

UNIT 8

PUMP



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OBJECTIVE

- ABLE TO CLASSIFY PUMP
- ABLE TO KNOW ABOUT WORKING OF RECIPROCATING PUMP
- ABLE TO DESCRIBE FUNCTION OF AIR CHAMBER
- ABLE TO KNOW ABOUT WORKING OF CENTRIFUGAL PUMP
- ABLE TO EXPLAIN PHENOMENON OF PRIMING
- ABLE TO COMPARE RECIPROCATING PUMP WITH CENTRIFUGAL PUMP
- ABLE TO KNOW CONSTRUCTION AND WORKING OF VARIOUS TYPE OF ROTARY PUMP

APPLICATION OF PUMP

THE PUMP IS ONE OF THE MOST IMPORTANT ACCESSORIES OF PRIME MOVERS LIKE HEAT ENGINE

THE PURPOSE OF USING PUMPS MAY BE INCREASING THE PRESSURE, IMPARTING KINETIC ENERGY, LIFTING AND CIRCULATING, EXHAUSTING OR EXTRACTING LIQUID ETC.

○ MAIN APPLICATION OF PUMP

1.AGRICULTURE AND IRRIGATION WORKS

2.MUNICIPAL WATER WORKS AND DRAINAGE SYSTEM

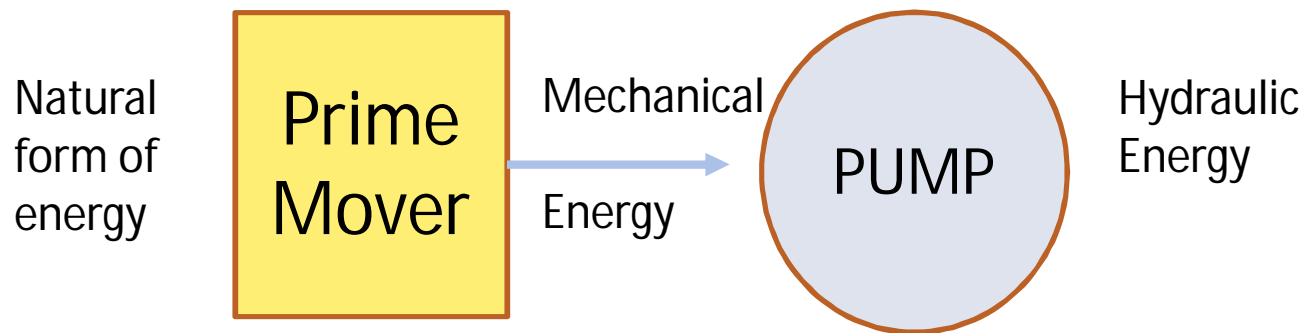
3.CONDENSING WATER, CONDENSATE, BOILER FEED, SUMP DRAIN AND SUCH OTHER SERVICES IN A STEAM POWER PLANT

4.HYDRAULIC CONTROL SYSTEM

5.OIL PUMPING

6.TRANSFER OF RAW MATERIALS, MATERIAL IN MANUFACTURING AND FINISHED PRODUCTS IN INDUSTRY

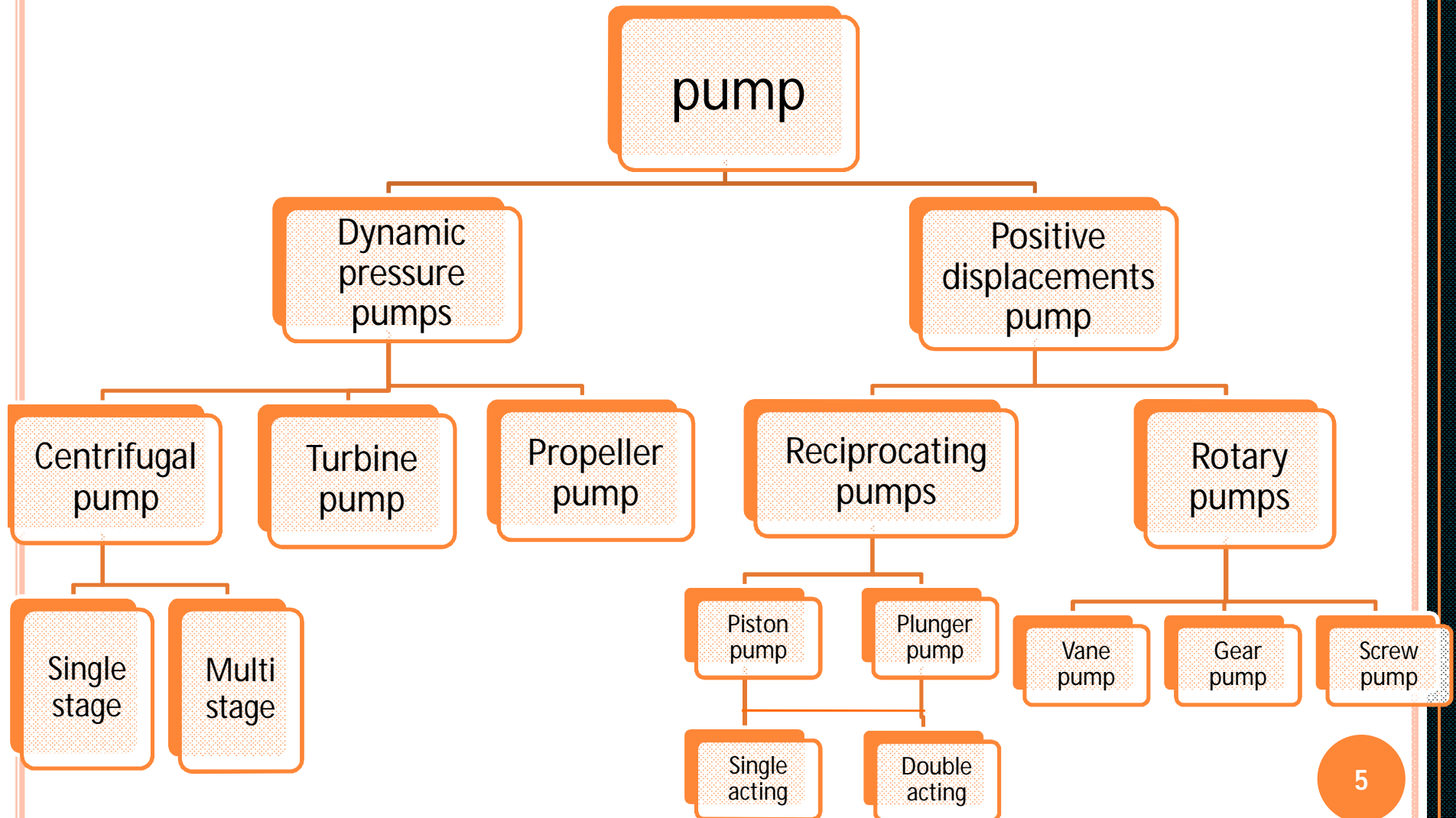
PUMP (DEFINITION)



THE PUMP IS A MECHANICAL DEVICE WHICH CONVEYS LIQUID FROM ONE PLACE TO ANOTHER PLACE. IT CAN BE DEFINED AS A HYDRAULIC MACHINES WHICH CONVERTS THE MECHANICAL ENERGY INTO HYDRAULIC ENERGY.

THE PUMP IS POWER ABSORBING MACHINE. THE POWER CAN BE SUPPLIED TO THE PUMP BY A PRIME MOVER LIKE AN ELECTRIC MOTOR, AN INTERNAL COMBUSTION ENGINE TO TURBINE

CLASSIFICATION OF PUMPS



DYNAMIC PUMP

IT IS OPERATE ON THE PRINCIPAL OF CENTRIFUGAL FORCE FOR CONVEYING LIQUID FROM ONE PLACE TO ANOTHER.

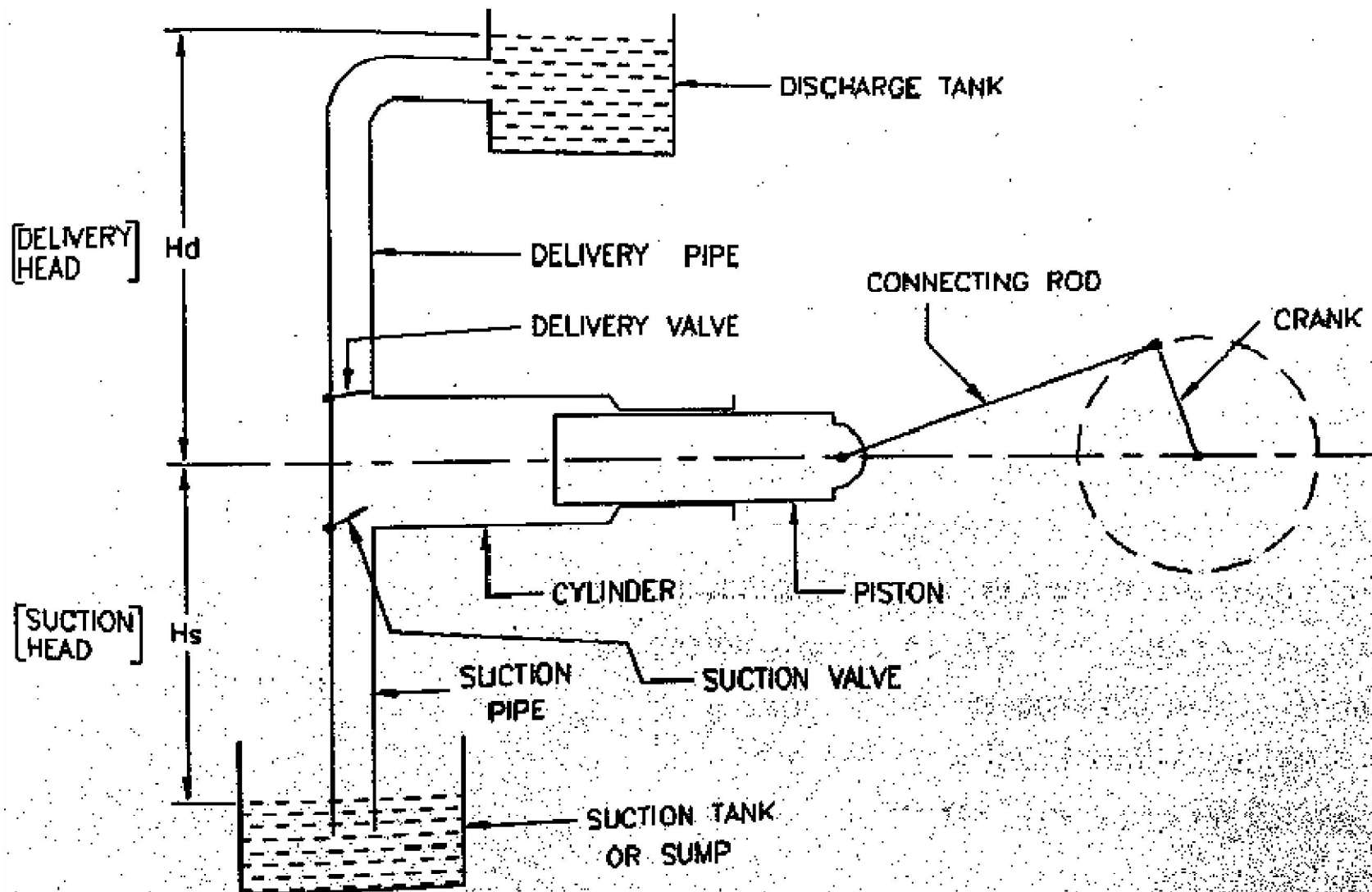
MAIN COMPONENT IS REVOLVING WHEEL OR IMPELLER WHICH HAS CURVED VANES ON IT.

POSITIVE DISPLACEMENT PUMP

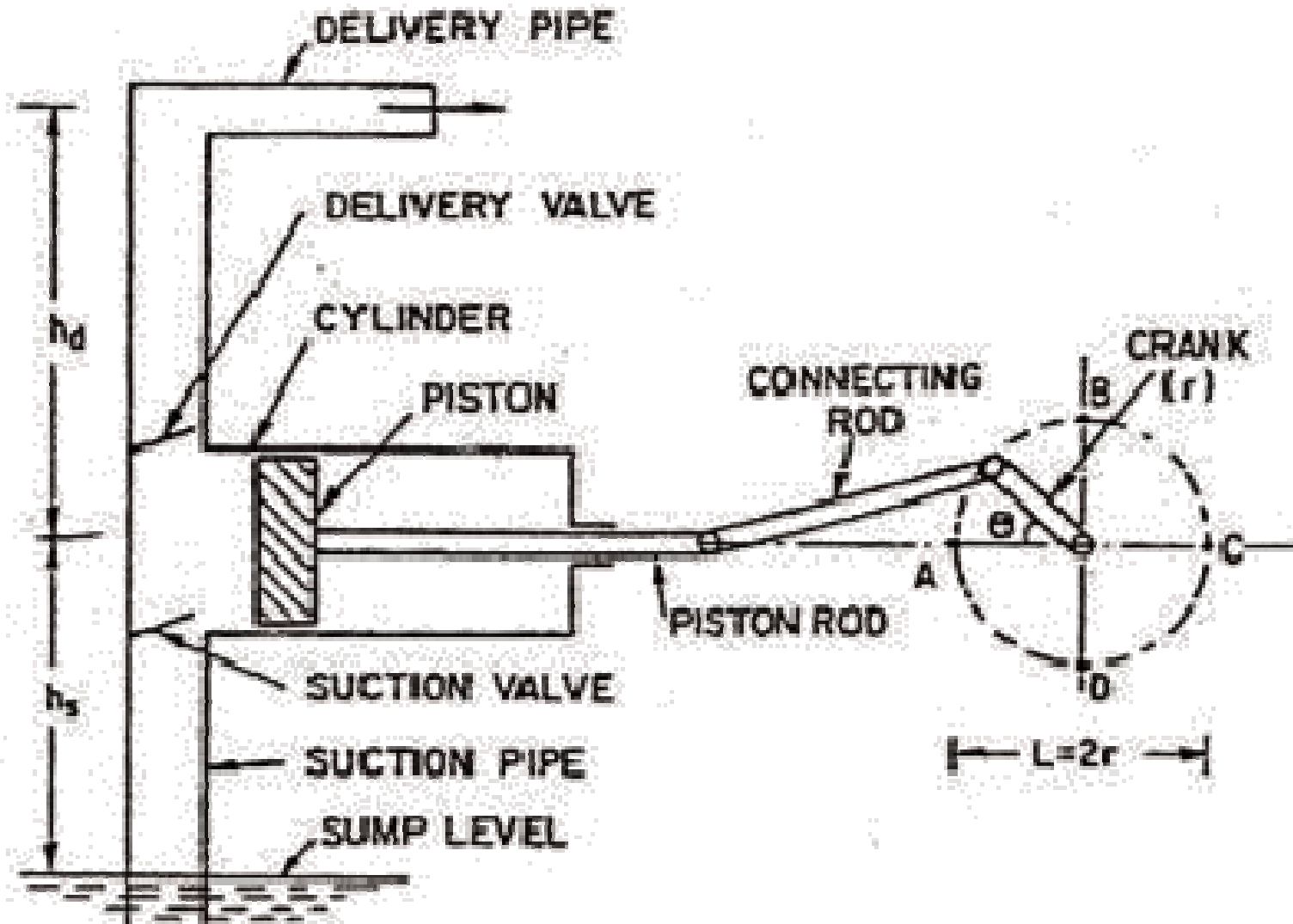
IT IS OPERATE ON THE PRINCIPAL OF PUSHING OF LIQUID BY A PISTON THAT EXECUTES A RECIPROCATING MOTION IN A CLOSELY FITTING CYLINDER.

MAIN COMPONENT IS PISTON OR PLUNGER AND CYLINDER.

RECIPROCATING PUMP



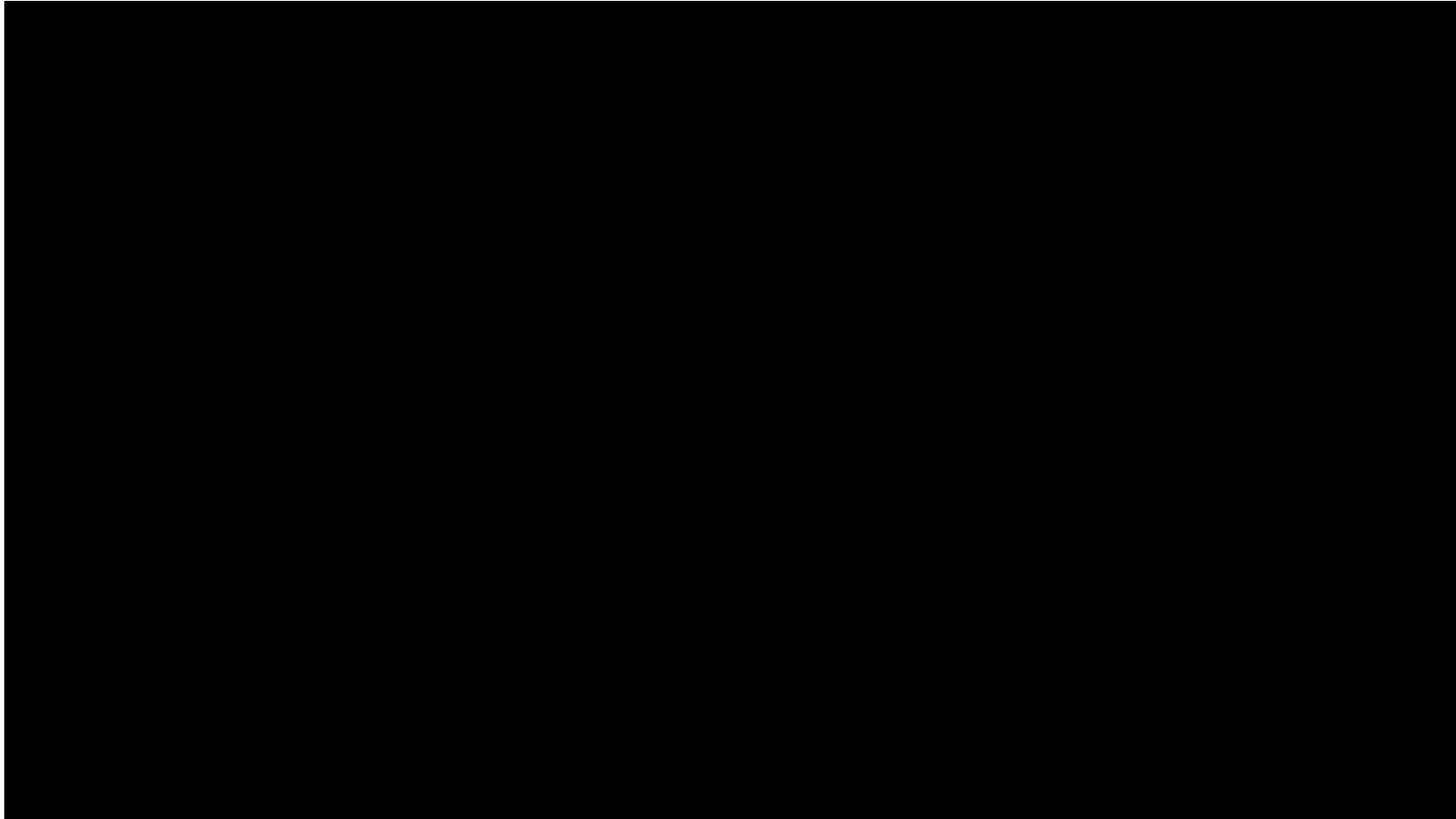
RECIPROCATING PUMP



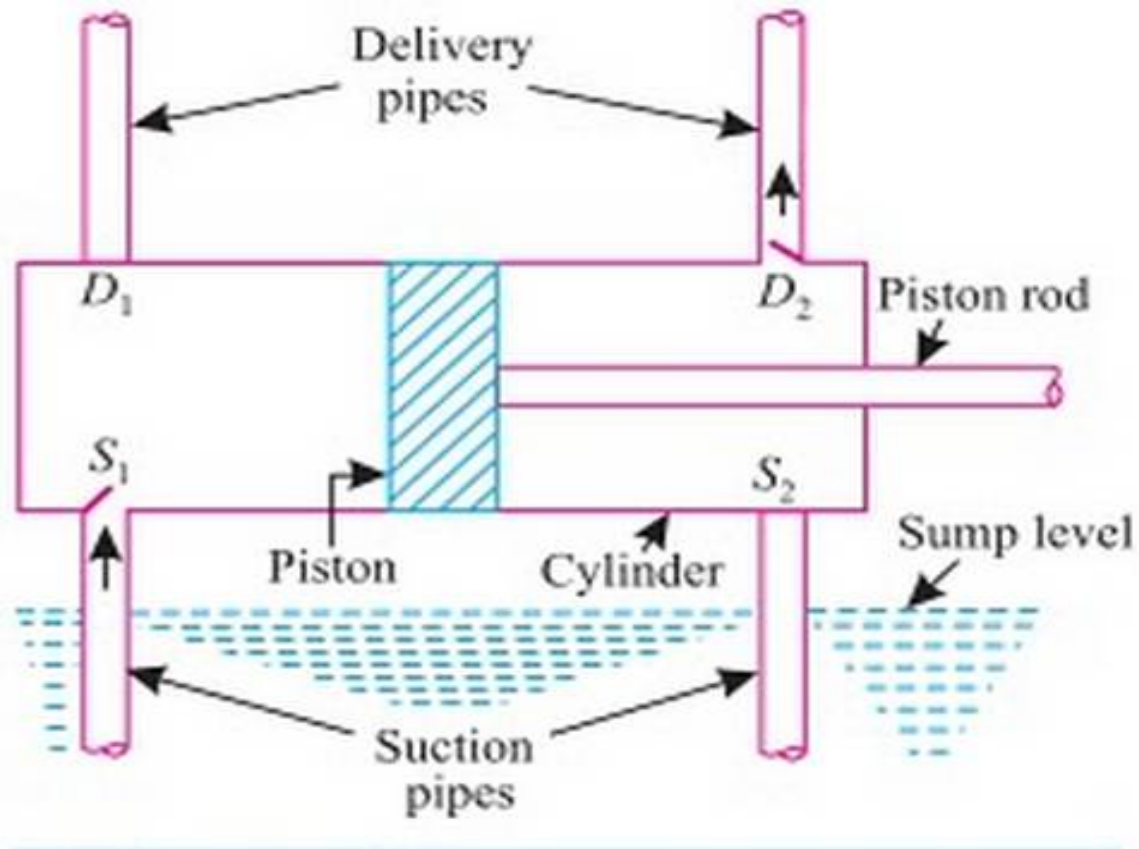
PARTS OF RECIPROCATING PUMP

- SUCTION PIPE –CONNECT SOURCE OF LIQUID TO THE CYLINDER.
- SUCTION VALVE-OPENS DURING SUCTION STROKE & CLOSES AT THE BEGINNING OF DELIVERY STROKE.
- CYLINDER- ACCOMMODATES LIQUID DURING SUCTION STROKE & DISCHARGE DURING DELIVERY STROKE
- PISTON –THIS IS RECIPROCATING PART WHICH CREATES NEGATIVE & POSITIVE PRESSURE DUE TO ITS TO AND FRO MOTION
- DELIVERY VALVE- CLOSES DURING SUCTION STROKE AND OPENS AT THE BEGINNING OF DELIVERY STROKE,
- CRANK & CONNECTING ROD-CONVERT THE ROTARY MOTION OF THE PRIME MOVER INTO THE RECIPROCATING MOTION OF THE PISTON OR PLUNGER.
- DELIVERY PIPE- CONNECT PUMP CYLINDER TO THE STROKES.
- PRIME MOVER-TO DRIVE THE PUMP.

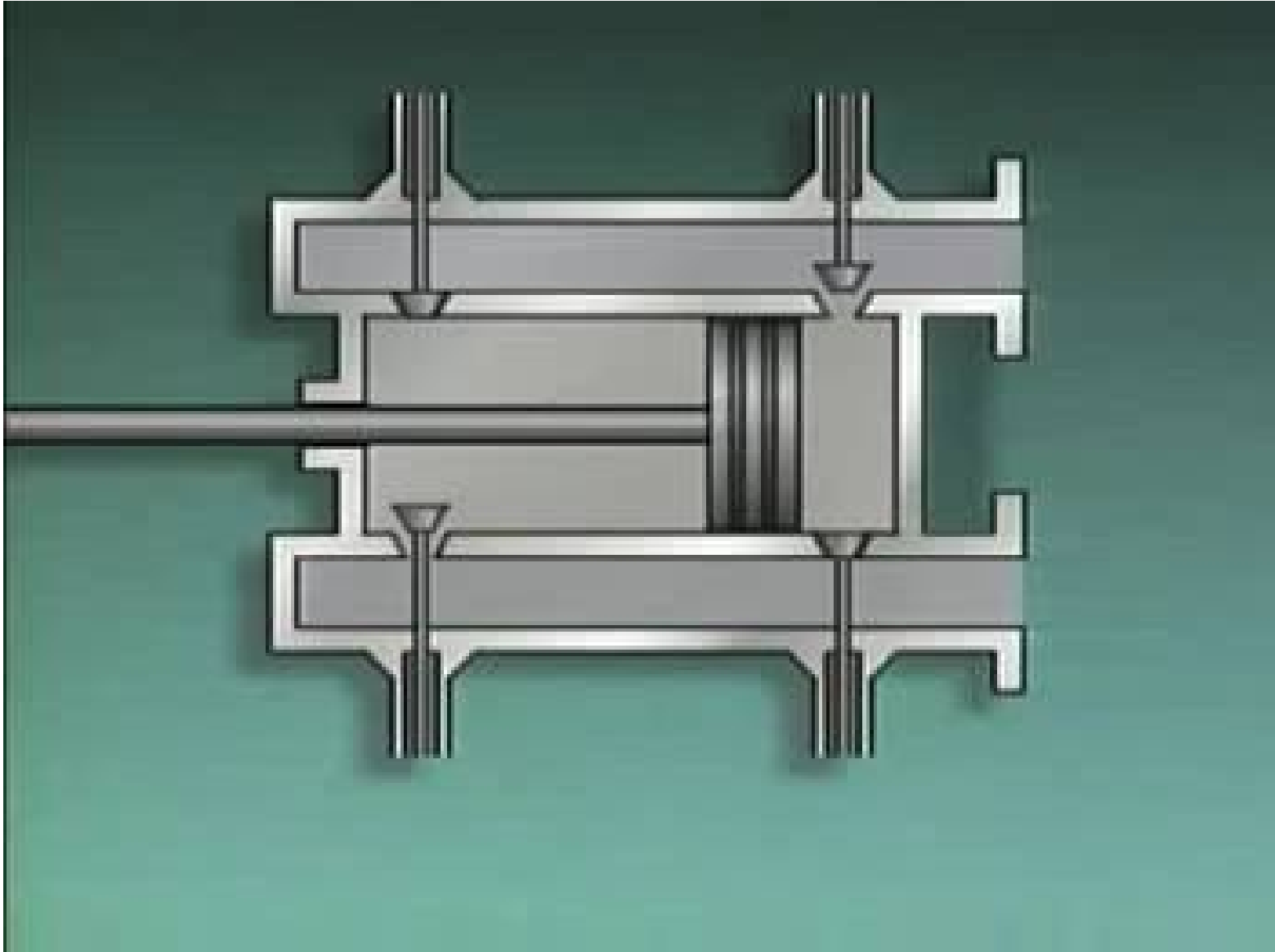
WORKING OF RECIPROCATING PUMP (SINGLE ACTING)



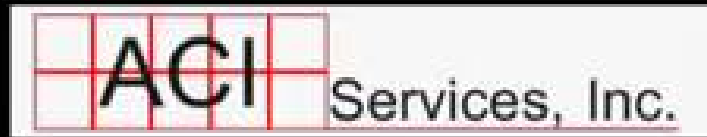
WORKING OF RECIPROCATING PUMP (DOUBLE ACTING)



WORKING OF RECIPROCATING PUMP (DOUBLE ACTING)



WORKING OF RECIPROCATING PUMP (DOUBLE ACTING)



DOUBLE ACTING COMPRESSOR CYLINDER

AIR CHAMBER

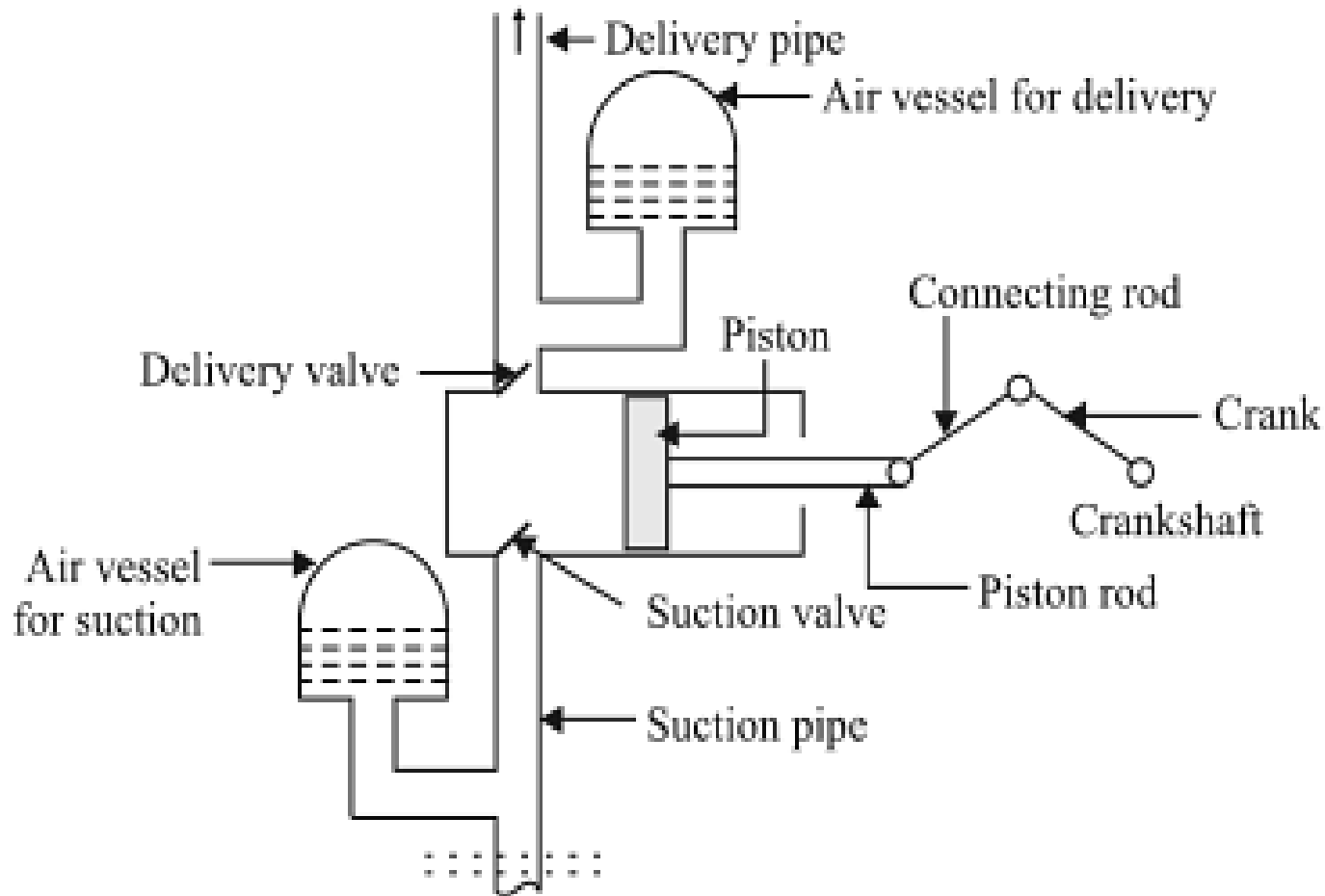
IN CASE OF SINGLE ACTING PUMP THE FLOW IN DELIVERY PIPE AS WELL AS IN SUCTION PIPE IS NOT CONTINUOUS.

IN DOUBLE ACTING OR MULTI- CYLINDER PUMP. THE FLOW IS CONTINUOUS BUT VELOCITY VARY IN SUCTION AS WELL AS IN DELIVERY PIPE.

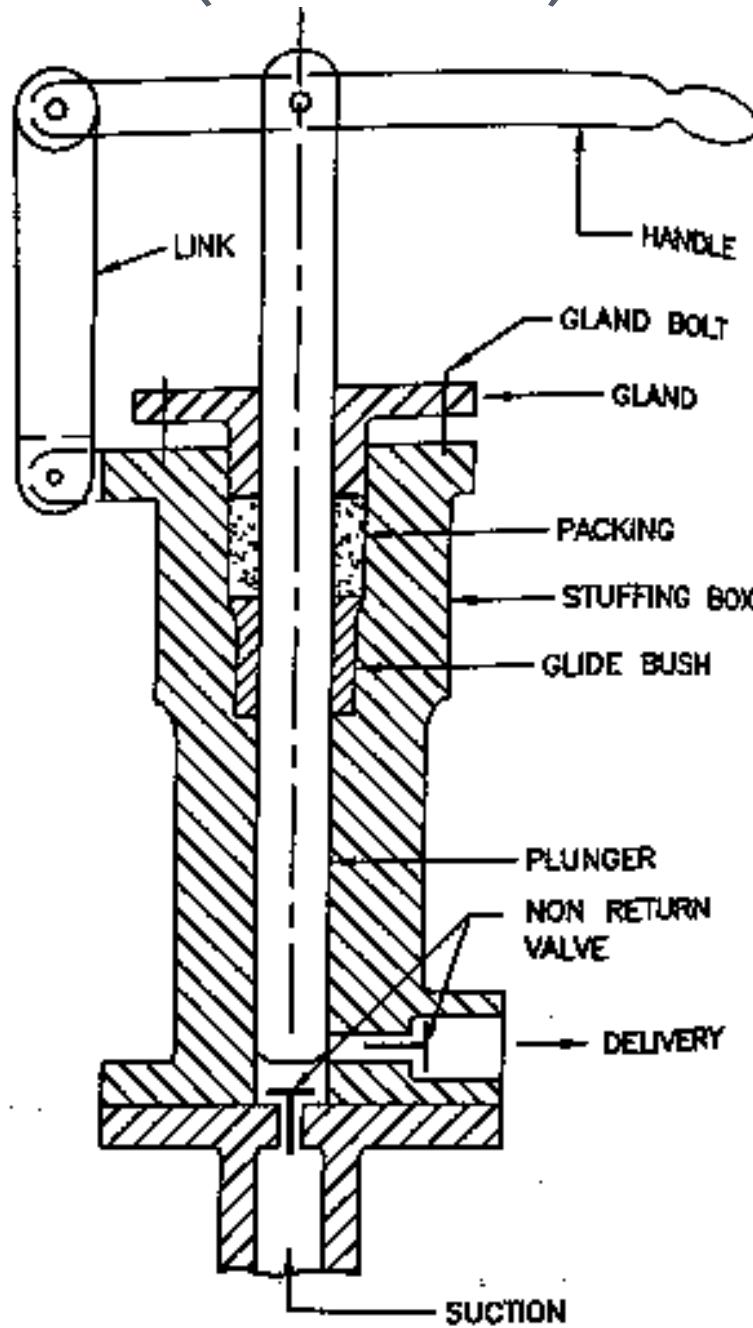
THE MAIN OBJECTIVES TO USE AIR CHAMBER IN SINGLE ACTING RECIPROCATING PUMPS ARE AS FOLLOWS:

1. TO OBTAIN A CONTINUOUS SUPPLY OF LIQUID AT A UNIFORM RATE
2. TO SAVE A CONSIDERABLE AMOUNT OF WORK IN OVERCOMING THE FRICTIONAL RESISTANCE IN SUCTION AND DELIVERY PIPES
3. TO RUN THE PUMP AT A HIGH SPEED WITHOUT CAVITATION OR SEPARATION

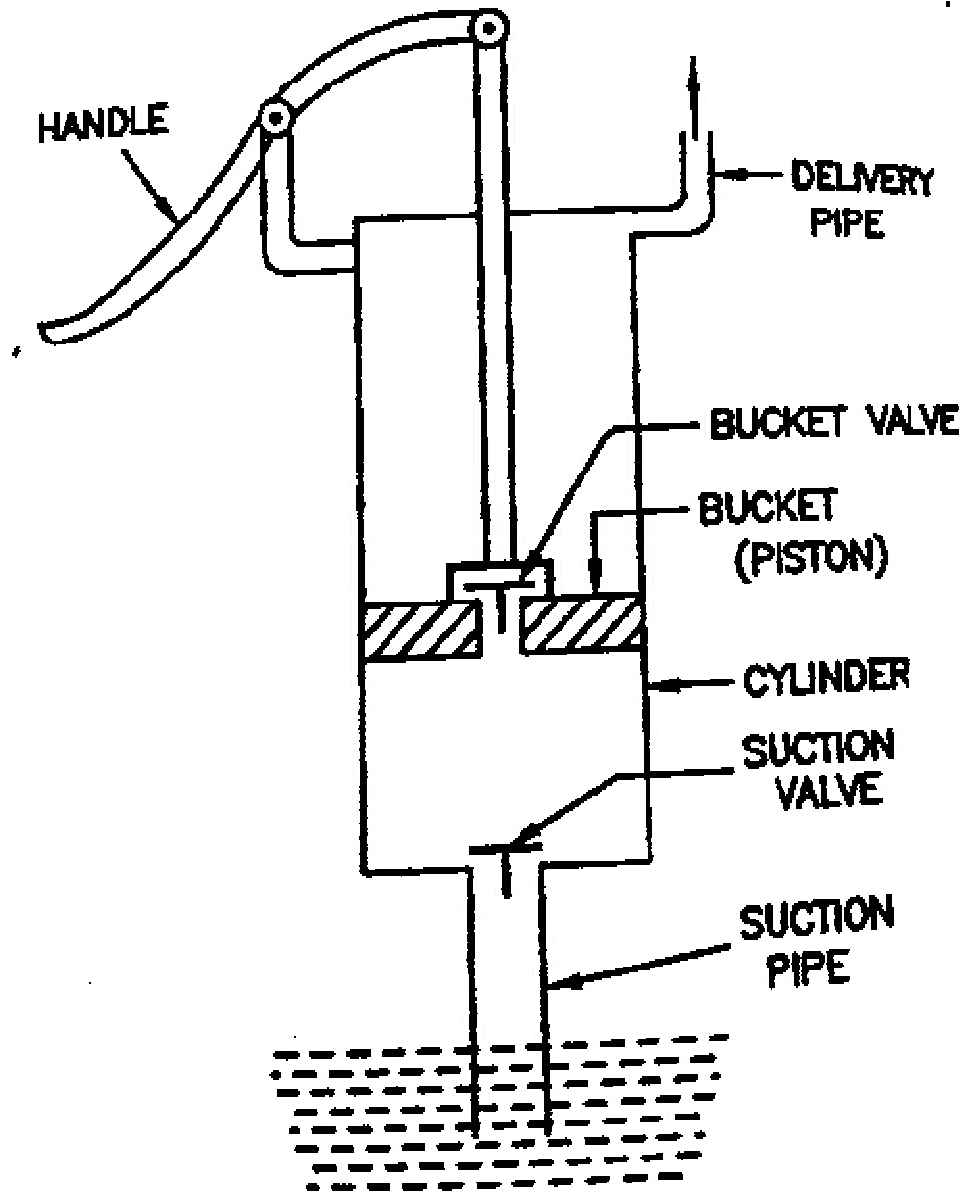
RECIPROCATING PUMP WITH AIR CHAMBER



PLUNGER PUMP (OPERATION)



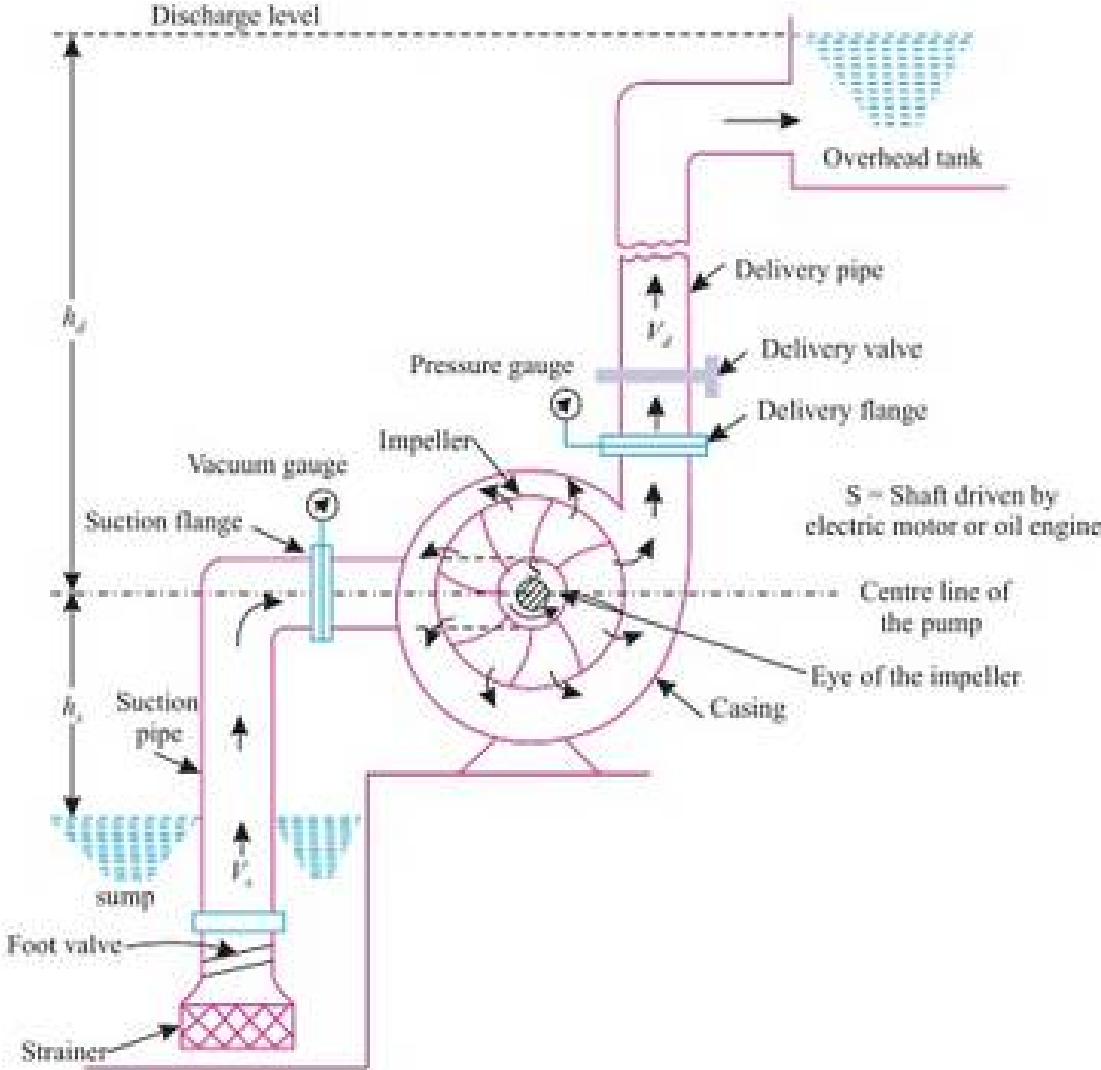
BUCKET PUMP (OPERATION)



SUMMARY OF RECIPROCATING PUMP

- WORK ON PRINCIPLE OF POSITIVE DISPLACEMENT
- THE DISCHARGE IS FLUCTUATING AND PULSATING
- IT CAN PRODUCE HIGH HEAD BUT LOW DISCHARGE
- IT IS USED ONLY FOR LIFTING PURE WATER OR LESS VISCOUS LIQUIDS
- INITIAL AND MAINTENANCE COST IS HIGH
- IT RUNS AT LOW SPEED. SPEED IS LIMITED DUE TO CAVITATION EFFECT
- EFFICIENCY IS LOW
- IT PRODUCES MUCH NOISE

CENTRIFUGAL PUMP



MAIN PART OF CENTRIFUGAL PUMP

THE IMPELLER, CASING, SUCTION PIPE, FOOT VALVE AND STRAINER ARE MAIN PART OF CENTRIFUGAL PUMP.

- IMPELLER: IT IS ROTATING PART OF CENTRIFUGAL PUMP AND INCREASE KINETIC ENERGY OF LIQUID. IT CONSISTS OF SERIES OF BACKWARD CURVED VANES. THE IMPELLER IS MOUNTED ON A SHAFT WHICH IS COUPLED TO THE SHAFT OF A ELECTRIC MOTOR
- CASING: IT IS AN AIR TIGHT PASSAGE SURROUNDING THE IMPELLER AND IS DESIGNED IN SUCH A WAY THAT THE KINETIC ENERGY OF THE LIQUID DISCHARGED AT THE OUTLET OF IMPELLER IS CONVERTED IN TO PRESSURE ENERGY BEFORE DELIVERY PIPE

CENTRIFUGAL PUMP (WORKING)

CENTRIFUGAL PUMPS



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CENTRIFUGAL PUMP (WORKING)

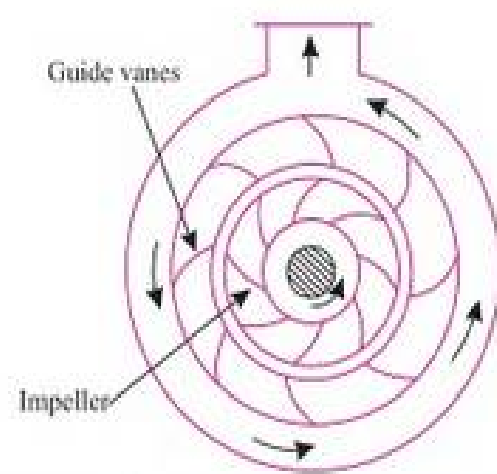
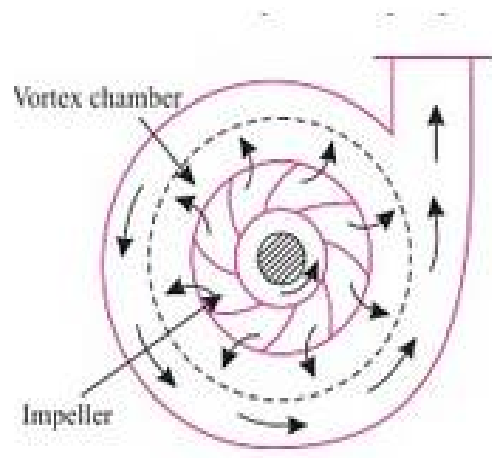
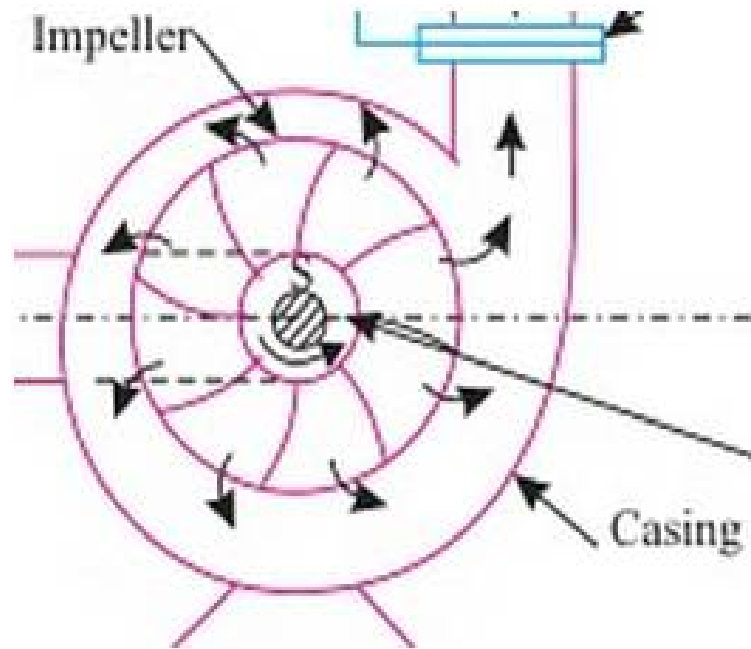
CENTRIFUGAL PUMPS



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TYPES OF CASING IN CENTRIFUGAL PUMP



PRIMING

OPERATION OF FILLING PASSAGE WAYS (SUCTION PIPE,
CASING AND DELIVERY PIPE UP TO DELIVERY VALVE

GEAR PUMP (WORKING)

Gear Pump

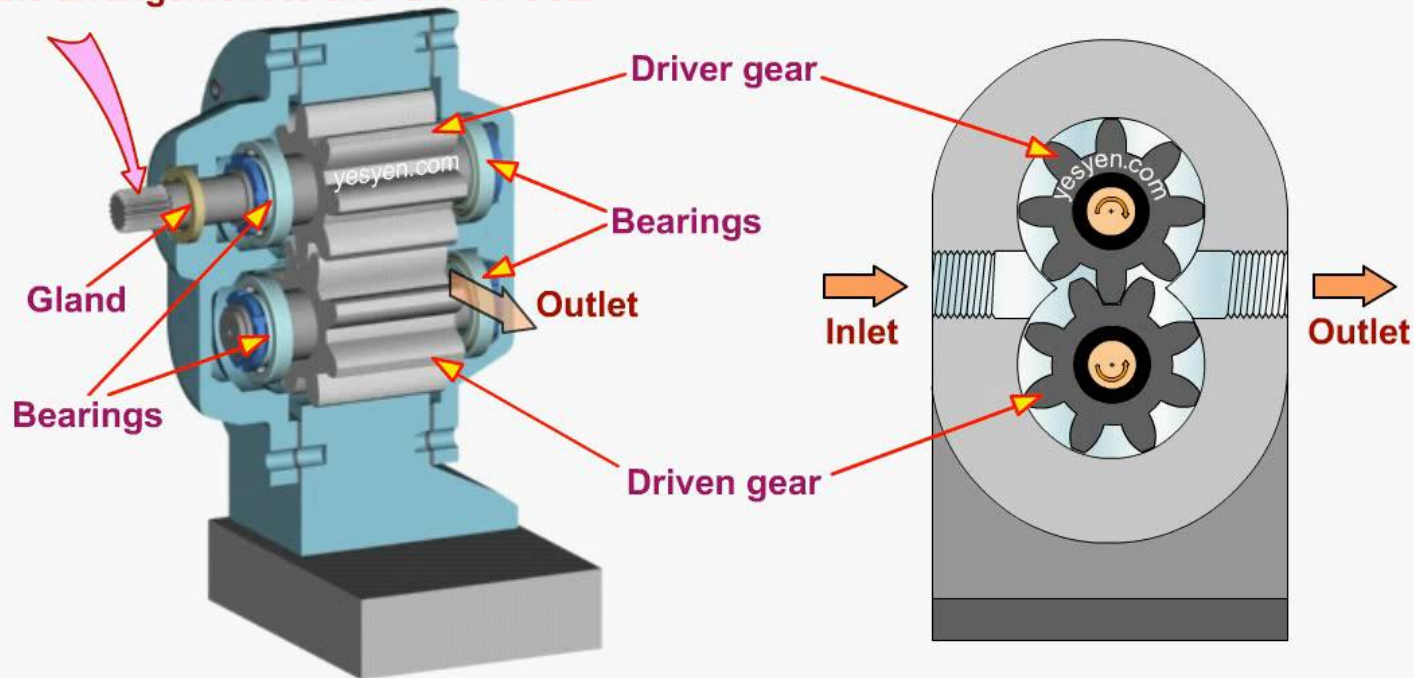
by

www.mekanizmalar.com

GEAR PUMP (WORKING)

GEAR PUMP - WORKING ANIMATION

Drive is transmitted from prime mover through suitable arrangement to the "Driver Gear"



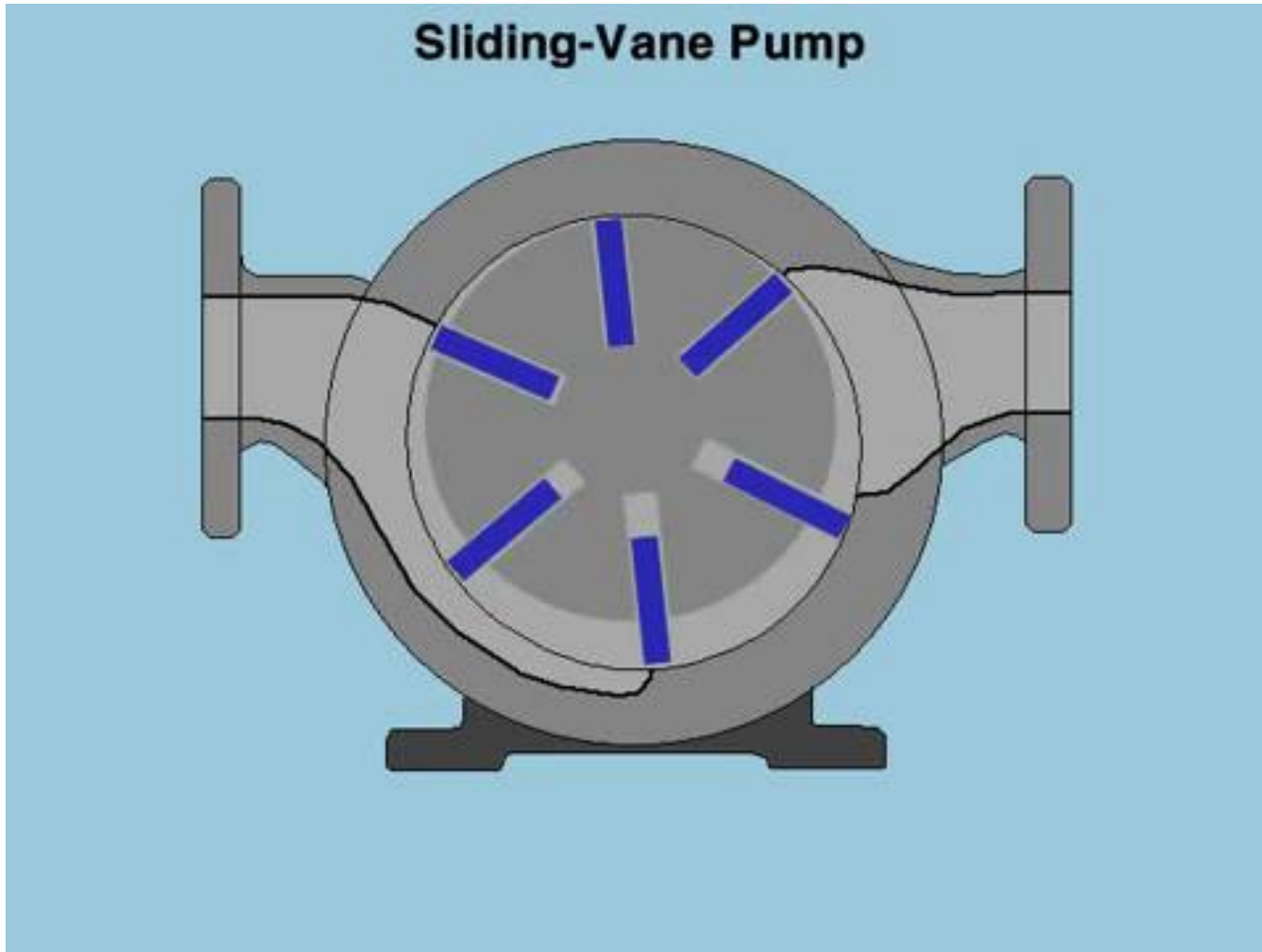
A typical model of a spur (teeth) type gear pump is shown.

www.yesyen.com

VANE PUMP (WORKING)



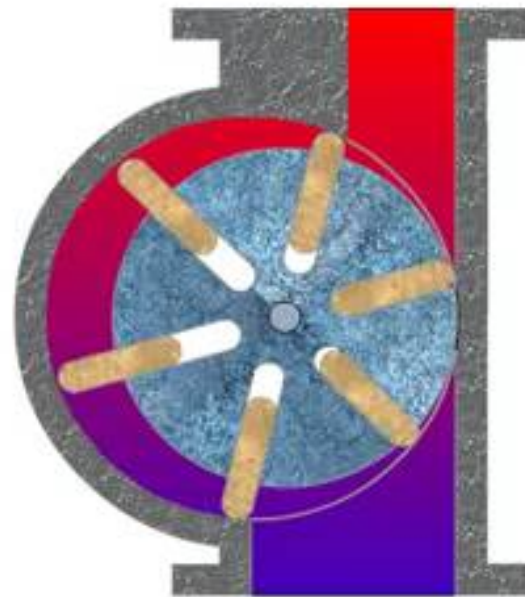
VANE PUMP (WORKING)



VANE PUMP (WORKING)

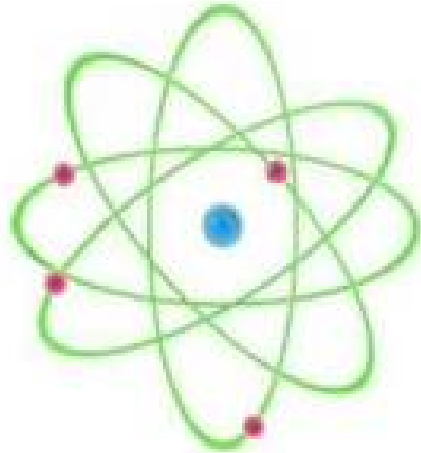
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Vane Pump



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ARCHIMEDES SCREW PUMP



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Archimedes Screw

THANK YOU



QUESTION???