FIG. 1

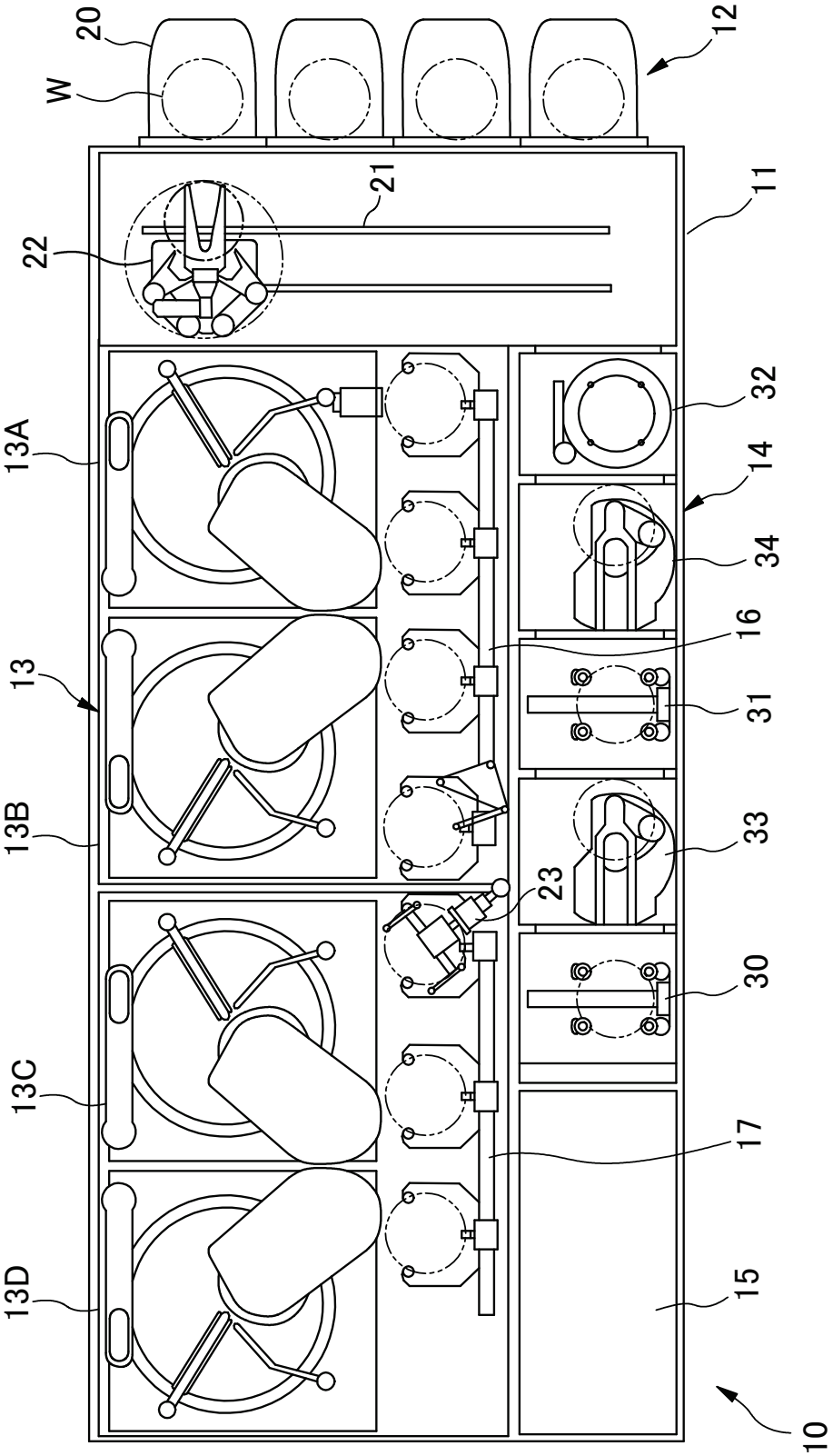


FIG. 2

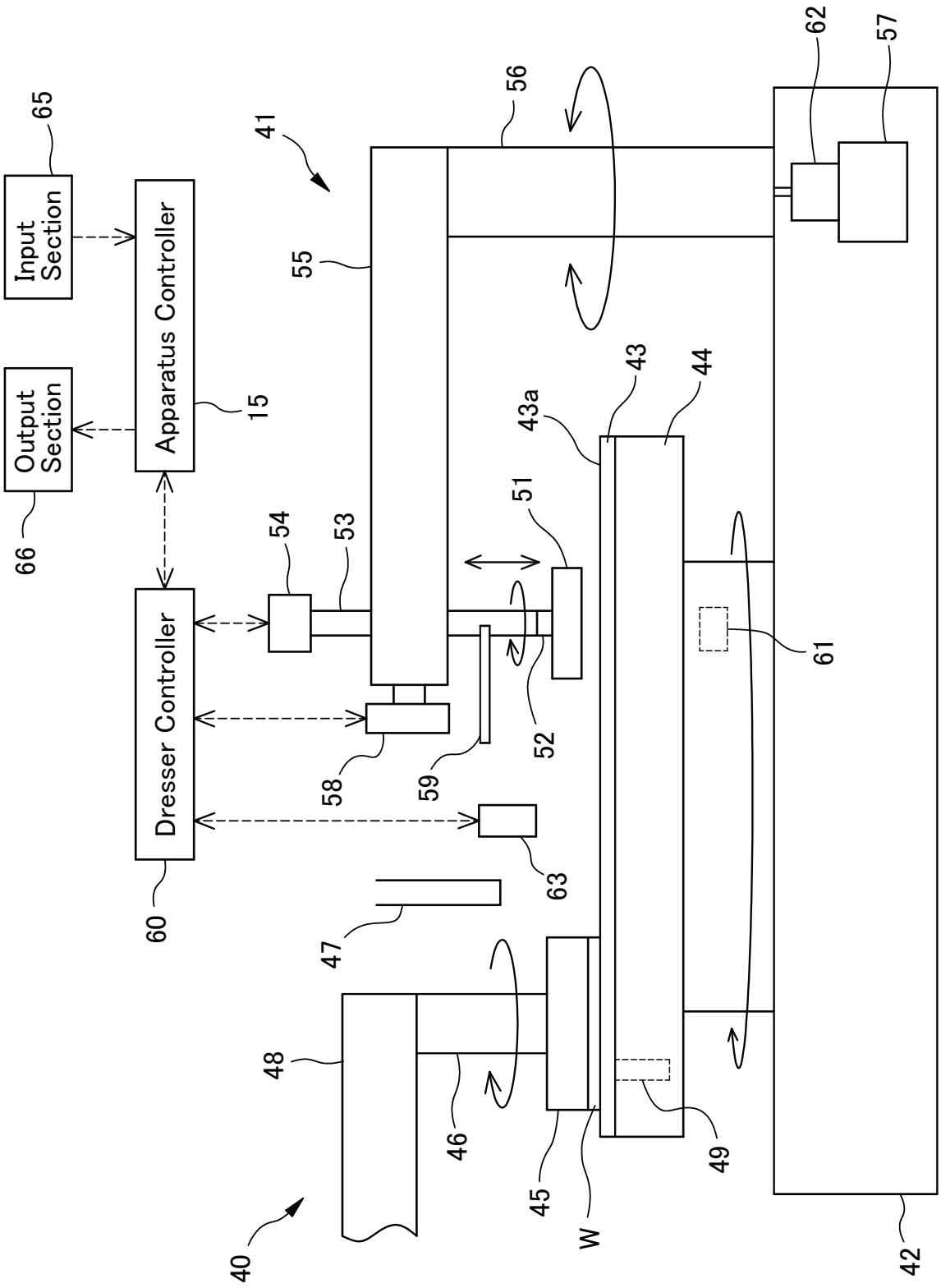

Input Section
65
Output Section
66
Apparatus Controller
15
Dresser Controller
60
41
55
56
62
57
54
53
51
43
43a
44
52
58
59
61
63
47
48
46
45
W
49
40
42

FIG. 3

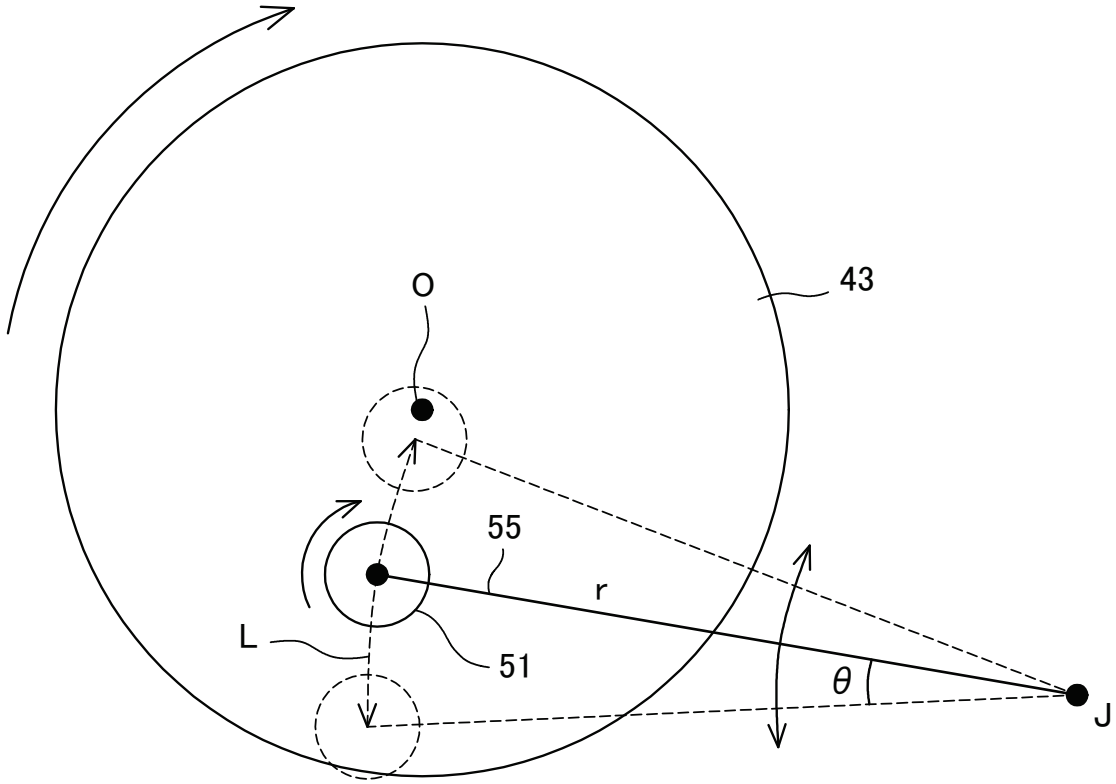


FIG. 4

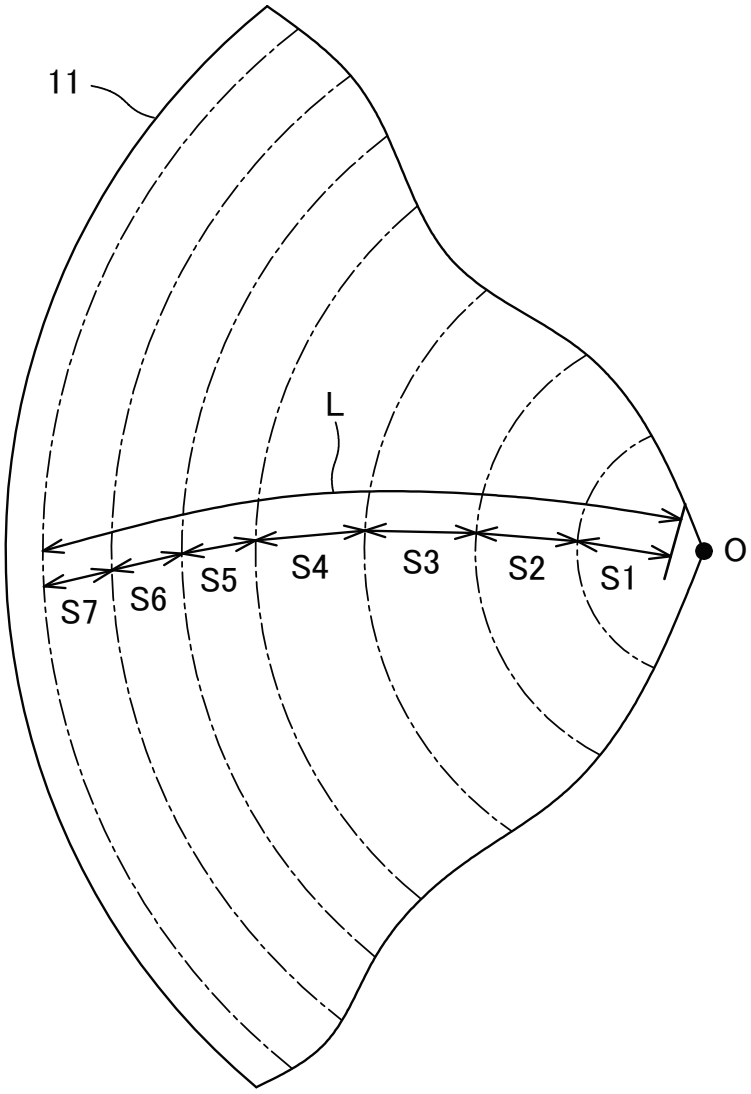


FIG. 5

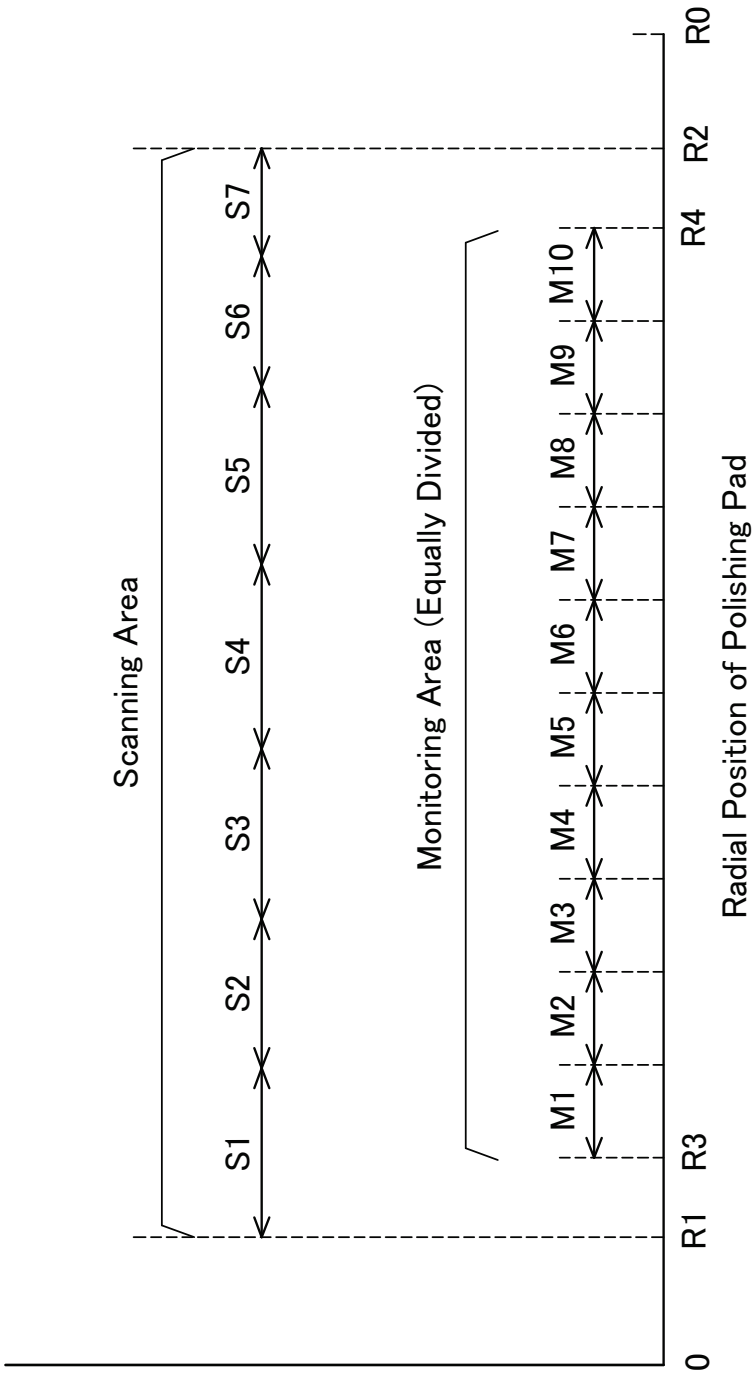

Scanning Area
Monitoring Area (Equally Divided)
S1
S2
S3
S4
S5
S6
S7
M1
M2
M3
M4
M5
M6
M7
M8
M9
M10
0
R1
R3
R4
R2
R0
Radial Position of Polishing Pad

FIG. 6

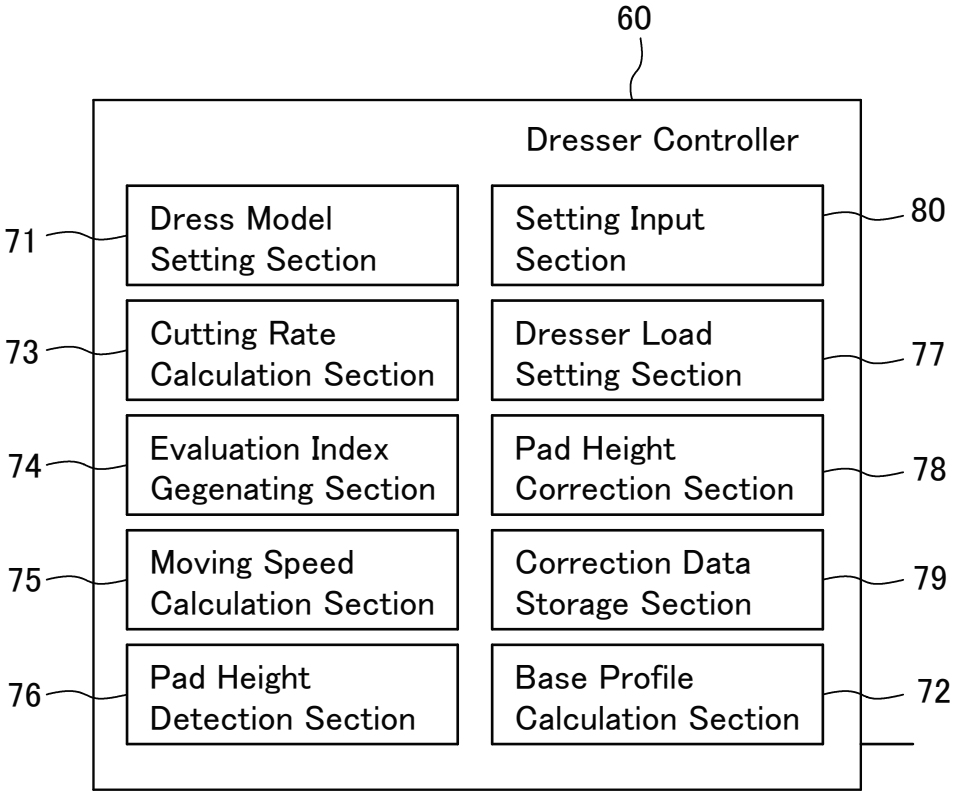

60
Dresser Controller
71
Dress Model Setting Section
Setting Input Section
80
73
Cutting Rate Calculation Section
Dresser Load Setting Section
77
74
Evaluation Index Gegenating Section
Pad Height Correction Section
78
75
Moving Speed Calculation Section
Correction Data Storage Section
79
76
Pad Height Detection Section
Base Profile Calculation Section
72

FIG. 7

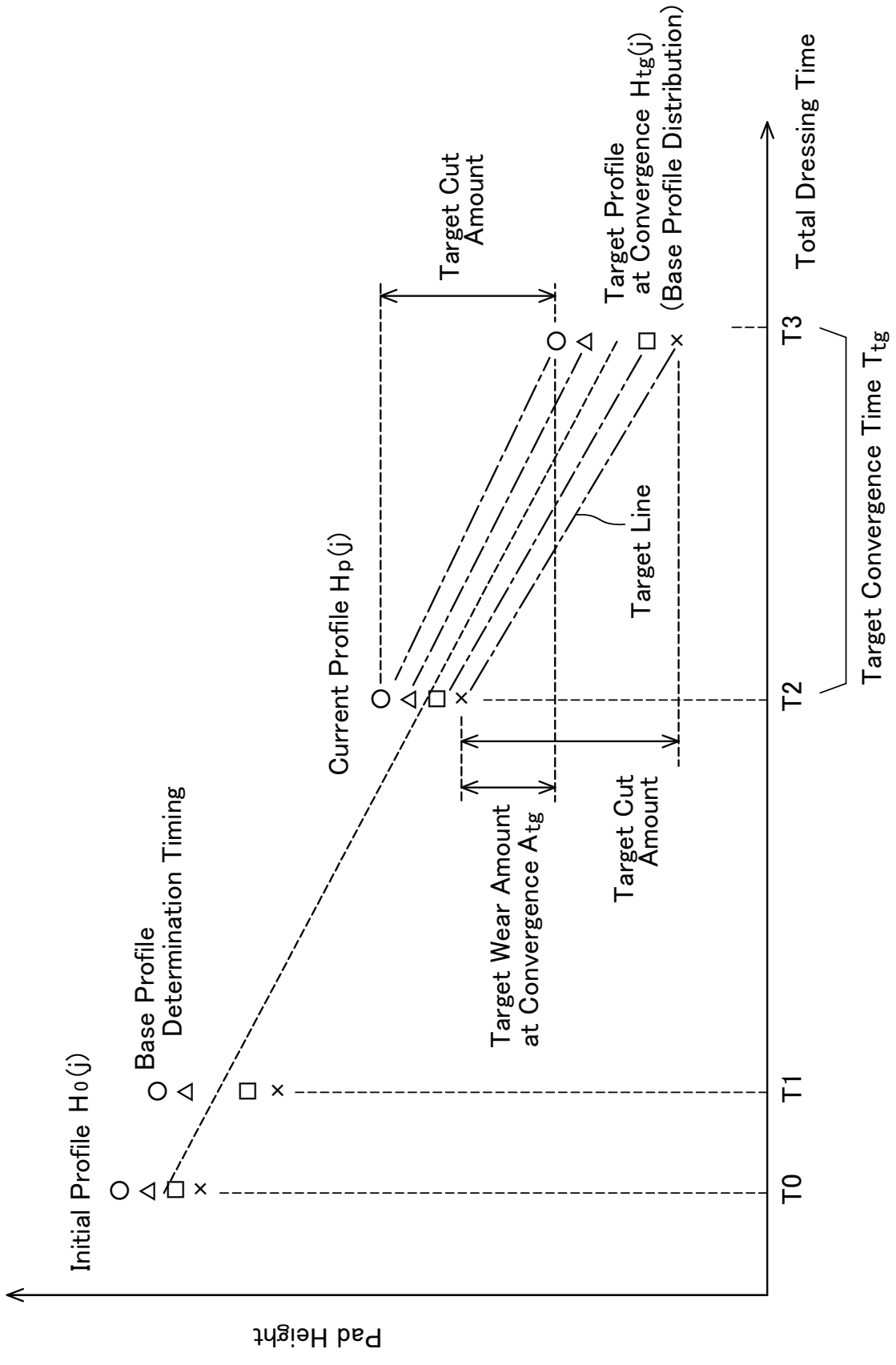

Pad Height
Initial Profile H0(j)
Base Profile Determination Timing
Current Profile Hp(j)
Target Cut Amount
Target Profile at Convergence Htg(j) (Base Profile Distribution)
Target Line
Target Wear Amount at Convergence Atg
Target Cut Amount
T0
T1
T2
T3
Total Dressing Time
Target Convergence Time Ttg

FIG. 8

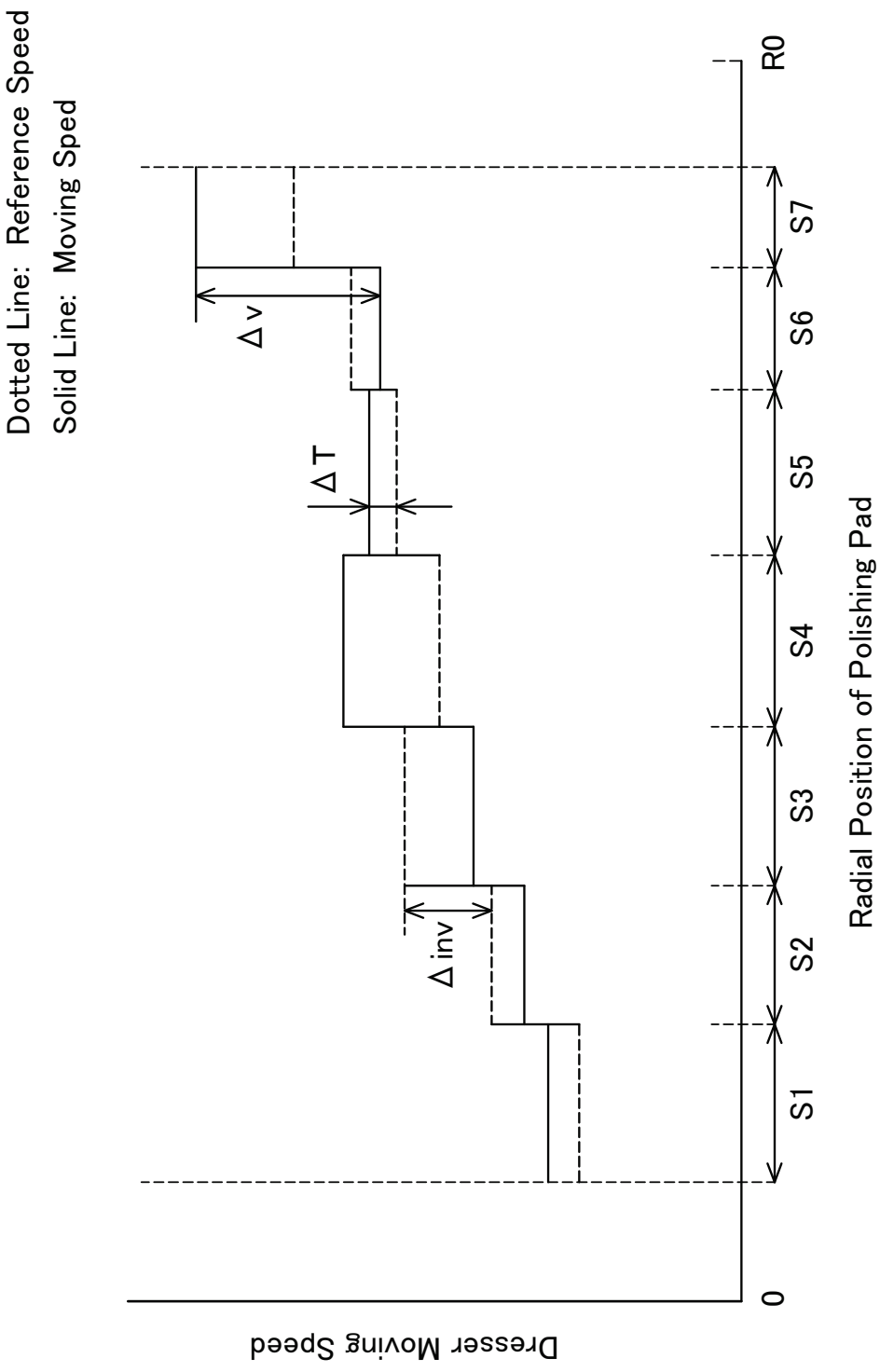

Dotted Line: Reference Speed
Solid Line: Moving Sped
Δ v
Δ T
Δ inv
S1
S2
S3
S4
S5
S6
S7
R0
0
Dresser Moving Speed
Radial Position of Polishing Pad

FIG. 9

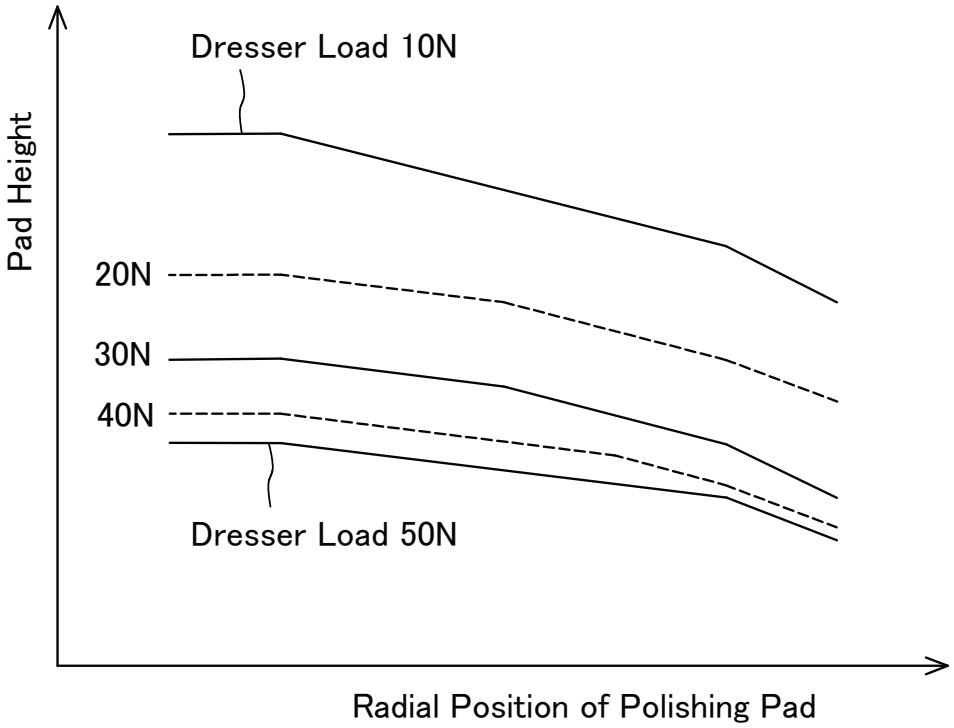

Dresser Load 10N
Pad Height
20N
30N
40N
Dresser Load 50N
Radial Position of Polishing Pad

FIG. 10

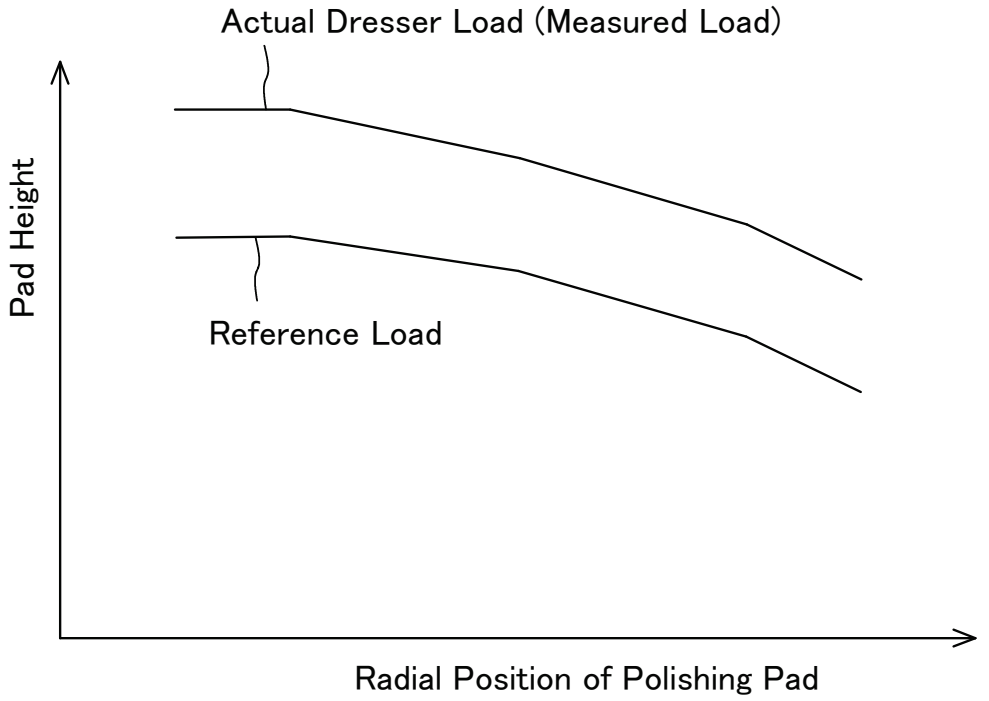

Actual Dresser Load (Measured Load)
Pad Height
Reference Load
Radial Position of Polishing Pad

FIG. 11

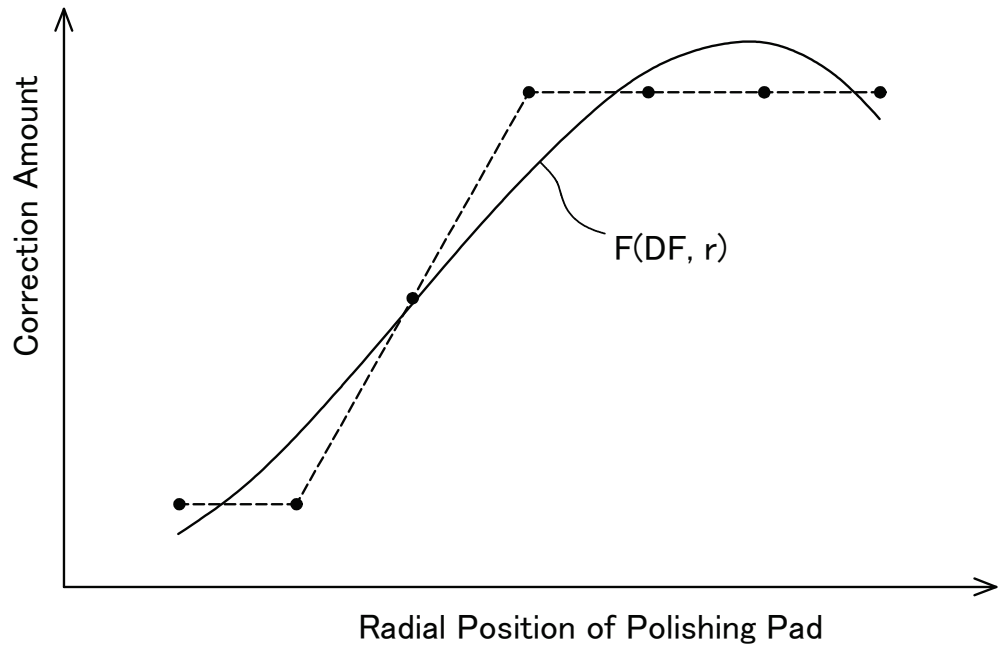

Correction Amount
F(DF, r)
Radial Position of Polishing Pad

FIG. 12

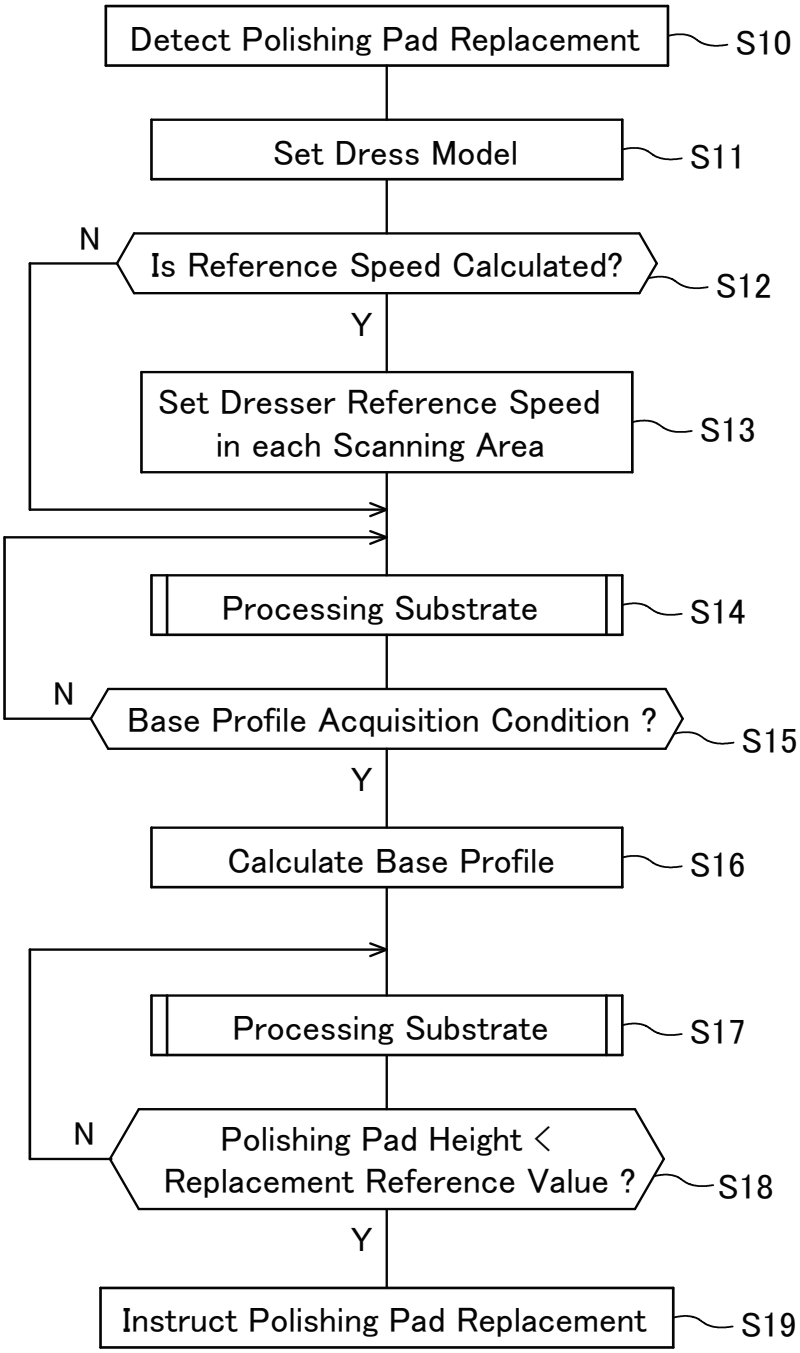

Detect Polishing Pad Replacement
S10
Set Dress Model
S11
N
Is Reference Speed Calculated?
S12
Y
Set Dresser Reference Speed in each Scanning Area
S13
Processing Substrate
S14
N
Base Profile Acquisition Condition ?
S15
Y
Calculate Base Profile
S16
Processing Substrate
S17
N
Polishing Pad Height < Replacement Reference Value ?
S18
Y
Instruct Polishing Pad Replacement
S19

FIG. 13

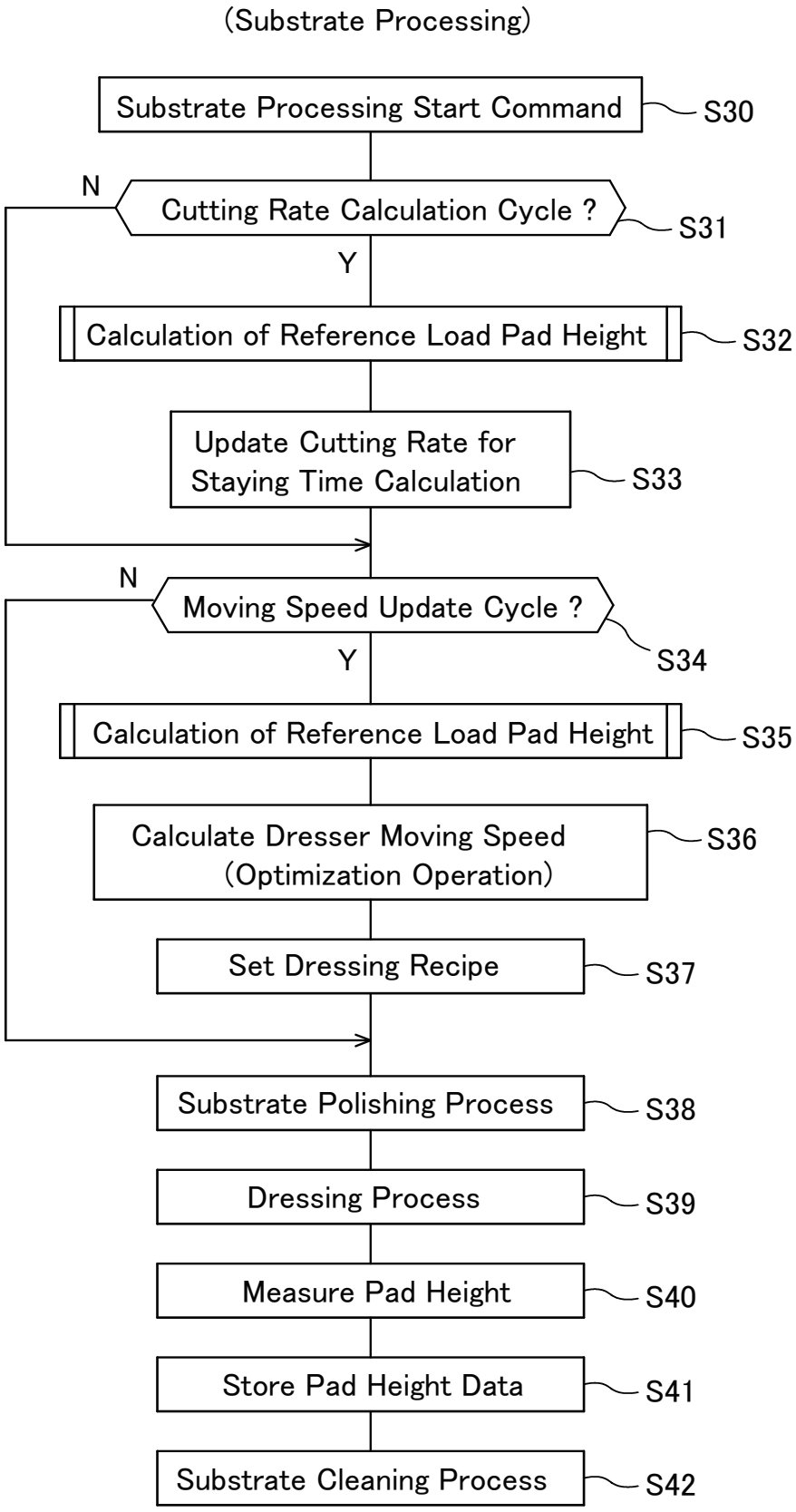

(Substrate Processing)
Substrate Processing Start Command
S30
N
Cutting Rate Calculation Cycle ?
S31
Y
Calculation of Reference Load Pad Height
S32
Update Cutting Rate for Staying Time Calculation
S33
N
Moving Speed Update Cycle ?
S34
Y
Calculation of Reference Load Pad Height
S35
Calculate Dresser Moving Speed (Optimization Operation)
S36
Set Dressing Recipe
S37
Substrate Polishing Process
S38
Dressing Process
S39
Measure Pad Height
S40
Store Pad Height Data
S41
Substrate Cleaning Process
S42

FIG. 14

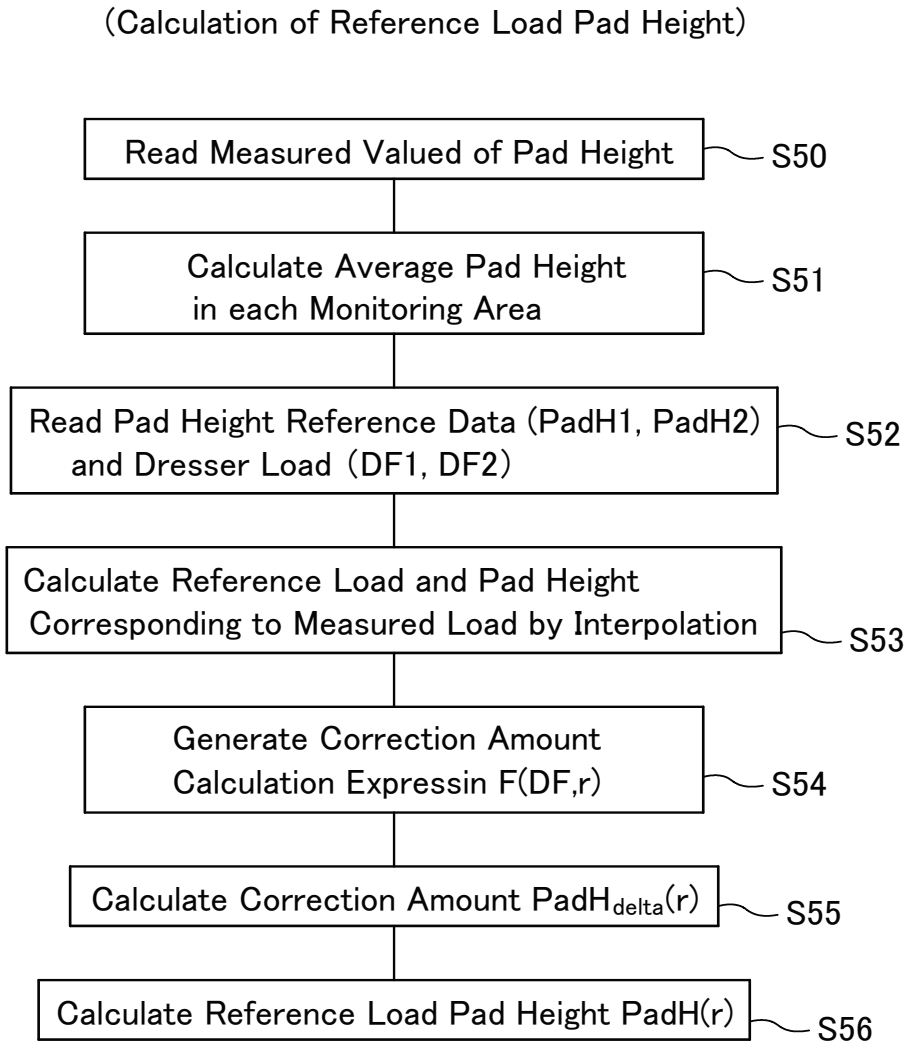
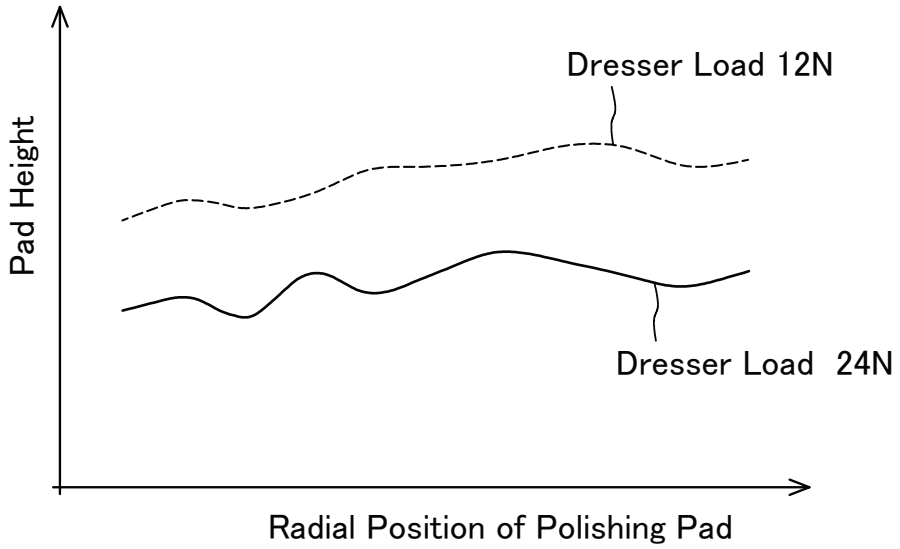
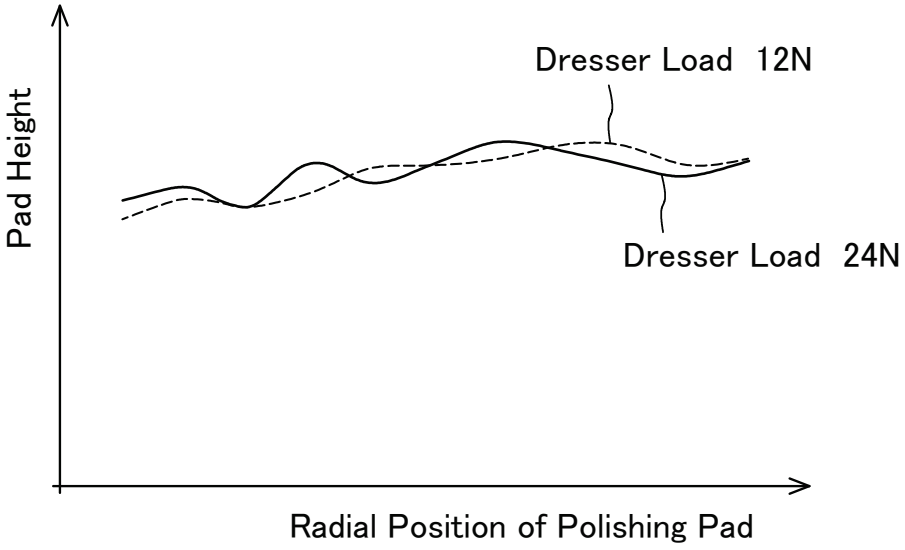

(Calculation of Reference Load Pad Height)
Read Measured Valued of Pad Height
S50
Calculate Average Pad Height in each Monitoring Area
S51
Read Pad Height Reference Data (PadH1, PadH2) and Dresser Load (DF1, DF2)
S52
Calculate Reference Load and Pad Height Corresponding to Measured Load by Interpolation
S53
Generate Correction Amount Calculation Expressin F(DF,r)
S54
Calculate Correction Amount PadH$_{delta}$(r)
S55
Calculate Reference Load Pad Height PadH(r)
S56

FIG. 15


Dresser Load 12N
Pad Height
Dresser Load 24N
Radial Position of Polishing Pad

(a)


Dresser Load 12N
Pad Height
Dresser Load 24N
Radial Position of Polishing Pad

(b)