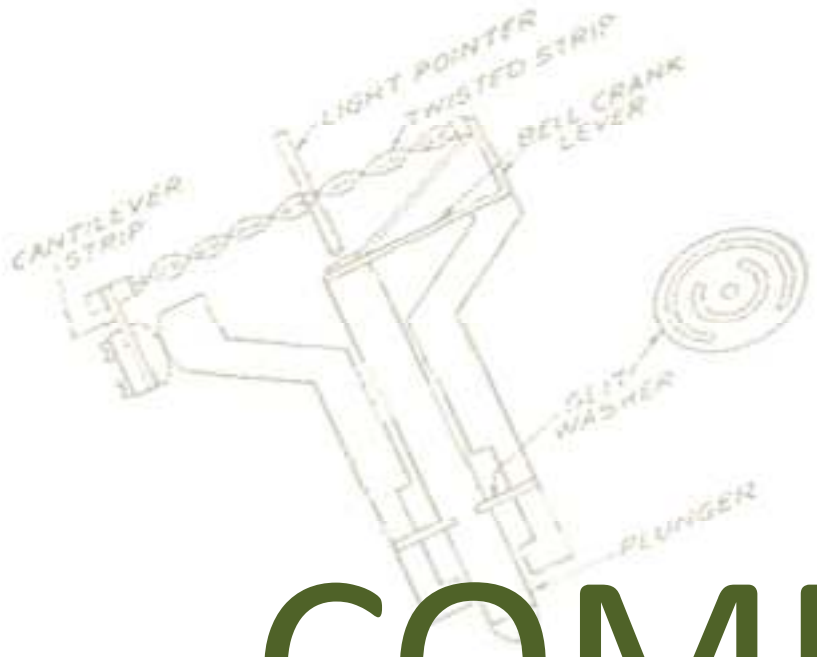
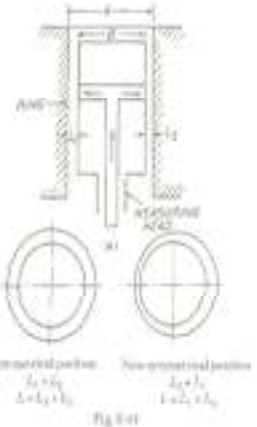
COMPARATORS





NEED FOR A COMPARATOR

(i) In mass production, where components are to be checked at a very fast rate.

(ii) As laboratory standards from which working or **inspection gauges** are set and correlated.

(iii) For inspecting newly purchased gauges.

(iv) Attached with some machines, comparators can be used as working gauges to prevent work spoilage and. to **maintain required tolerances** at all stages of manufacturing

(v) In selective assembly of parts, where parts are graded in three or more groups depending upon their tolerances.

TYPES OF COMPARATOR

(1) Mechanical comparators

(2) Pneumatic comparators

(3) Optical comparators

(4) Electrical comparators (LVDT)

(5) Fluid displacement comparators

(6) Projection comparators

(7) Multi-check comparators

(8) Automatic gauging machines

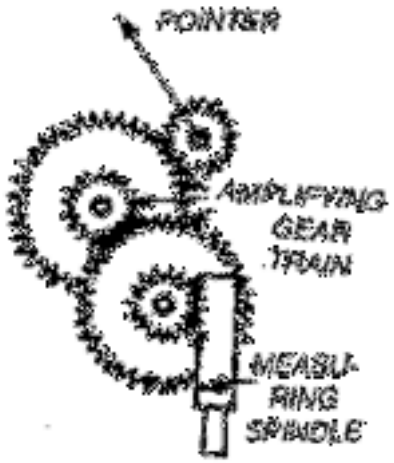
MECHANICAL COMPARATOR

1}DIAL INDICATOR (Dial Gauge)

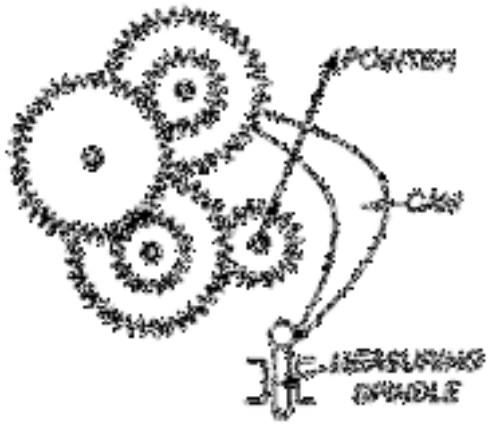
2}Johansson 'Mikrokator‘

3}Sigma Comparator

Systems of Displacement Amplification used in Mechanical Comparators



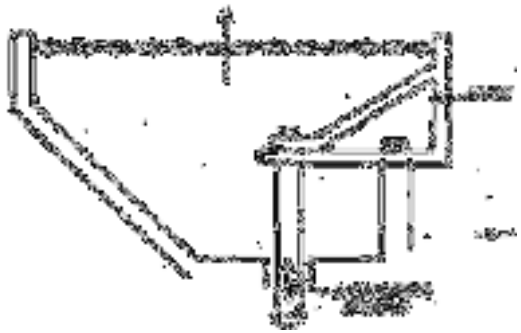
Rack and pinion



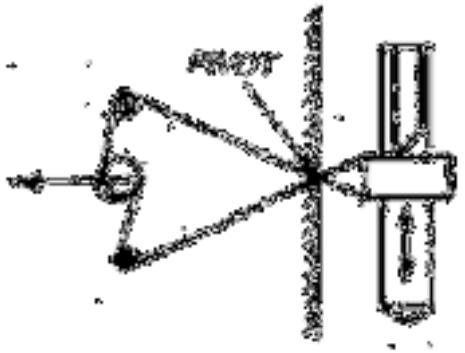
Cam and gear train

Lever with toothed gear.

Compound levers

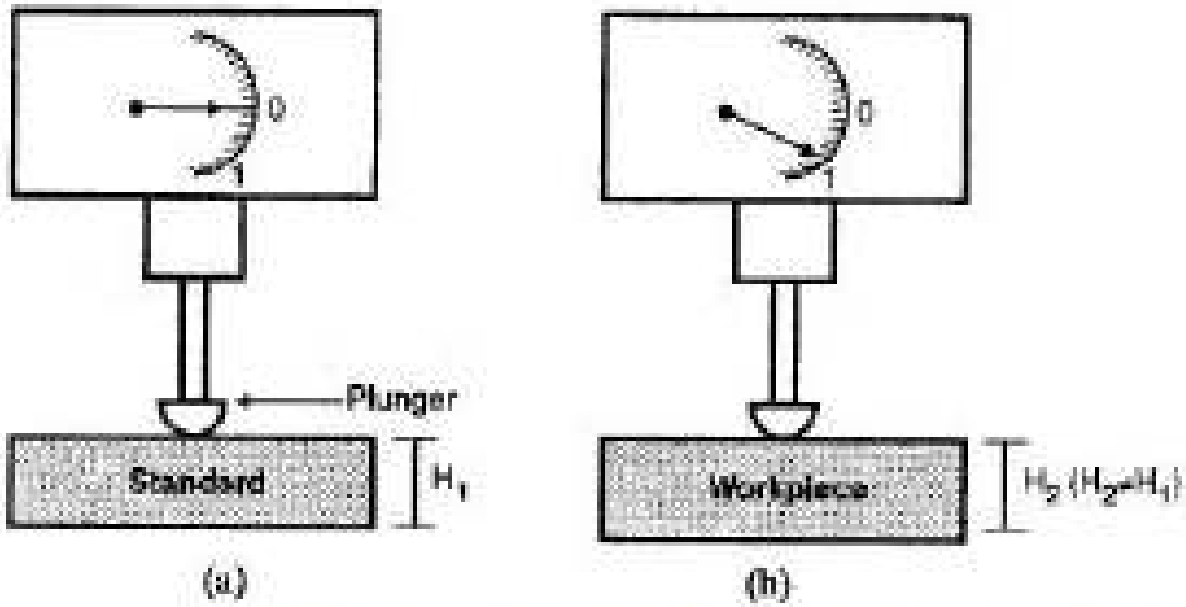


Twisted taut strip



Lever combined

COMPARATOR



(a) (b)

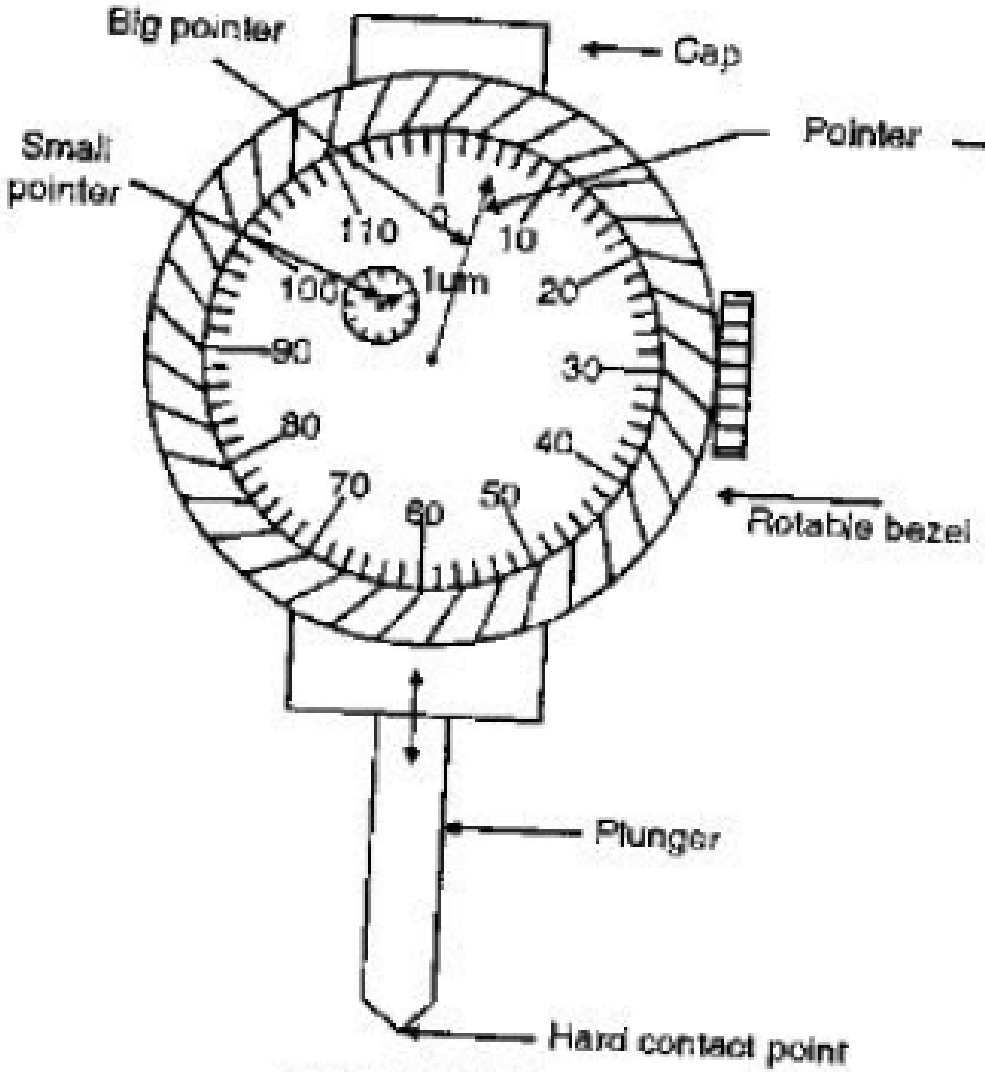
Initially, the comparator is adjusted to zero on its dial with a standard job in position as shown in Figure(a). The reading H1is taken with the help of a plunger. Then the standard job is replaced by the work-piece to be checked and the reading H2 is taken. If H1and H2 are different, then the change i~ the dimension will be shown on the dial of the comparator. Thus difference is then magnified 1000 to 3000 X to get the clear variation in the standard and actual job.

In short, Comparator is a device which

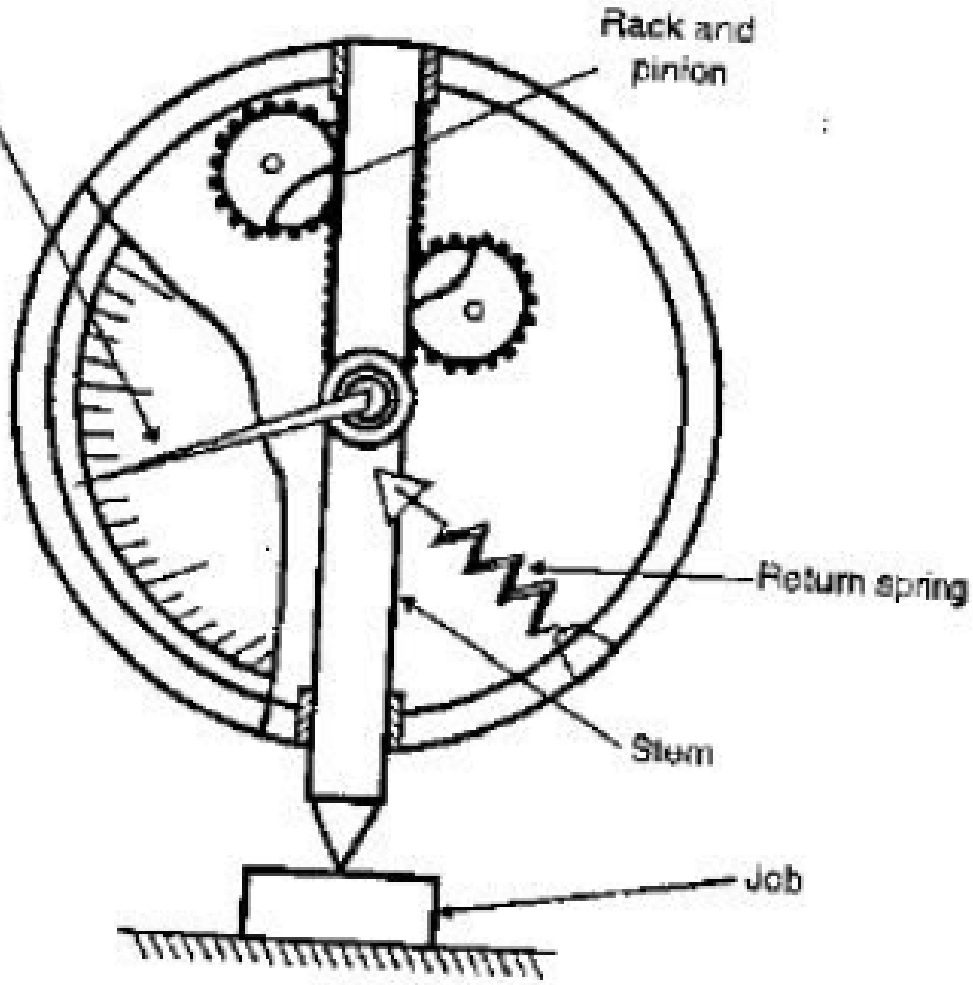
(1) Picks up small variations in dimensions.
(2) Magnifies it.
(3) Displays it by using indicating devices, by which comparison can be made with some standard value.

DIAL INDICATOR

Working dial Gauge

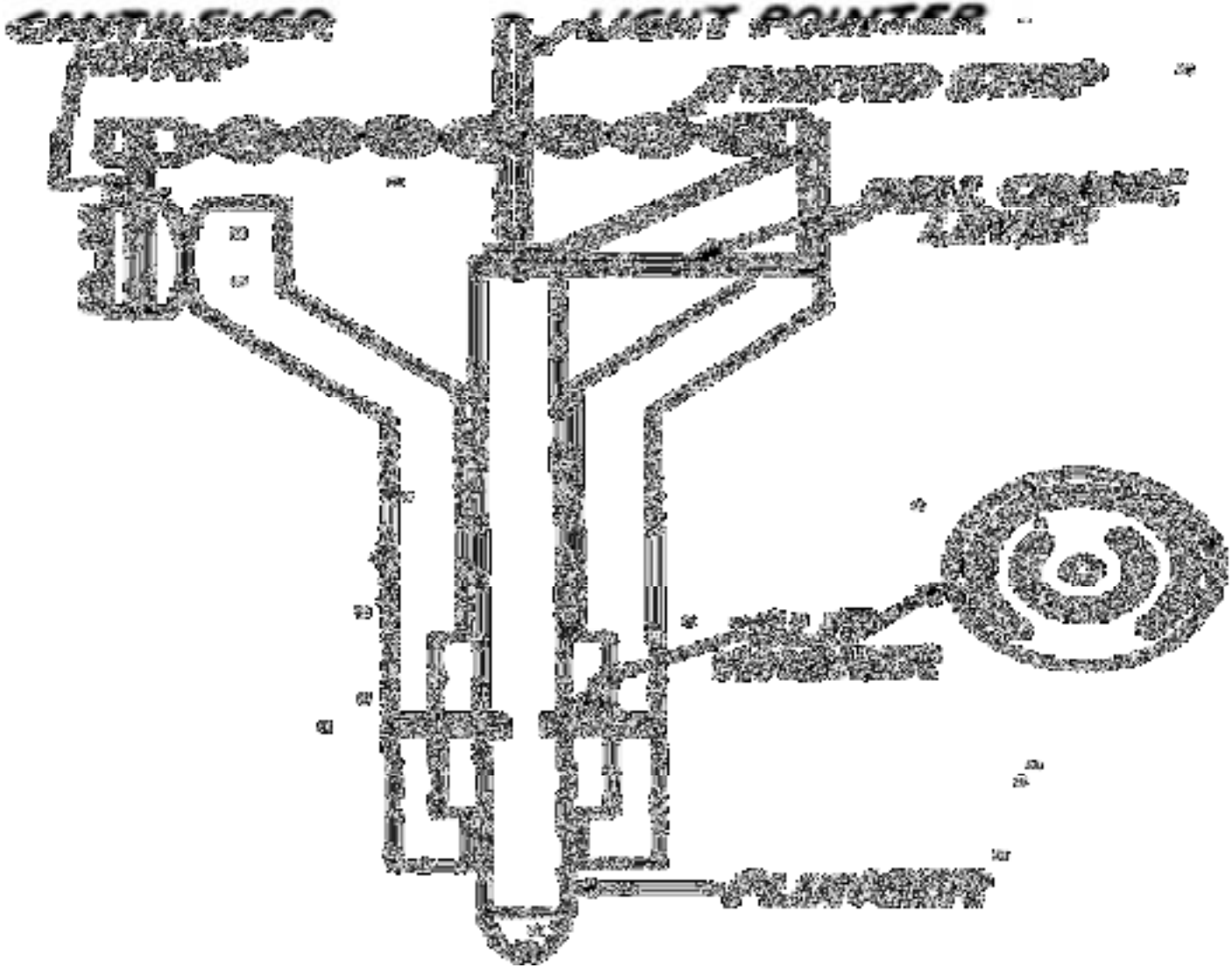


(a) Dial indicator

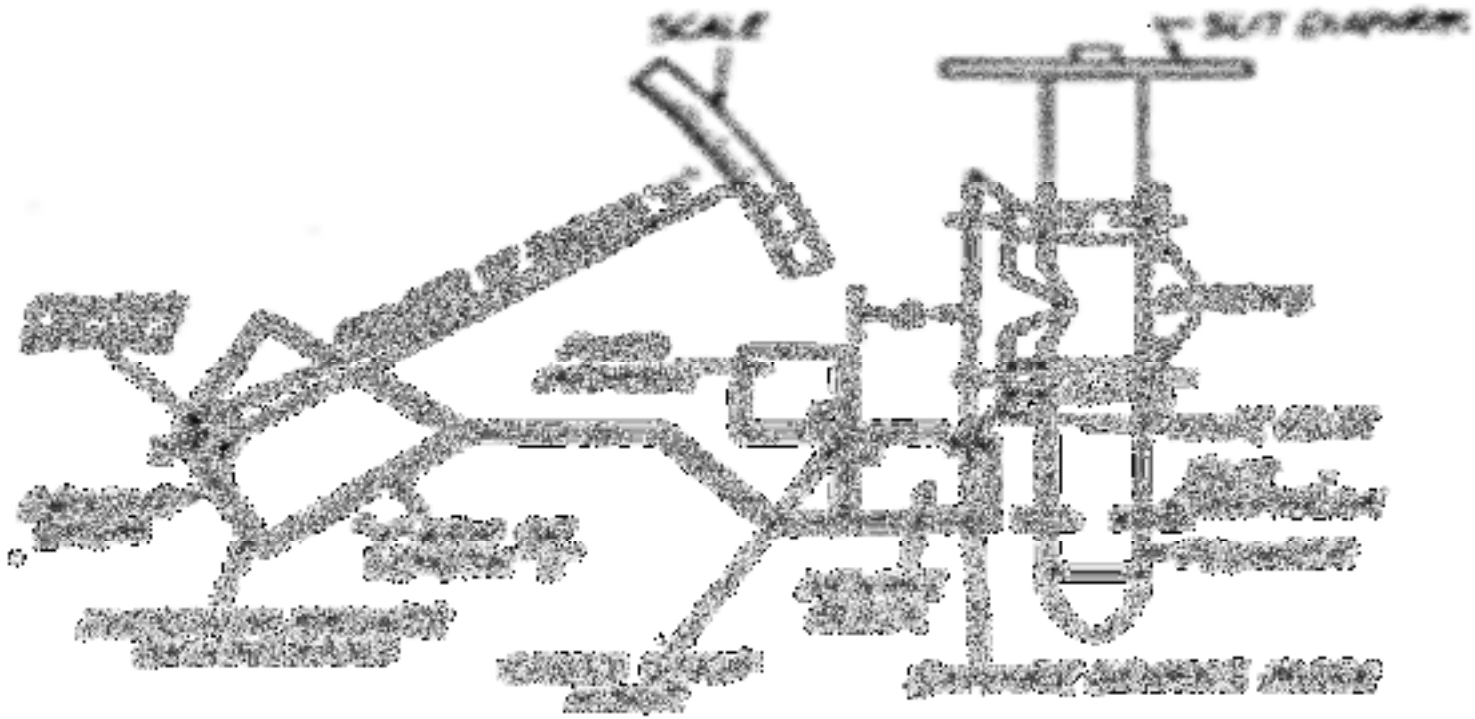


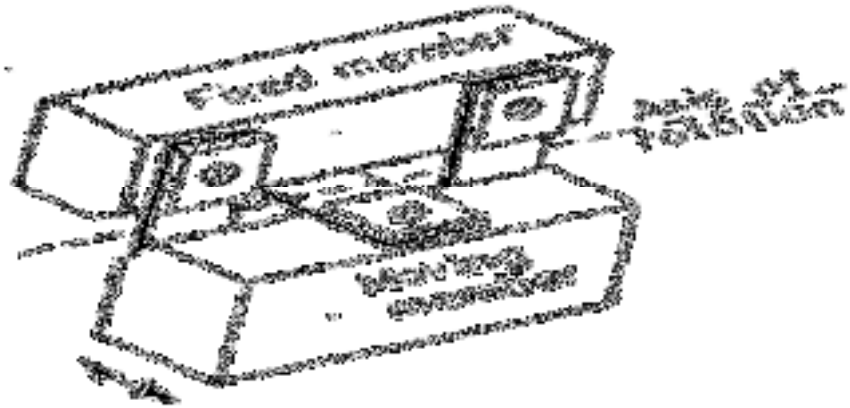
(b) Mechanism of dial indicator

Johansson ‘Mikrokator’



Sigma Comparator

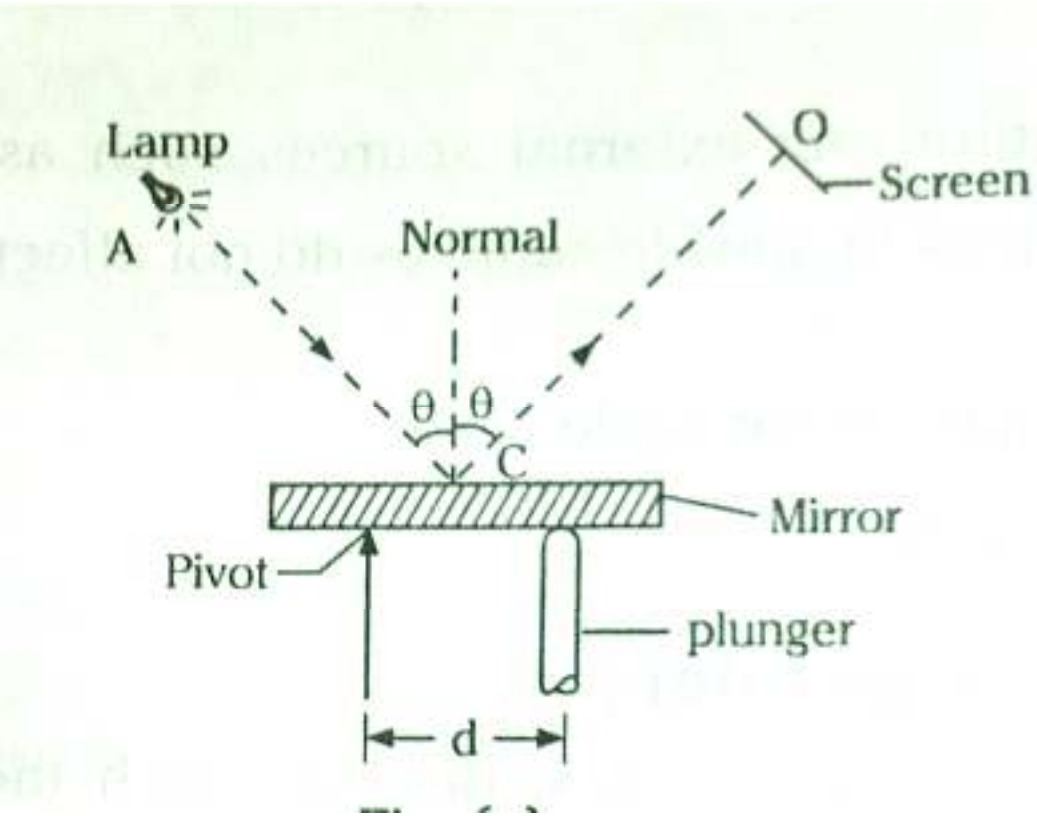


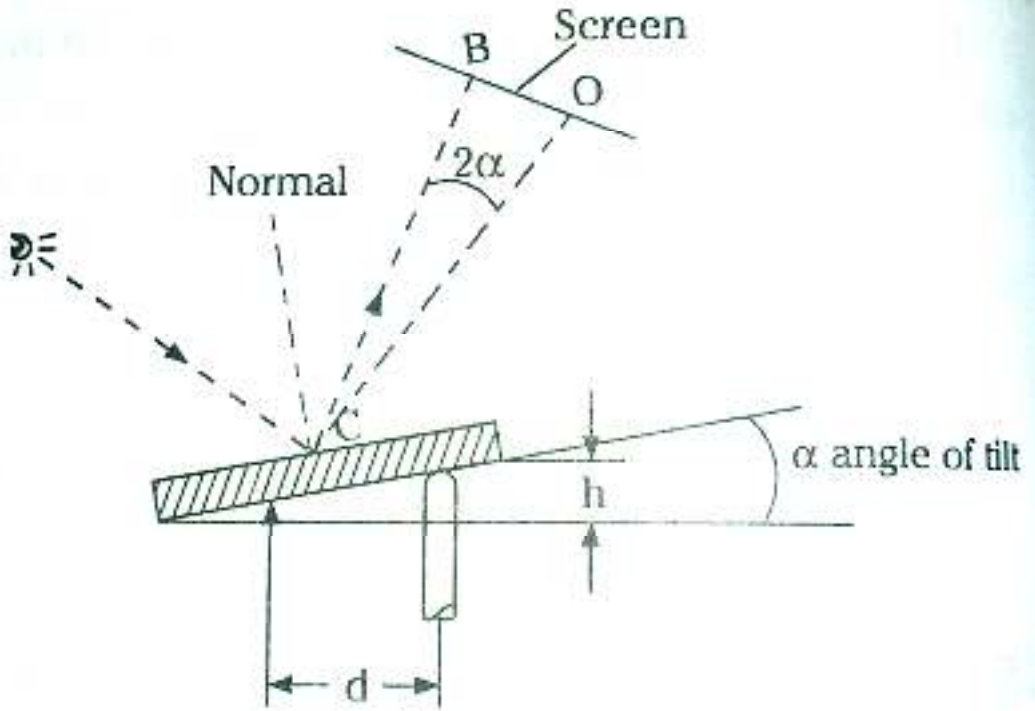


OPTICAL COMPARATOR

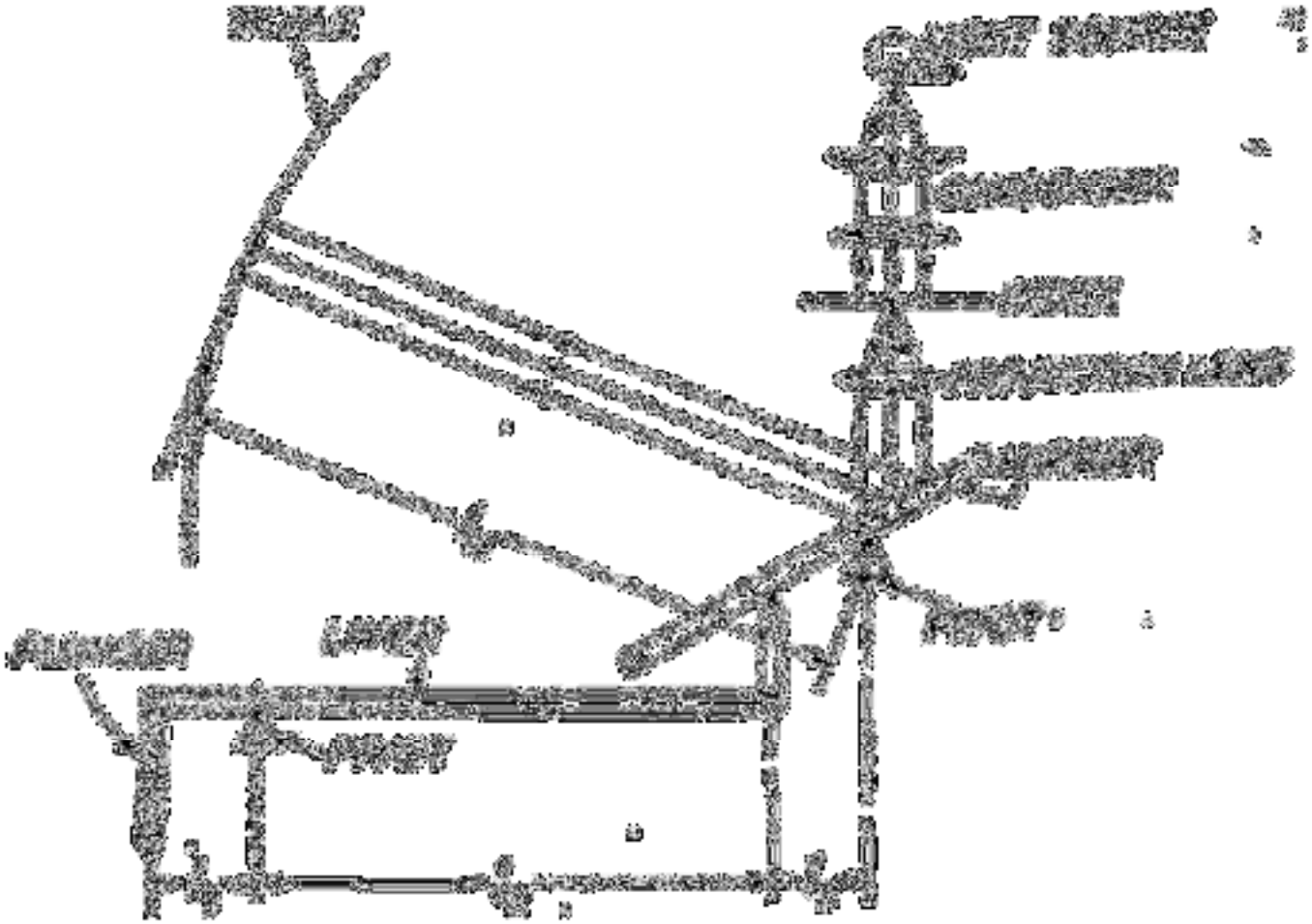
- PRINCIPLE
- MECHANICAL OPTICAL TYPE
- ZEISS ULTRA OPTIMETER

PRINCIPLE

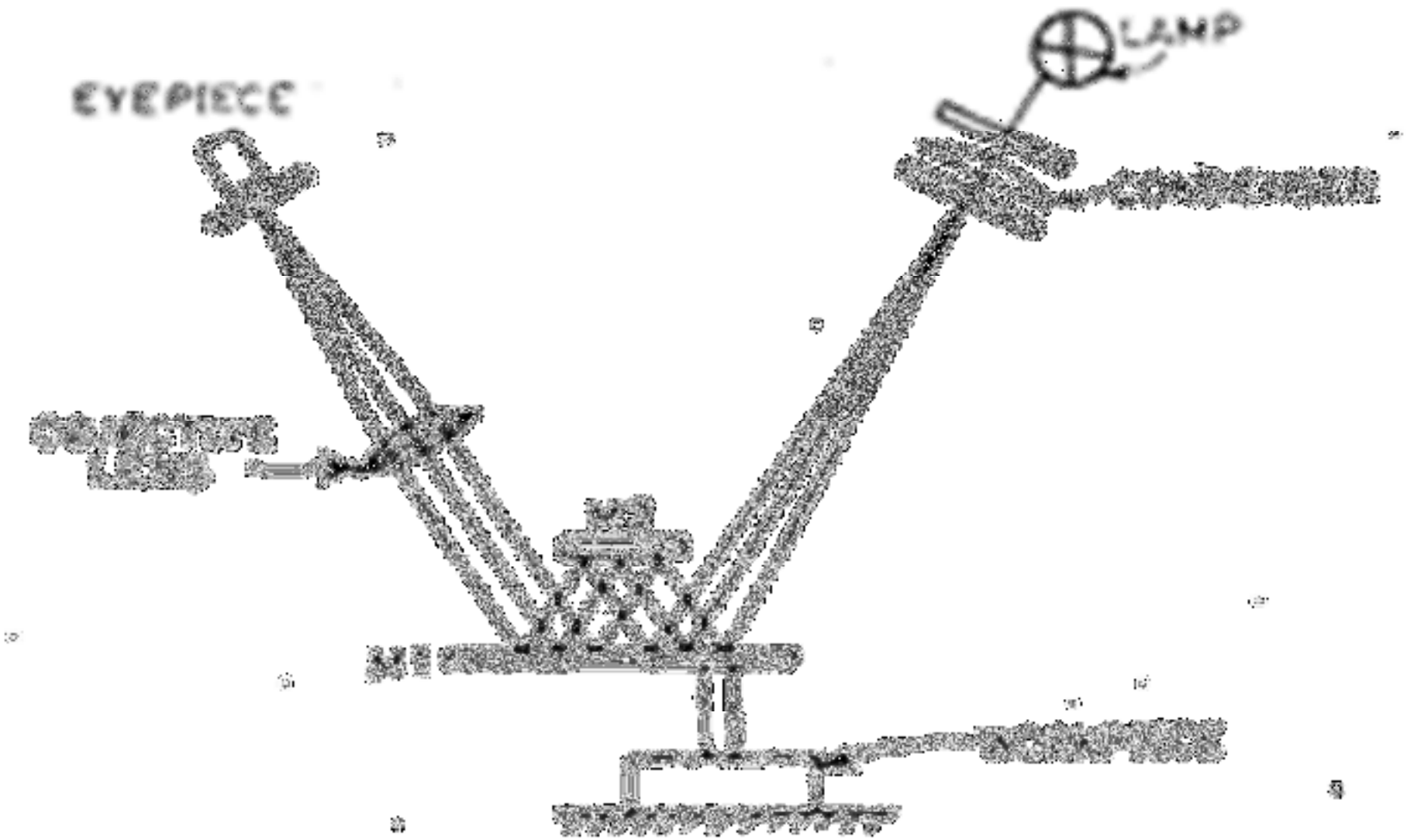

Lamp
A
Normal
O
Screen
θ
θ
C
Mirror
Pivot
plunger
d


Screen
B
O
Normal
2α
C
α angle of tilt
h
d

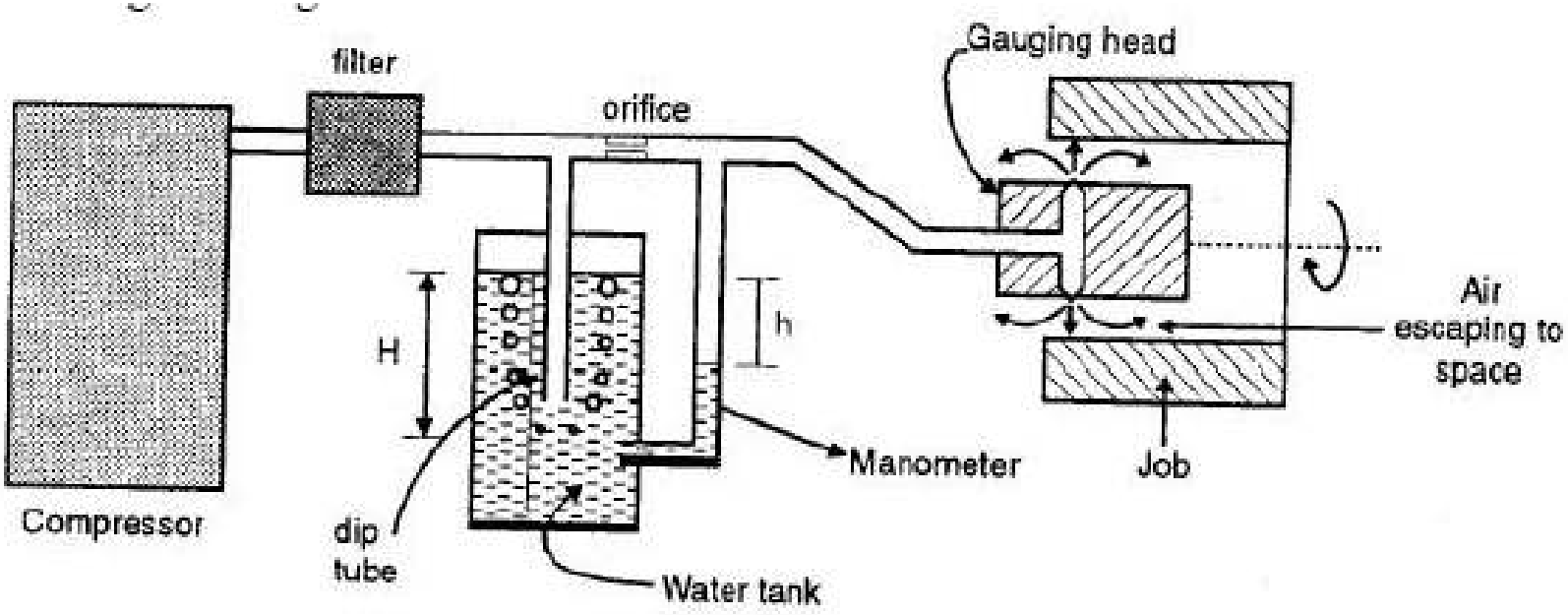
MECHANICAL OPTICAL TYPE COMPARATOR

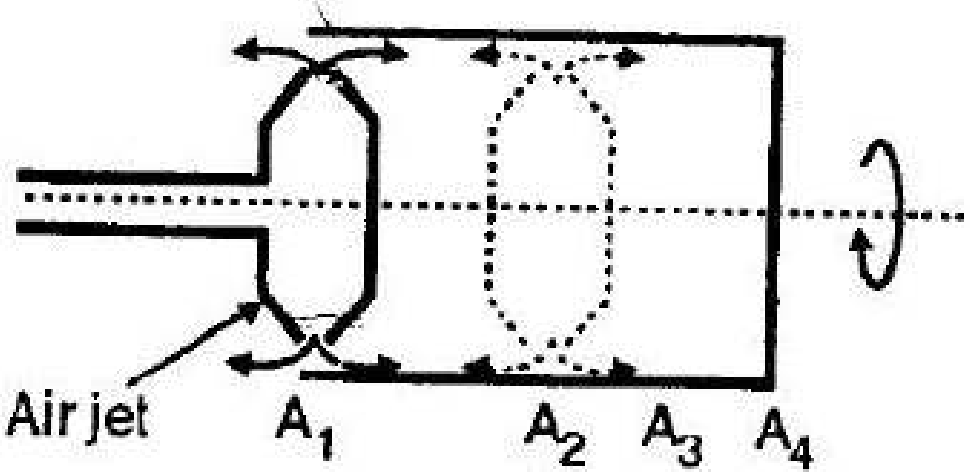


ZEISS ULTRA-OPTIMETER



PNEUMATIC COMPARATOR



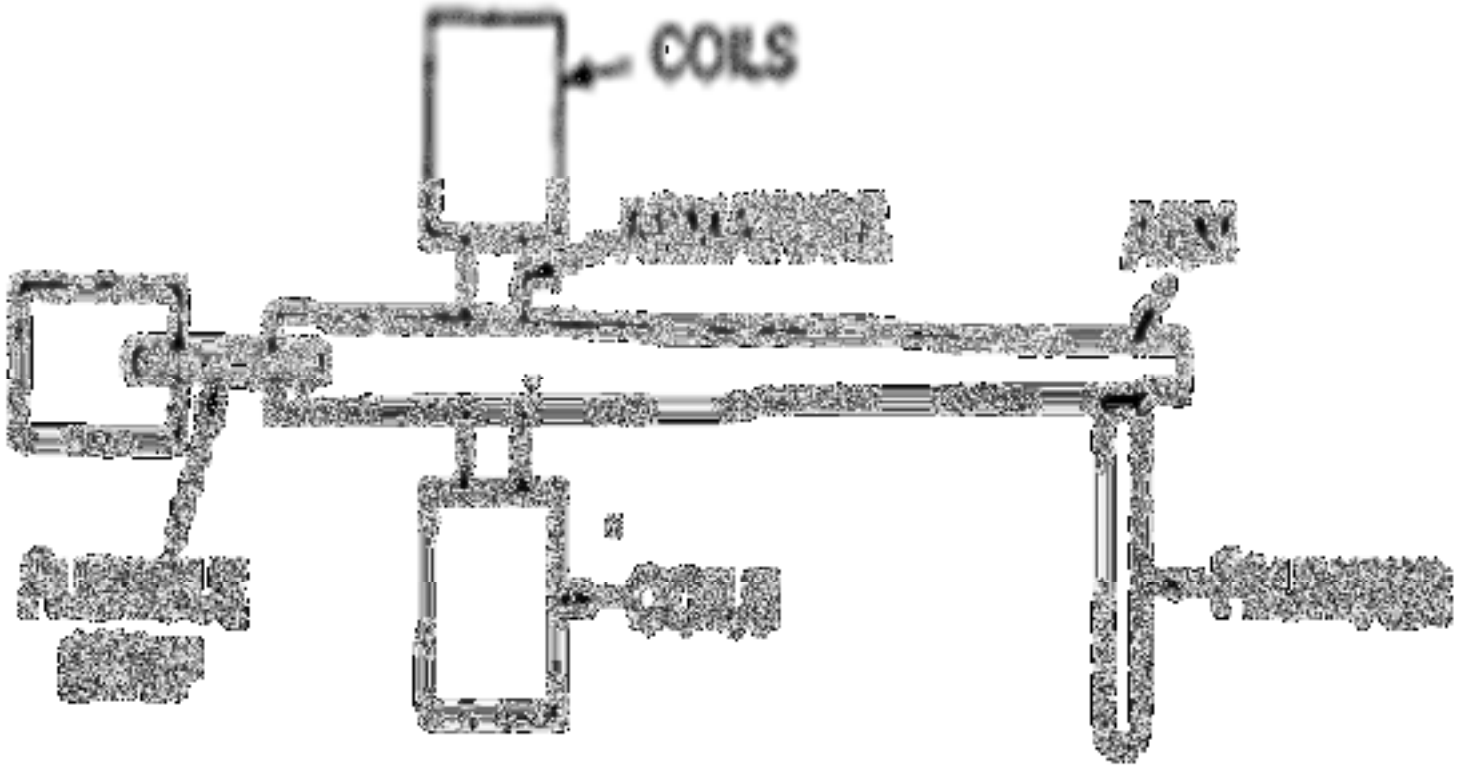


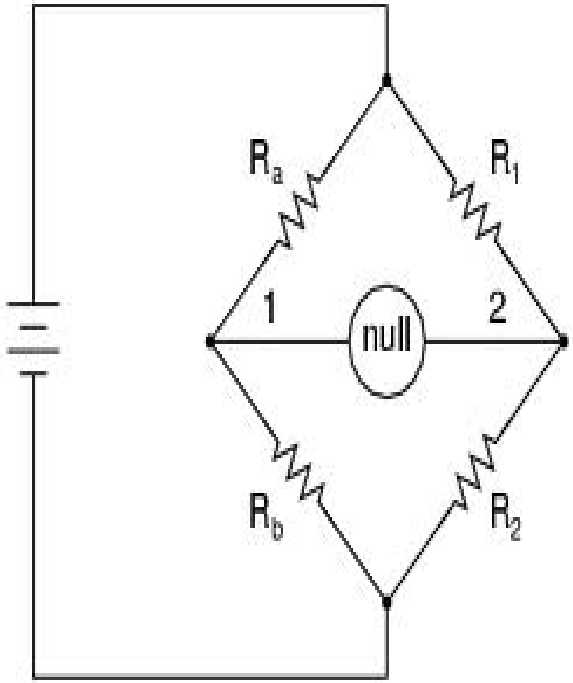
- **Advantages:**
- 1. It is cheaper, simple to operate and the cost is low.
- 2. It is free from mechanical hysteresis and wear.
- 3. The magnification can be obtained as high as 10,000 X.
- 4. The gauging member is not in direct contact with the work.
- 5. Indicating and measuring is done at two different places.
- 6. Tapers and ovality can be easily detected.
- 7. The method is self cleaning due to continuous flow of air through the jets and this
- makes the method ideal to be used on shop floor for online controls.
- **Disadvantages:**
- 1. They are **very sensitive** to temperature and humidity changes.
- 2. The **accuracy** may be influenced by the **surface roughness** of the component being
- checked.
- 3. **Different gauging heads** are needed for different jobs.
- 4. Auxiliary equipments such as air filters, pressure gauges and regulators are needed.
- 5. Non-uniformity of scale is a peculiar aspect of air gauging as the **variation of back**
- pressure is linear, over only a small range of the orifice size variation.

ELECTRICAL AND ELECTRONIC COMPARATOR

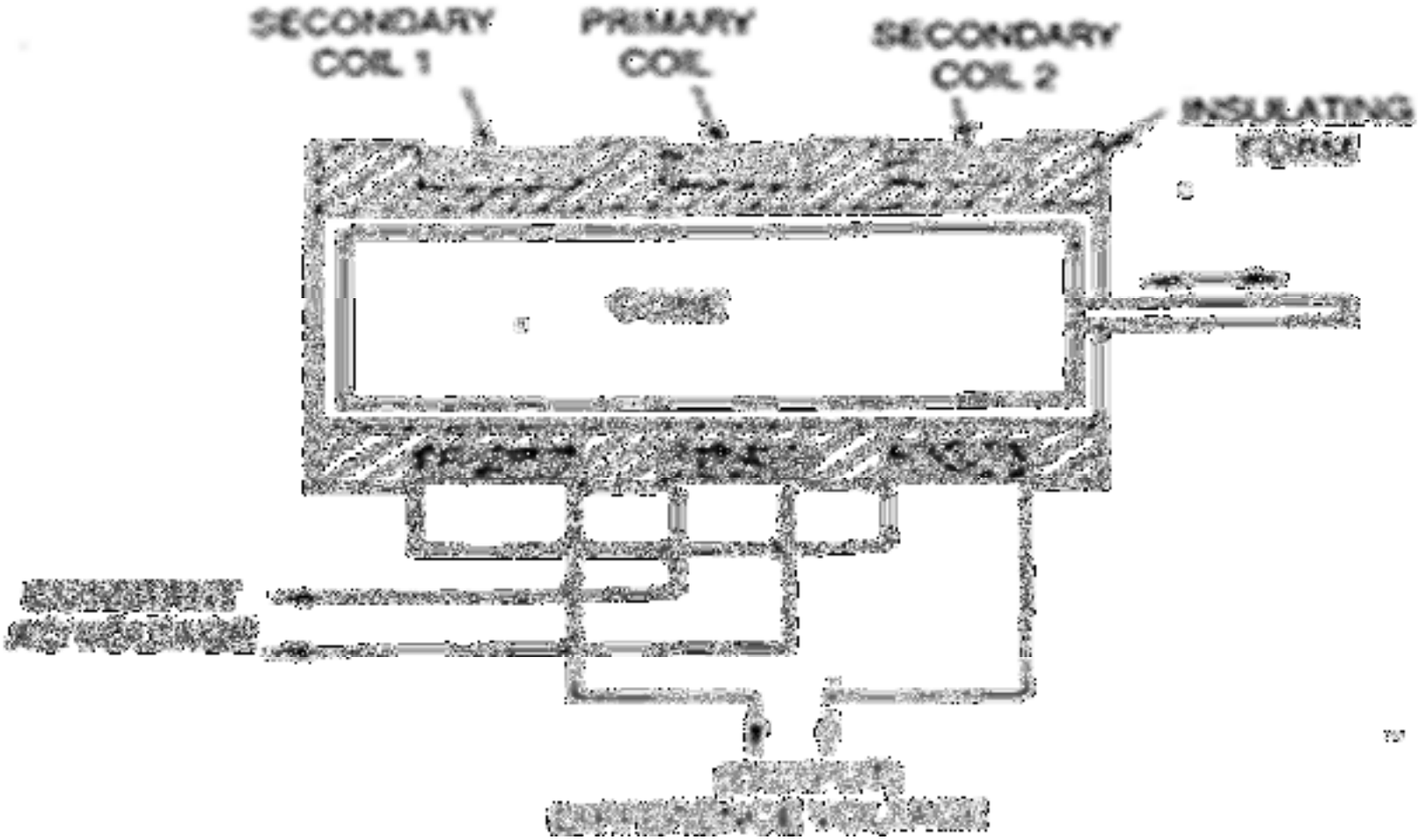
- PRINCIPLE
- LINEAR VARIABLE DIFFERENTIAL TRANSFORMER(LVDT)

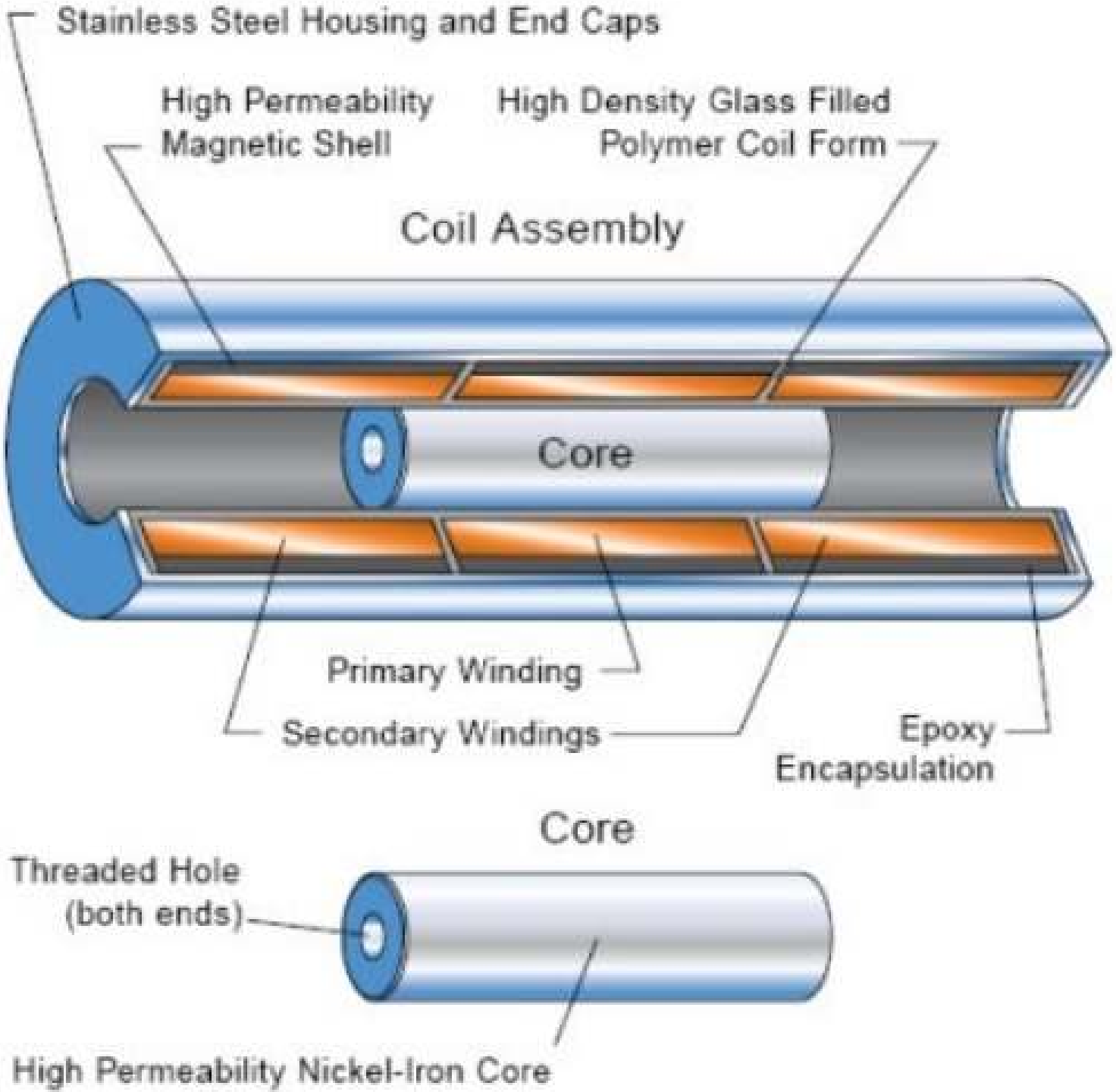
PRINCIPLE





LINEAR VARIABLE DIFFERENTIAL TRANSFORMER(LVDT)




Stainless Steel Housing and End Caps
High Permeability
Magnetic Shell
High Density Glass Filled
Polymer Coil Form
Coil Assembly
Core
Primary Winding
Secondary Windings
Epoxy
Encapsulation
Core
Threaded Hole
(both ends)
High Permeability Nickel-Iron Core