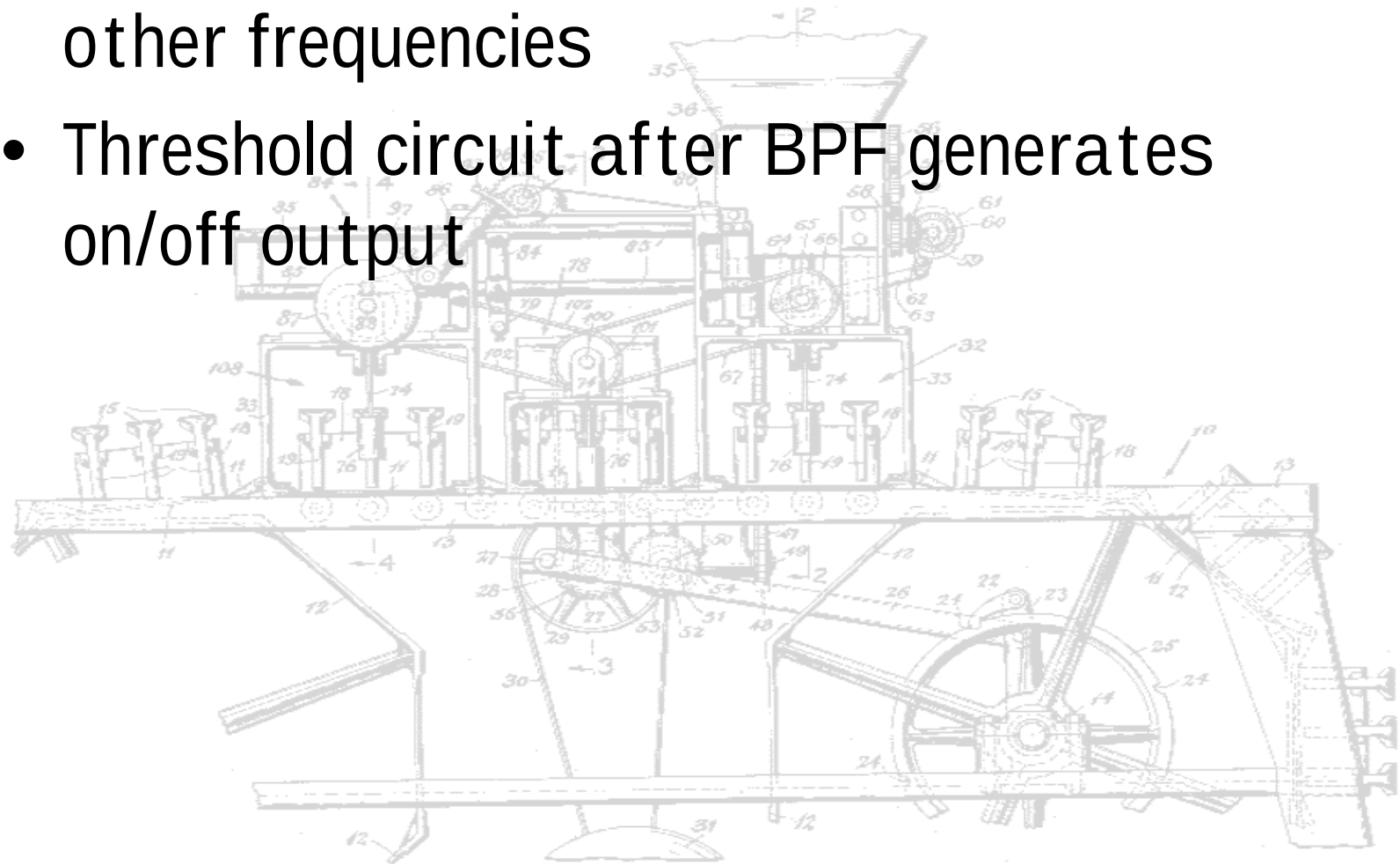
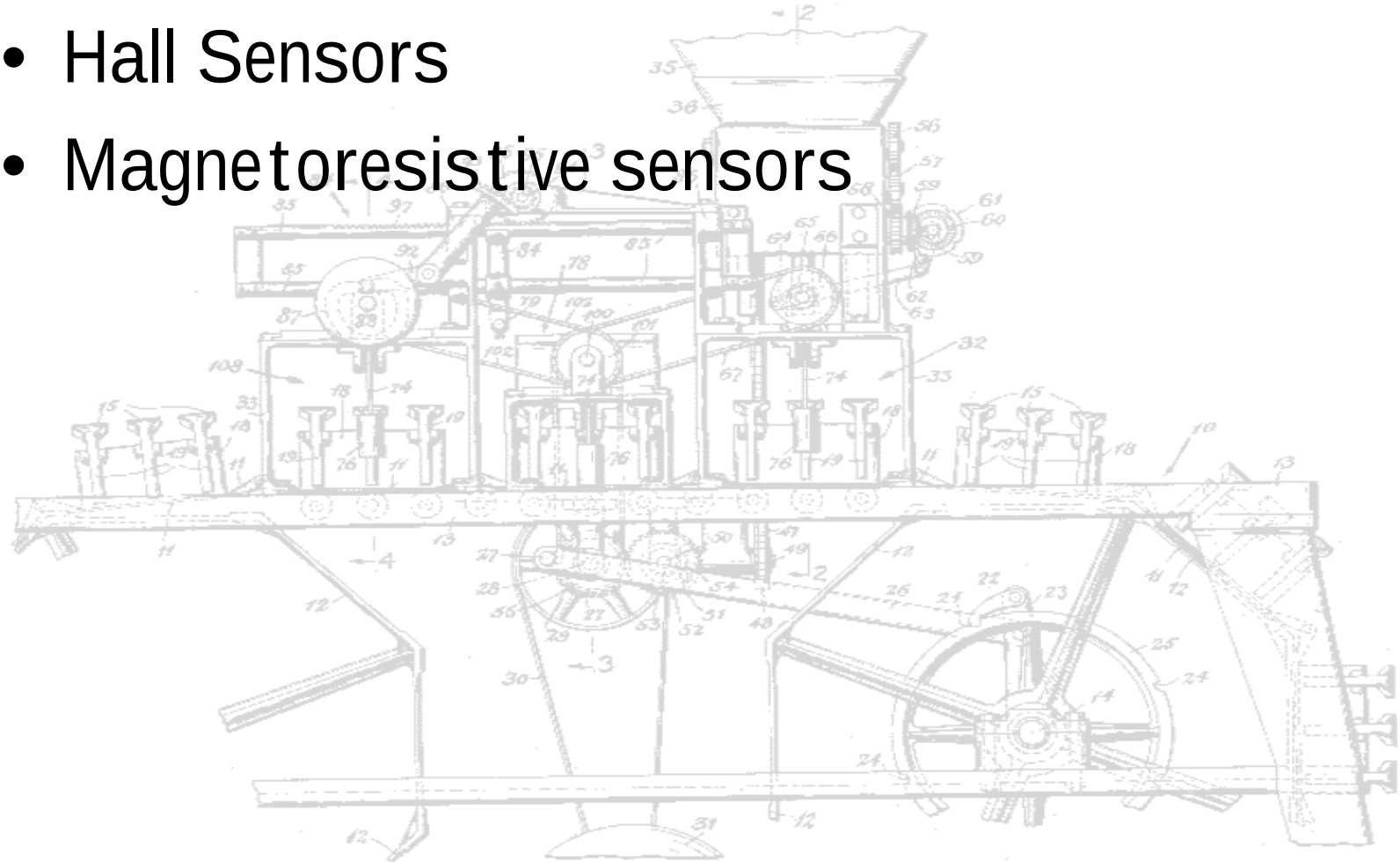
Modulation

- “Chop” LED drive on and off at many kHz
- Bandpass filter after photodiode eliminates other frequencies
- Threshold circuit after BPF generates on/off output

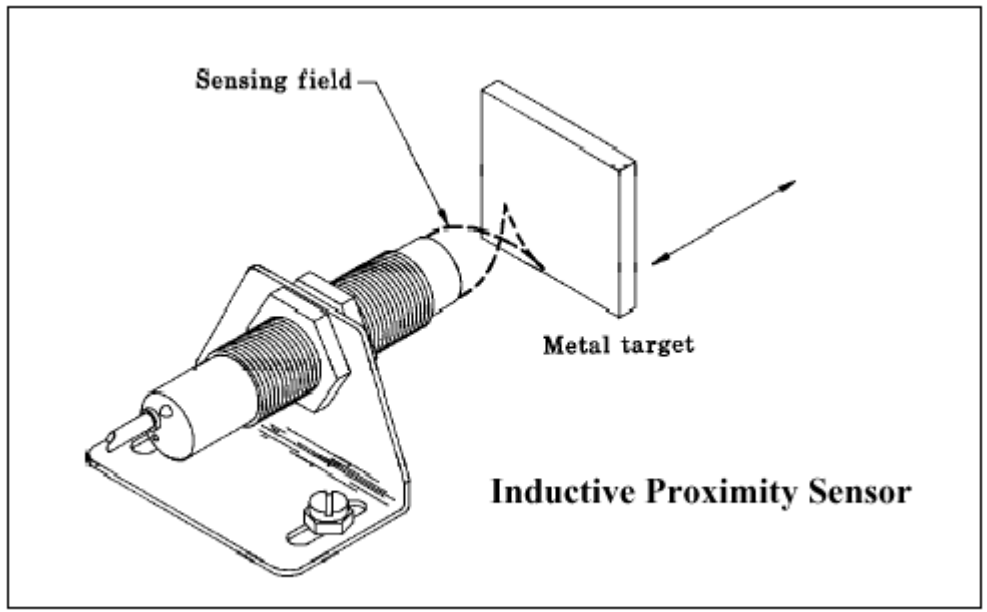


Magnetic Sensors

- Reed switches
- Induction proximity sensors
- Hall Sensors
- Magnetoresistive sensors



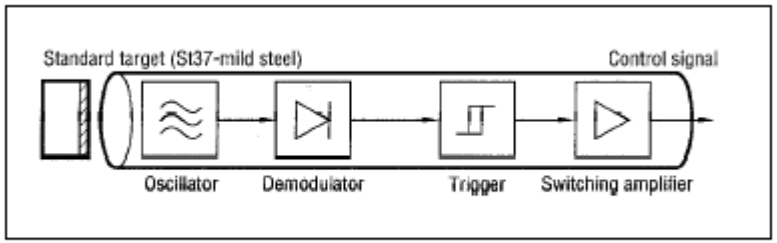
Inductive Proximity Sensor

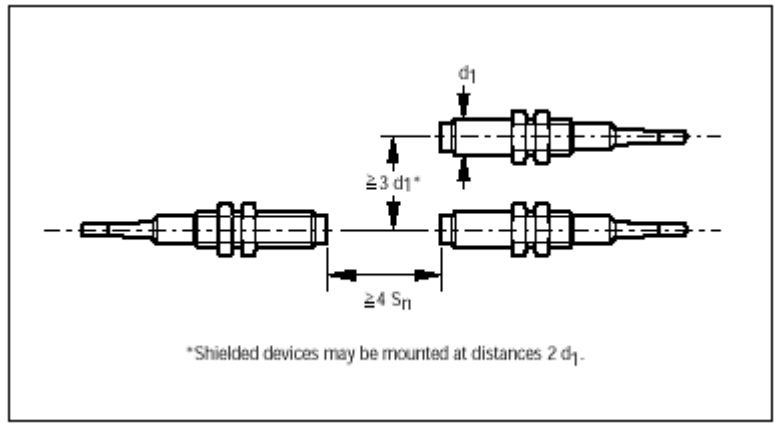


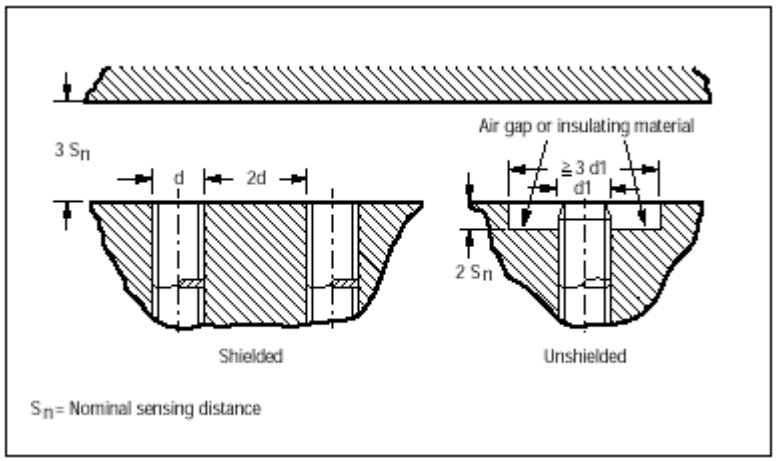
Inductive Proximity Sensors

- Eddy current sensing
- Shielded and unshielded

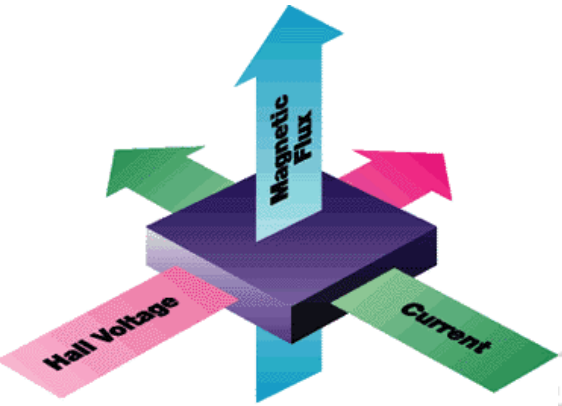
$60-$100

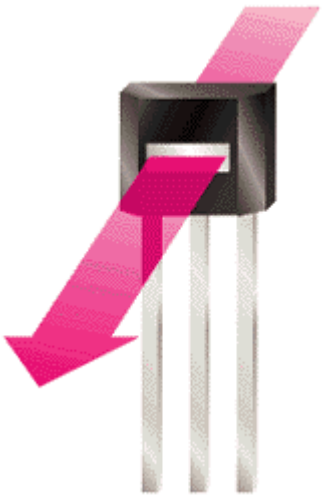






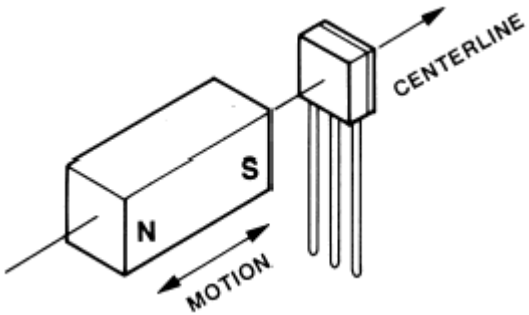
Hall Sensors

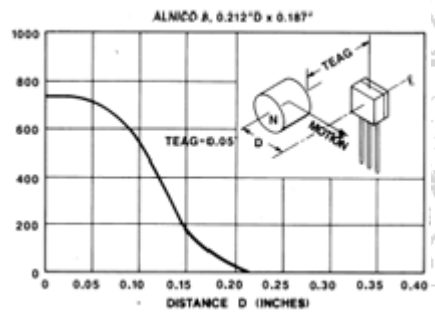




- Hall effect:
  - constant voltage forces a constant current in semiconductor sheet
  - Magnetic field flux lines perpendicular to current cause proportional voltage across sheet.
  - Discovered by E.F.Hall in 1879.
- Linear sensor needs voltage regulator and amplifier
- Switch also needs threshold circuit, with hysteresis

Hall Switches

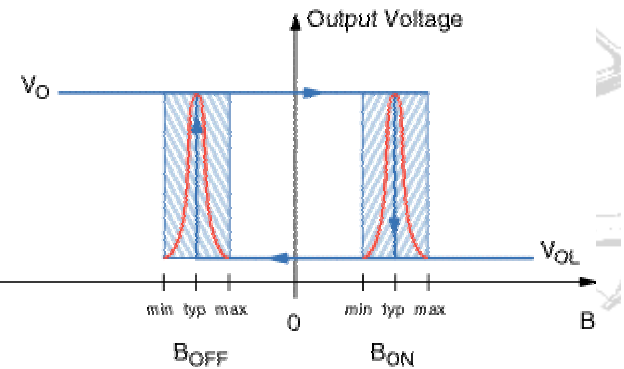


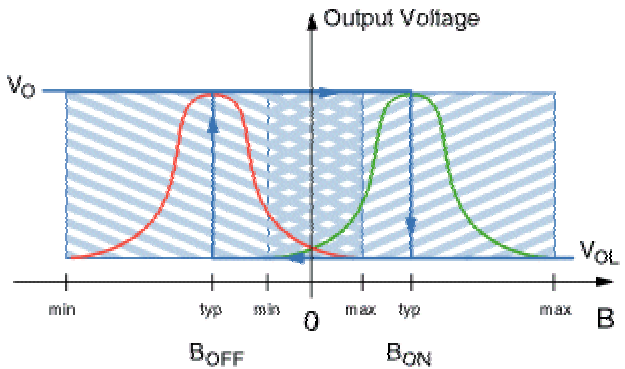


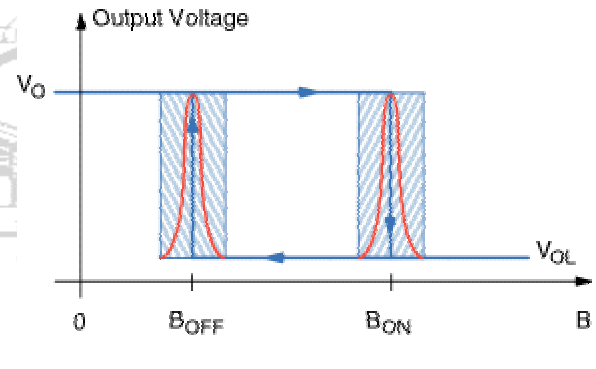
- Magnet motion
  - head-on
  - bypass or slide-by

$2 - $30

- Total effective air gap (TEAG)
- Sensitivity, Hysteresis, & Temperature
- Latched, bipolar, and unipolar

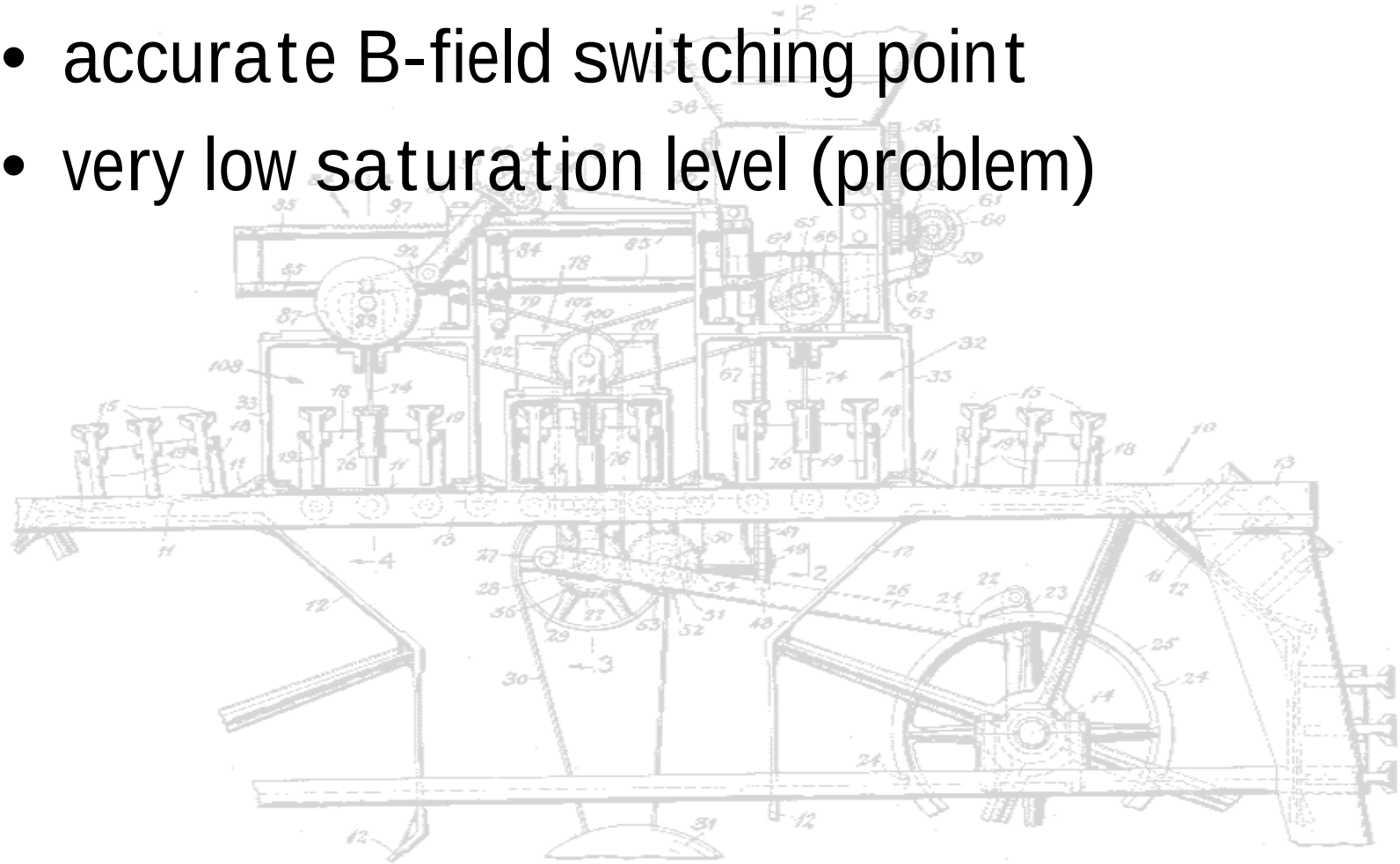






Magnetoresistive

- disk drive heads
- excellent repeatability
- accurate B-field switching point
- very low saturation level (problem)



Other position sensors

- capacitive
- ultrasonic
- variable reluctance

  (coil around magnet, senses moving ferrous matrl)