

FIG. 1

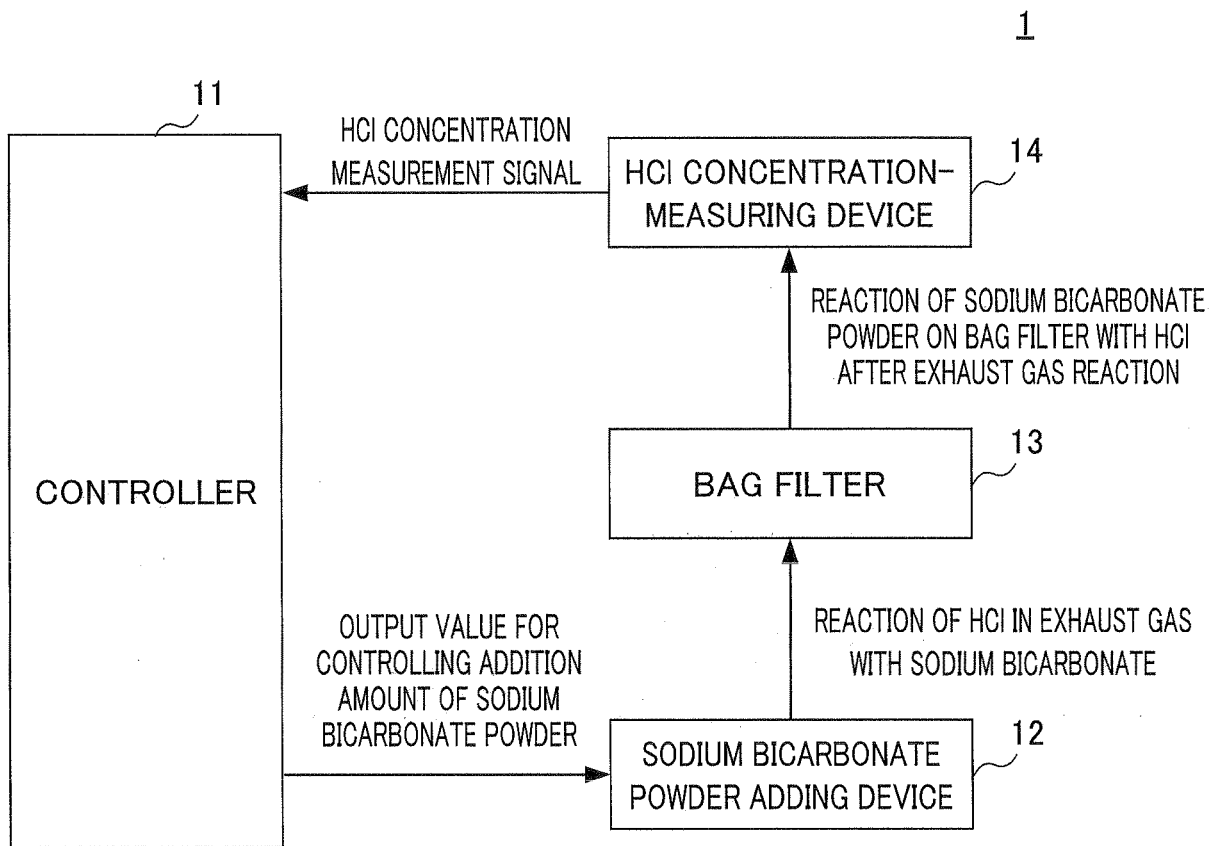


FIG. 2

SIMULATION REACTION SYSTEM 1 BASIC STRUCTURE CHART

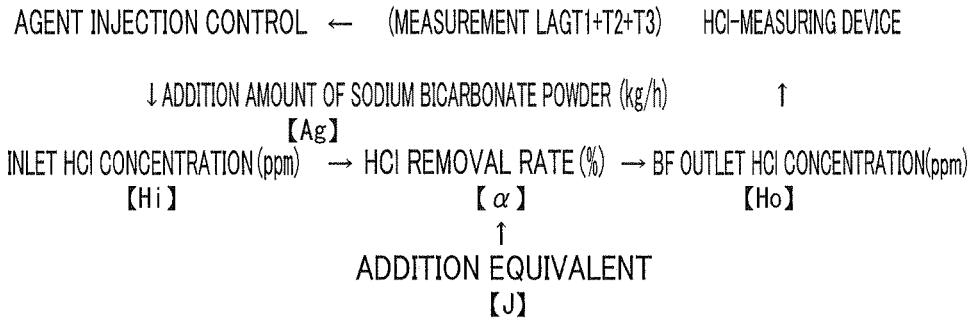


FIG. 3

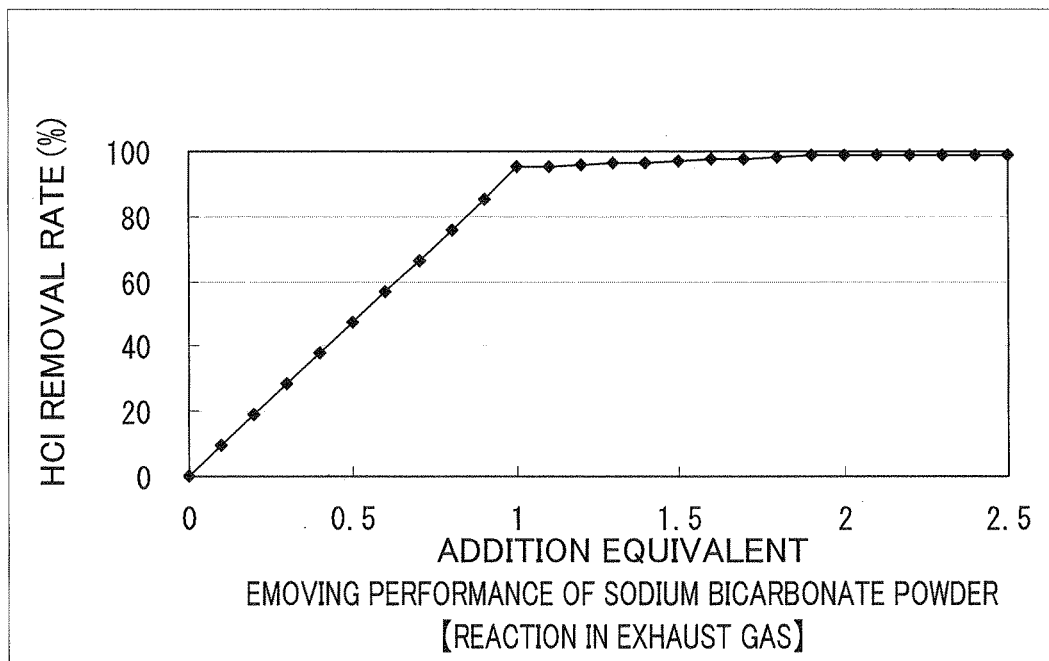


FIG. 4

HCl CONCENTRATION AT BAG FILTER OUTLET OF REAL MACHINE

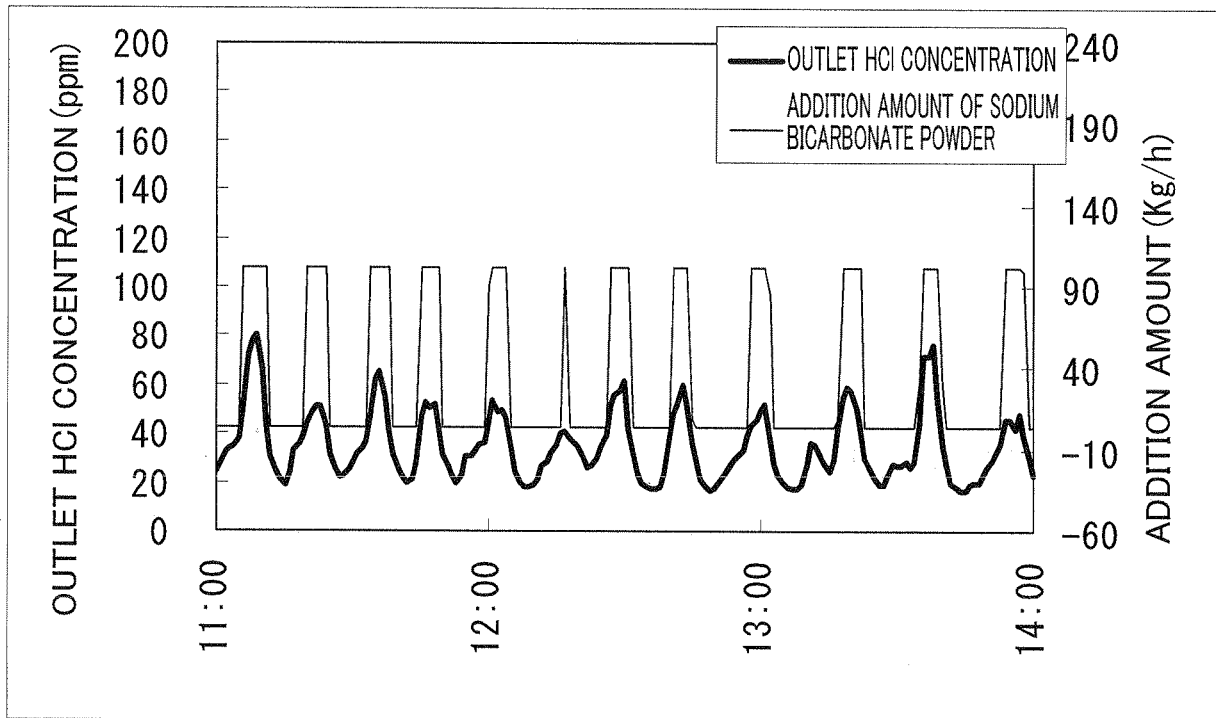


FIG. 5

SIMULATION REACTION SYSTEM 1 [REACTION IN EXHAUST GAS: INSTANT REACTION]

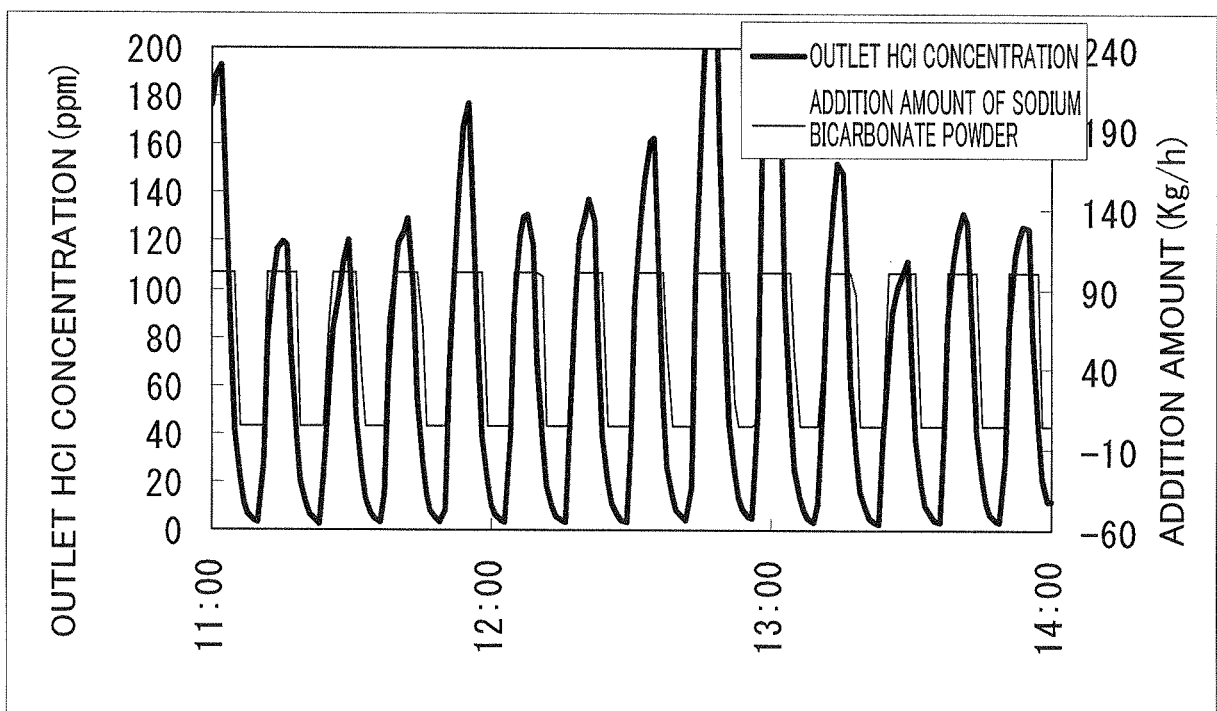


FIG. 6

SIMULATION REACTION SYSTEM2 BASIC STRUCTURE CHART

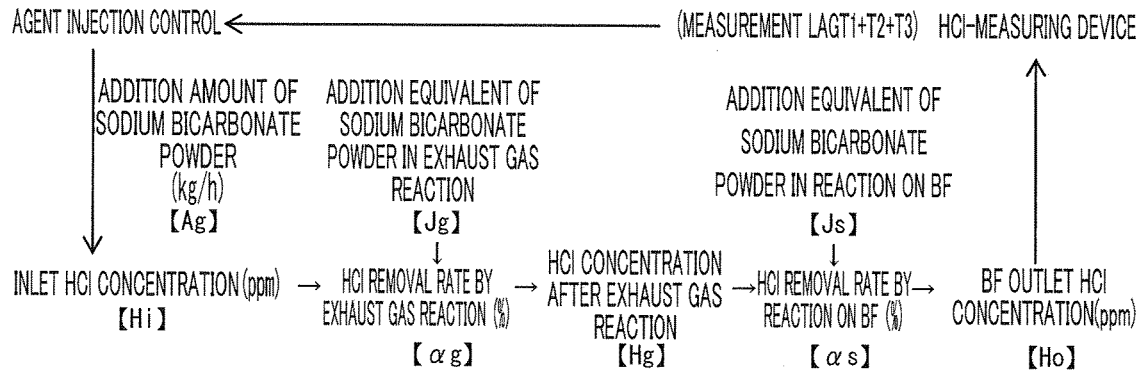


FIG. 7

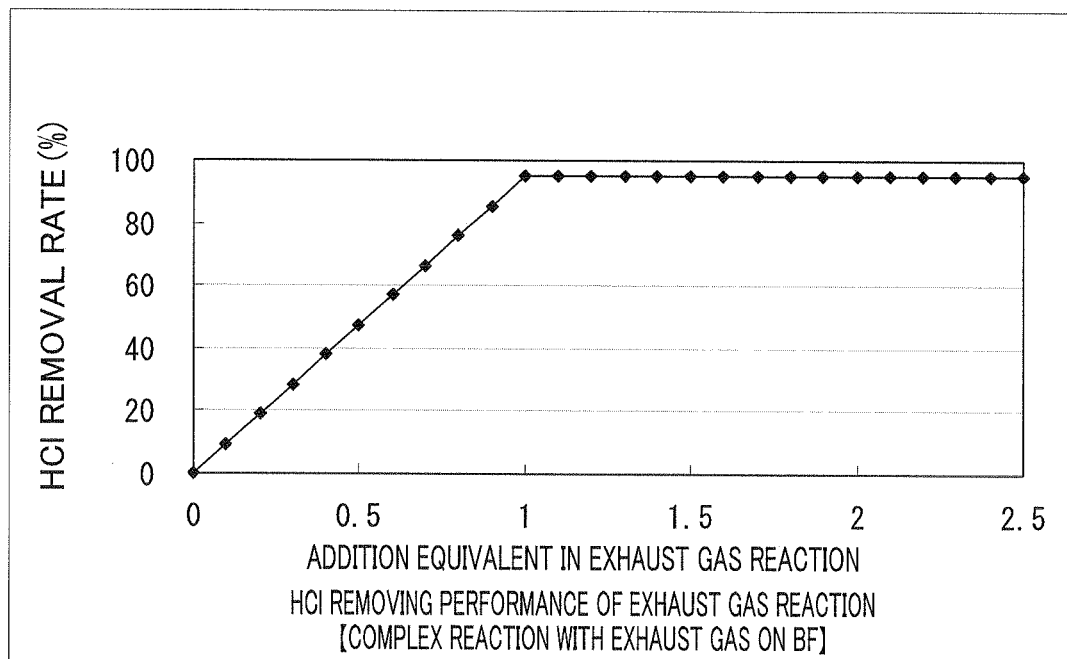


FIG. 8

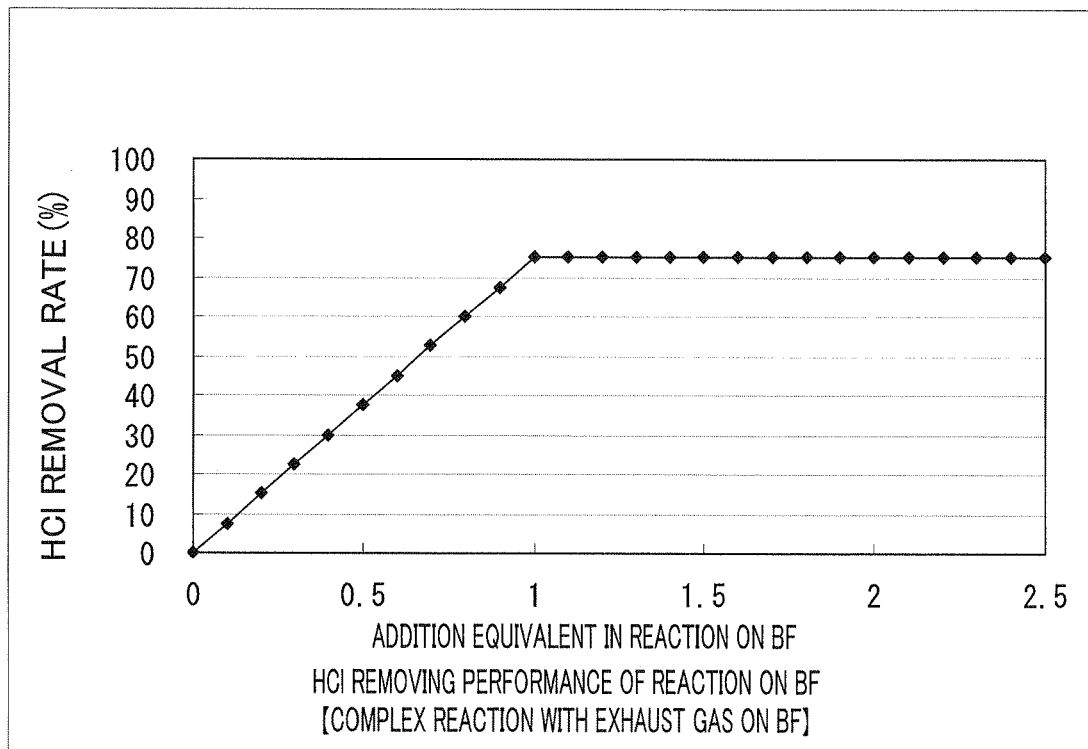


FIG. 9

SIMULATION REACTION SYSTEM2 [COMPLEX REACTION WITH EXHAUST GAS ON BAG FILTER]

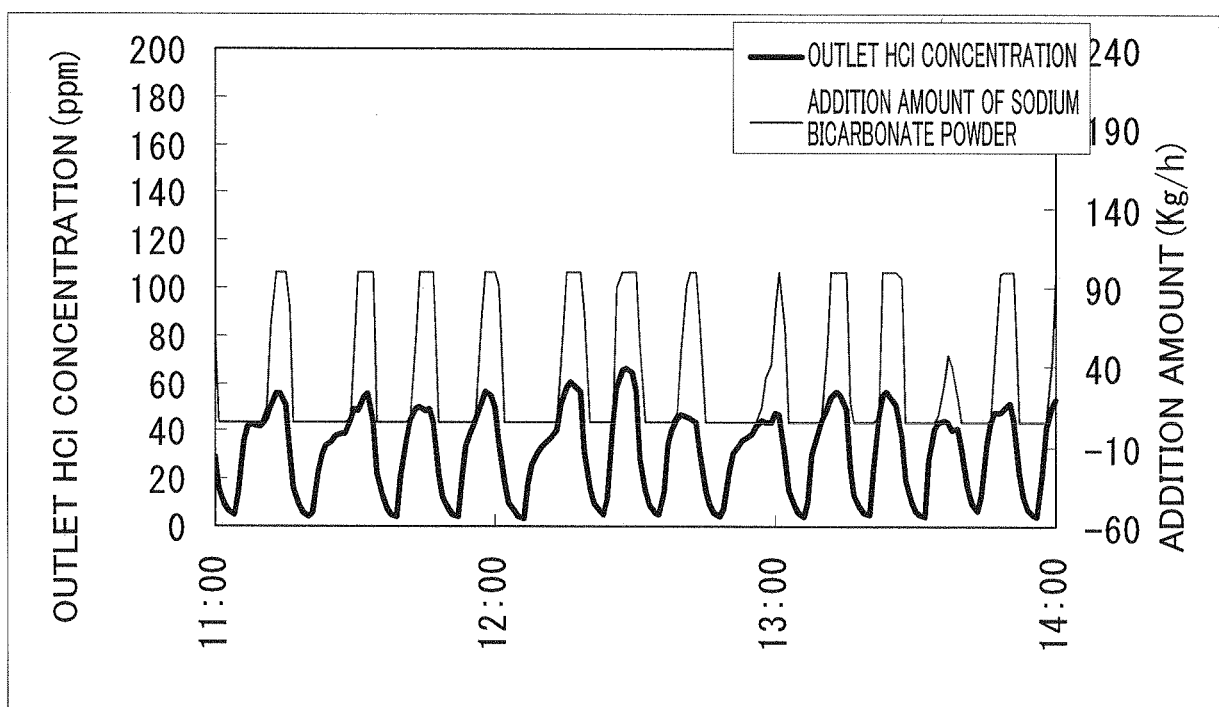


FIG. 10

	CONTROL SYSTEM	CONTROL SET-POINT VALUE AT HCL SLOPE > 0 (ppm)	CONTROL SET-POINT VALUE AT HCL SLOPE $\leq$ 0 (ppm)	AVERAGE TIME OF HCL SLOPE (MIN)	ADDITION AMOUNT OF SODIUM BICARBONATE POWDER kg/h	BF OUTLET HCL CONCENTRATION		
						AVERAGE	1-HOUR AVERAGE MAXIMUM	INSTANT MAXIMUM (PEAK)
						ppm	ppm	ppm
COMPARATIVE EXAMPLE 1	PID	40	40	0.1	35	33	38	100
EXAMPLE 1	PID	30	40	0.1	43	28	33	79
EXAMPLE 2	PID	30	50	0.1	40	29	35	94
COMPARATIVE EXAMPLE 2	STEP	40	40	0.1	24	38	57	264
EXAMPLE 3	STEP	30	40	0.1	30	30	35	98
EXAMPLE 4	STEP	30	50	0.1	28	32	37	96
EXAMPLE 5	STEP	30	50	1	29	33	37	101
EXAMPLE 6	STEP	30	50	5	28	32	38	99
EXAMPLE 7	STEP	30	50	7	27	32	38	101
EXAMPLE 8	STEP	30	50	10	24	35	45	221

FIG. 11

INLET HCl CONCENTRATION (ppm)

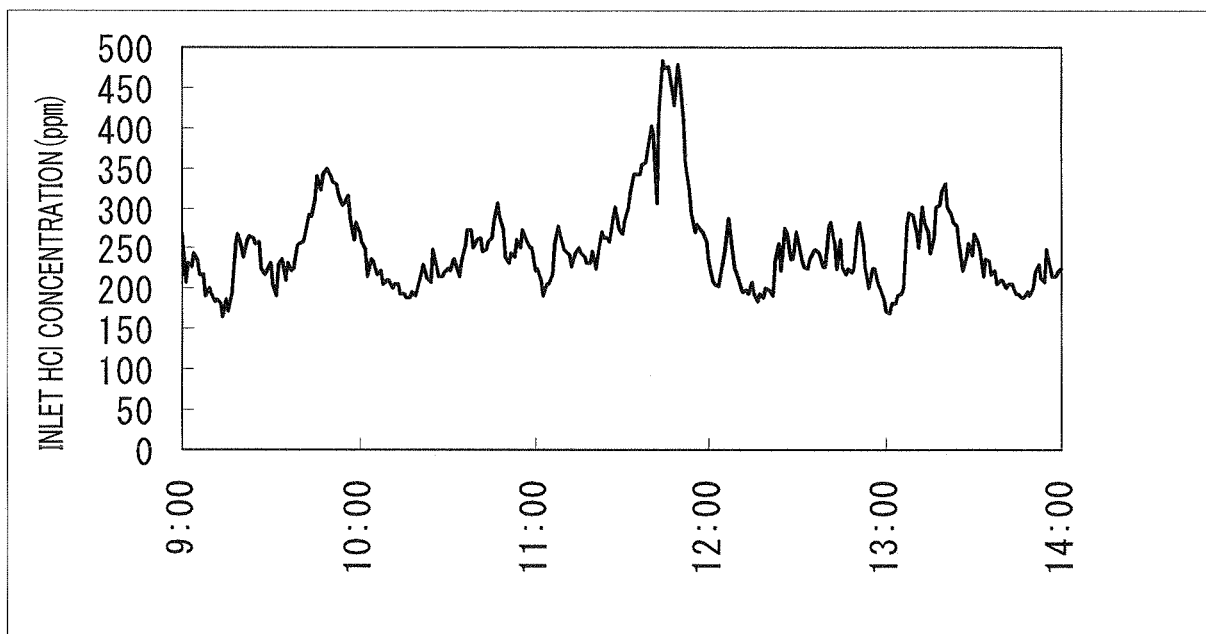


FIG. 12

COMPARATIVE EXAMPLE 1

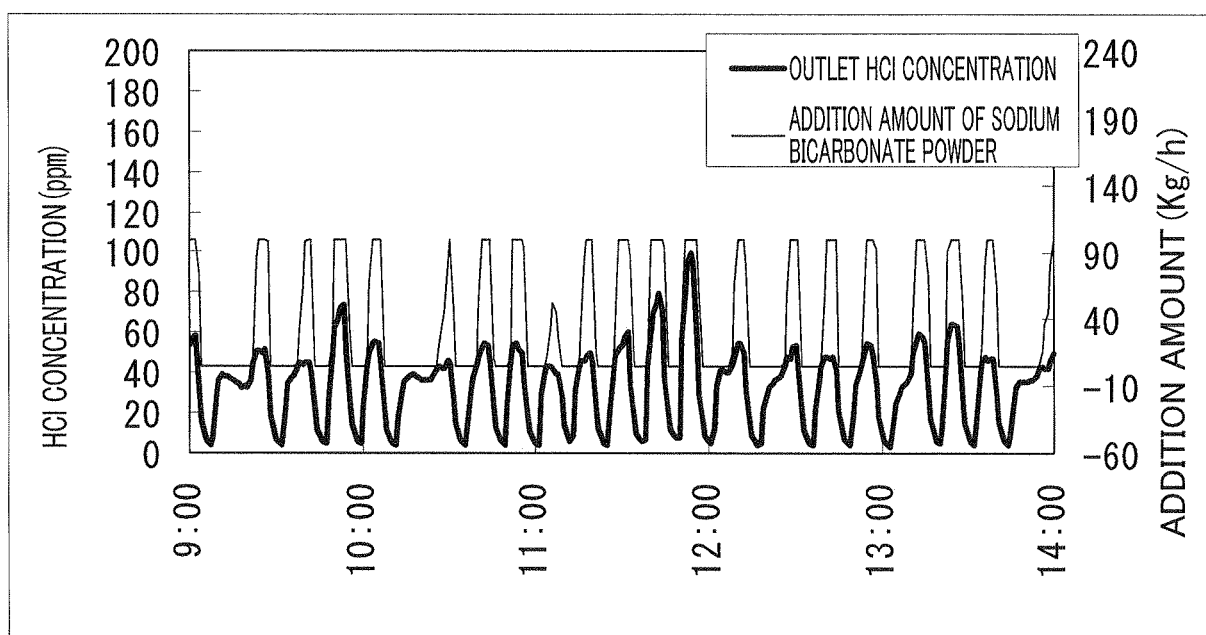


FIG. 13

EXAMPLE 1

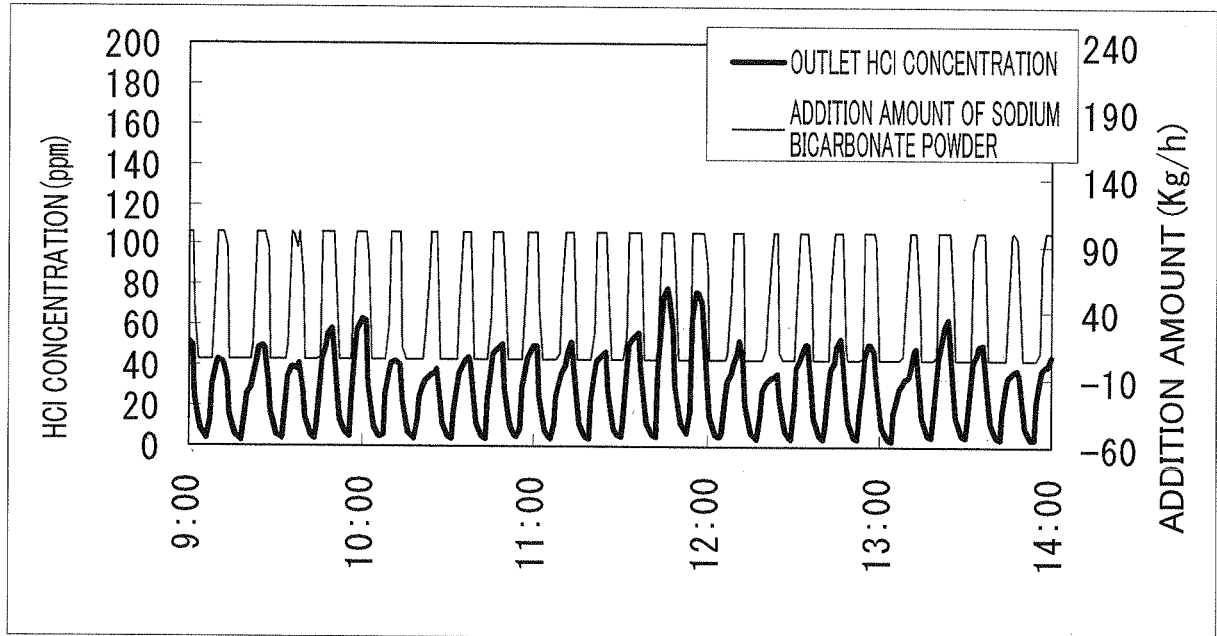


FIG. 14

EXAMPLE 2

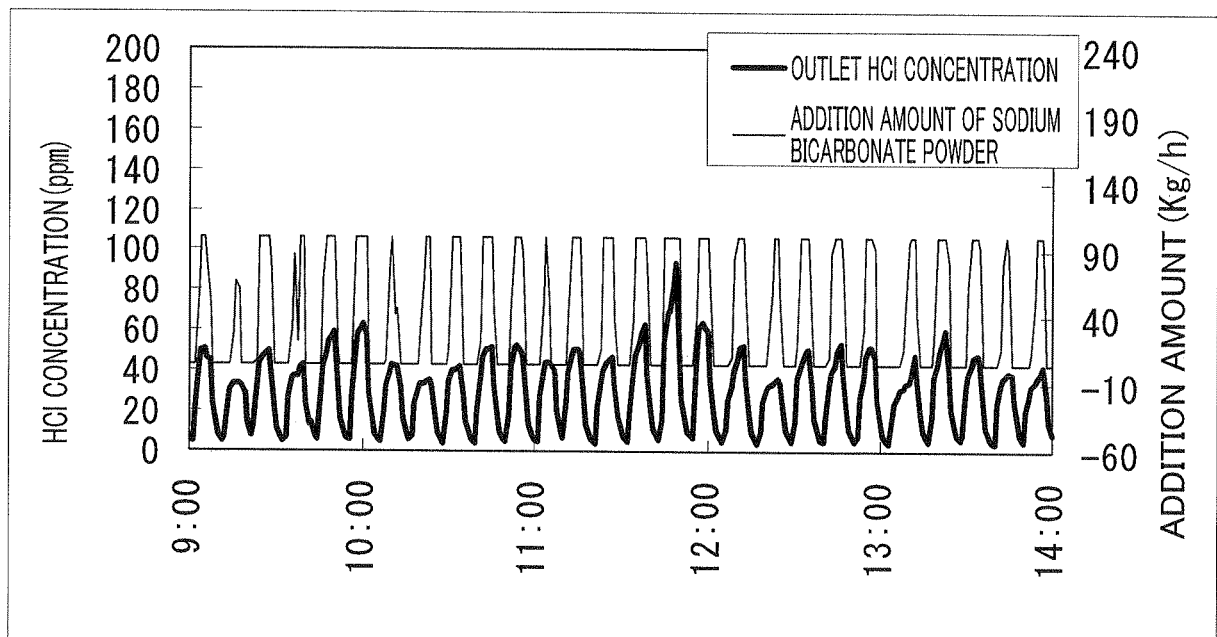


FIG. 15

SETTING IN COMPARATIVE EXAMPLE 2

	SETTING	SETTING AT HCl SLOPE > 0	SETTING AT HCl SLOPE ≤ 0
SV CONTROL SET-POINT VALUE [CONCENTRATION FOR STARTING CONTROL OUTPUT (ABOVE OUTPUT LOWER LIMIT)]	40	40	40
SM1 OUTPUT RESTRICTION1 CORRESPONDING CONCENTRATION	50	50	50
SM2 OUTPUT UPPER LIMIT CORRESPONDING CONCENTRATION	60	60	60
SVΔ1 [CORRECTION IN THE HCl INCREASING PERIOD SV=SV-SVA1]	0	-	-
SVB1 [CORRECTION IN THE HCl DECREASING PERIOD SV=SV+SVB1]	0	-	-
LO [CONTROL OUTPUT LOWER LIMIT]	5	5	5
LM1 [OUTPUT RESTRICTION1] [SV~SM1]	50	50	50
LM2 [OUTPUT RESTRICTION2] [SM1~SM2]	70	70	70
LH [CONTROL OUTPUT UPPER LIMIT] [>SM2]	100	100	100
	BF OUTLET HCl CONCENTRATION [CALCULATION INPUT VALUE]	TABLE OF CONTROL OUTPUT FOR INPUT HCl VALUE AT HCl SLOPE > 0	TABLE OF CONTROL OUTPUT FOR INPUT HCl VALUE AT HCl SLOPE ≤ 0
>SM2			CONTROL OUTPUT ADDITION AMOUNT (kg/h)
SM2 OUTPUT UPPER LIMIT CORRESPONDING CONCENTRATION	60.0	60.0	100.0
SM1~SM2			100.0
SM1 OUTPUT RESTRICTION1 CORRESPONDING CONCENTRATION	50.0	50.0	70.0
SV~SM1	48.5	48.5	50.0
STEPWISE OUTPUT DEPENDING ON ACIDIC GAS CONCENTRATION BETWEEN LO AND LM1	49.0	49.0	47.8
	48.5	48.5	45.5
	48.0	48.0	43.3
	47.5	47.5	41.0
	47.0	47.0	38.8
	46.5	46.5	36.5
	46.0	46.0	34.3
	45.5	45.5	32.0
	45.0	45.0	29.8
	44.5	44.5	27.5
	44.0	44.0	25.3
	43.5	43.5	23.0
	43.0	43.0	20.8
	42.5	42.5	18.5
	42.0	42.0	16.3
	41.5	41.5	14.0
	41.0	41.0	11.8
	40.5	40.5	9.5
	40.0	40.0	7.3
SV CONTROL SET-POINT VALUE [CONCENTRATION FOR STARTING CONTROL OUTPUT (ABOVE OUTPUT LOWER LIMIT)]	40.0	40.0	5.0

FIG. 16

COMPARATIVE EXAMPLE 2

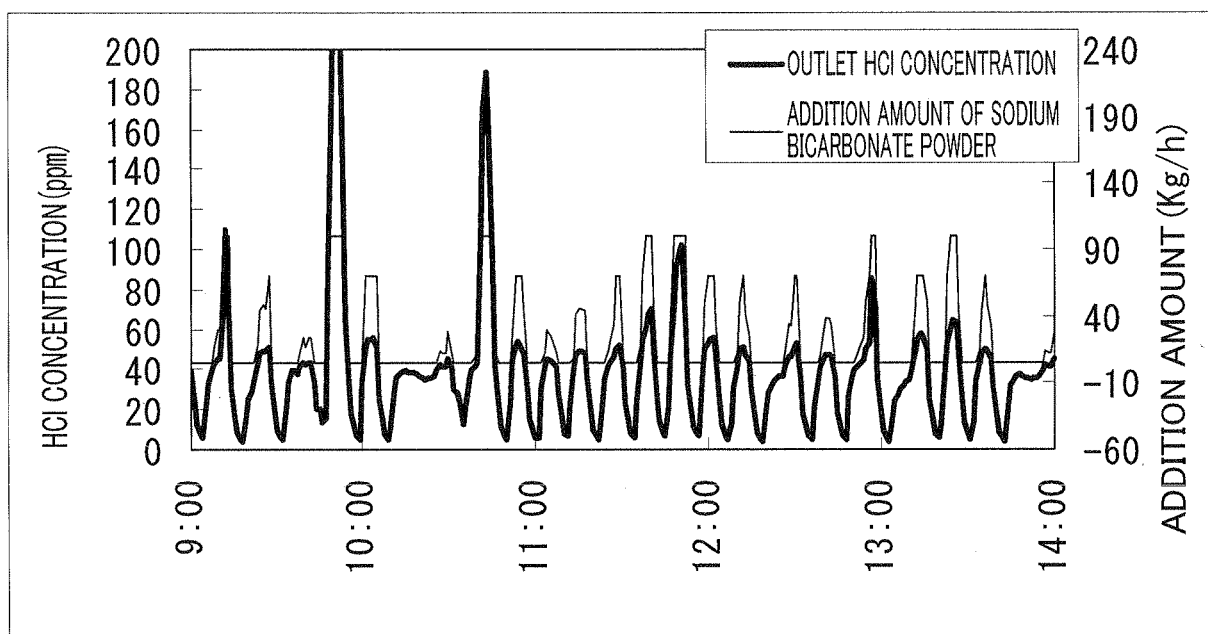


FIG. 17

SETTING IN COMPARATIVE EXAMPLE 3

		SETTING	SETTING AT HCl SLOPE > 0	SETTING AT HCl SLOPE ≤ 0
SV CONTROL SET-POINT VALUE [CONCENTRATION FOR STARTING CONTROL OUTPUT (ABOVE OUTPUT LOWER LIMIT)]	ppm	40	30	40
	ppm	50	40	50
	ppm	60	50	60
	ppm	10	-	-
	ppm	0	-	-
	Kg/h	5	5	5
	Kg/h	50	50	50
	Kg/h	10	10	10
	Kg/h	100	100	100
	Kg/h	100	100	100
		BF OUTLET HCl CONCENTRATION [CALCULATION INPUT VALUE]	TABLE OF CONTROL OUTPUT FOR INPUT HCl VALUE AT HCl SLOPE > 0	TABLE OF CONTROL OUTPUT FOR INPUT HCl VALUE AT HCl SLOPE ≤ 0
>SM2	SM2 OUTPUT UPPER LIMIT CORRESPONDING CONCENTRATION	60.0	50.0	60.0
	SM1~SM2	50.0	40.0	50.0
	SM1 OUTPUT RESTRICTION1 CORRESPONDING CONCENTRATION	49.5	39.5	49.5
	SM1~SM1	49.0	39.0	49.0
	STEPWISE OUTPUT DEPENDING ON ACIDIC GAS CONCENTRATION BETWEEN LO AND LM1	48.5	38.5	48.5
		48.0	38.0	48.0
		47.5	37.5	47.5
		47.0	37.0	47.0
		46.5	36.5	46.5
		46.0	36.0	46.0
SV CONTROL SET-POINT VALUE [CONCENTRATION FOR STARTING CONTROL OUTPUT (ABOVE OUTPUT LOWER LIMIT)]	SM1 OUTPUT RESTRICTION1 CORRESPONDING CONCENTRATION	45.5	35.5	45.5
	SM1~SM1	45.0	35.0	45.0
	STEPWISE OUTPUT DEPENDING ON ACIDIC GAS CONCENTRATION BETWEEN LO AND LM1	44.5	34.5	44.5
		44.0	34.0	44.0
		43.5	33.5	43.5
		43.0	33.0	43.0
		42.5	32.5	42.5
		42.0	32.0	42.0
		41.5	31.5	41.5
		41.0	31.0	41.0
SV CONTROL SET-POINT VALUE [CONCENTRATION FOR STARTING CONTROL OUTPUT (ABOVE OUTPUT LOWER LIMIT)]	SM1 OUTPUT RESTRICTION1 CORRESPONDING CONCENTRATION	40.5	30.5	40.5
	SM1~SM1	40.0	30.0	40.0
	STEPWISE OUTPUT DEPENDING ON ACIDIC GAS CONCENTRATION BETWEEN LO AND LM1	39.5	29.5	39.5
		39.0	29.0	39.0
		38.5	28.5	38.5
		38.0	28.0	38.0
		37.5	27.5	37.5
		37.0	27.0	37.0
		36.5	26.5	36.5
		36.0	26.0	36.0

CONTROL OUTPUT
ADDITION AMOUNT
(kg/h)100.0
100.0
70.0
50.0
47.8
45.5
43.3
41.0
38.8
36.5
34.3
32.0
29.8
27.5
25.3
23.0
20.8
18.3
16.3
14.0
11.8
8.5
7.3
5.0

FIG. 18

EXAMPLE 3

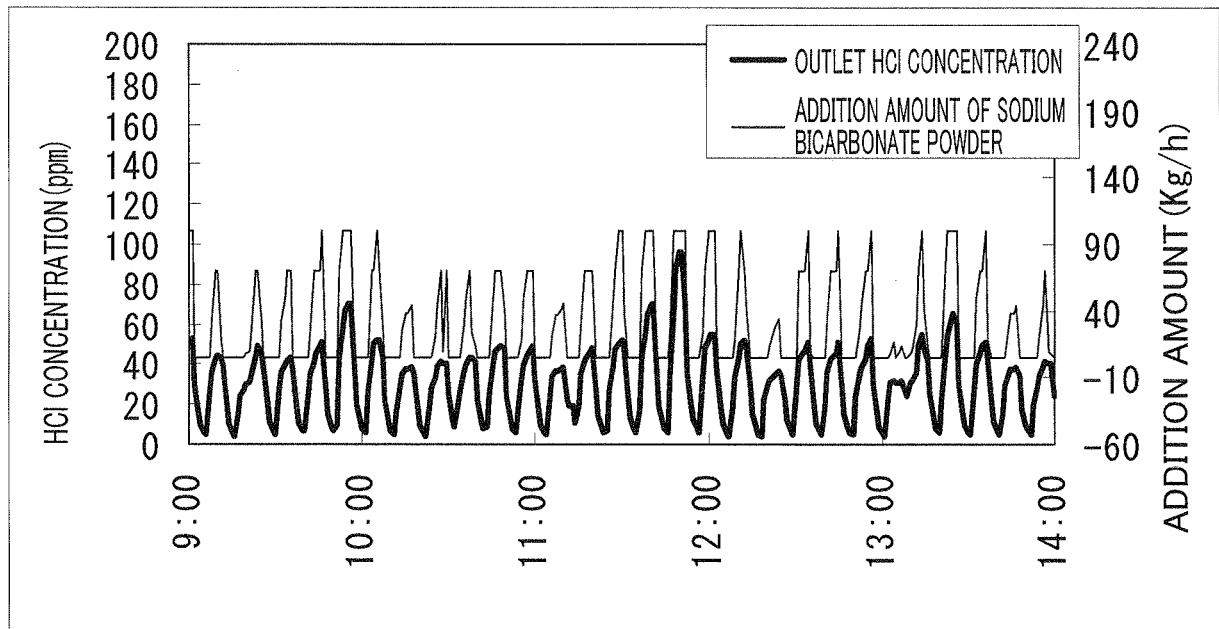


FIG. 19

EXAMPLE 4, EXAMPLES 5 TO 8 (CHANGED AVERAGE TIME OF SLOPE)

		SETTING	SETTING AT HCl SLOPE > 0	SETTING AT HCl SLOPE ≤ 0
SV CONTROL SET-POINT VALUE [CONCENTRATION FOR STARTING CONTROL OUTPUT (ABOVE OUTPUT LOWER LIMIT)]	ppm	40	30	50
	ppm	50	40	60
	ppm	60	50	70
	ppm	10	-	-
	ppm	10	-	-
	kg/h	5	5	5
	kg/h	50	50	50
	kg/h	70	70	70
	kg/h	100	100	100
		BF OUTLET HCl CONCENTRATION [CALCULATION INPUT VALUE]	TABLE OF CONTROL OUTPUT FOR INPUT HCl VALUE AT HCl SLOPE > 0	TABLE OF CONTROL OUTPUT FOR INPUT HCl VALUE AT HCl SLOPE ≤ 0
		60.0	50.0	70.0
		50.0	40.0	60.0
		49.5	39.5	59.5
SM2 OUTPUT UPPER LIMIT CORRESPONDING CONCENTRATION SM1 ~ SM2		49.0	39.0	59.0
		48.5	38.5	58.5
		48.0	38.0	58.0
		47.5	37.5	57.5
		47.0	37.0	57.0
		46.5	36.5	56.5
		46.0	36.0	56.0
		45.5	35.5	55.5
		45.0	35.0	55.0
		44.5	34.5	54.5
		44.0	34.0	54.0
		43.5	33.5	53.5
		43.0	33.0	53.0
SV ~ SM1 STEPWISE OUTPUT DEPENDING ON ACIDIC GAS CONCENTRATION BETWEEN LO AND LM1		42.5	32.5	52.5
		42.0	32.0	52.0
		41.5	31.5	51.5
		41.0	31.0	51.0
		40.5	30.5	50.5
		40.0	30.0	50.0
SV CONTROL SET-POINT VALUE [CONCENTRATION FOR STARTING CONTROL OUTPUT (ABOVE OUTPUT LOWER LIMIT)]				

CONTROL OUTPUT ADDITION AMOUNT (kg/h)	100.0
	100.0
	70.0
	50.0
	47.8
	45.5
	43.3
	41.0
	38.8
	36.5
	34.3
	32.0
	29.8
	27.5
	25.3
	23.0
	20.8
	18.5
	16.3
	14.0
	11.8
	9.5
	7.3
	5.0

FIG. 20

EXAMPLE 4

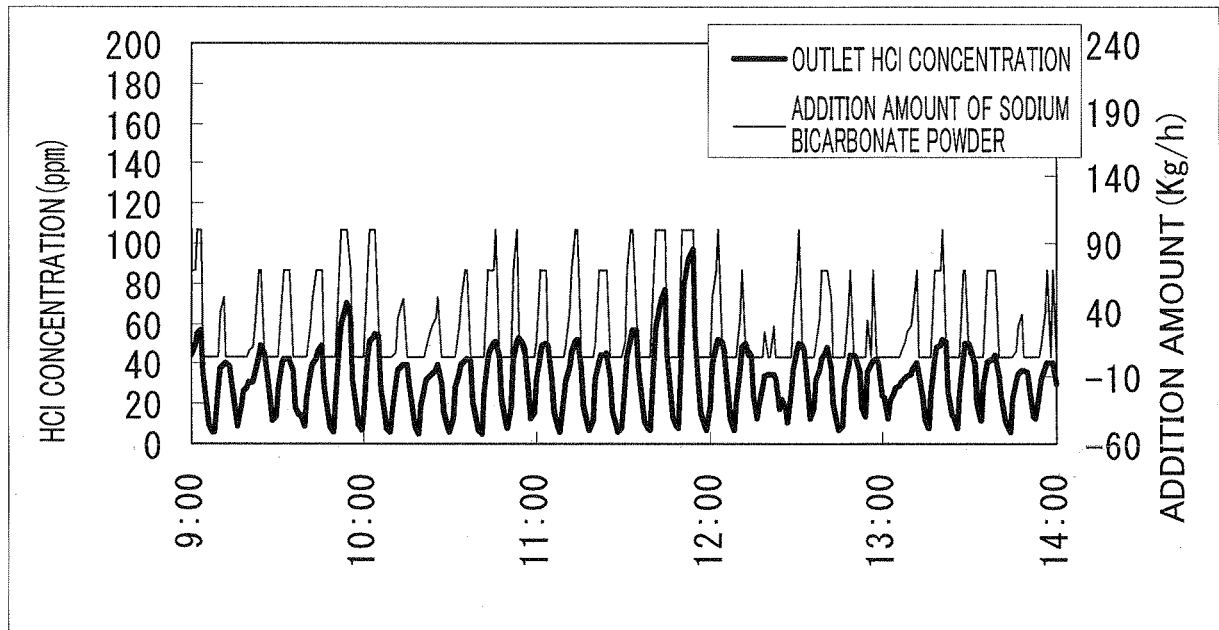


FIG. 21

EXAMPLE 5

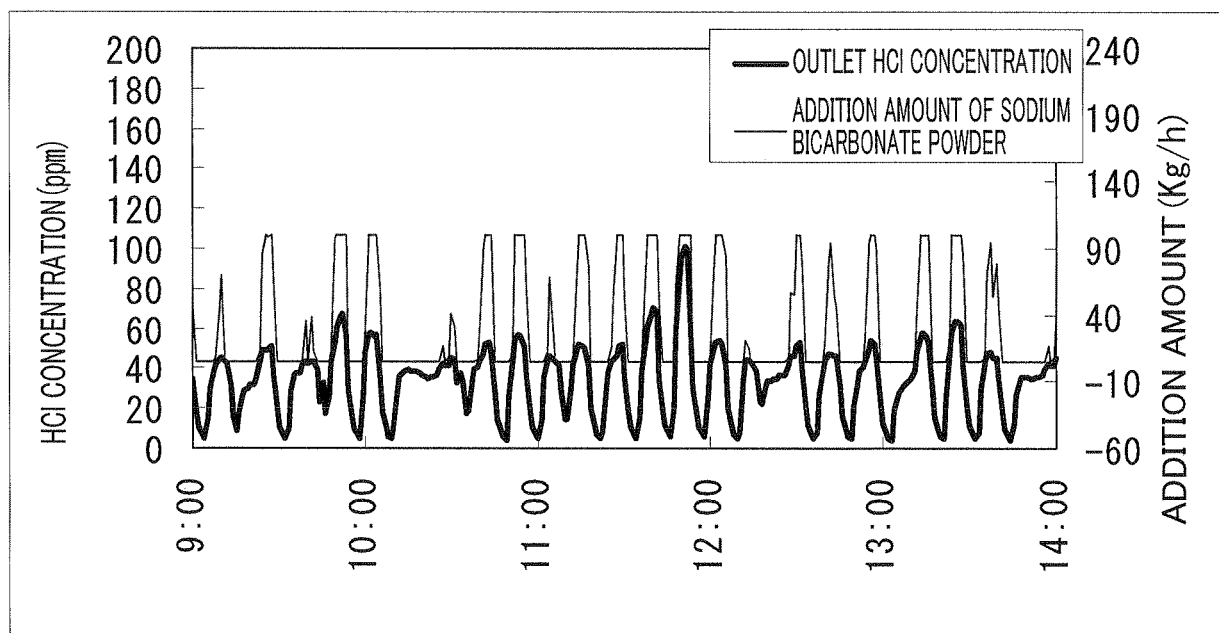


FIG. 22

EXAMPLE 6

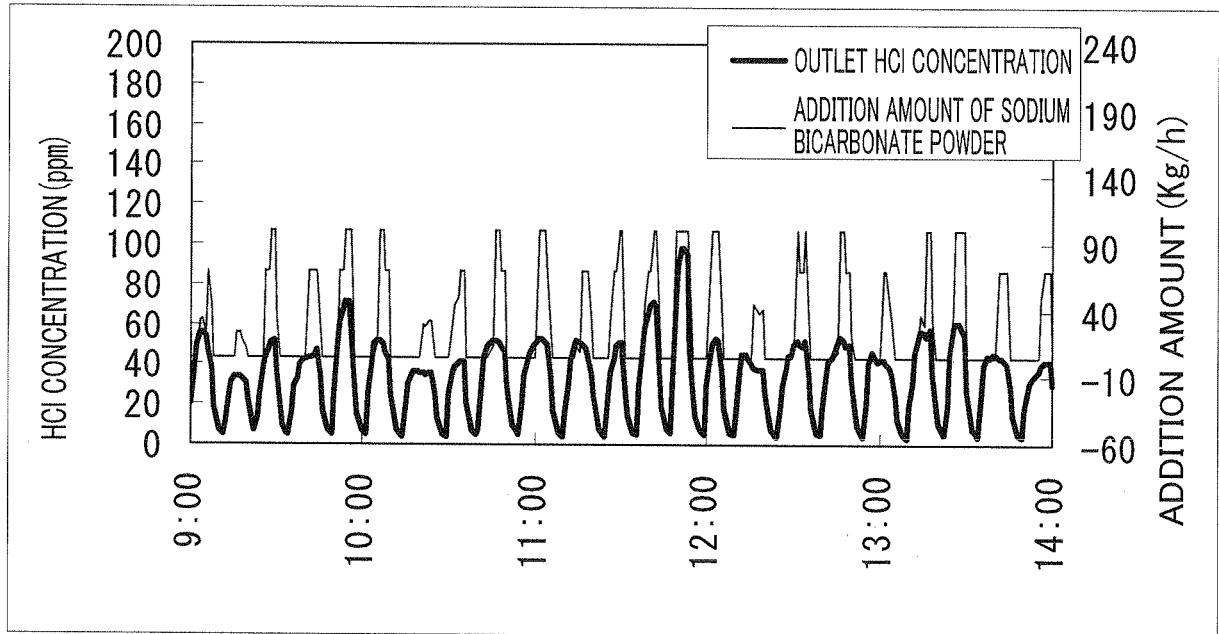


FIG. 23

EXAMPLE 7

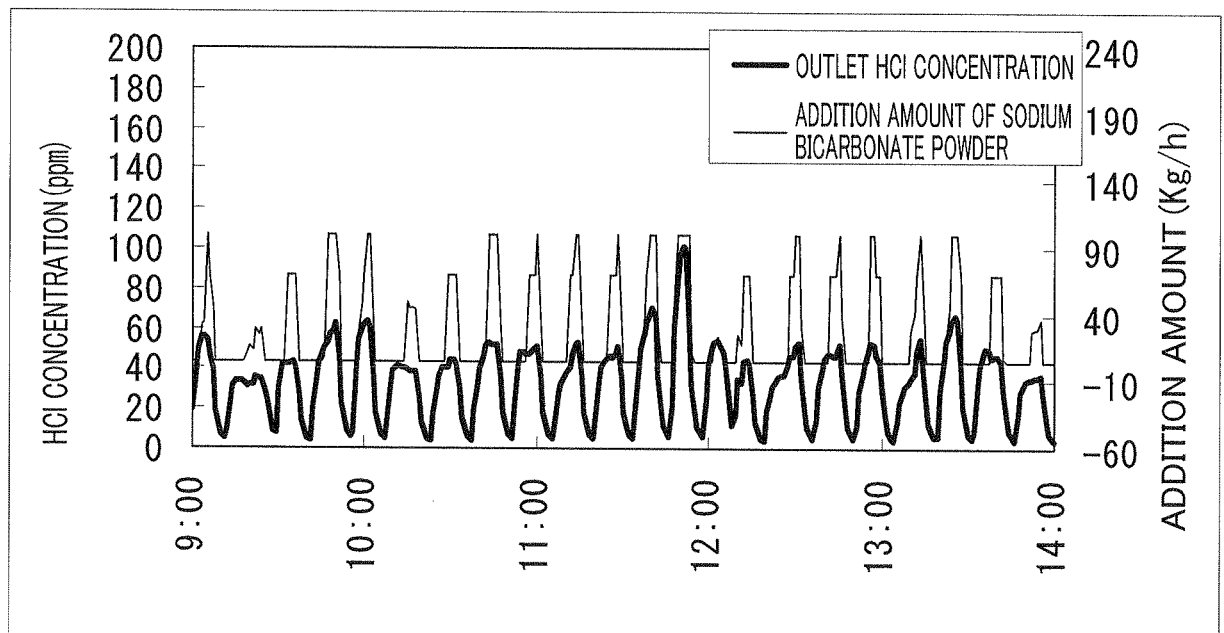


FIG. 24

EXAMPLE 8

