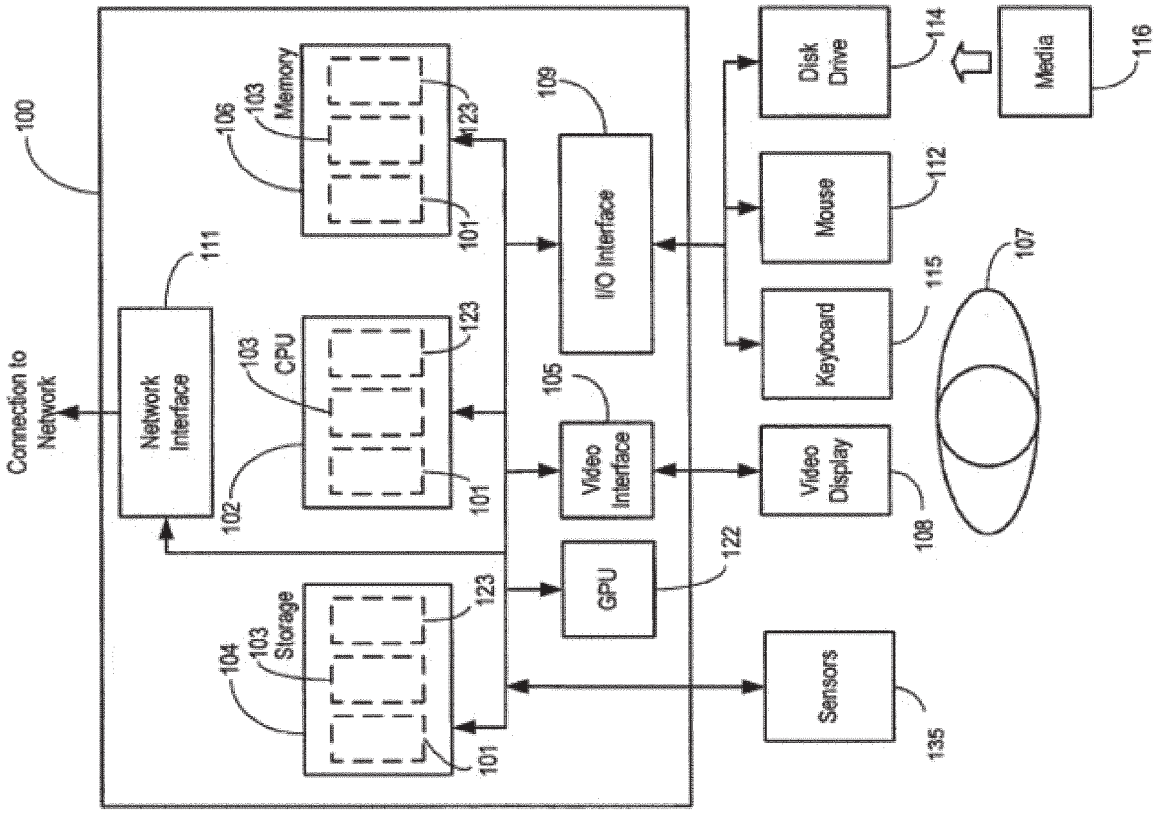

100
Connection to Network
Network Interface
111
102
103 CPU
101
123
106
103 Memory
101
123
104
103 Storage
101
123
109
I/O Interface
105
Video Interface
GPU
122
Sensors
135
Disk Drive
114
Media
116
Mouse
112
Keyboard
115
Video Display
108
107

FIG. 1

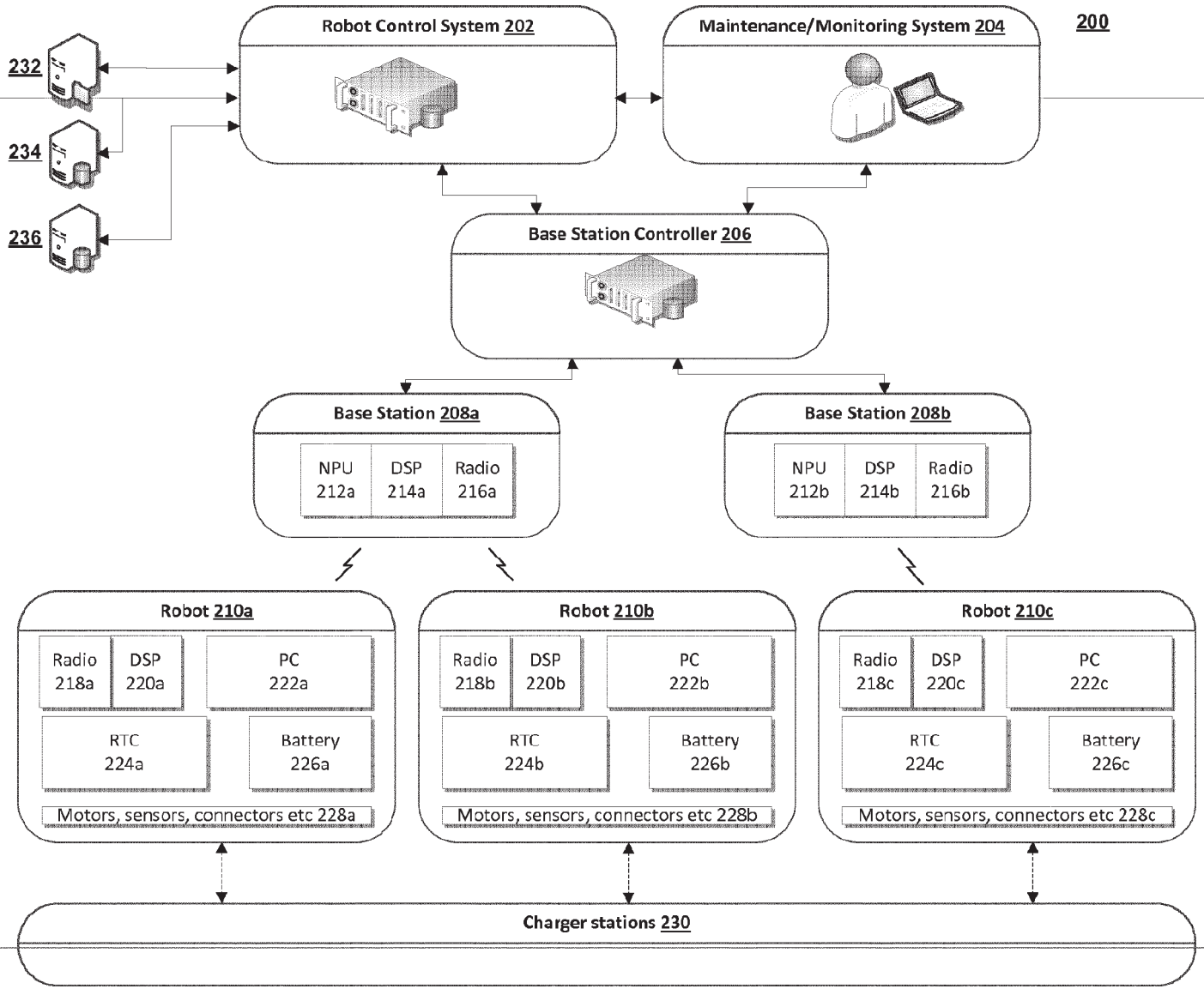

200
Robot Control System 202
Maintenance/Monitoring System 204
232
234
236
Base Station Controller 206
Base Station 208a
NPU 212a
DSP 214a
Radio 216a
Base Station 208b
NPU 212b
DSP 214b
Radio 216b
Robot 210a
Radio 218a
DSP 220a
PC 222a
RTC 224a
Battery 226a
Motors, sensors, connectors etc 228a
Robot 210b
Radio 218b
DSP 220b
PC 222b
RTC 224b
Battery 226b
Motors, sensors, connectors etc 228b
Robot 210c
Radio 218c
DSP 220c
PC 222c
RTC 224c
Battery 226c
Motors, sensors, connectors etc 228c
Charger stations 230

FIG. 2

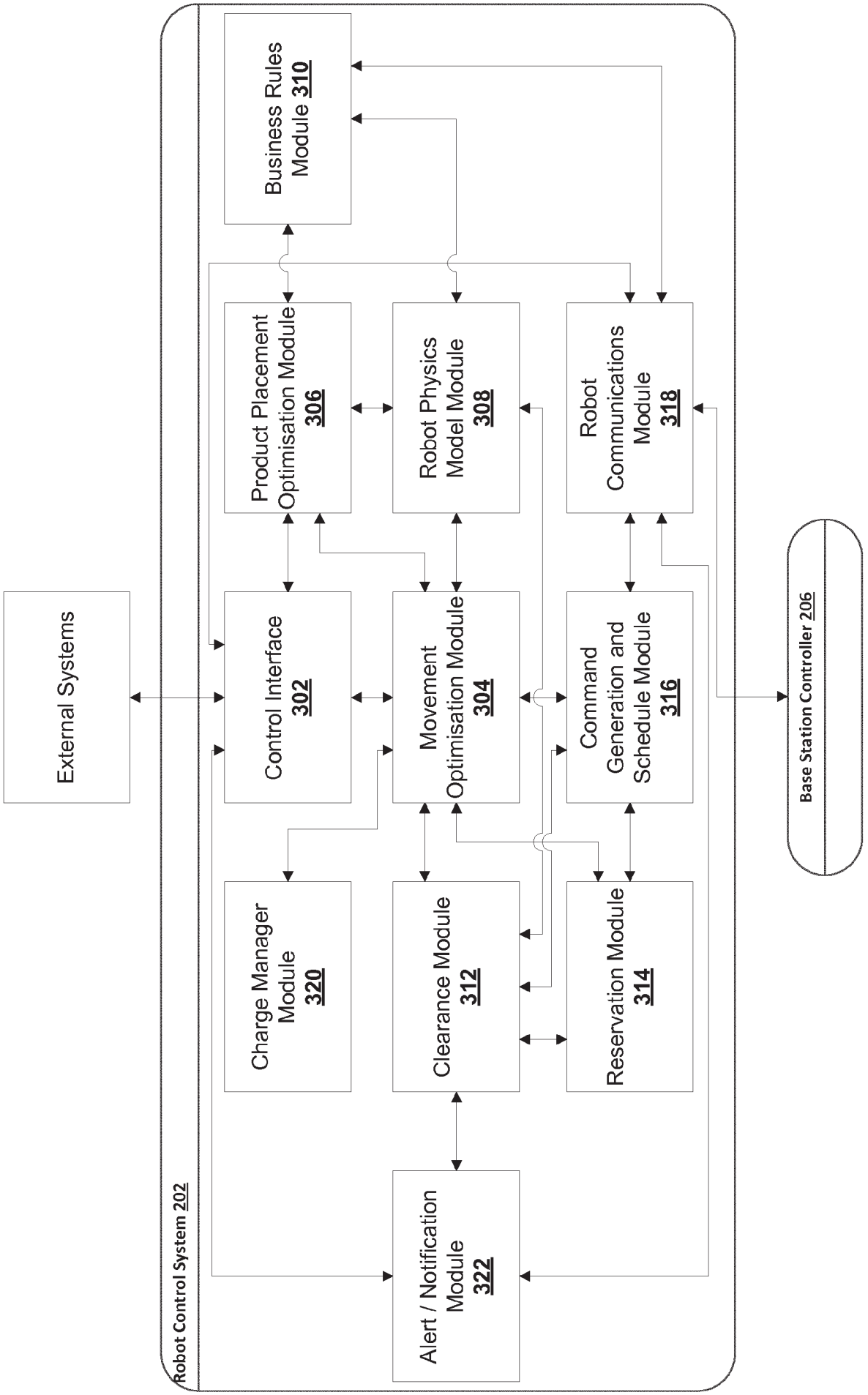

External Systems
Robot Control System 202
Control Interface 302
Business Rules Module 310
Product Placement Optimisation Module 306
Robot Physics Model Module 308
Robot Communications Module 318
Movement Optimisation Module 304
Command Generation and Schedule Module 316
Charge Manager Module 320
Clearance Module 312
Reservation Module 314
Alert / Notification Module 322
Base Station Controller 206

FIG. 3

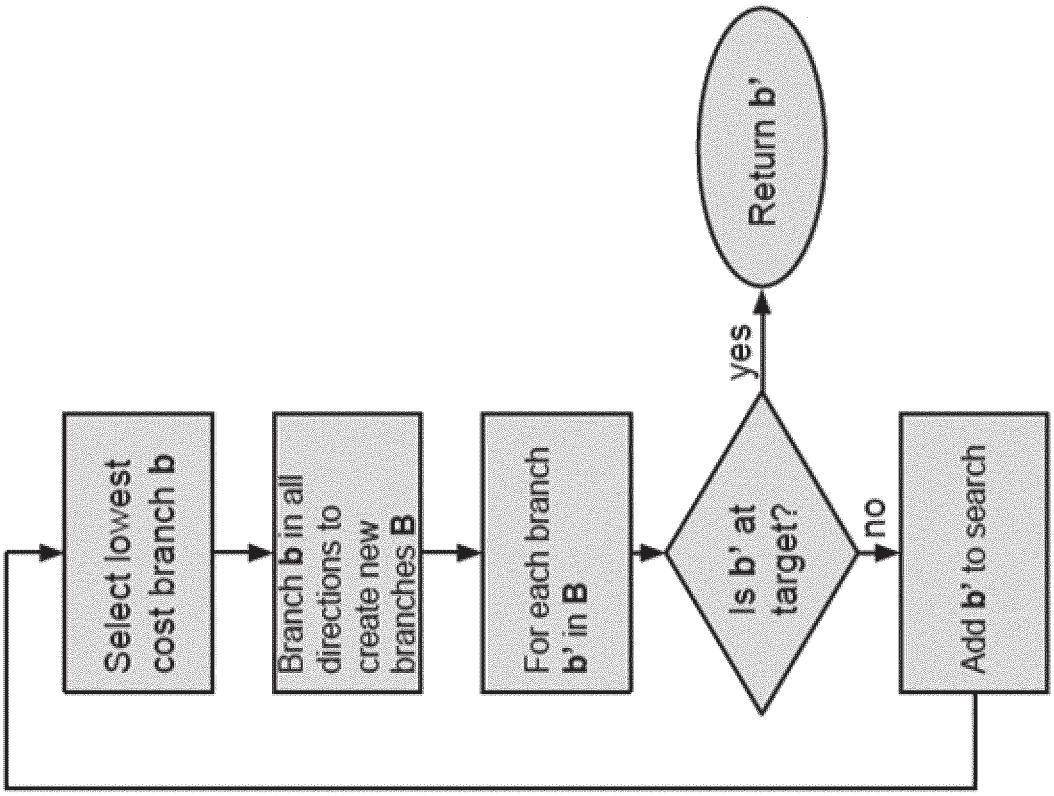

Select lowest cost branch b
Branch b in all directions to create new branches B
For each branch b' in B
Is b' at target?
yes
Return b'
no
Add b' to search

FIG. 4

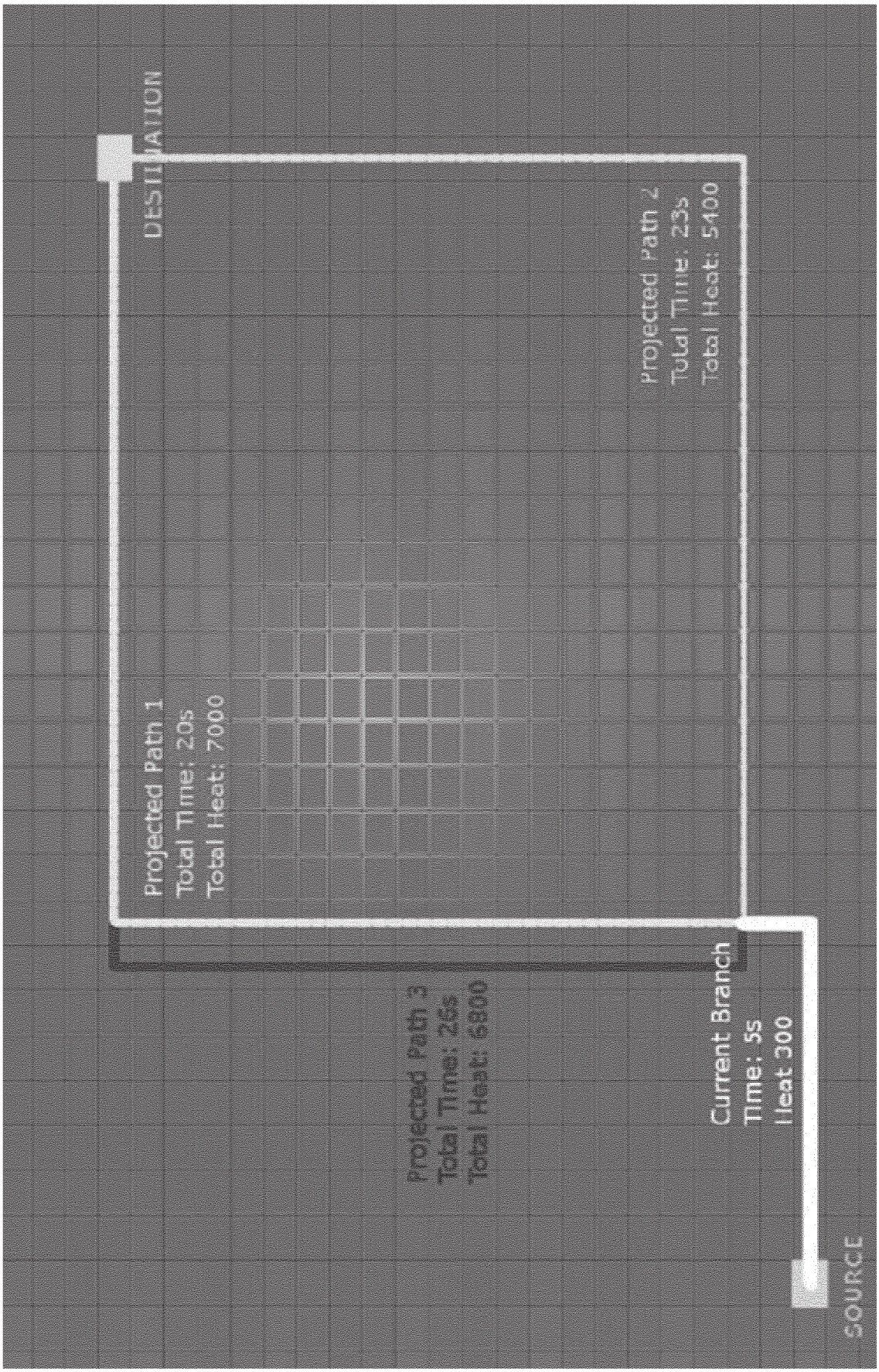

DESTINATION
Projected Path 1
Total Time: 20s
Total Heat: 7000
Projected Path 2
Total Time: 23s
Total Heat: 5400
Projected Path 3
Total Time: 26s
Total Heat: 6800
Current Branch
Time: 5s
Heat 300
SOURCE

FIG. 5

			Path 1	Path 2	Path 3
		Total Time	20	23	26
		Total Heat	7000	5400	6800
	Coefficients		Total Path Costs		
x	C_t (= 2^x)	C_h (= 2^{-x})	Path 1	Path 2	Path 3
1	2	0.5	3540	2746	3452
2	4	0.25	1830	1442	1804
3	8	0.125	1035	859	1058
4	16	0.0625	757.5	705.5	841
5	32	0.03125	858.75	904.75	1044.5
6	64	0.015625	1389.375	1556.375	1770.25
7	128	0.007813	2614.688	2986.188	3381.125
8	256	0.003906	5147.344	5909.094	6682.563
9	512	0.001953	10253.67	11786.55	13325.28
10	1024	0.000977	20486.84	23557.27	26630.64

FIG. 6a

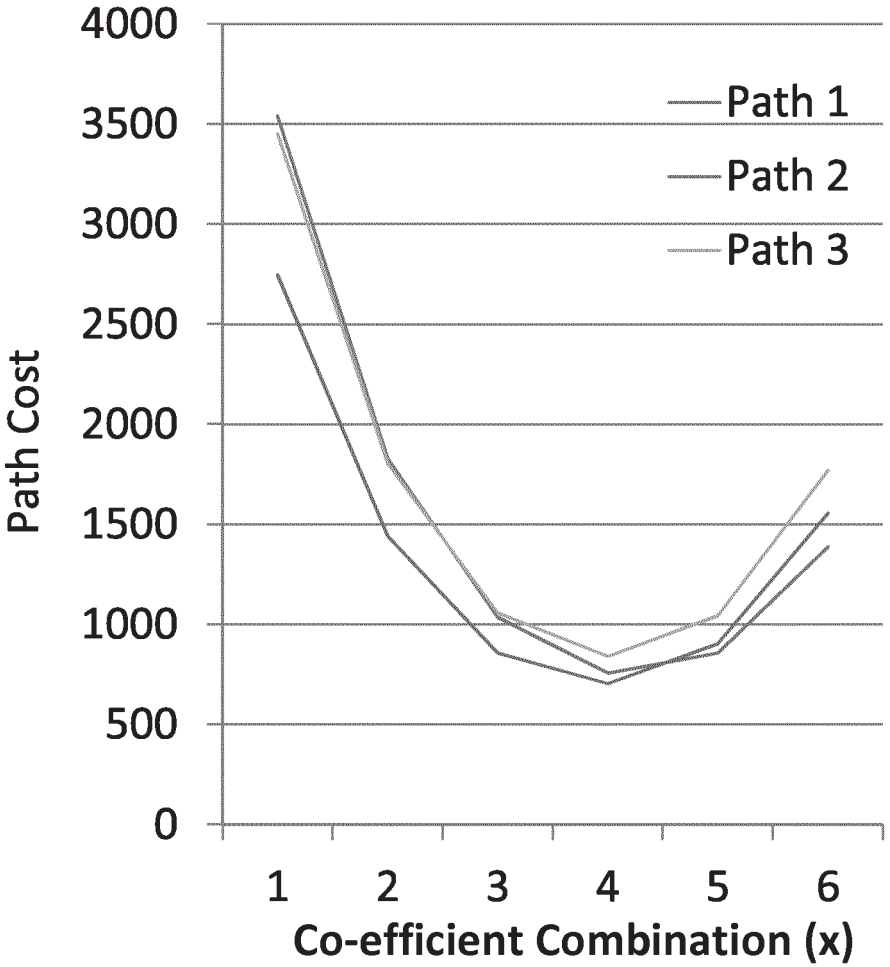


FIG. 6b

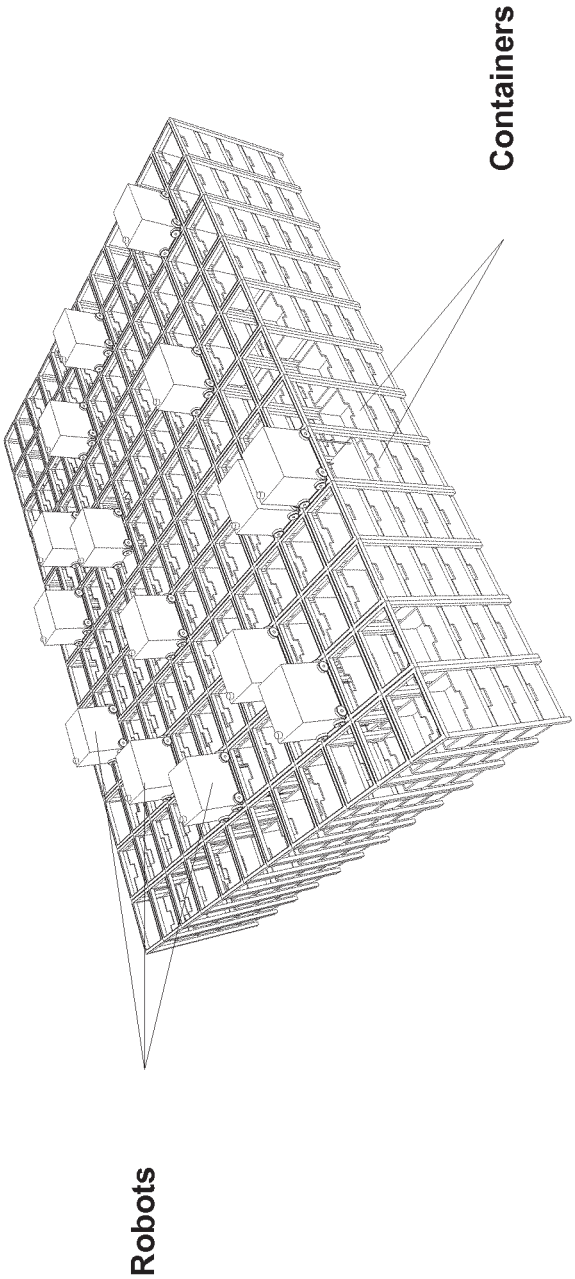


FIG. 7

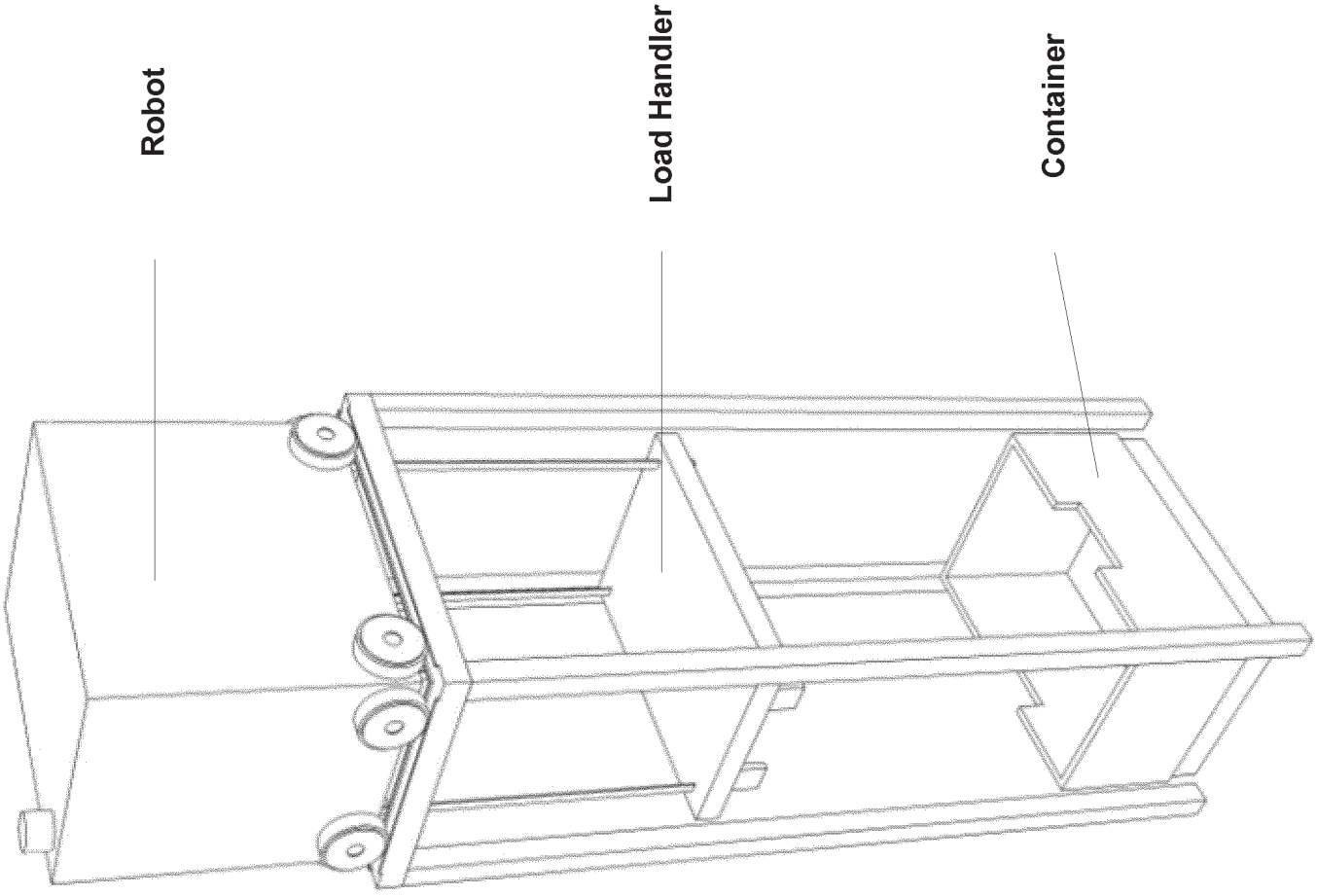


FIG. 8