

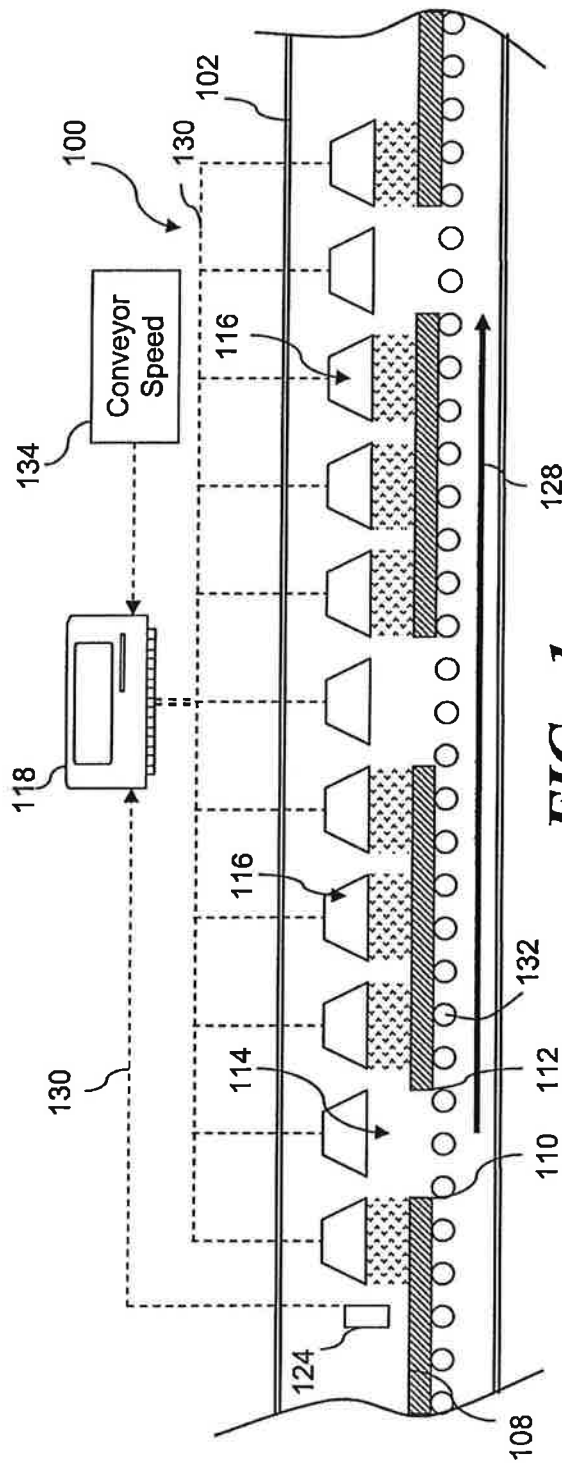


FIG. -1-

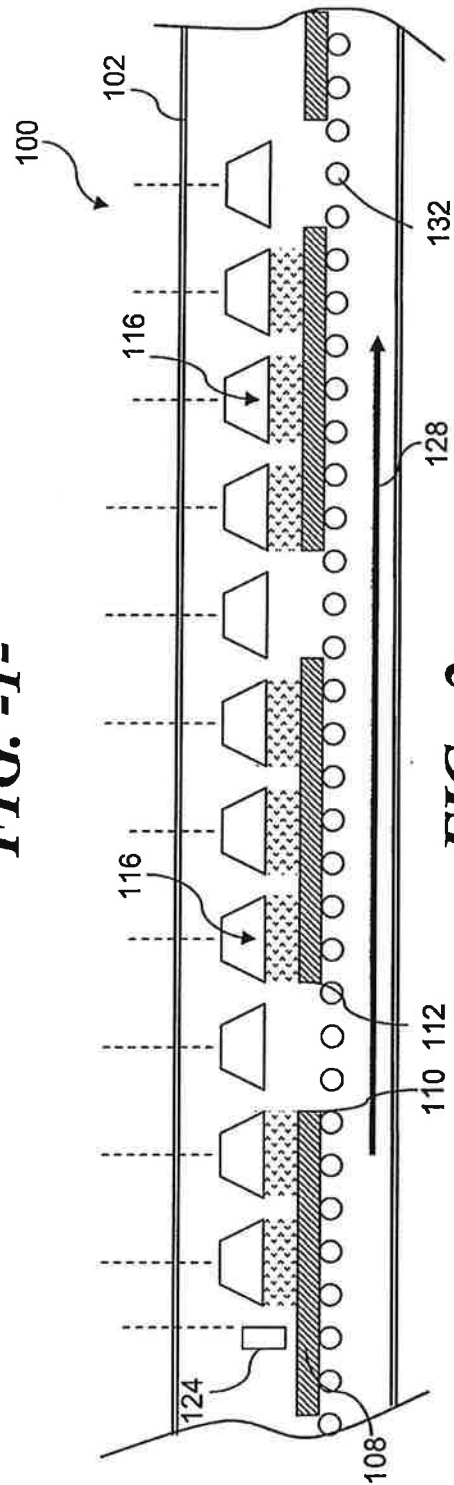


FIG. -2-

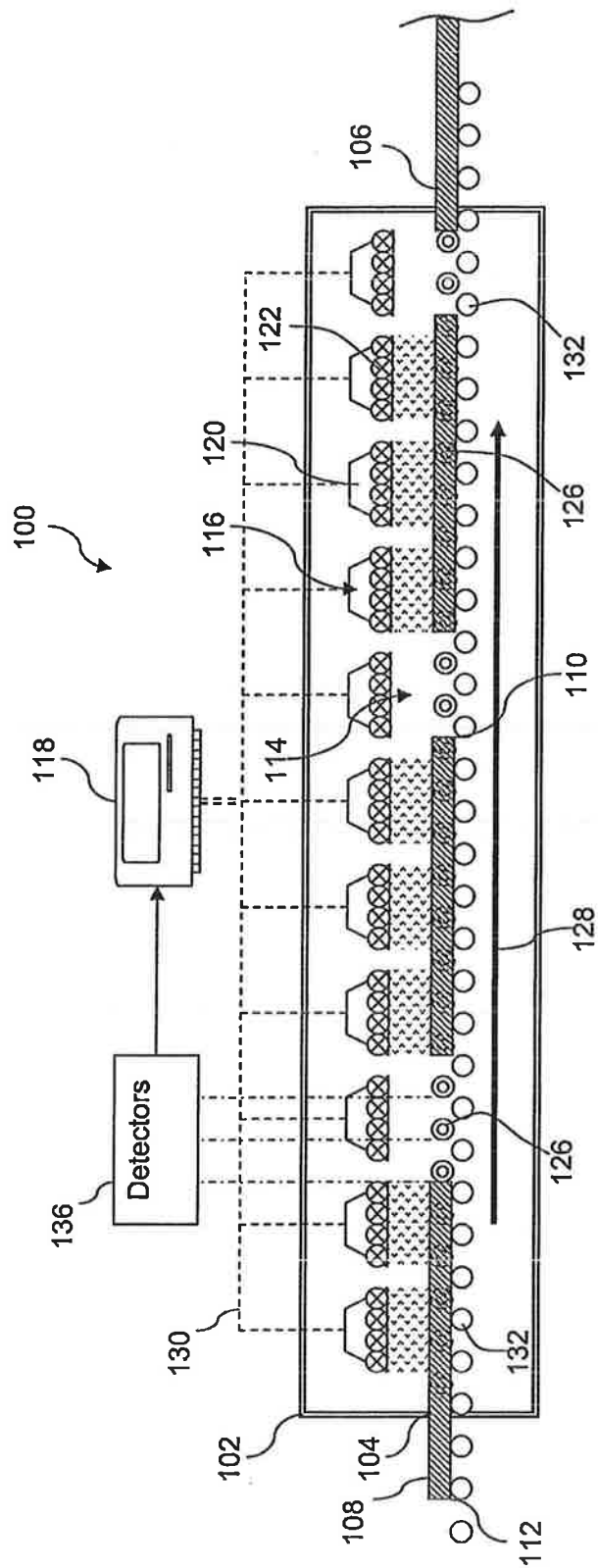


FIG. -3-

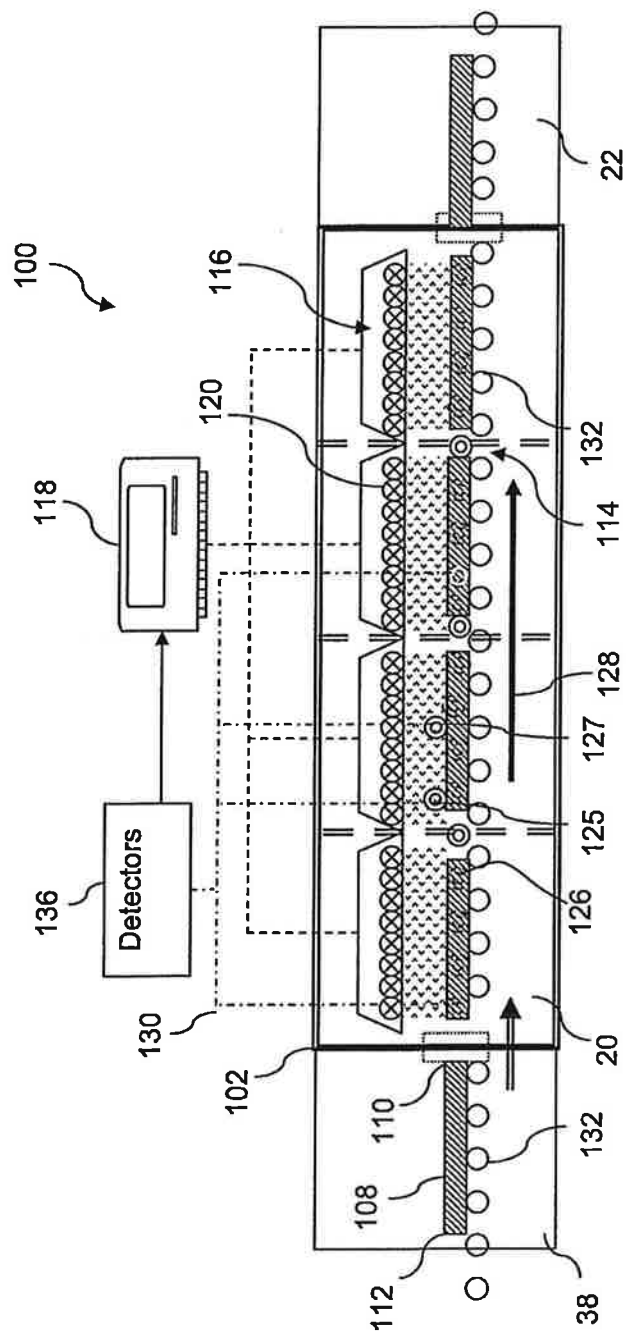


FIG. -4-

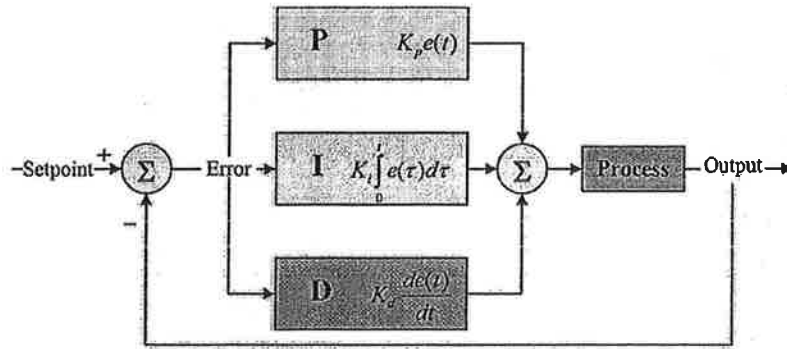
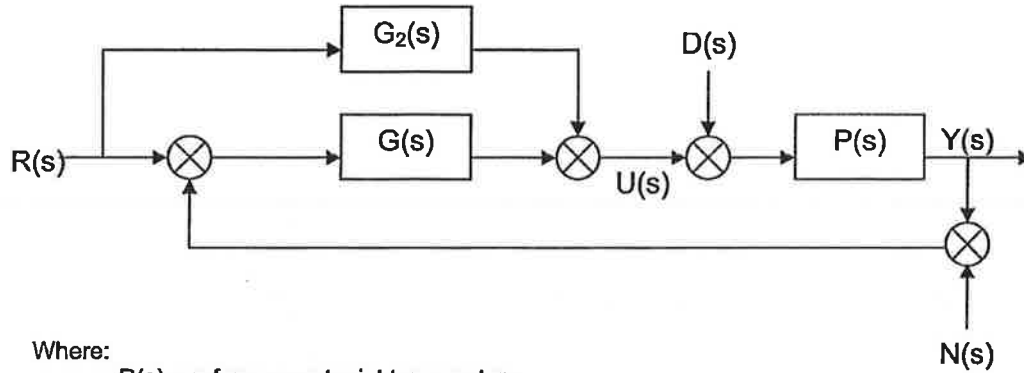


FIG. -5-



Where:

$R(s)$ = reference setpoint temperature

$U(s)$ = manipulated signal (i.e., MV)

$D(s)$ = disturbance signal

$Y(s)$ = output signal (i.e., PV)

$N(s)$ = noise signal

$B(s)$ = modified process variable (PV)

$P(s)$ = plant process function; for a heater modeling process, function may be:

$$\frac{1}{LCs^2 + RCs + 1}$$

where the heater has inductance (L), capacitance (C), and resistance (R)

$G(s)$ = standard PID transfer function

$G_2(s)$ = spatially modulated transfer function in a feed-forward architecture; for a ramp function triggered by spatial position of the substrate relative to heater, function may be:

$$K_{p2}(1/s^2)$$

where K_{p2} is the ramp constant

Where: Closed loop transfer function becomes:

$$\frac{Y(s)}{R(s)} = \frac{[G(s) + G_2(s)]P(s)}{1 + G(s)P(s)}$$

FIG. -6-

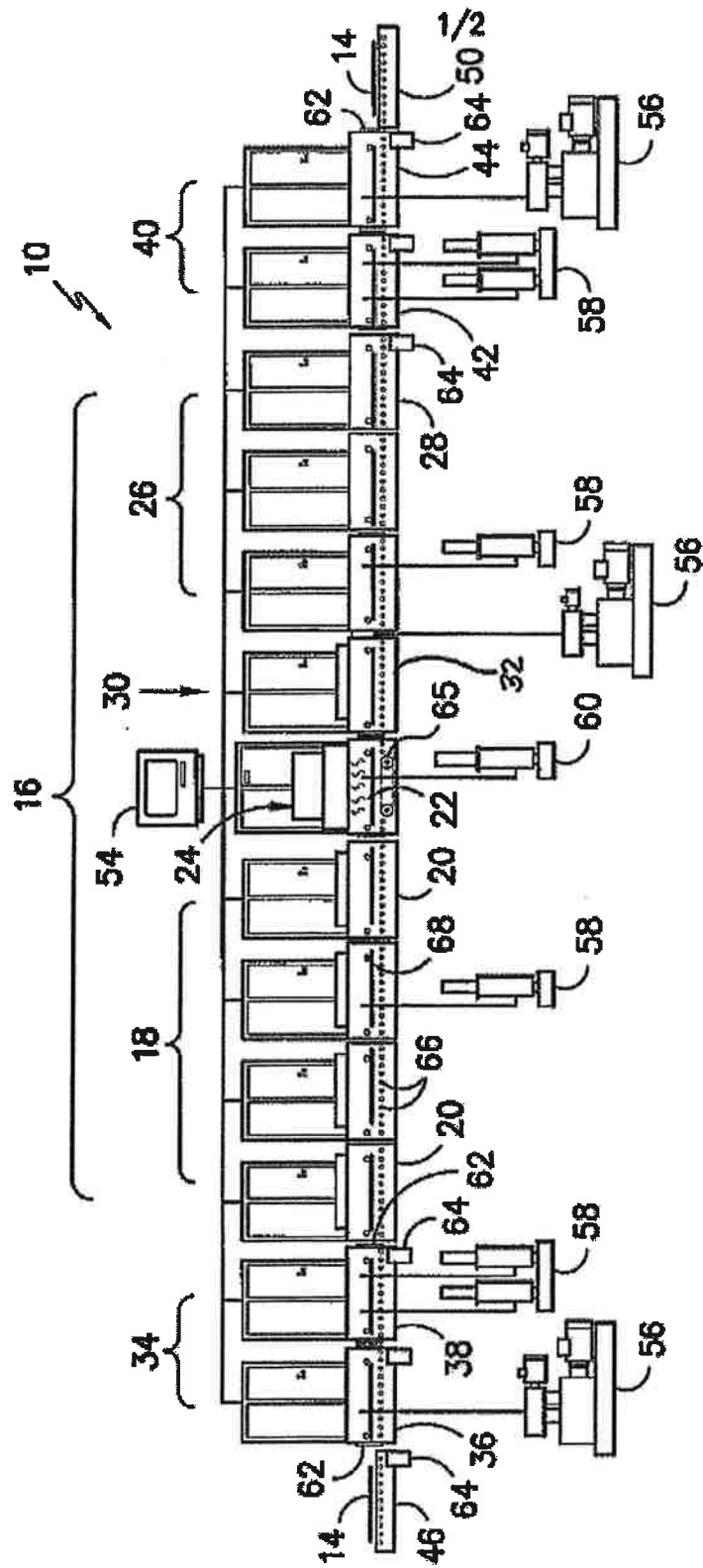


FIG. -7-

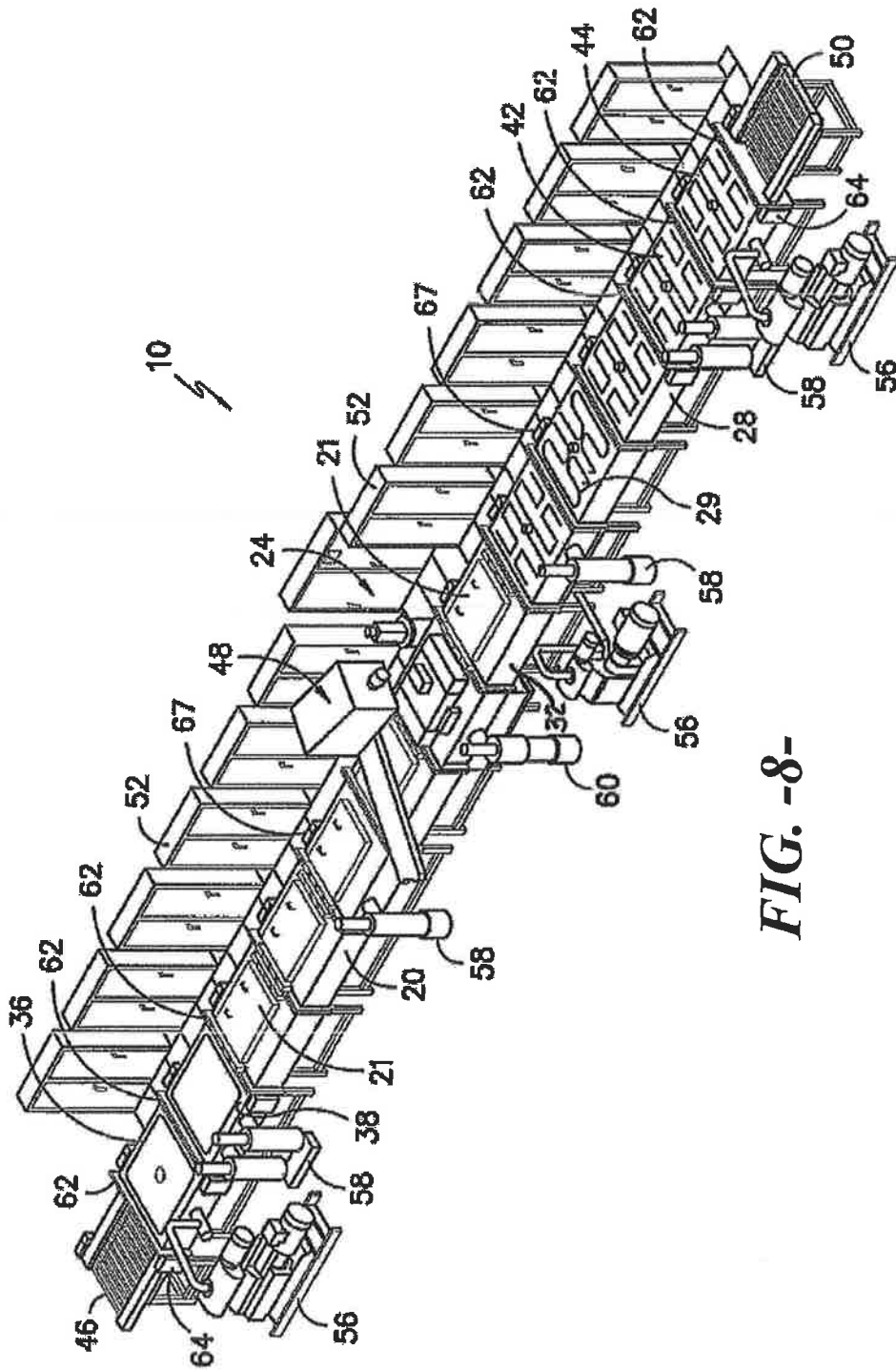


FIG. -8-