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Describe any one with neat sketch.

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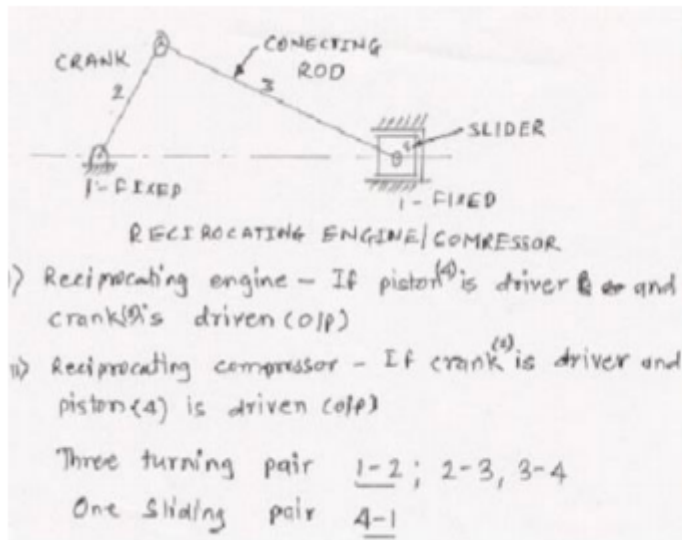
**Question:**

**State any four inversions of single slider crane chain.  
Describe any one with neat sketch.**

**Answer:**

1. Reciprocating engine, Reciprocating compressor;
2. Whitworth quick return mechanism, Rotary engine,
3. Slotted crank mechanism, Oscillatory engine.
4. Hand pump, pendulum pump.

**1. Reciprocating engine**, Reciprocating compressor link 1 is fixed



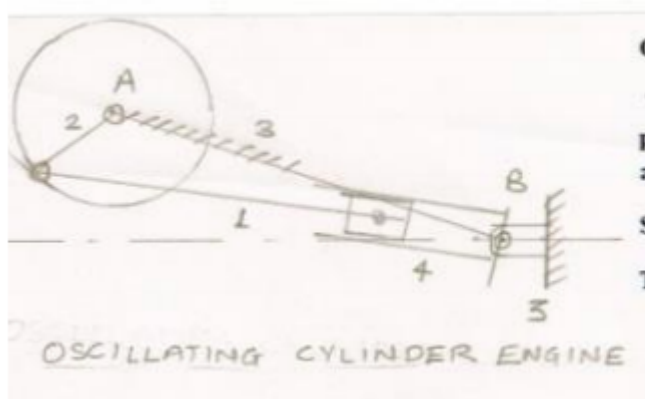
**Reciprocating engine** – In reciprocating engine piston/slider (link 4) reciprocates in cylinder (fixed link 1) forming sliding pair. The connecting rod (fixed link 3) oscillates and crank rotates about fixed link 1.

Here input is from slider or piston (link 4)

**Reciprocating compressor** – In reciprocating compressor, piston/slider (link 4) reciprocates in cylinder (fixed link 1) forming sliding pair. The connecting rod (fixed link 3) oscillates and crank rotates about fixed link 1.

Here input is from crank (link 2).

## 2. Whitworth quick return mechanism, Rotary engine link 2 is fixed,

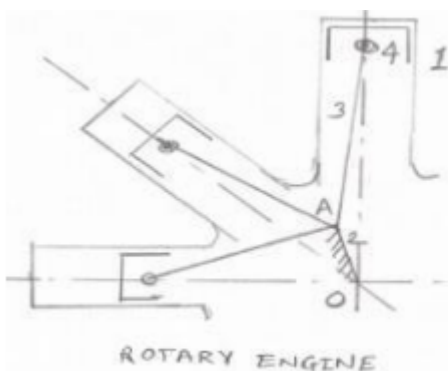


**Oscillating cylinder engine**

The crank (link 2) rotates; the piston is connected to piston rod (link 1) reciprocates and cylinder oscillates about fixed link 3.

Sliding pair 1-4,

Turning pair 1-2, 2-3, 3-4



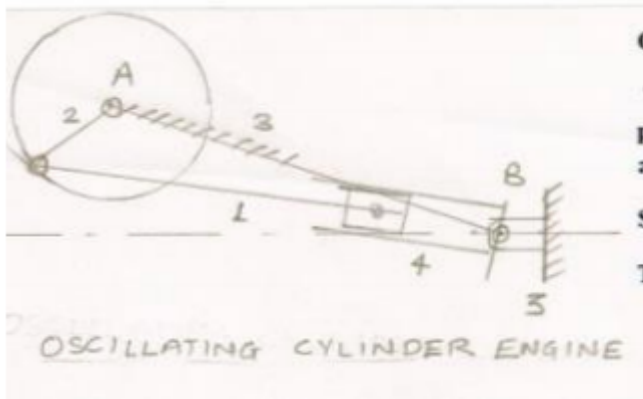
**Rotary engine**

Crank link is fixed (link 2), slider (link 4) is mounted in cylinder, all sliders are connected by connecting rod (link 3). The complete assembly of cylinders and crankcase rotates about center O.

Sliding pair 1-4,

Turning pair 3-4, 2-3, 1-2

## 3.- Oscillatory engine. Slotted crank mechanism. link 3 is fixed



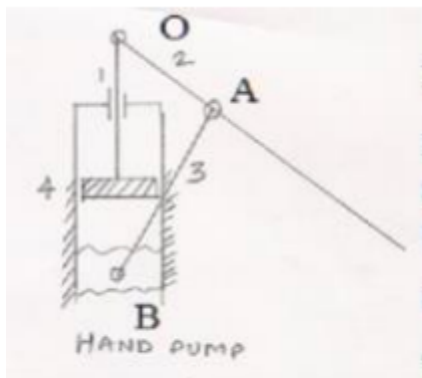
#### Oscillating cylinder engine

The crank (link 2) rotates; the piston is connected to piston rod (link 1) reciprocates and cylinder oscillates about fixed link 3.

Sliding pair 1-4,

Turning pair 1-2 , 2-3, 3-4

#### 4. Hand pump, pendulum pump. link 4 is fixed



#### Hand pump

Link 3 can oscillates about fixed point B on link 4, this makes end A of link 2 to oscillates about B and end O to reciprocates along the axis of the fixed link 4

Sliding pair 1-4,

Turning pair 1-2 , 2-3, 3-4