FIG. 1

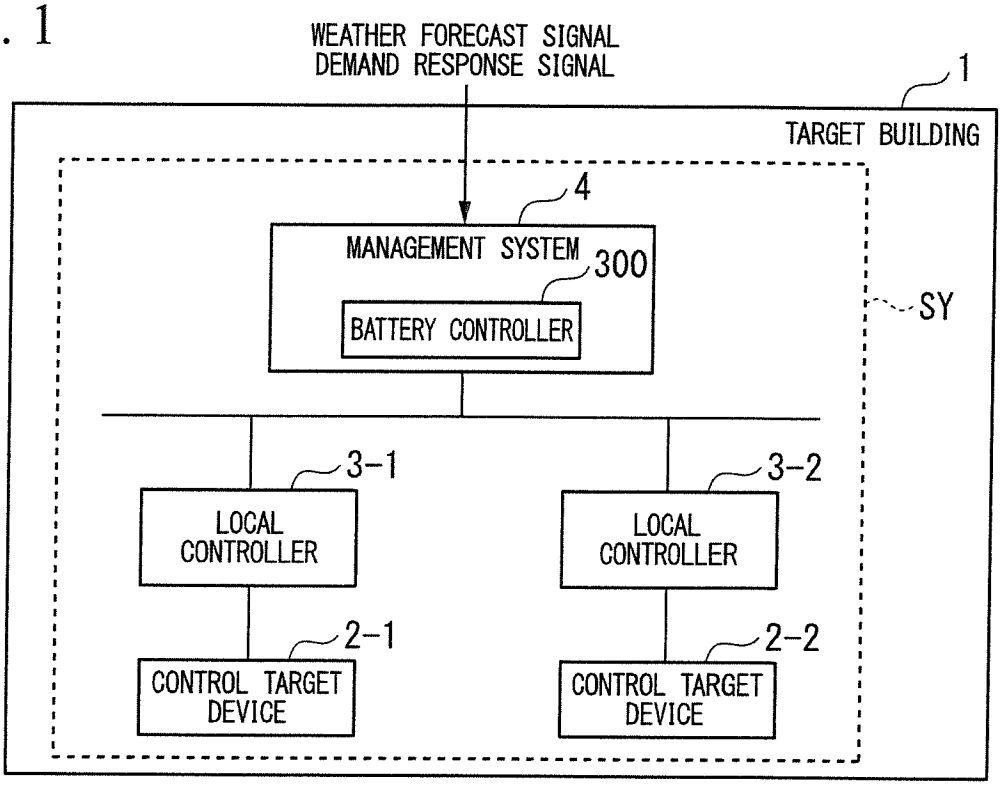

WEATHER FORECAST SIGNAL
DEMAND RESPONSE SIGNAL
1
TARGET BUILDING
4
MANAGEMENT SYSTEM
300
BATTERY CONTROLLER
SY
3-1
LOCAL CONTROLLER
3-2
LOCAL CONTROLLER
2-1
CONTROL TARGET DEVICE
2-2
CONTROL TARGET DEVICE

FIG. 2

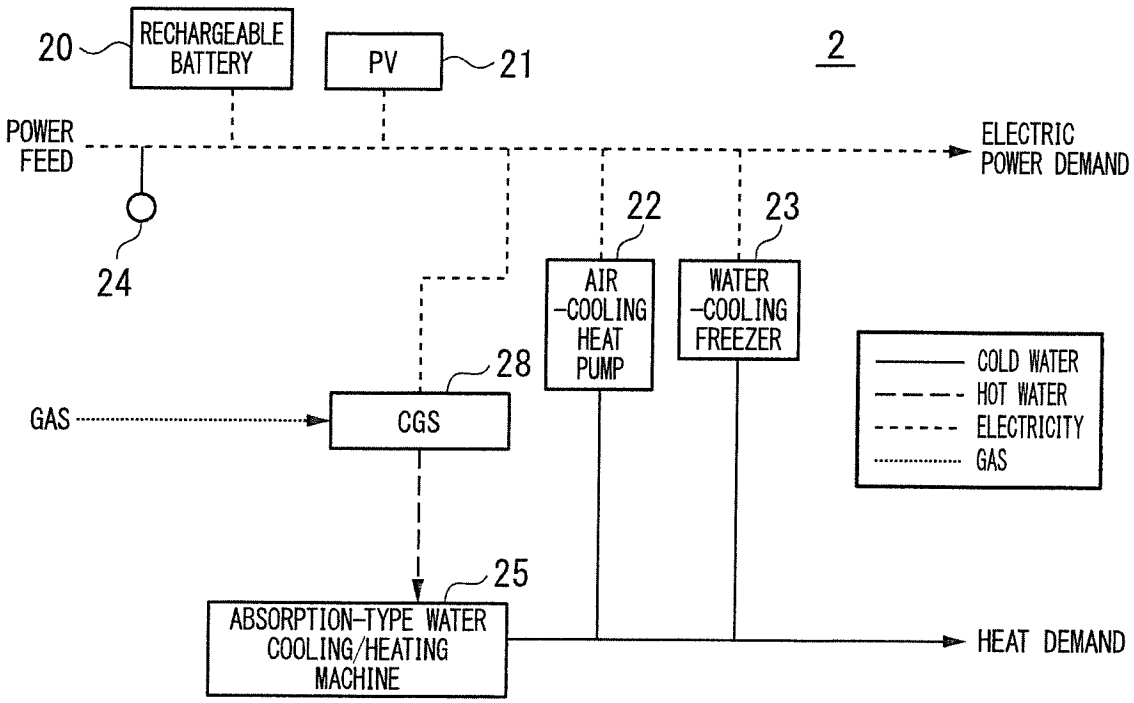

20
RECHARGEABLE BATTERY
PV
21
2
POWER FEED
ELECTRIC POWER DEMAND
24
22
23
AIR -COOLING HEAT PUMP
WATER -COOLING FREEZER
28
GAS
CGS
COLD WATER
HOT WATER
ELECTRICITY
GAS
25
ABSORPTION-TYPE WATER COOLING/HEATING MACHINE
HEAT DEMAND

FIG. 3

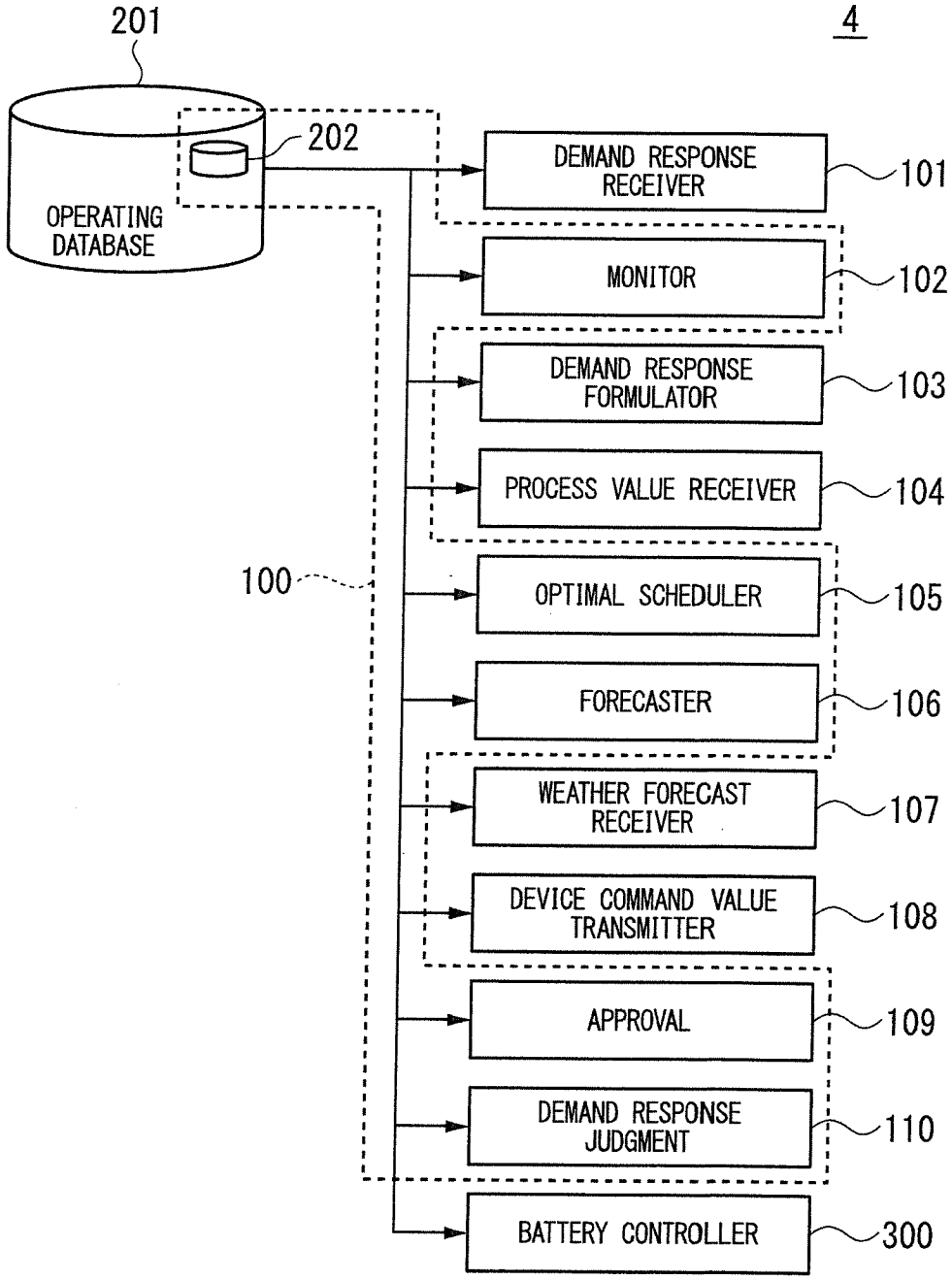

201
4
202
OPERATING DATABASE
DEMAND RESPONSE RECEIVER
101
MONITOR
102
DEMAND RESPONSE FORMULATOR
103
PROCESS VALUE RECEIVER
104
100
OPTIMAL SCHEDULER
105
FORECASTER
106
WEATHER FORECAST RECEIVER
107
DEVICE COMMAND VALUE TRANSMITTER
108
APPROVAL
109
DEMAND RESPONSE JUDGMENT
110
BATTERY CONTROLLER
300

FIG. 4

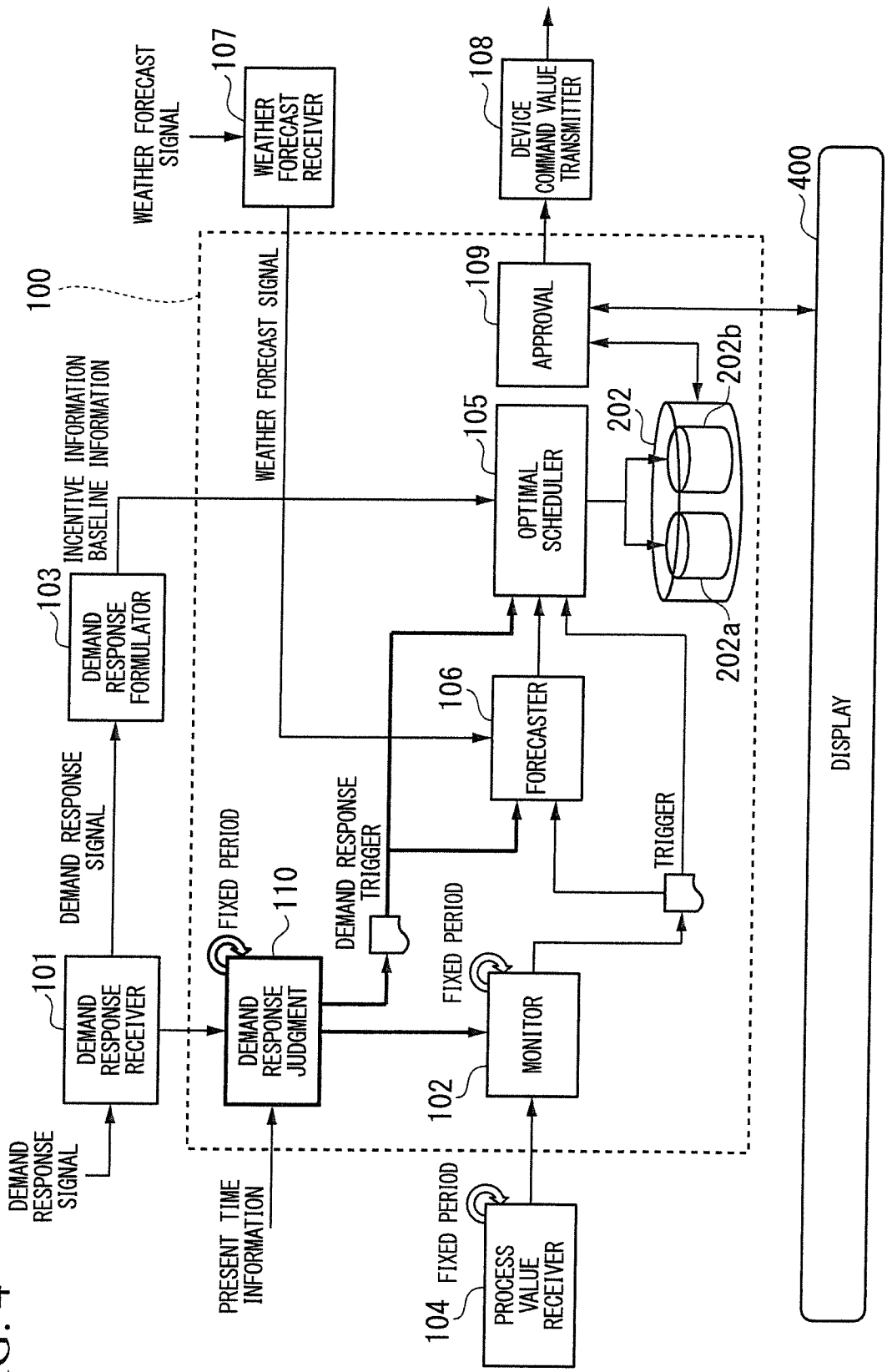

DEMAND RESPONSE SIGNAL
PRESENT TIME INFORMATION
100
101
DEMAND RESPONSE RECEIVER
DEMAND RESPONSE SIGNAL
103
DEMAND RESPONSE FORMULATOR
INCENTIVE INFORMATION BASELINE INFORMATION
WEATHER FORECAST SIGNAL
107
WEATHER FORECAST RECEIVER
WEATHER FORECAST SIGNAL
108
DEVICE COMMAND VALUE TRANSMITTER
109
APPROVAL
105
OPTIMAL SCHEDULER
202
202b
202a
106
FORECASTER
110
DEMAND RESPONSE JUDGMENT
FIXED PERIOD
DEMAND RESPONSE TRIGGER
TRIGGER
FIXED PERIOD
102
MONITOR
104
FIXED PERIOD
PROCESS VALUE RECEIVER
400
DISPLAY

FIG. 5

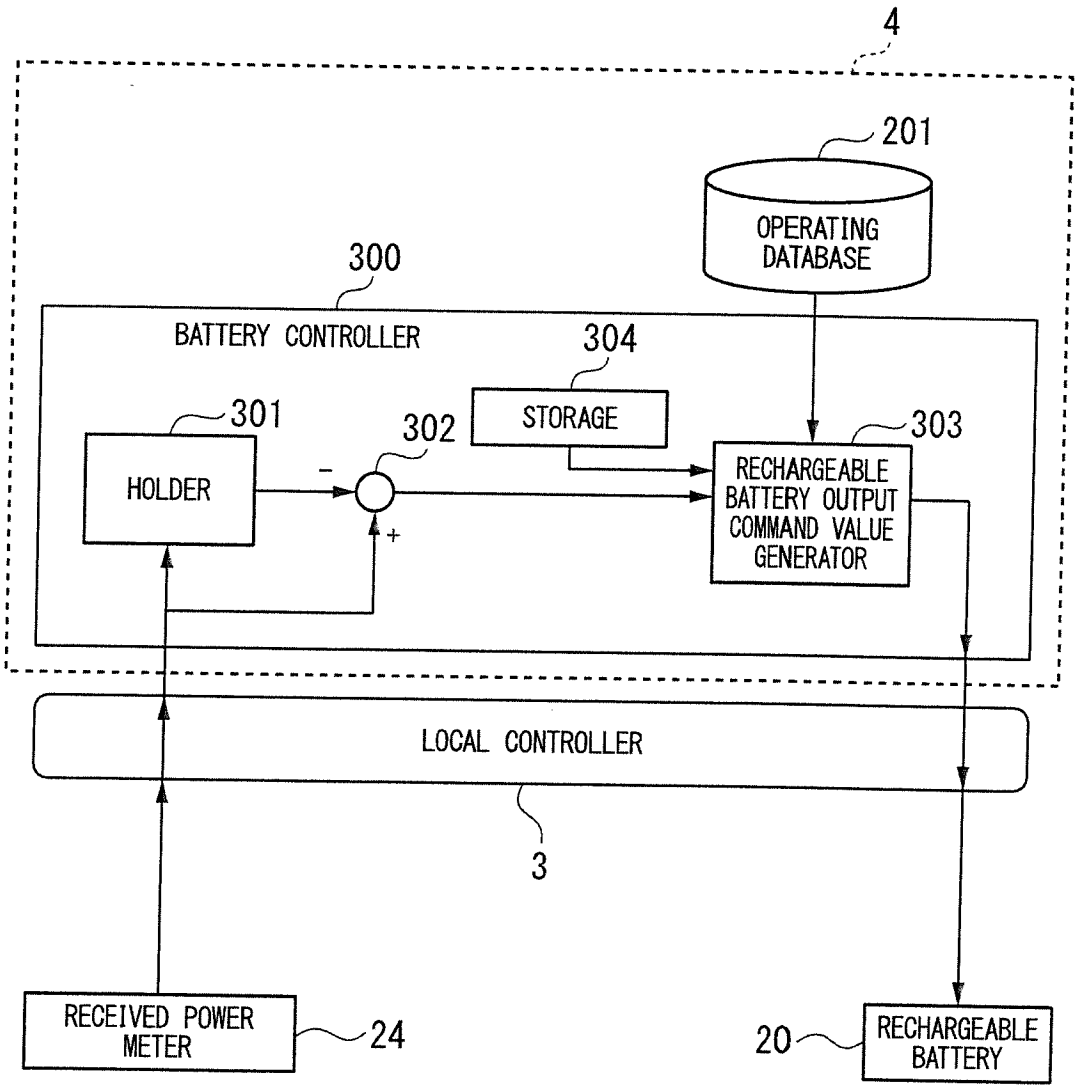

4
201
OPERATING DATABASE
300
BATTERY CONTROLLER
304
STORAGE
301
HOLDER
302
303
RECHARGEABLE BATTERY OUTPUT COMMAND VALUE GENERATOR
LOCAL CONTROLLER
3
RECEIVED POWER METER
24
20
RECHARGEABLE BATTERY

FIG. 6

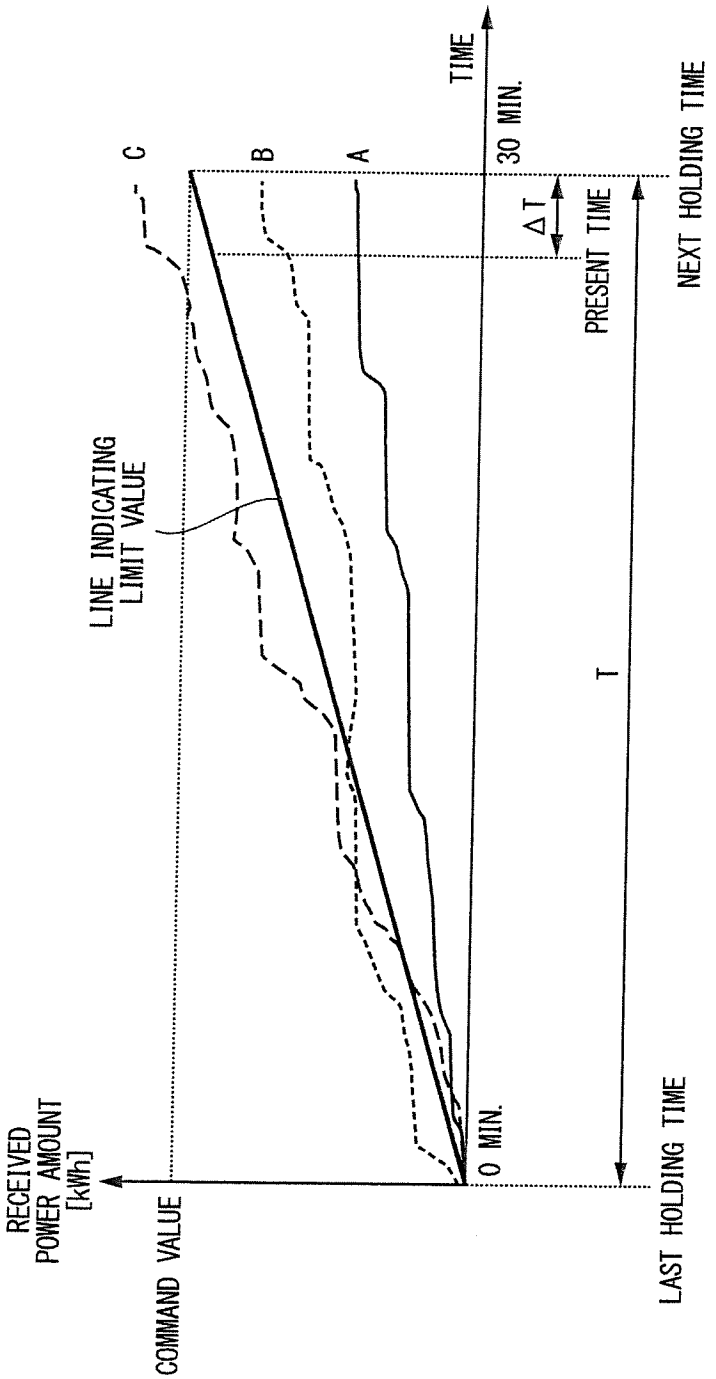

RECEIVED POWER AMOUNT [kWh]
COMMAND VALUE
LINE INDICATING LIMIT VALUE
C
B
A
TIME
0 MIN.
30 MIN.
ΔT
PRESENT TIME
T
LAST HOLDING TIME
NEXT HOLDING TIME

FIG. 7

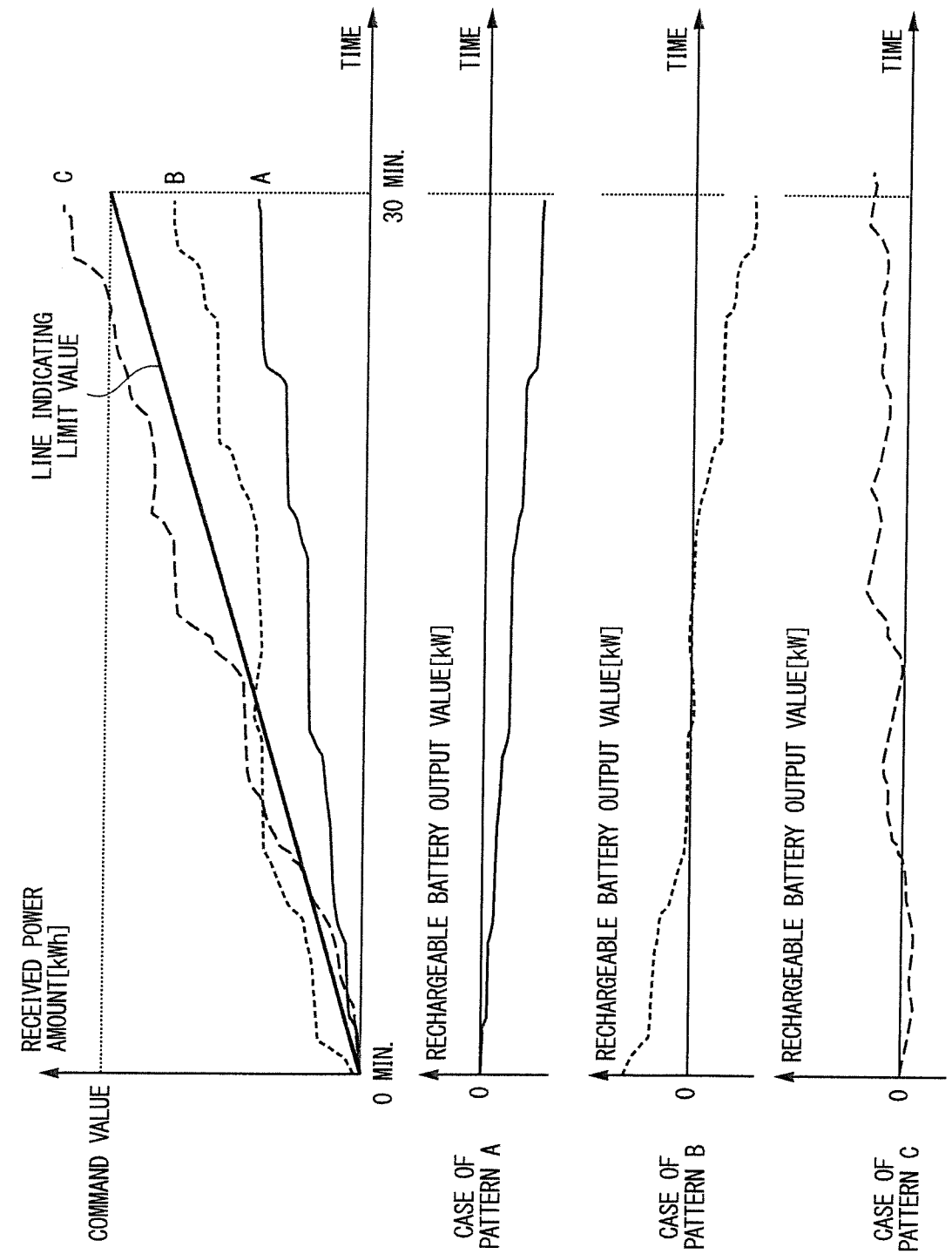

RECEIVED POWER AMOUNT[kWh]
COMMAND VALUE
LINE INDICATING LIMIT VALUE
C
B
A
TIME
0 MIN.
30 MIN.
RECHARGEABLE BATTERY OUTPUT VALUE[kW]
0
CASE OF PATTERN A
CASE OF PATTERN B
CASE OF PATTERN C

FIG. 8

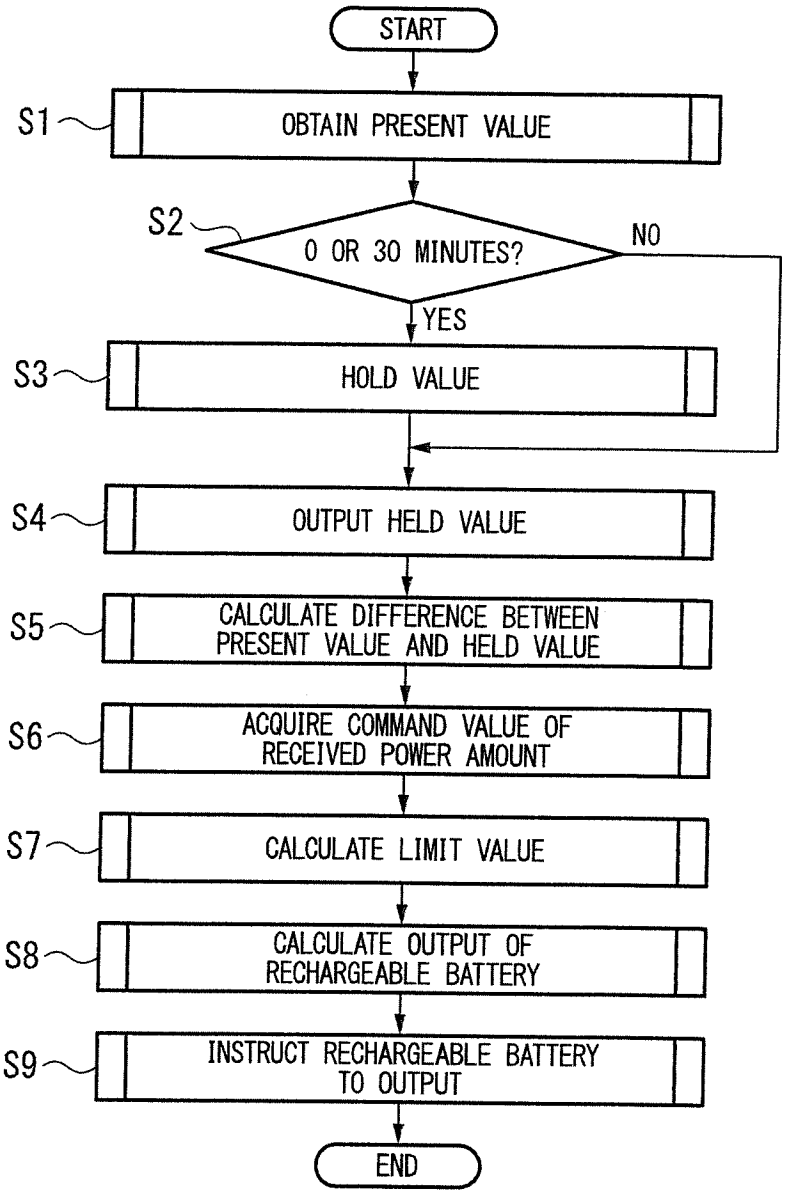

START
S1
OBTAIN PRESENT VALUE
S2
0 OR 30 MINUTES?
NO
YES
S3
HOLD VALUE
S4
OUTPUT HELD VALUE
S5
CALCULATE DIFFERENCE BETWEEN PRESENT VALUE AND HELD VALUE
S6
ACQUIRE COMMAND VALUE OF RECEIVED POWER AMOUNT
S7
CALCULATE LIMIT VALUE
S8
CALCULATE OUTPUT OF RECHARGEABLE BATTERY
S9
INSTRUCT RECHARGEABLE BATTERY TO OUTPUT
END

FIG. 9

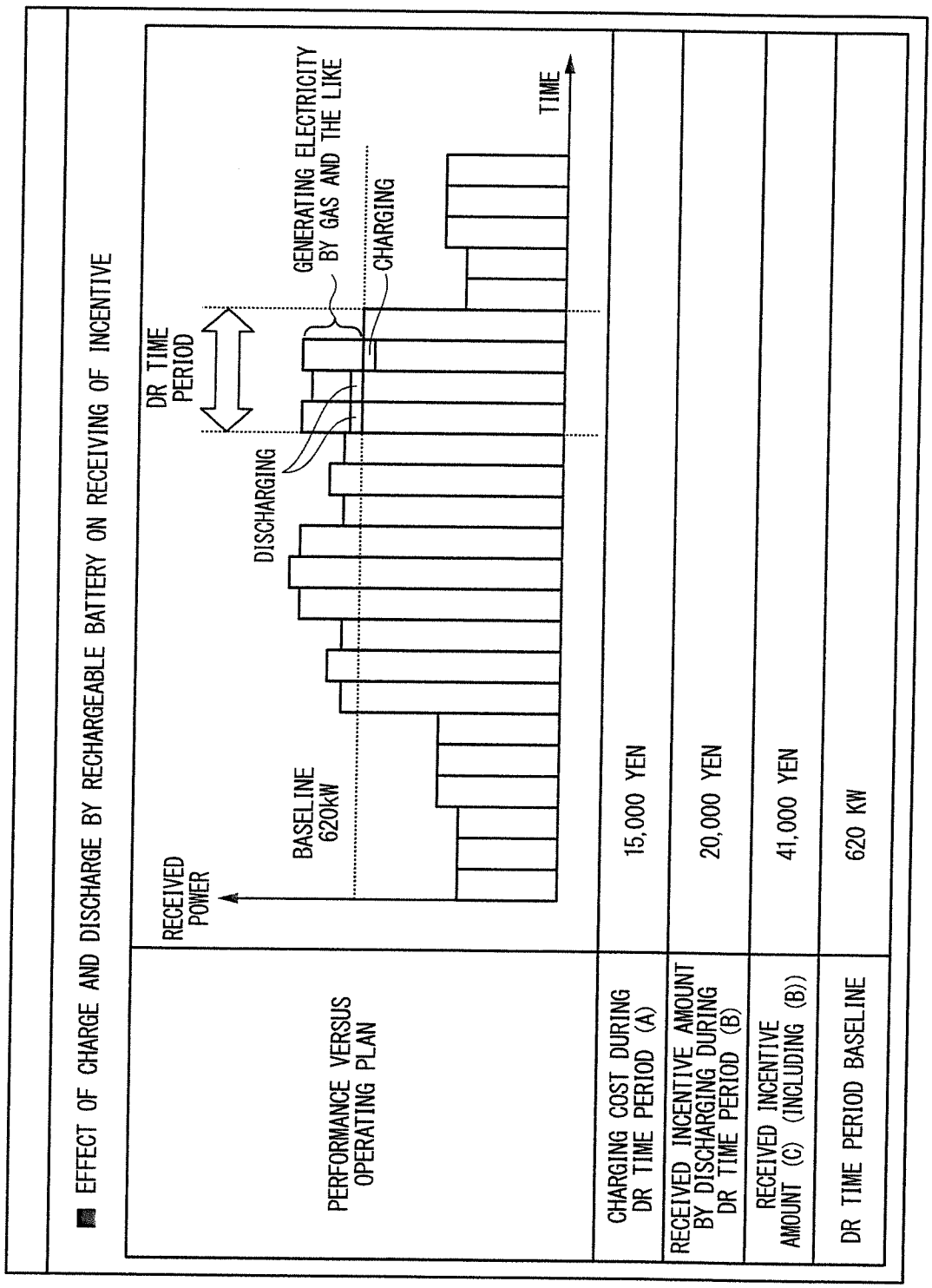

■ EFFECT OF CHARGE AND DISCHARGE BY RECHARGEABLE BATTERY ON RECEIVING OF INCENTIVE
PERFORMANCE VERSUS OPERATING PLAN
RECEIVED POWER
BASELINE 620kW
DISCHARGING
DR TIME PERIOD
GENERATING ELECTRICITY BY GAS AND THE LIKE
CHARGING
TIME
CHARGING COST DURING DR TIME PERIOD (A)
15,000 YEN
RECEIVED INCENTIVE AMOUNT BY DISCHARGING DURING DR TIME PERIOD (B)
20,000 YEN
RECEIVED INCENTIVE AMOUNT (C) (INCLUDING (B))
41,000 YEN
DR TIME PERIOD BASELINE
620 KW

FIG. 10

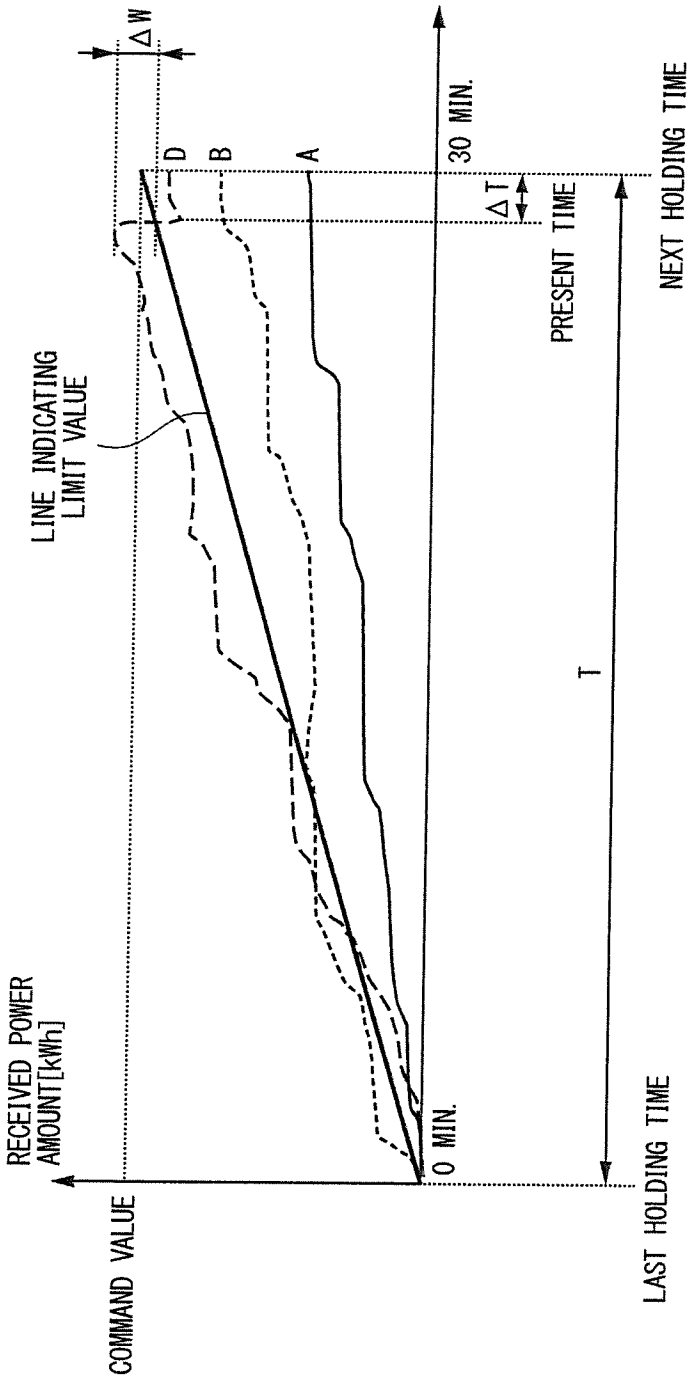

RECEIVED POWER AMOUNT[kWh]
COMMAND VALUE
LINE INDICATING LIMIT VALUE
ΔW
D
B
A
0 MIN.
30 MIN.
ΔT
PRESENT TIME
T
NEXT HOLDING TIME
LAST HOLDING TIME

FIG. 11

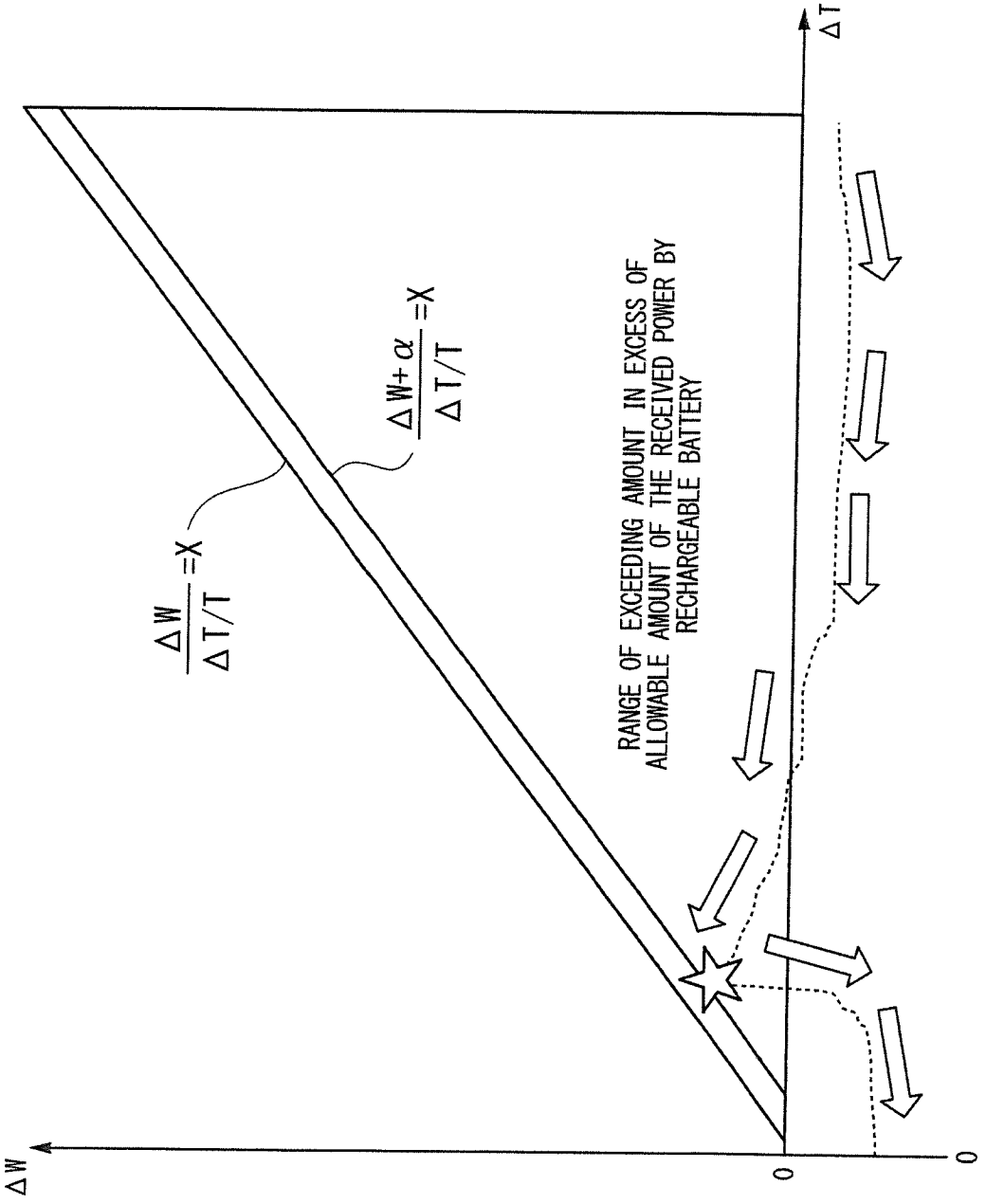

ΔW
ΔT
0
0
$\frac{\Delta W}{\Delta T/T}=X$
$\frac{\Delta W+\alpha}{\Delta T/T}=X$
RANGE OF EXCEEDING AMOUNT IN EXCESS OF ALLOWABLE AMOUNT OF THE RECEIVED POWER BY RECHARGEABLE BATTERY

FIG. 12

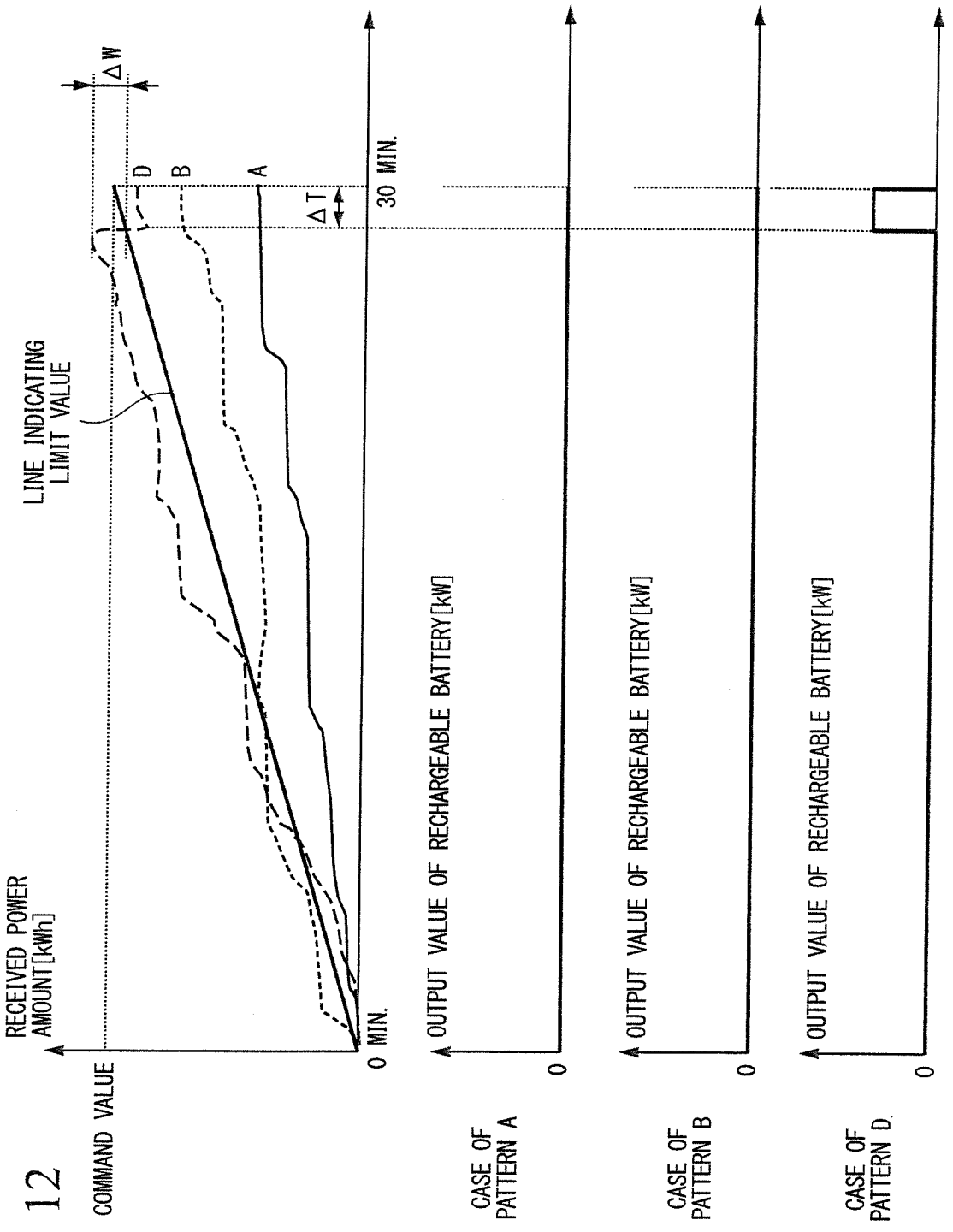

RECEIVED POWER AMOUNT[kWh]
COMMAND VALUE
LINE INDICATING LIMIT VALUE
ΔW
D
B
A
ΔT
30 MIN.
0 MIN.
OUTPUT VALUE OF RECHARGEABLE BATTERY[kW]
0
CASE OF PATTERN A
OUTPUT VALUE OF RECHARGEABLE BATTERY[kW]
0
CASE OF PATTERN B
OUTPUT VALUE OF RECHARGEABLE BATTERY[kW]
0
CASE OF PATTERN D

FIG. 13

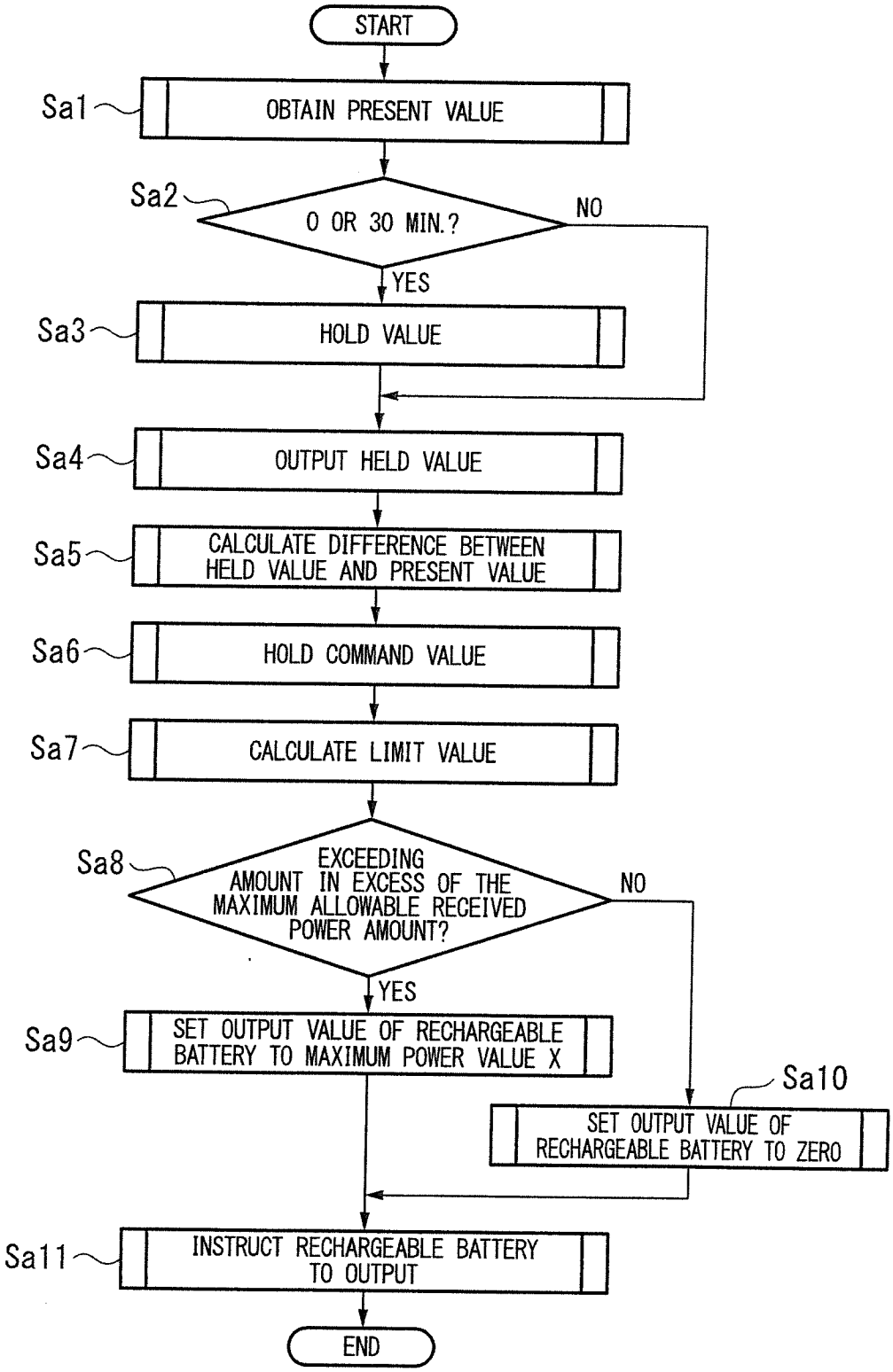

START
Sa1
OBTAIN PRESENT VALUE
Sa2
0 OR 30 MIN.?
NO
YES
Sa3
HOLD VALUE
Sa4
OUTPUT HELD VALUE
Sa5
CALCULATE DIFFERENCE BETWEEN HELD VALUE AND PRESENT VALUE
Sa6
HOLD COMMAND VALUE
Sa7
CALCULATE LIMIT VALUE
Sa8
EXCEEDING AMOUNT IN EXCESS OF THE MAXIMUM ALLOWABLE RECEIVED POWER AMOUNT?
NO
YES
Sa9
SET OUTPUT VALUE OF RECHARGEABLE BATTERY TO MAXIMUM POWER VALUE X
Sa10
SET OUTPUT VALUE OF RECHARGEABLE BATTERY TO ZERO
Sa11
INSTRUCT RECHARGEABLE BATTERY TO OUTPUT
END

FIG. 14

■ EFFECT OF CHARGE AND DISCHARGE BY RECHARGEABLE BATTERY ON RECEIVING OF INCENTIVE

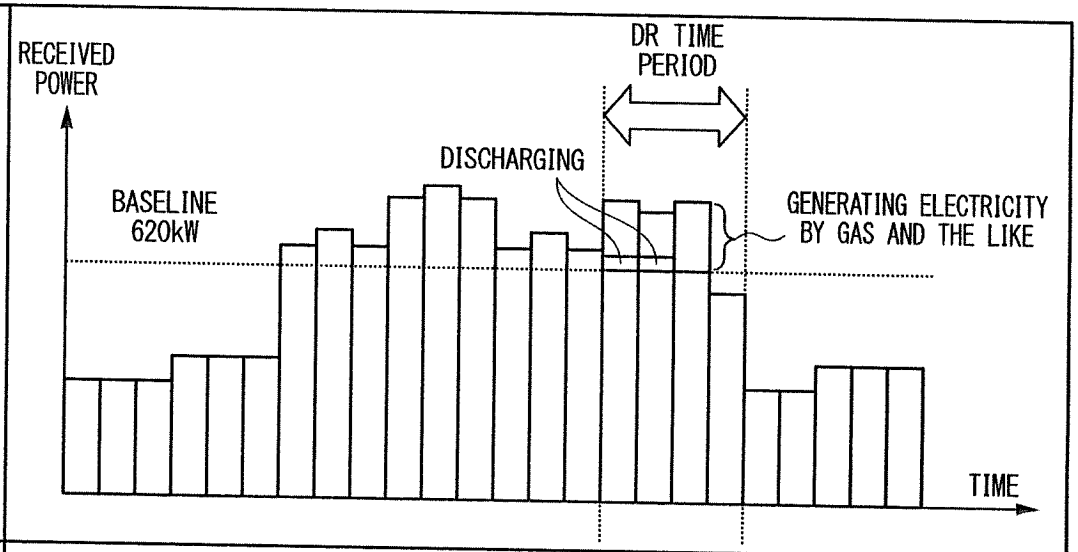
PERFORMANCE VERSUS OPERATING PLAN	
CHARGING COST DURING DR TIME PERIOD (A)	0 YEN
RECEIVED INCENTIVE AMOUNT BY DISCHARGING DURING DR TIME PERIOD (B)	20,000 YEN
RECEIVED INCENTIVE AMOUNT (C) (INCLUDING (B))	41,000 YEN
DR TIME PERIOD BASELINE	620kW

FIG. 15

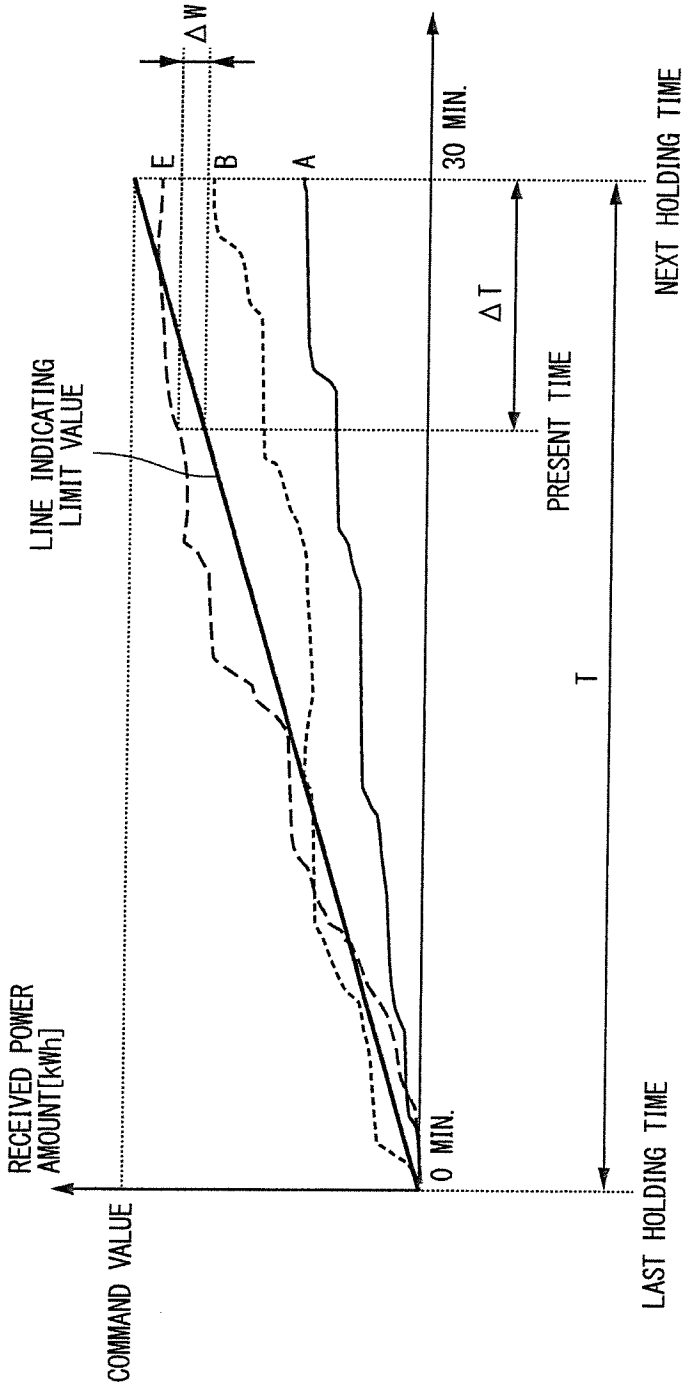
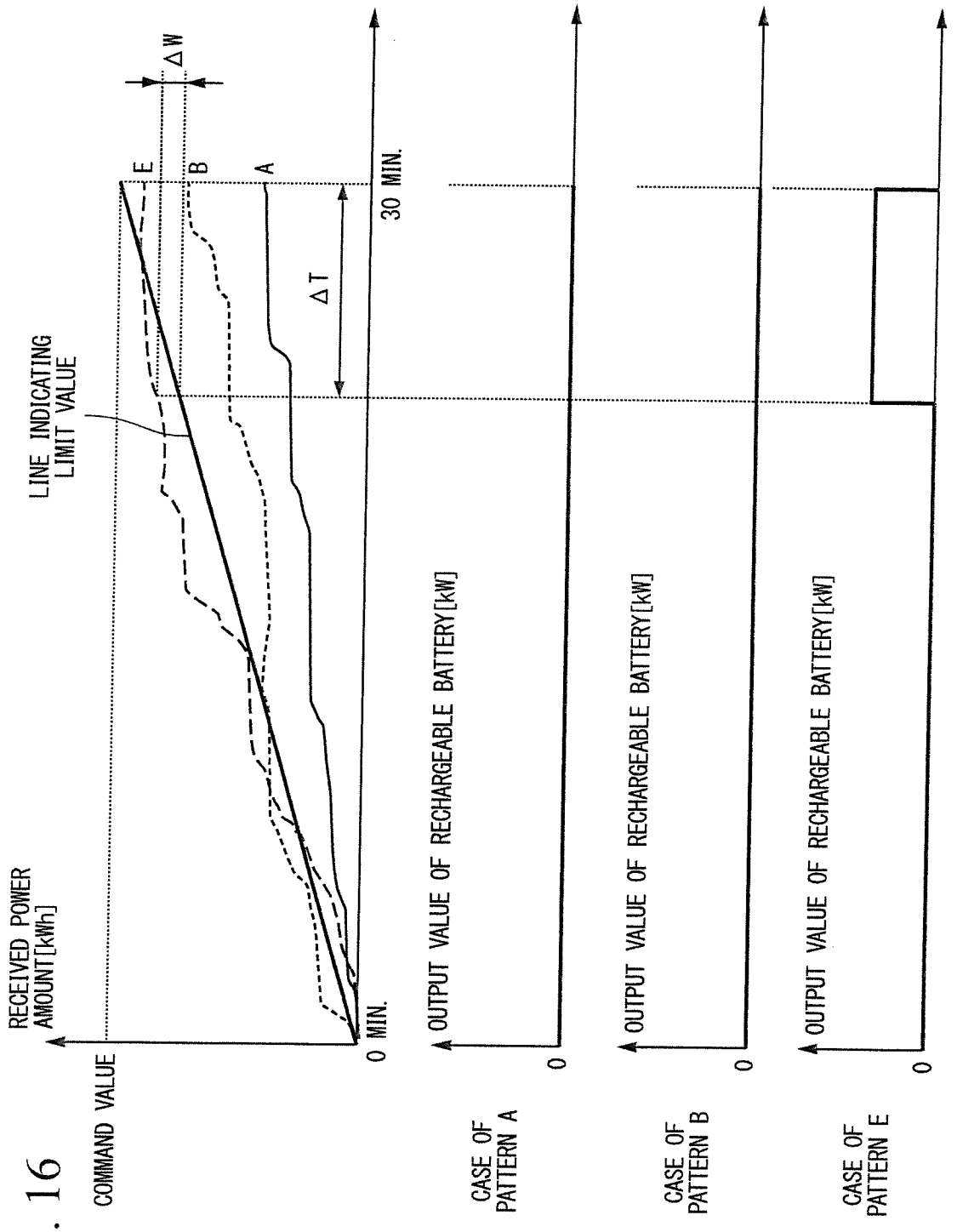

RECEIVED POWER AMOUNT[kWh]
COMMAND VALUE
LINE INDICATING LIMIT VALUE
ΔW
E
B
A
0 MIN.
30 MIN.
ΔT
PRESENT TIME
T
NEXT HOLDING TIME
LAST HOLDING TIME

FIG. 16


RECEIVED POWER AMOUNT[kWh]
COMMAND VALUE
LINE INDICATING LIMIT VALUE
ΔW
E
B
A
ΔT
0 MIN.
30 MIN.
OUTPUT VALUE OF RECHARGEABLE BATTERY[kW]
0
CASE OF PATTERN A
OUTPUT VALUE OF RECHARGEABLE BATTERY[kW]
0
CASE OF PATTERN B
OUTPUT VALUE OF RECHARGEABLE BATTERY[kW]
0
CASE OF PATTERN E