controlled* electrically or hydraulically driven *telemotor*.



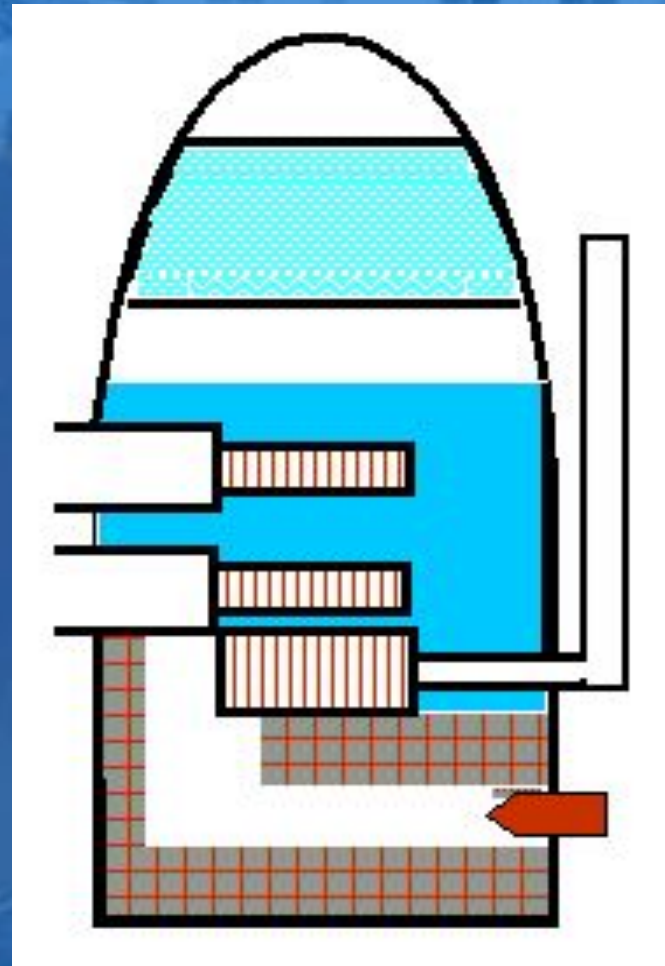
Ruddertrunk

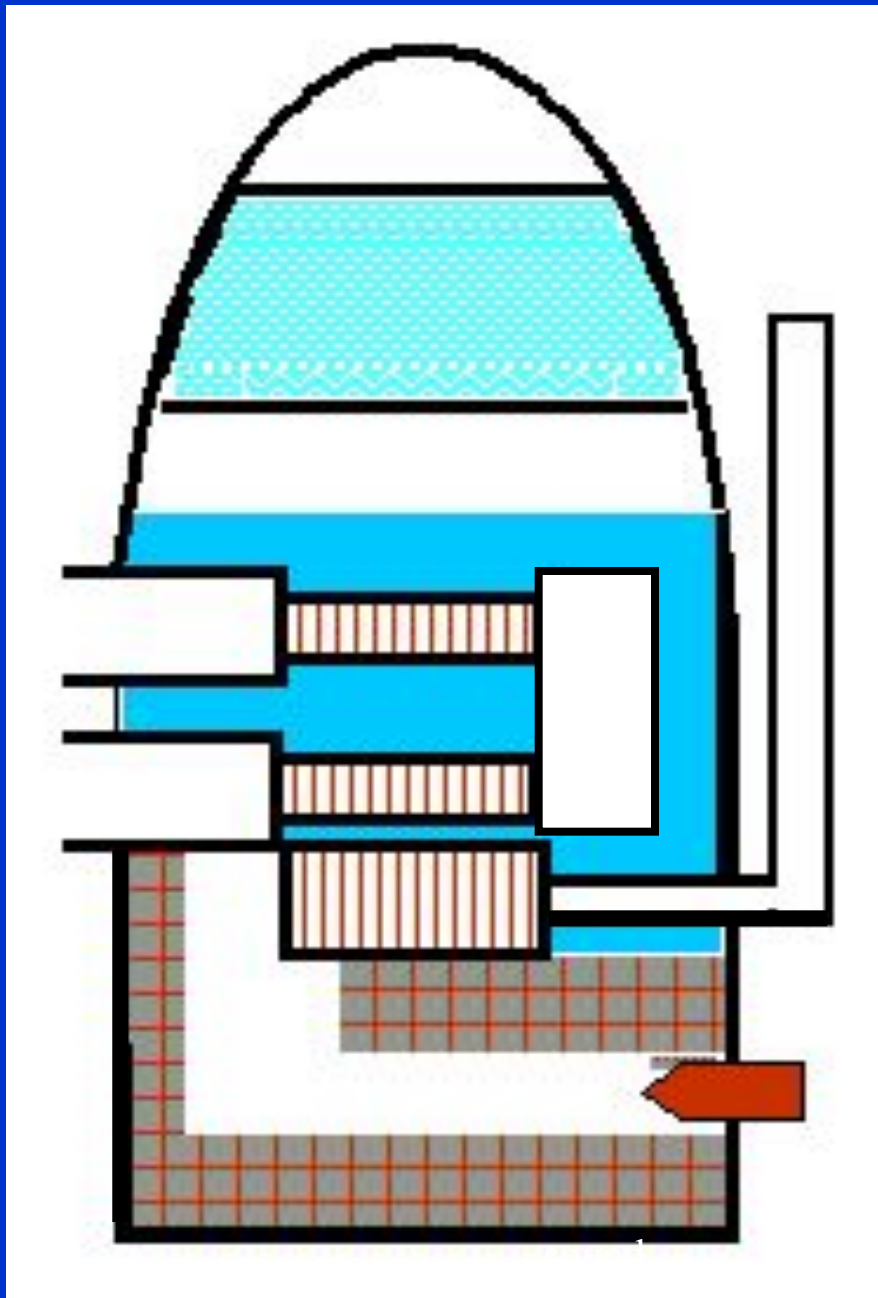
The *rudderstock* goes through the ruddertrunk.



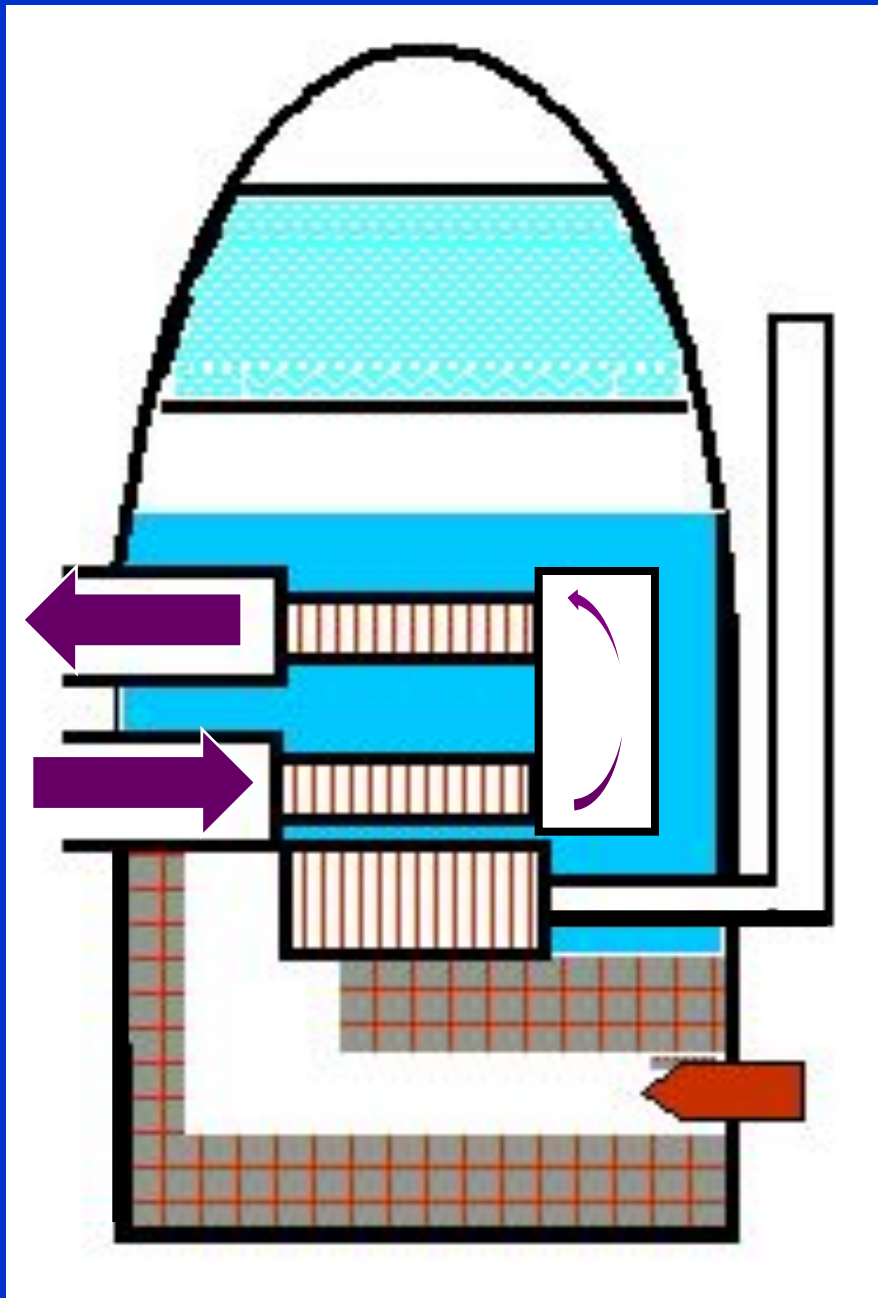
By turning the steering wheel on the bridge the hydraulic pressure is built up. This moves the rams in the cylinders.

Exhaust gas boilers





The exhaust gas boiler (or *waste heat boiler*) consists of a *welded vertical cylinder* with a *hemispherical top*.

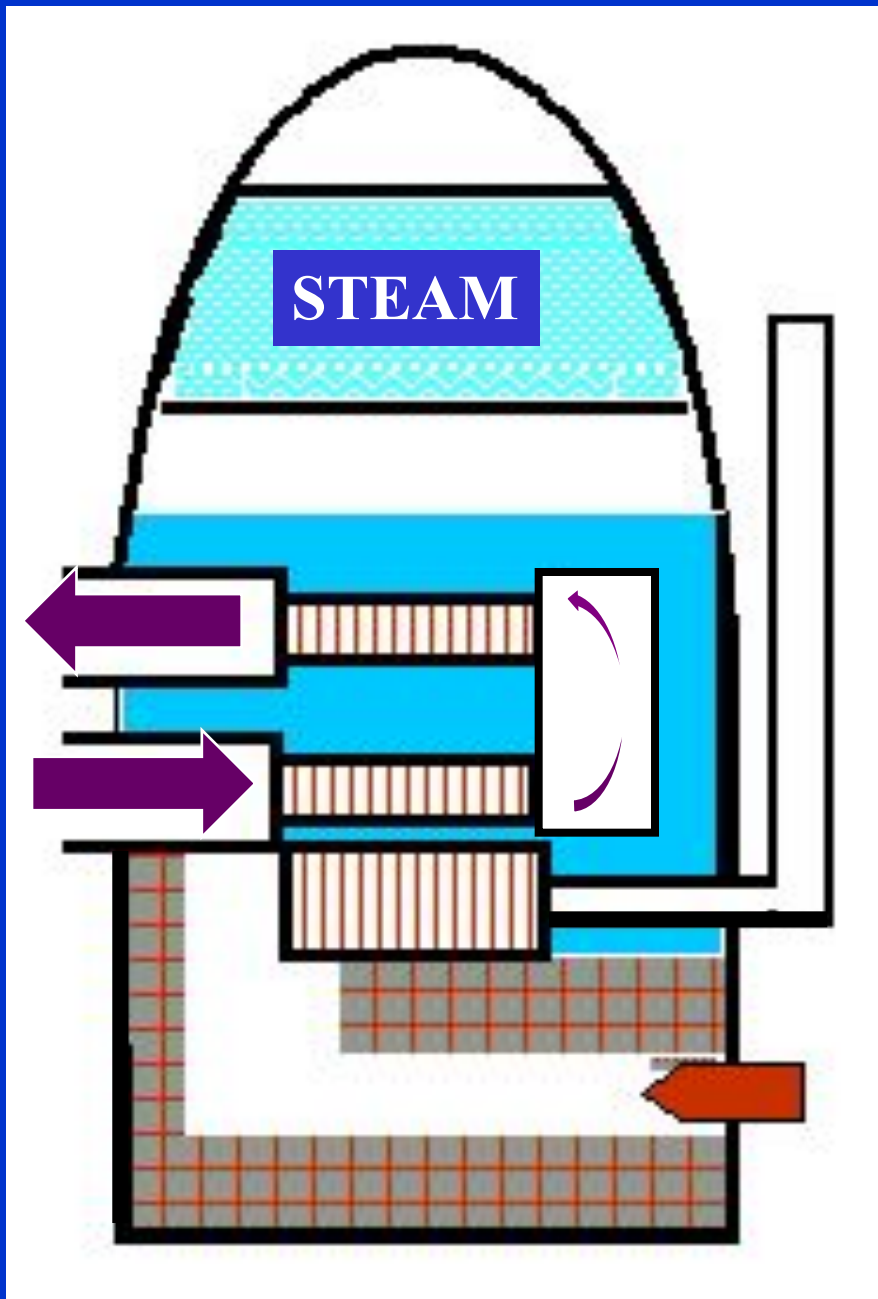


Exhaust gases enter the boiler through the *exhaust gas inlet*;

Exhaust gases heat up *banks of tubes*, which heat up the water;



The exhaust gases leave the boiler through the *exhaust gas outlet*.

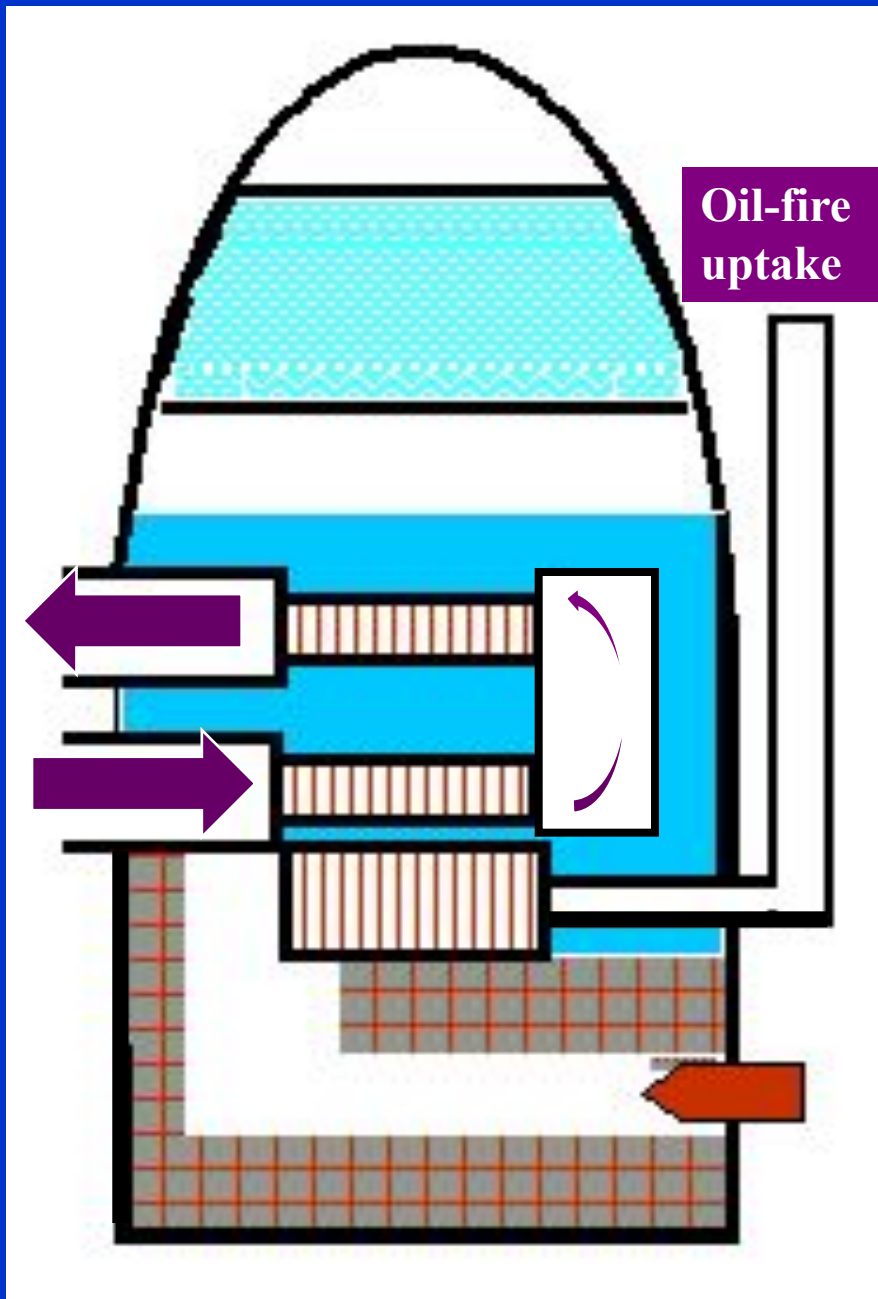


Water turns to steam, which is used to produce energy for heating purposes, or even for driving *auxiliaries*.

Firebricks protect the boiler shell against damage.

Firebricks also prevent heat loss.

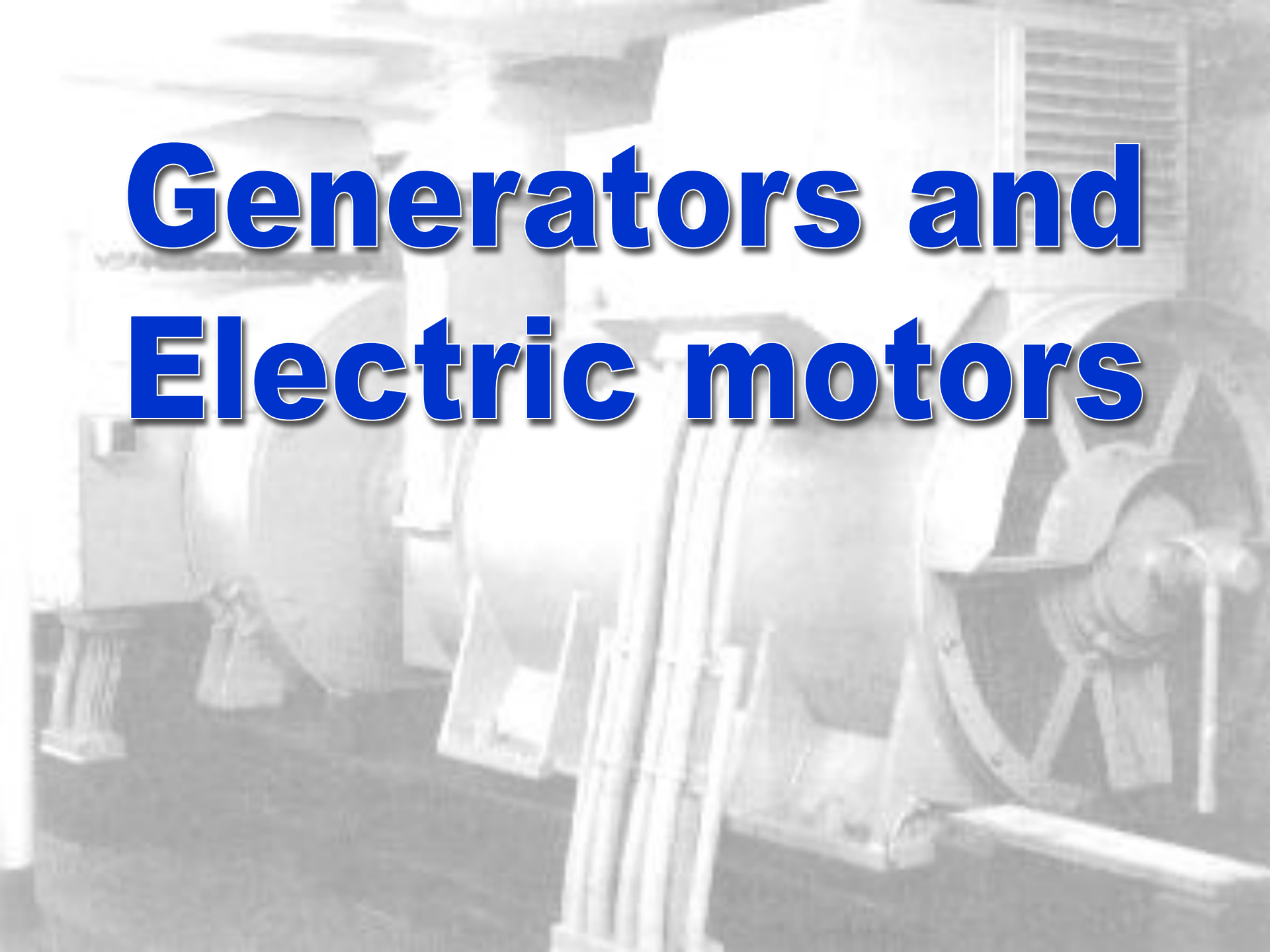




In a *composite boiler* the generation of steam can be maintained by *oil firing* when the *idle engine* does not produce any exhaust gases.



Generators and Electric motors



THE GENERATOR

A large industrial generator is shown in a factory setting. The generator is a massive piece of machinery with a large circular opening on the right side, revealing internal components like a rotor and stator. The background is slightly blurred, showing other parts of the factory environment.

A generator produces either *alternating current (A/C)* or *direct current (D/C)*.

Alternating current *changes* polarity about 50 times a second. A/C is used for *lighting* and to drive *auxiliary engines*.



Direct current doesn't change polarity, but *travels in one direction*.




***A converter* changes A/C into D/C.**

A/C → D/C

THE TRANSFORMER

A transformer increases the voltage

(step-up) 

or reduces the voltage

(step-down) 

ELECTRIC MOTORS



- . The compound motor is a combination of a *shunt motor* and a *series motor*.
- . The a- synchronous motor does not have *vulnerable carbon brushes*.
- . The synchronous motor has carbon brushes that require a lot of maintenance.

THE COMPOUND ELECTRIC MOTOR



The *compound* motor combines the *advantages* of the shunt motor and series motor: it has a *constant speed* and a *high starting torque*.

THE A-SYNCHRONOUS MOTOR.



The advantage of the a-synchronous motor is, that it doesn't have *carbon brushes* and *coils*.

The disadvantages of the a-synchronous motor are, that it requires much *initial current* and it produces a *low starting-torque*.

THE SYNCHRONOUS MOTOR.



The advantages of the synchronous motor are, that it requires *little initial current* and it produces a *high starting-torque*.

The disadvantages of the synchronous motor are the *maintenance* it requires, and its *price*.

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SHIPPING AND TRANSPORT COLLEGE ROTTERDAM