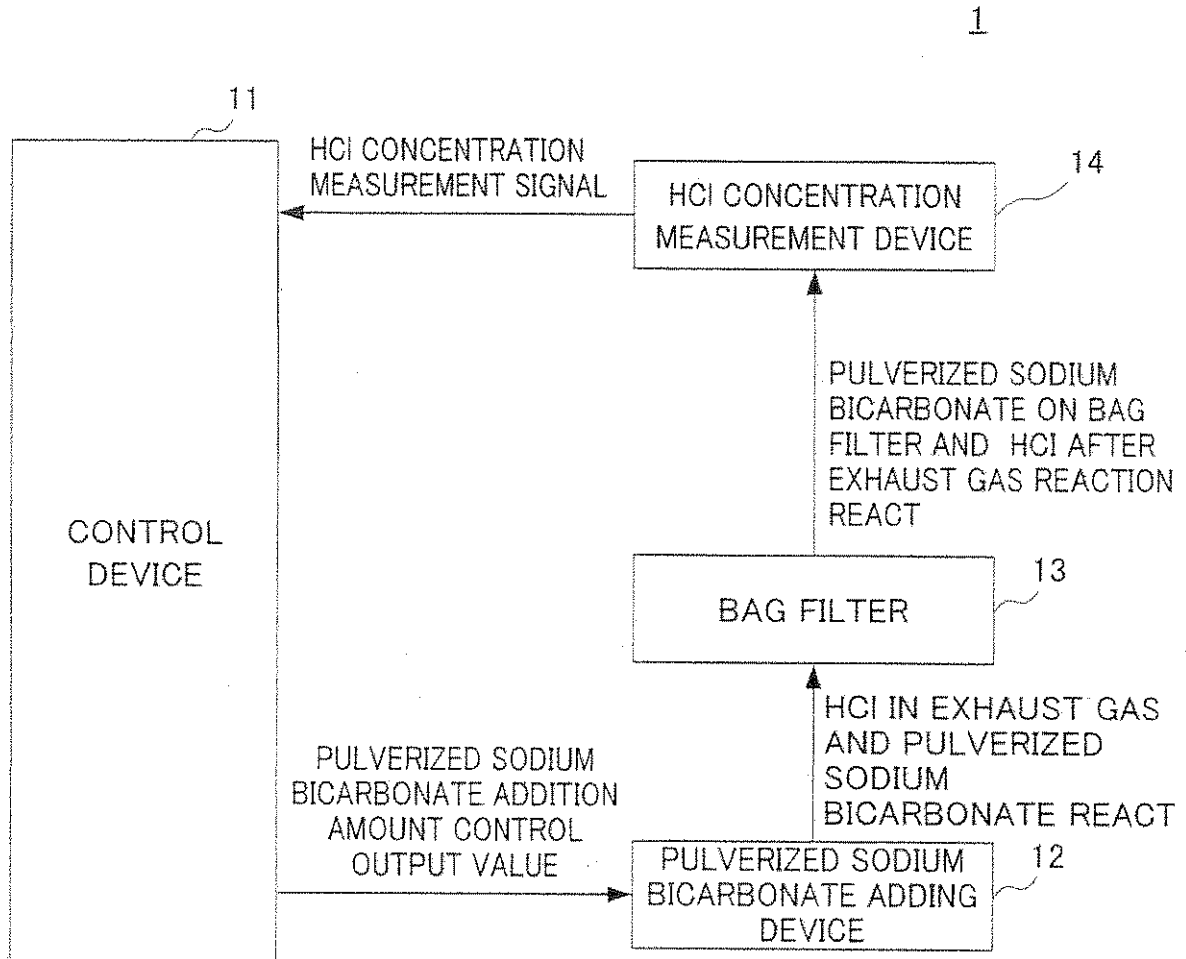


FIG 1



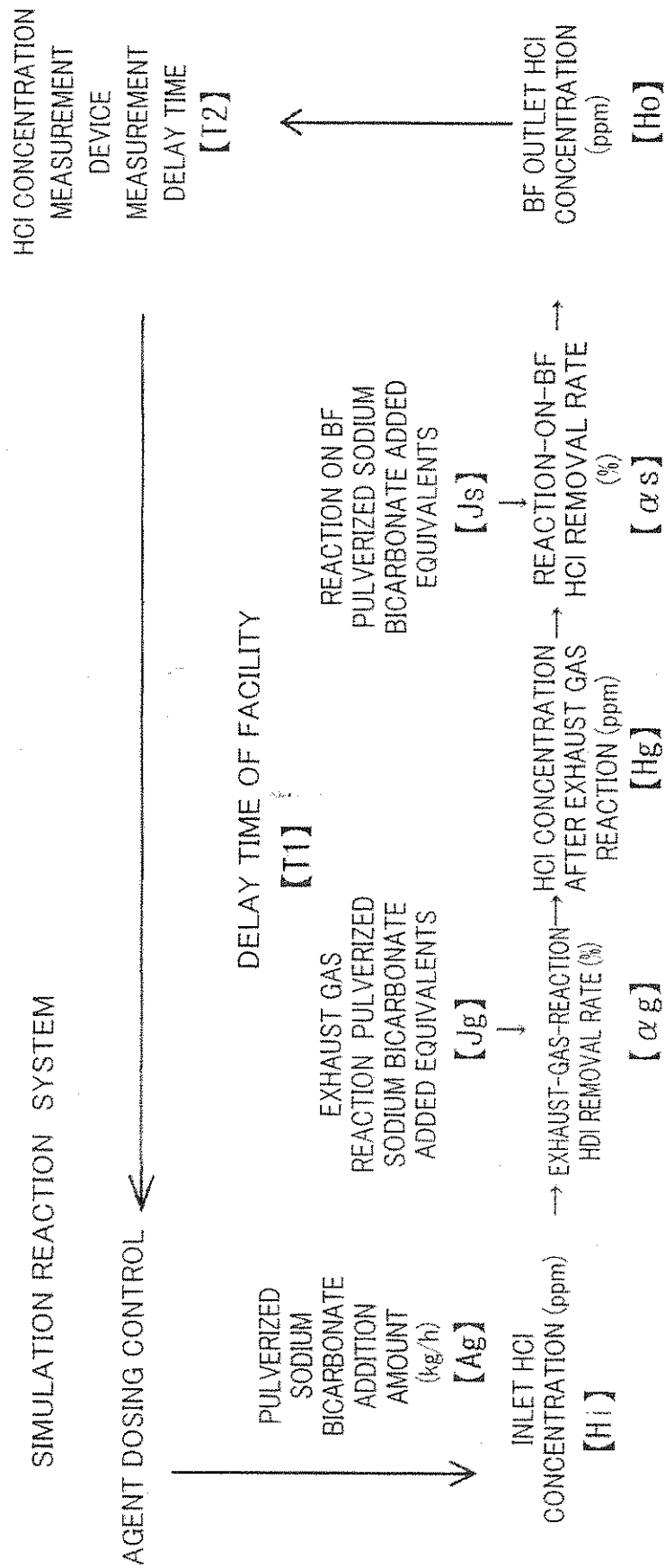
2
G
L

FIG 3

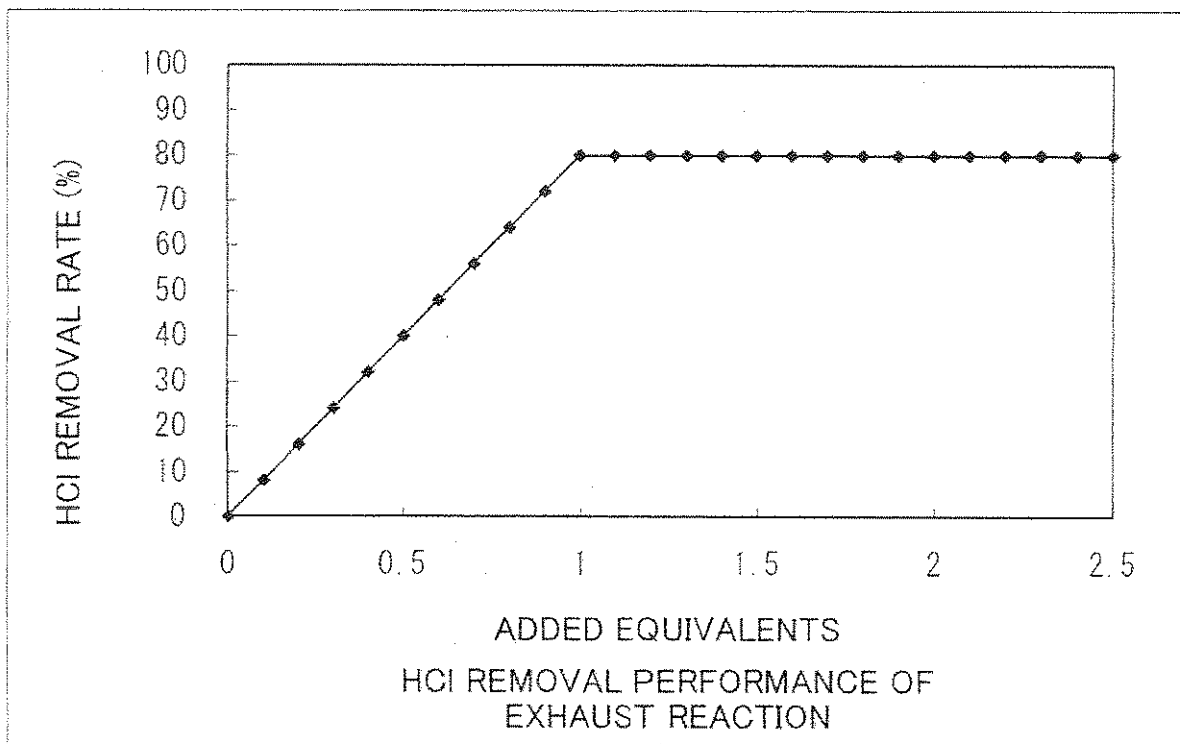


FIG 4

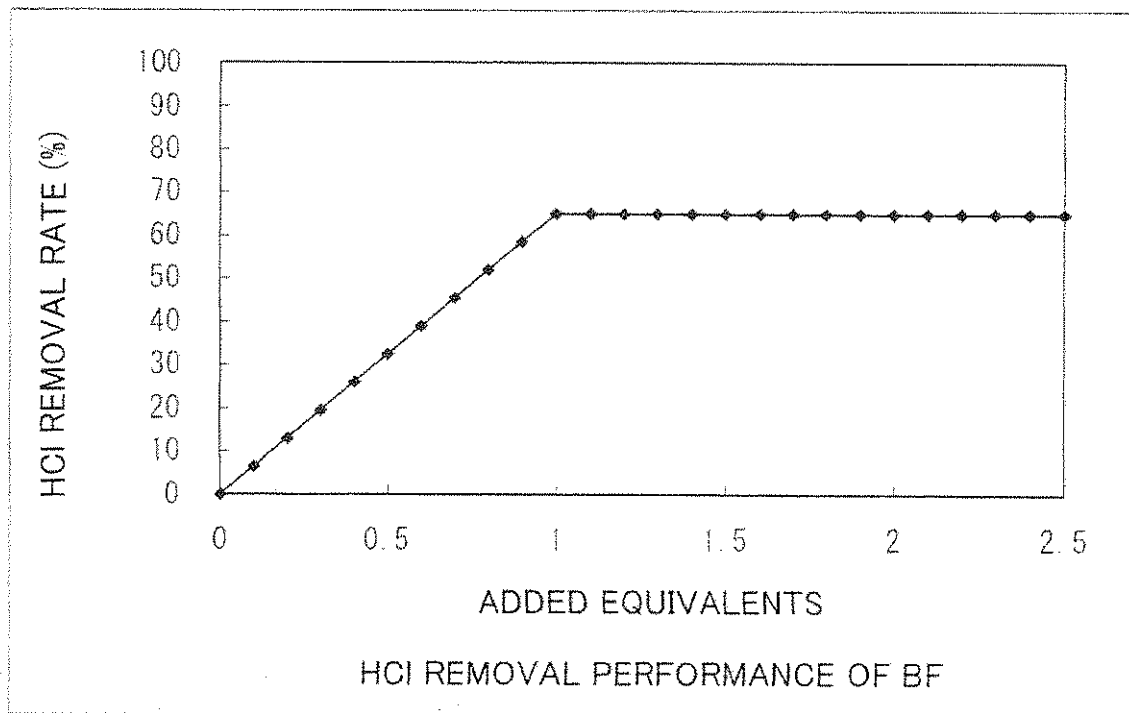


FIG 5

INLET HCl CONCENTRATION

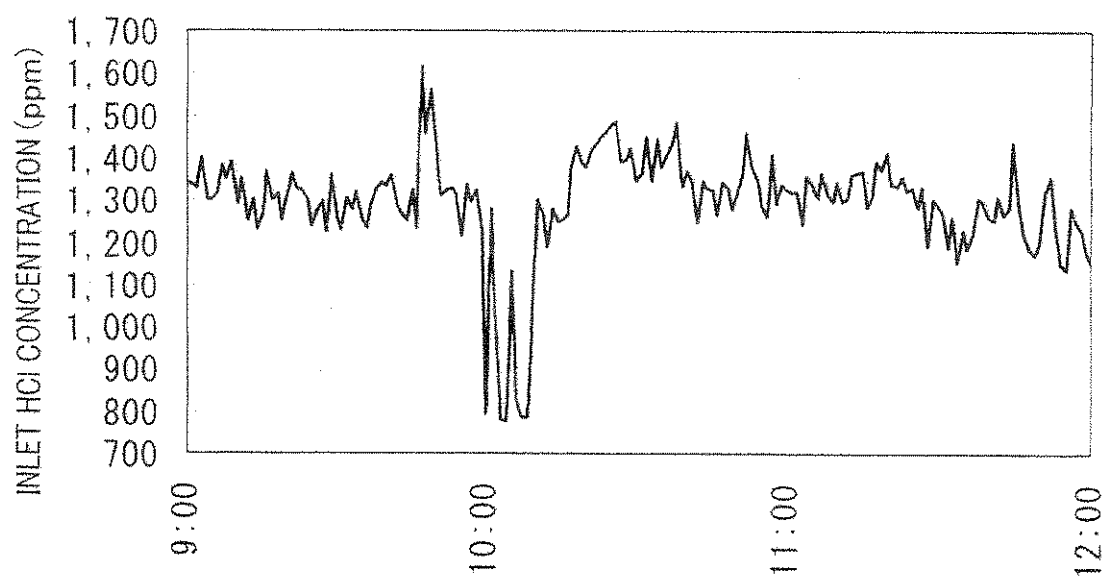


FIG 6

ACTUAL EQUIPMENT INVESTIGATION RESULTS

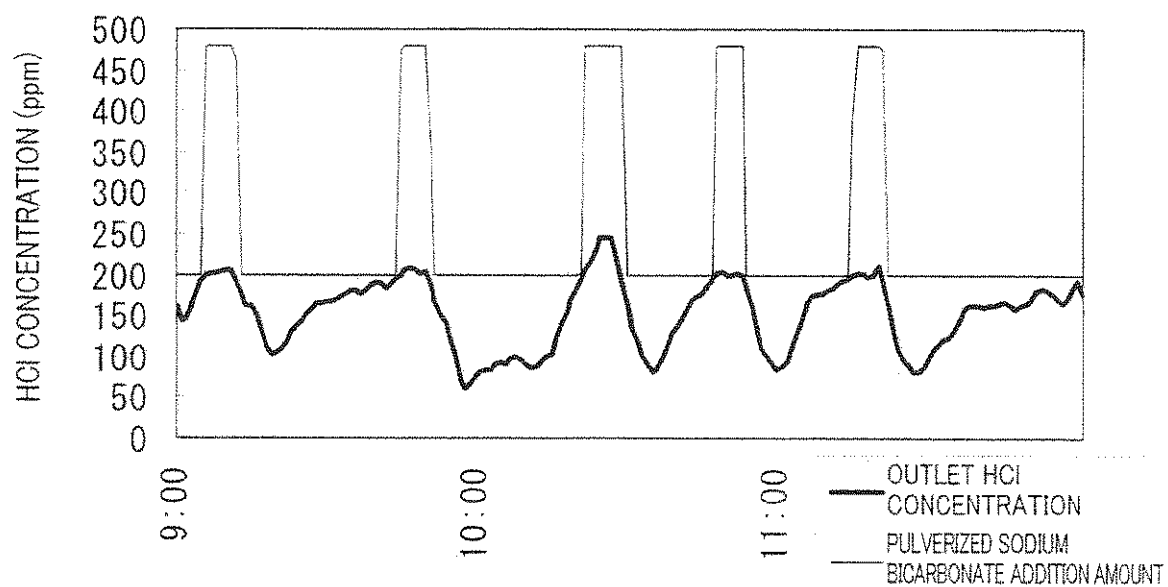


FIG 7

SIMULATION INVESTIGATION RESULTS

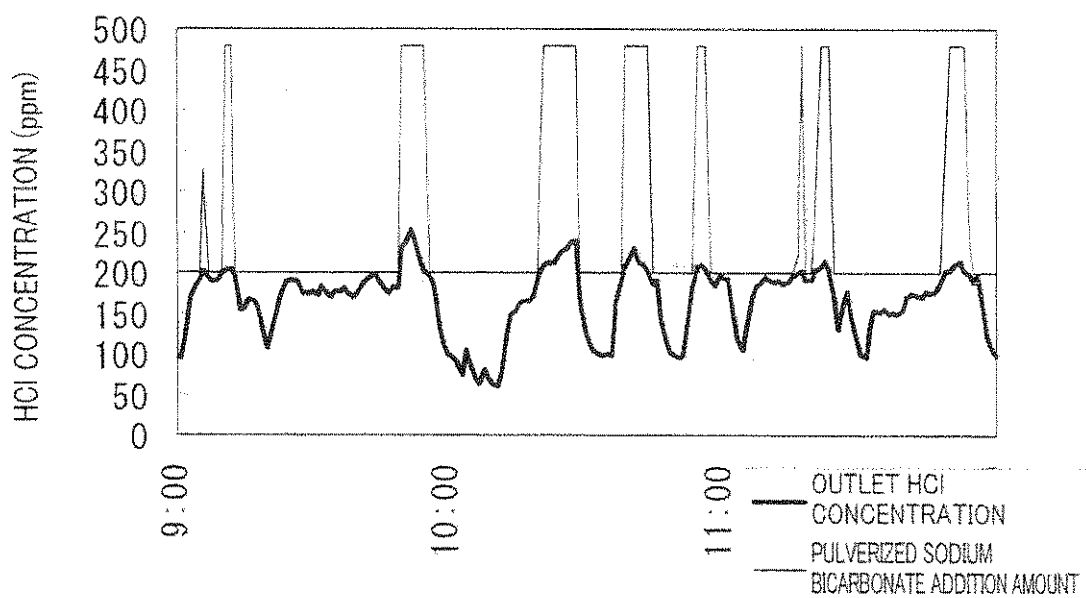


FIG 9

INLET HCl CONCENTRATION

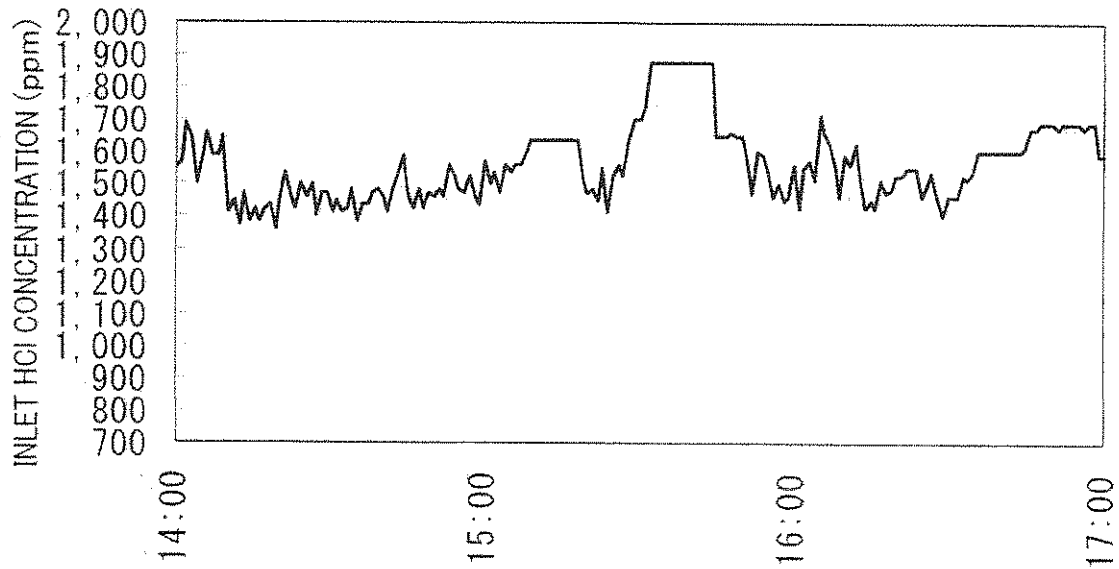


FIG 10

COMPARATIVE EXAMPLE 1

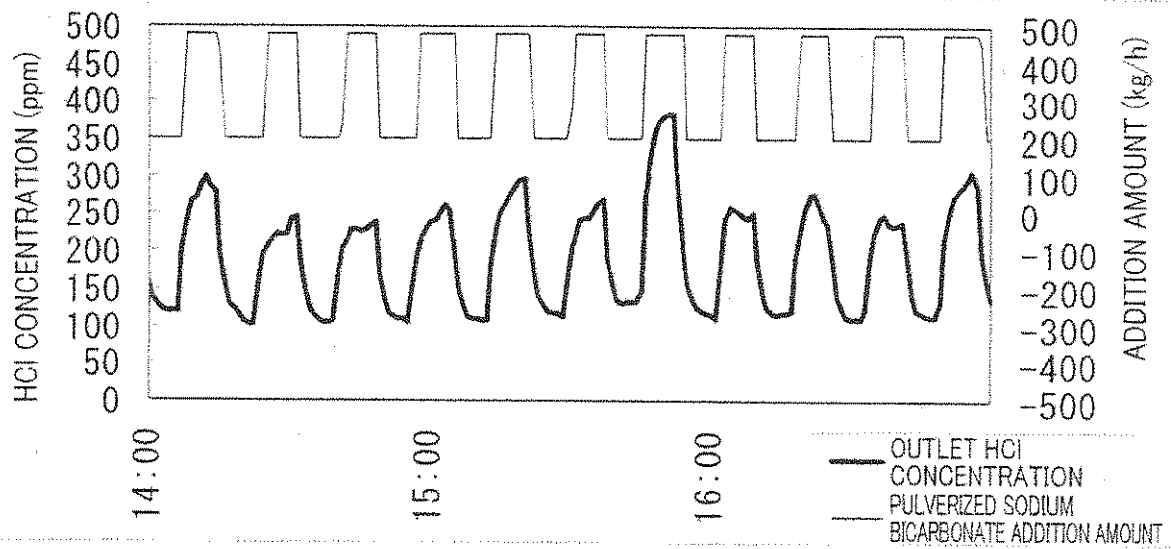


FIG 9

INLET HCl CONCENTRATION

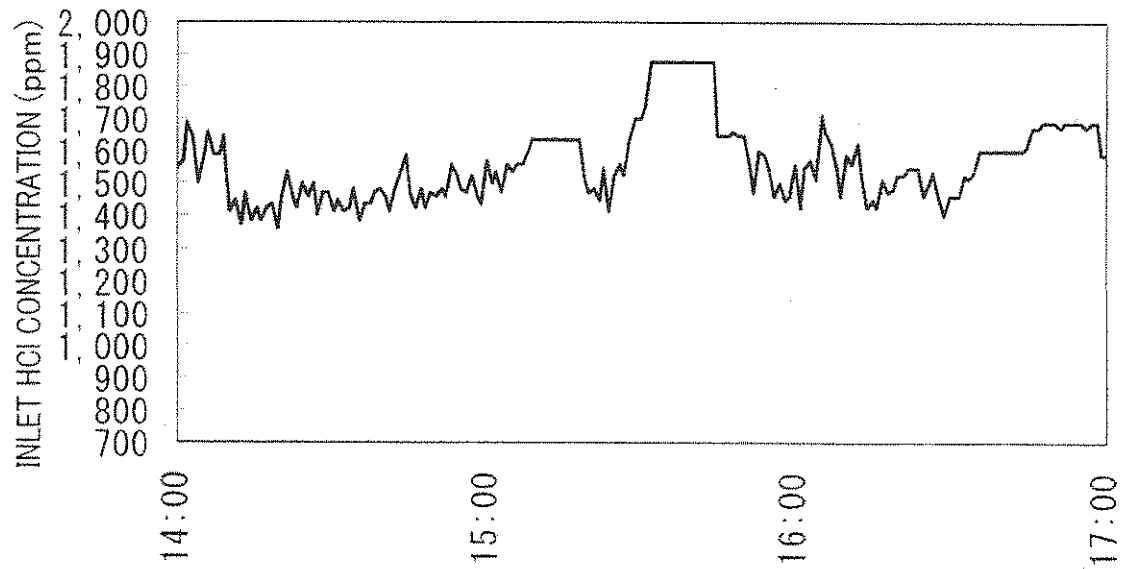


FIG 10

COMPARATIVE EXAMPLE 1

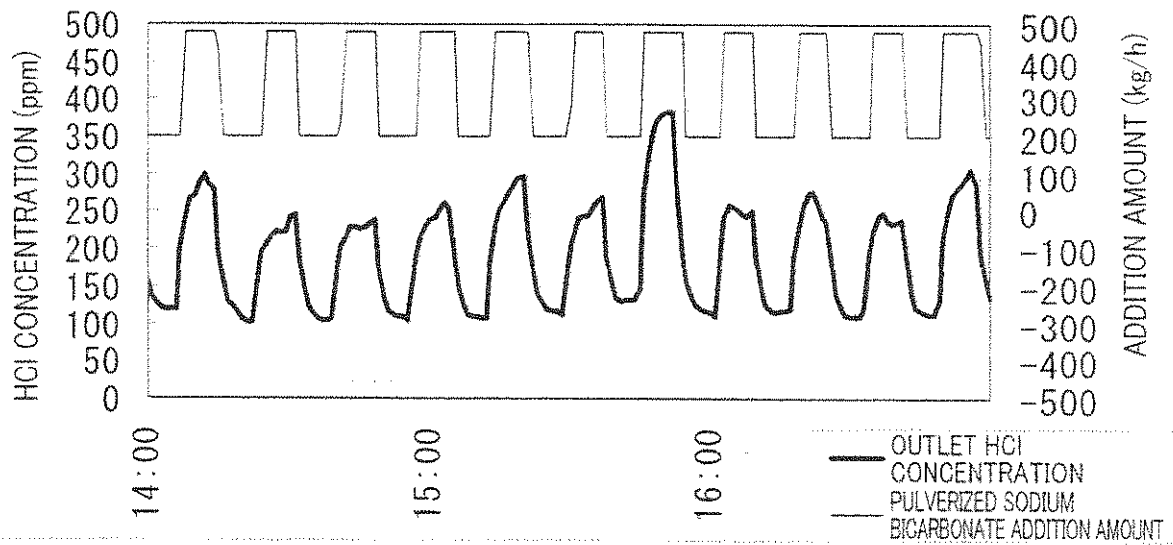


FIG 11

EXAMPLE 1

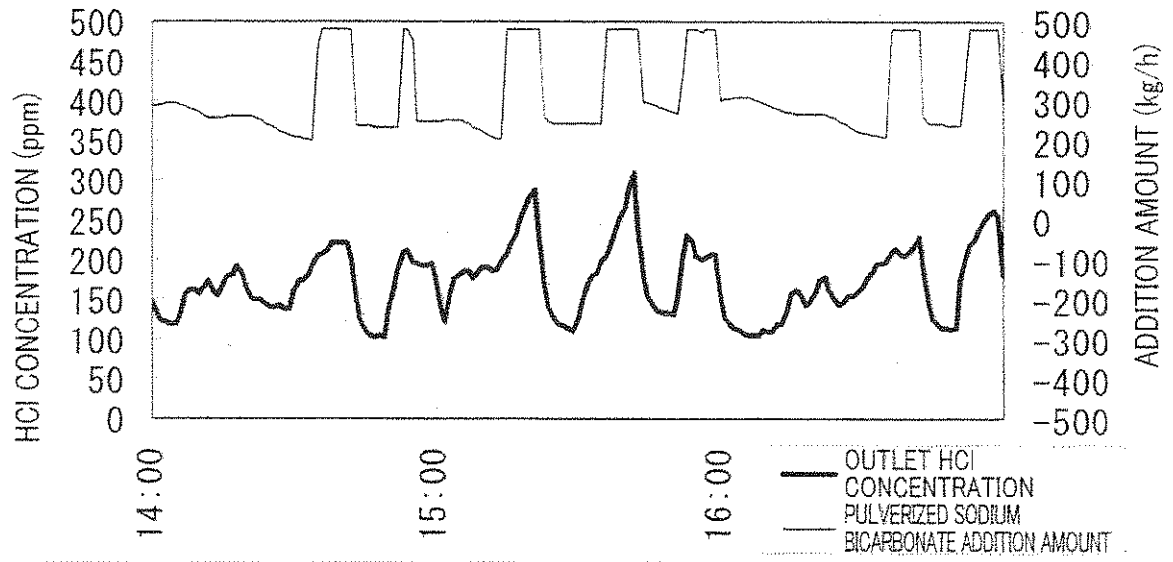


FIG 13

COMPARATIVE EXAMPLE 2

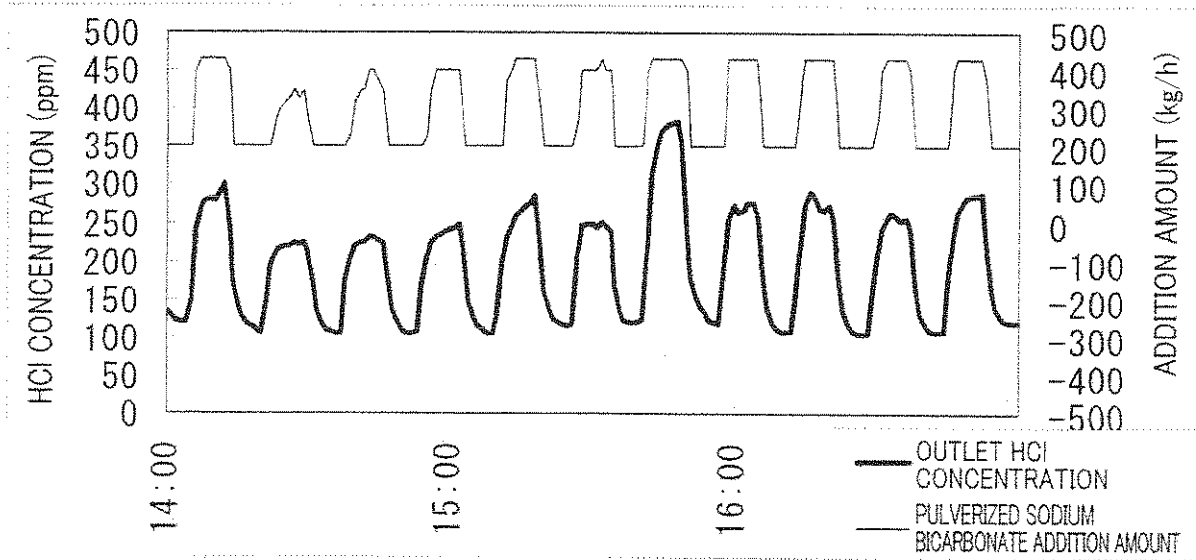


FIG 14

EXAMPLE 2

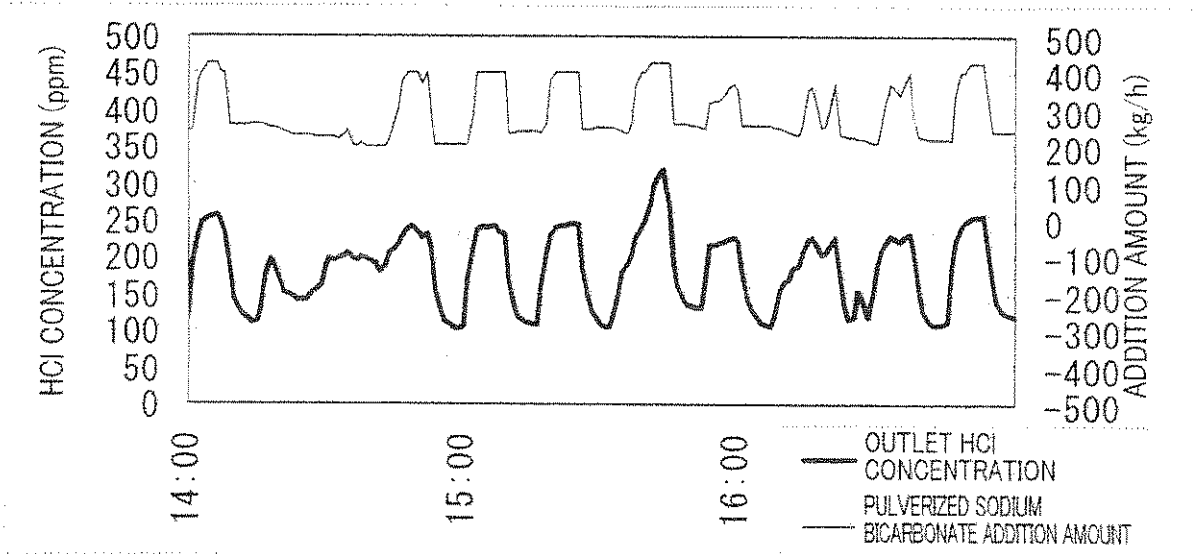


FIG. 15

SETTINGS OF COMPARATIVE EXAMPLE 3, AND EXAMPLES 3, 9, 10, 11, 17, 18, 21, 22

SETTING	HCl SLOPE > 0 SETTING	HCl SLOPE = < 0 SETTING	MEASUREMENT SIGNAL (PV)	TABLE OF CONTROL OUTPUT FOR HCl SLOPE > 0 INPUT HCl VALUE	TABLE OF CONTROL OUTPUT FOR HCl SLOPE = < 0 INPUT HCl VALUE	COMPARATIVE EXAMPLE 3			EXAMPLE 3, 9, 10, 11, 17, 18, 21, 22
						CONTROL OUTPUT ADDITION AMOUNT Ag (kg/h)	CONTROL OUTPUT ADDITION AMOUNT Ag (kg/h)	CONTROL OUTPUT ADDITION AMOUNT Ag (kg/h)	
SV [CONTROL OUTPUT UPPER LIMIT CORRESPONDING CONCENTRATION]	200	180							
SM1 OUTPUT LIMIT 1 CORRESPONDING CONCENTRATION	230	210							
SM2 OUTPUT UPPER LIMIT CORRESPONDING CONCENTRATION	250	230							
SVΔ1 [CORRECTION WHEN HCl ASCENDS SV-SV-SVΔ1]	20	-							
SVΔ1 [CORRECTION WHEN HCl DESCENDS SV-SV-SVΔ1]	20	-							
LO [CONTROL OUTPUT LOWER LIMIT]	200	200							
LM1 [OUTPUT LIMIT 1] (SV ~ SM1)	380	380							
LM2 [OUTPUT LIMIT 2] (SM1 ~ SM2)	400	400							
LH [CONTROL OUTPUT UPPER LIMIT] (SM2)	430	430							
SV ~ SM2						430	230	LH-L0	
SM2 OUTPUT UPPER LIMIT CORRESPONDING CONCENTRATION	250	230		270		430	230	LH-L0	
SM1 ~ SM2						400	200	LM2-L0	
SM1 OUTPUT LIMIT 1 CORRESPONDING CONCENTRATION	230	210		250		380	180	LM1-L0	
SV ~ SM1						371	171	[FORMULA 1]	
STEP-WISE OUTPUT DEPENDING ON ACIDIC GAS CONCENTRATION BETWEEN LO AND LM1	229	209		249		362	162	[FORMULA 1]	
	227	207		247		353	153	[FORMULA 1]	
	226	206		246		344	144	[FORMULA 1]	
	224	204		244		335	135	[FORMULA 1]	
	223	203		243		326	126	[FORMULA 1]	
	221	201		241		317	117	[FORMULA 1]	
	220	200		240		308	108	[FORMULA 1]	
	218	198		238		299	99	[FORMULA 1]	
	217	197		237		290	90	[FORMULA 1]	
	215	195		235		281	81	[FORMULA 1]	
	214	194		234		272	72	[FORMULA 1]	
	212	192		232		263	63	[FORMULA 1]	
	211	191		231		254	54	[FORMULA 1]	
	209	189		229		245	45	[FORMULA 1]	
	208	188		228		236	36	[FORMULA 1]	
	206	186		226		227	27	[FORMULA 1]	
	205	185		225		218	18	[FORMULA 1]	
	203	183		223		209	9	[FORMULA 1]	
	202	182		222		200	0	[FORMULA 1]	
SVΔ2 [CONTROL OUTPUT LOWER LIMIT] (SVΔ1 ~ SVΔ2)	200	180		220		200	0	0	

NOTE: EXAMPLE 22 ADDED 480 kg/h WHEN 1-h AVERAGE VALUE OF OUTPUT HCl CONCENTRATION IS AT LEAST 190 ppm

[FORMULA 1] $Ag1 = (LM1-L0) / 20 \times (PV-SV) / (SM1-SV) \times 20$

FIG 16

COMPARATIVE EXAMPLE 3

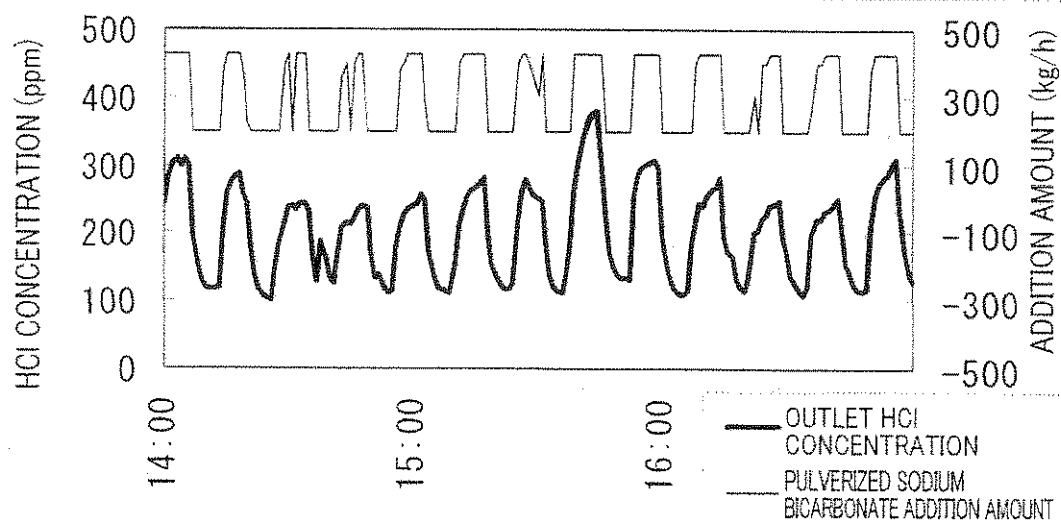
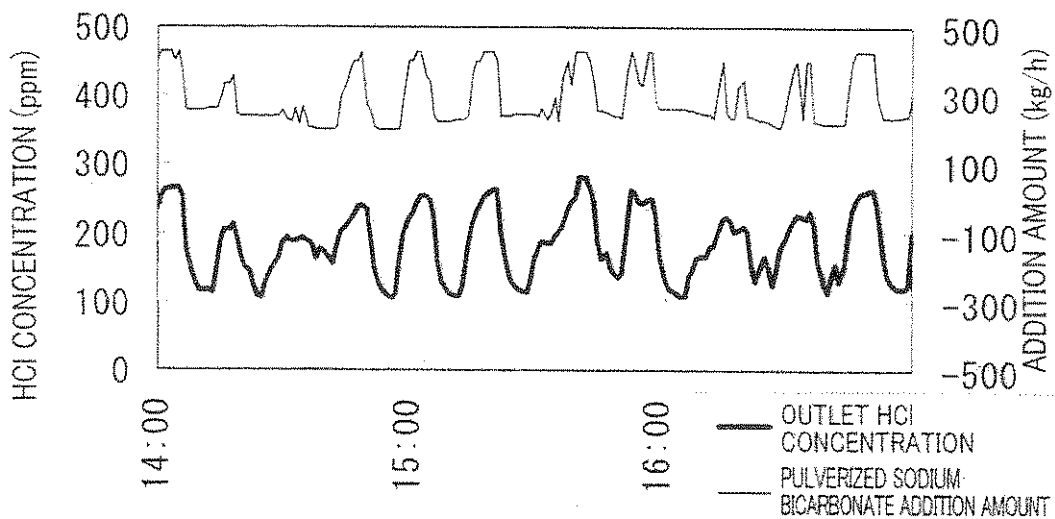


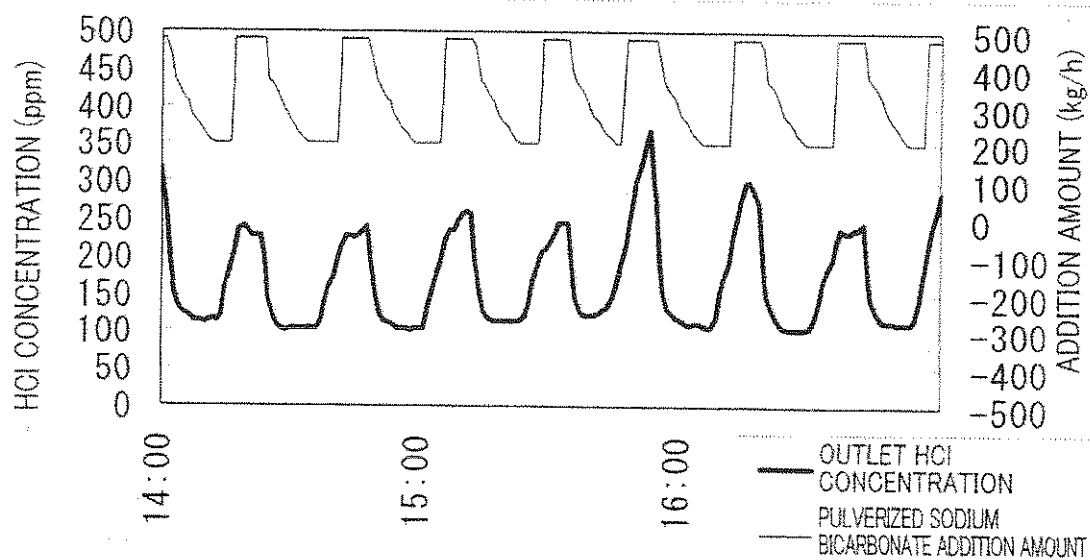
FIG 17

EXAMPLE 3



EXAMPLE 4

FIG 18



EXAMPLE 5

FIG 19

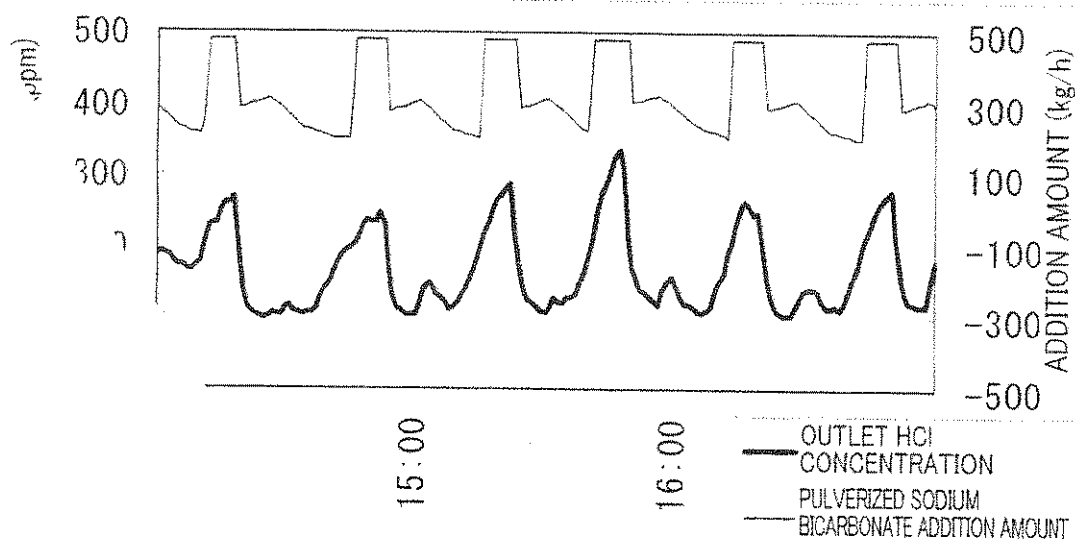


FIG 20

EXAMPLE 6

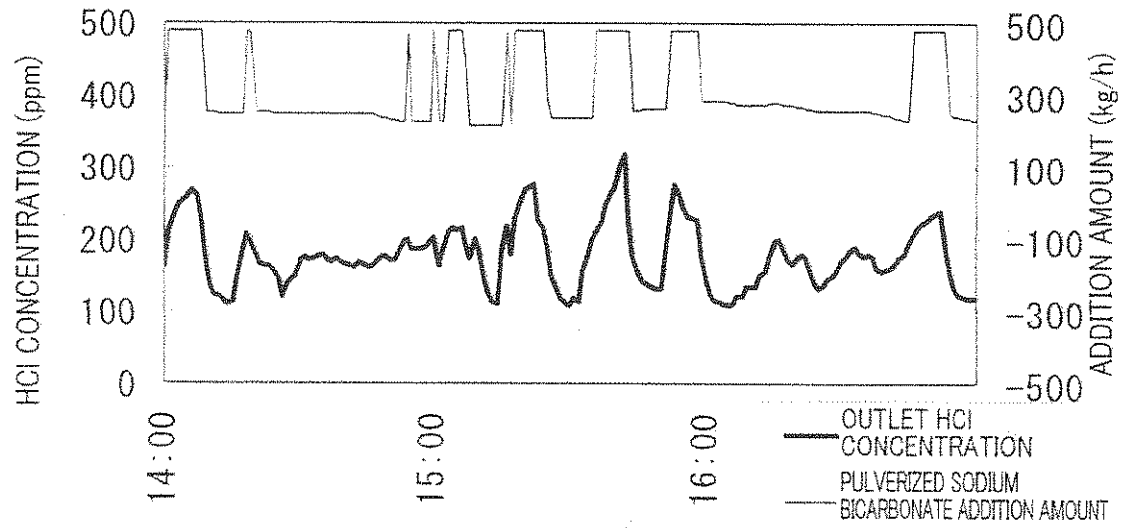


FIG 21

EXAMPLE 7

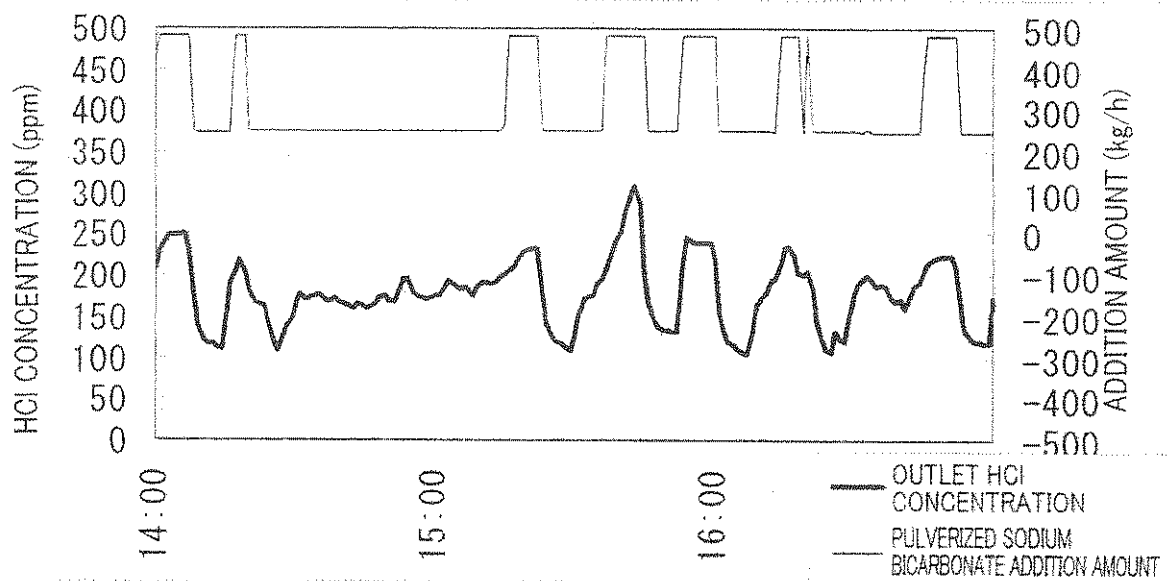


FIG 22

EXAMPLE 8

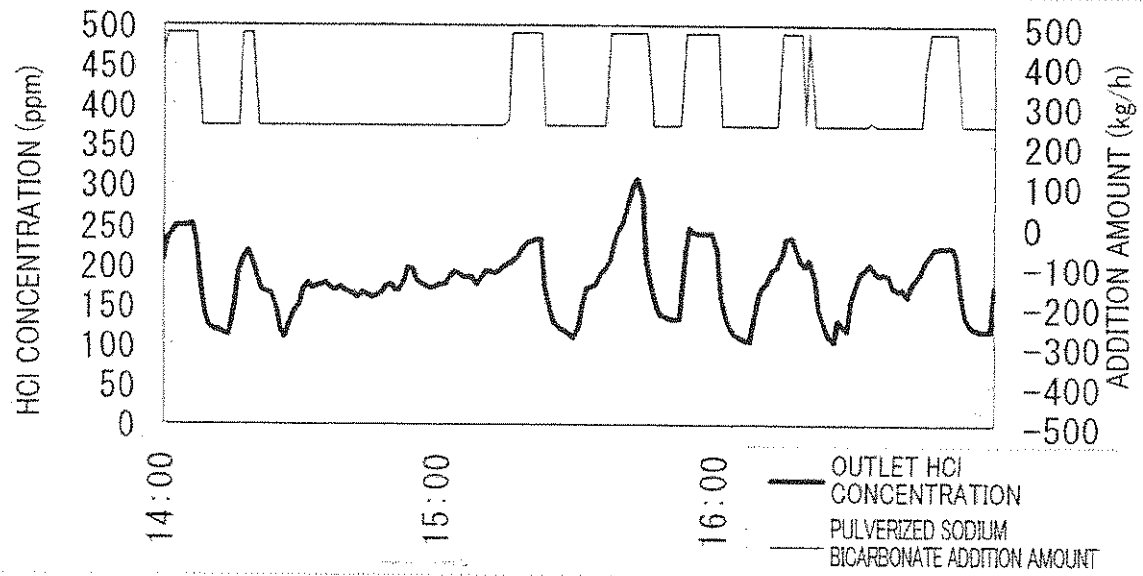


FIG 23

EXAMPLE 9

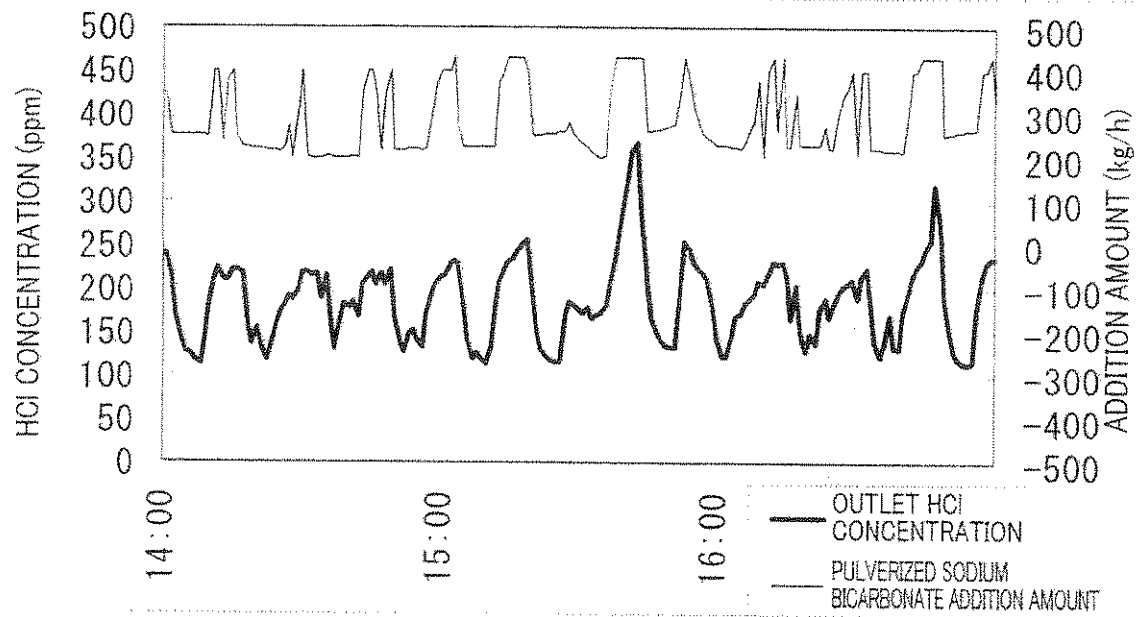


FIG 24

EXAMPLE 10

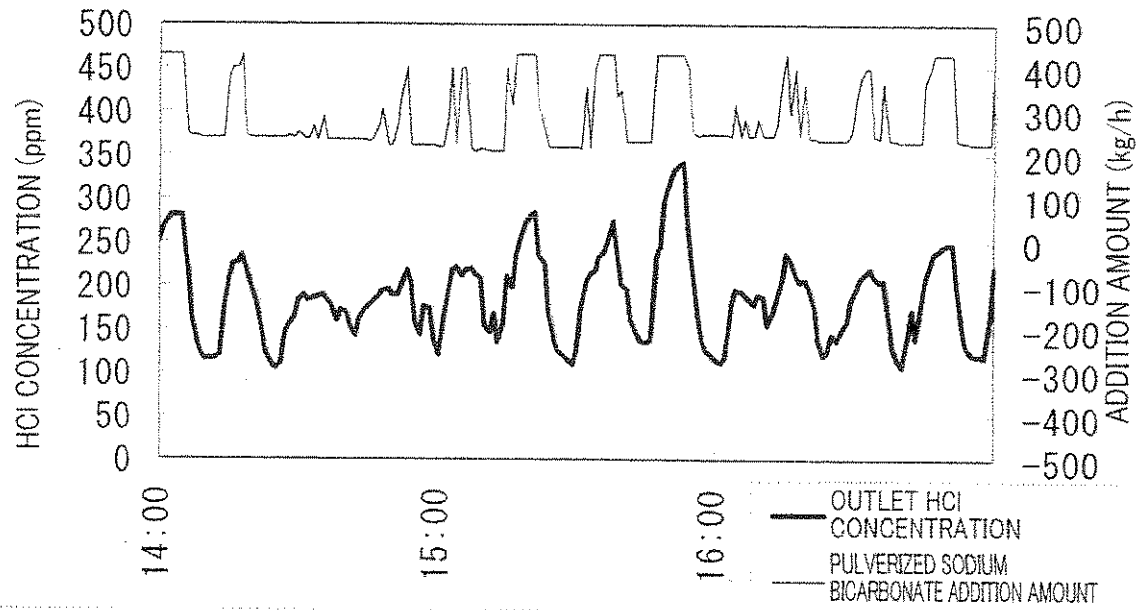


FIG 25

EXAMPLE 11

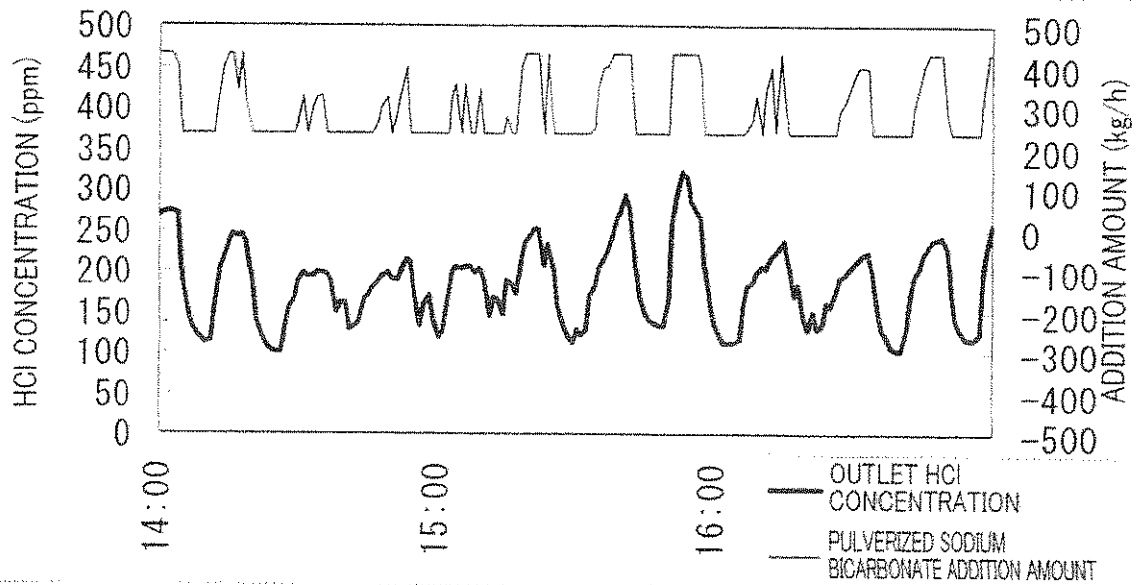


FIG 26

EXAMPLE 12

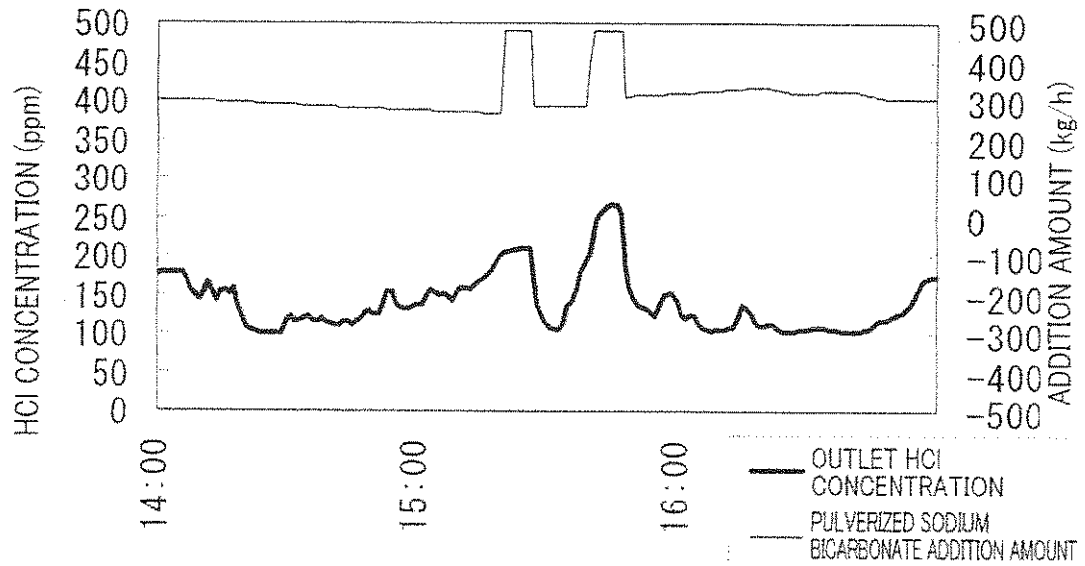


FIG 27

EXAMPLE 13

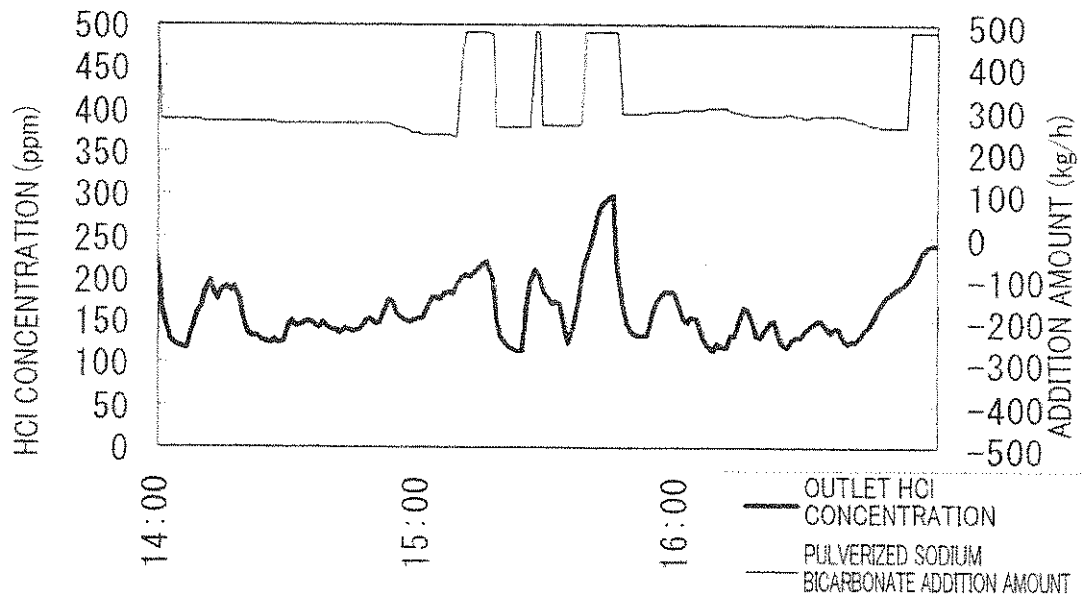


FIG 28

EXAMPLE 14

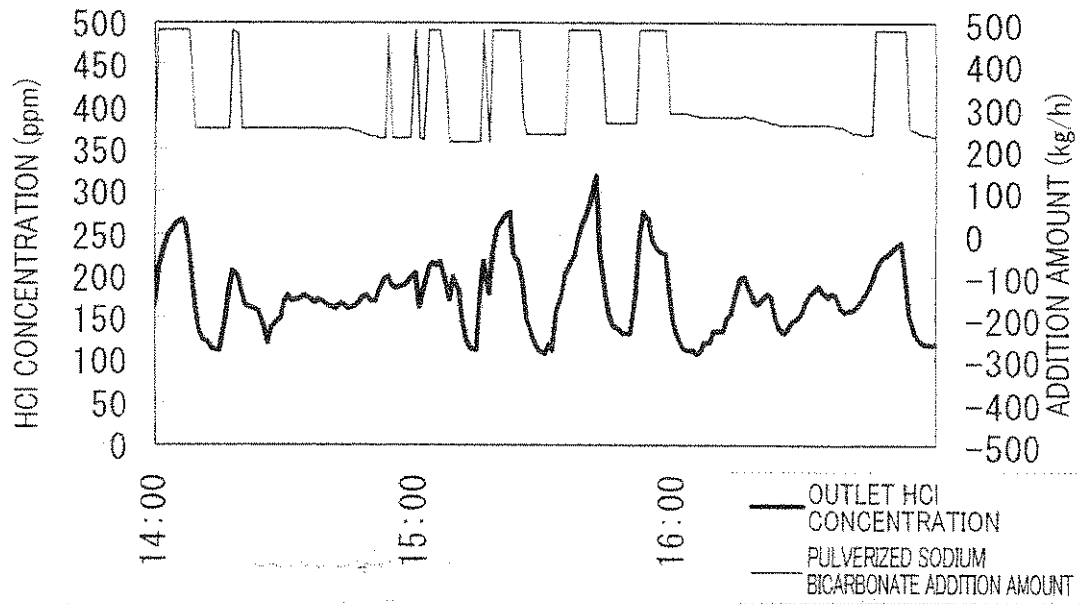


FIG 29

EXAMPLE 15

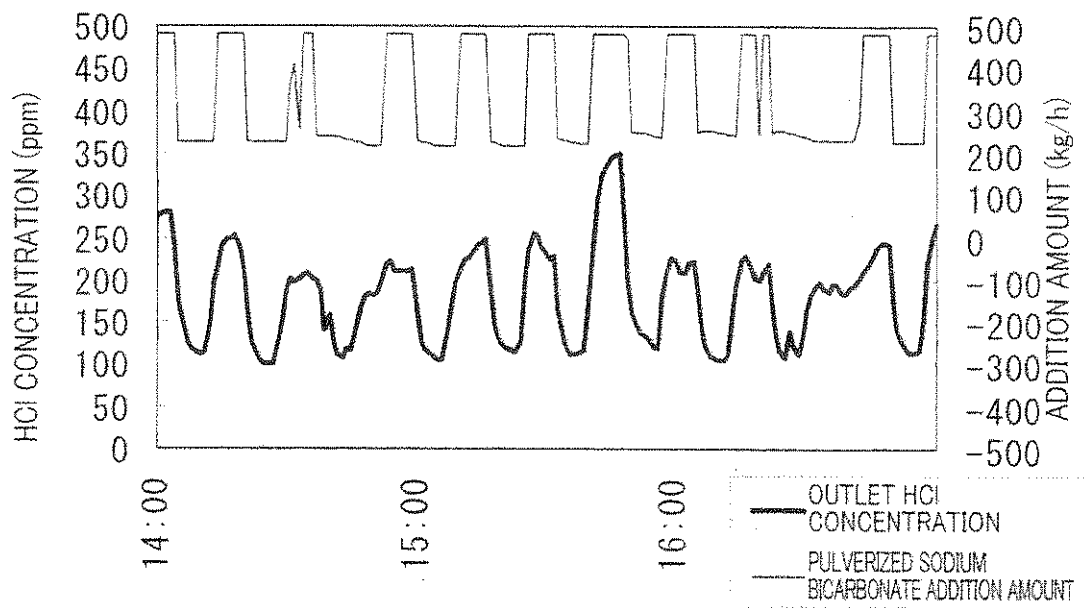


FIG 30

EXAMPLE 16

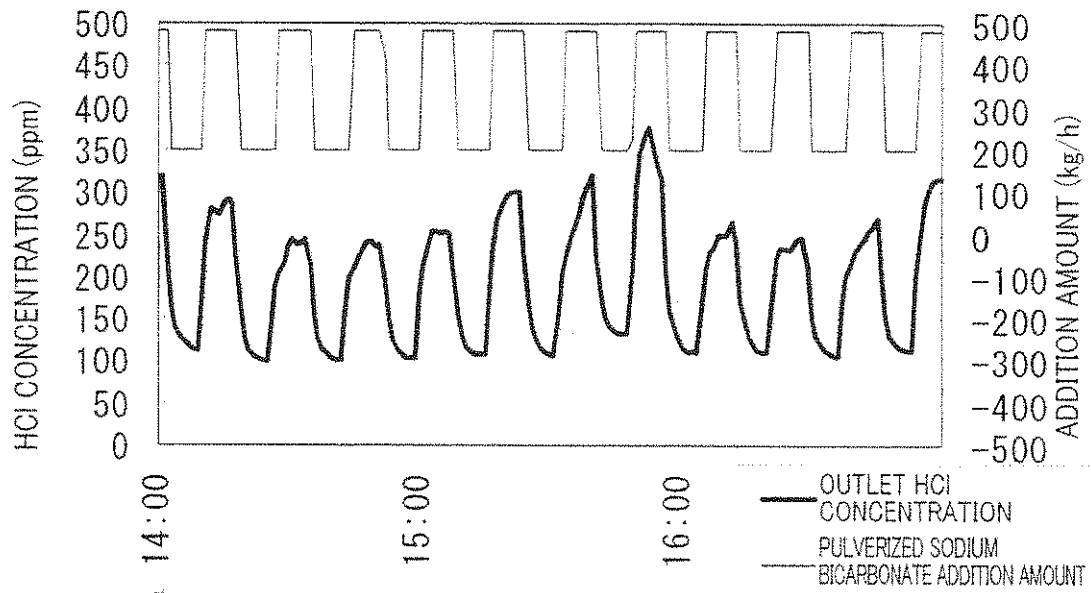


FIG 31

EXAMPLE 17

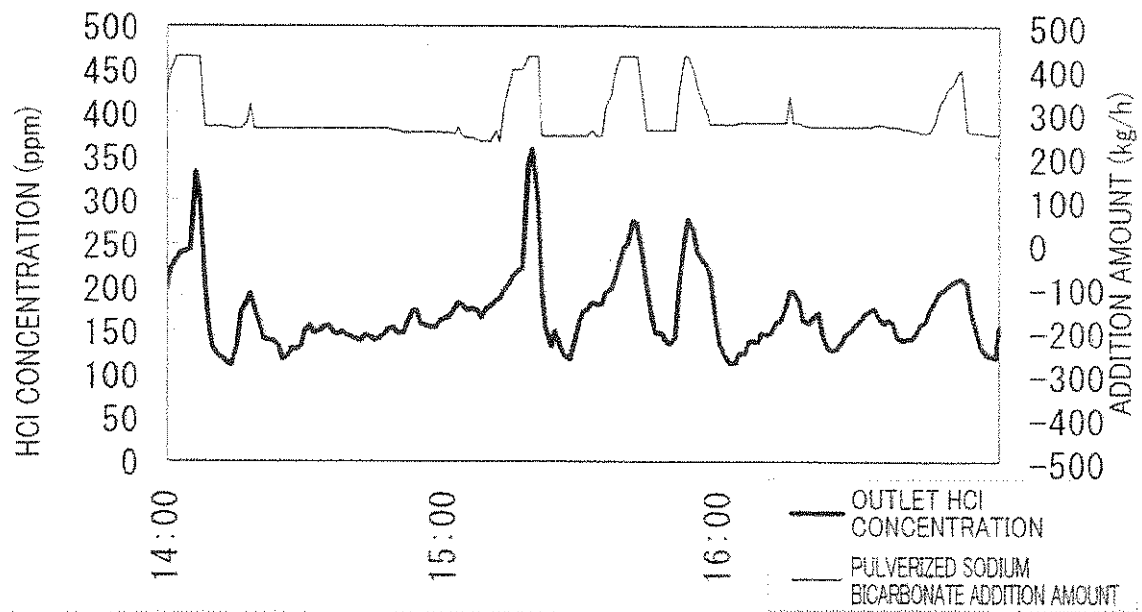


FIG 32

EXAMPLE 18

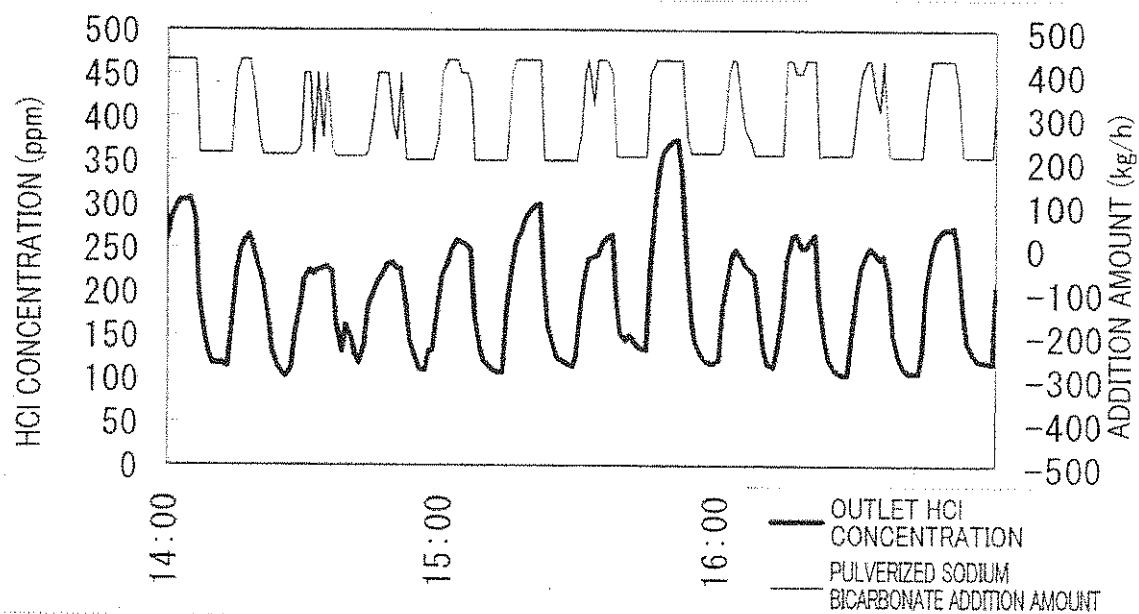


FIG 33

COMPARATIVE EXAMPLE 19

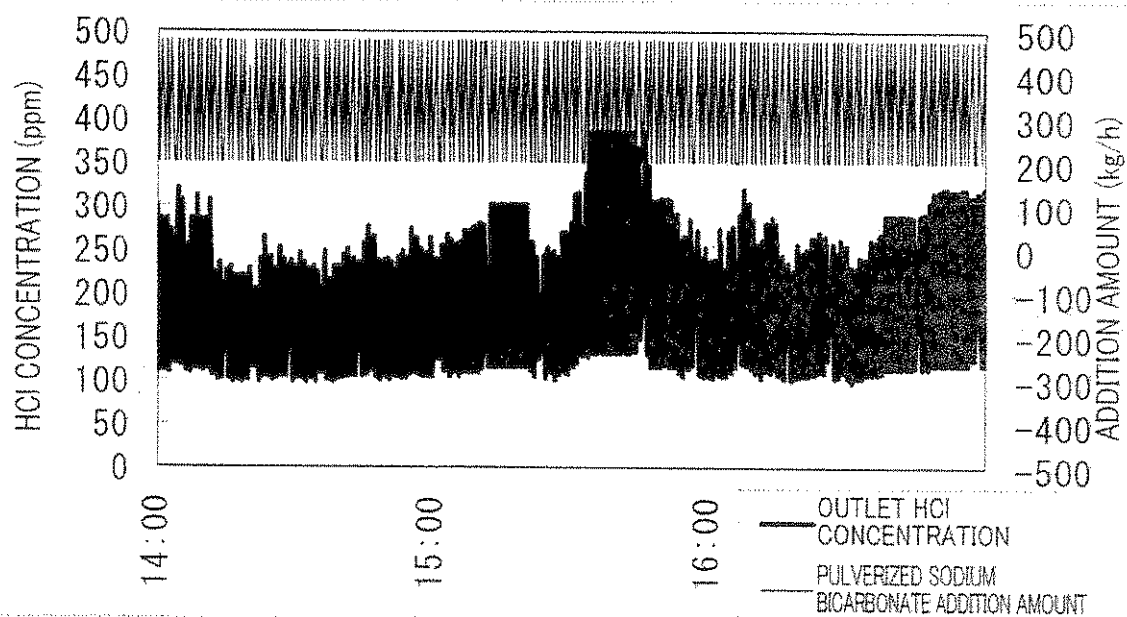


FIG 34

EXAMPLE 19

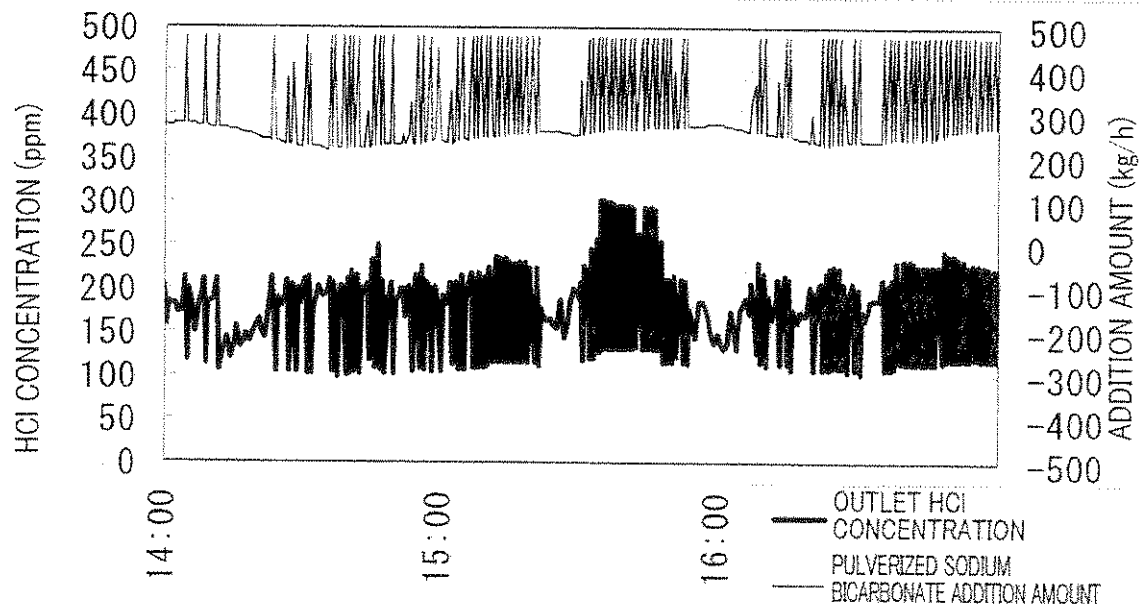


FIG 35

EXAMPLE 20

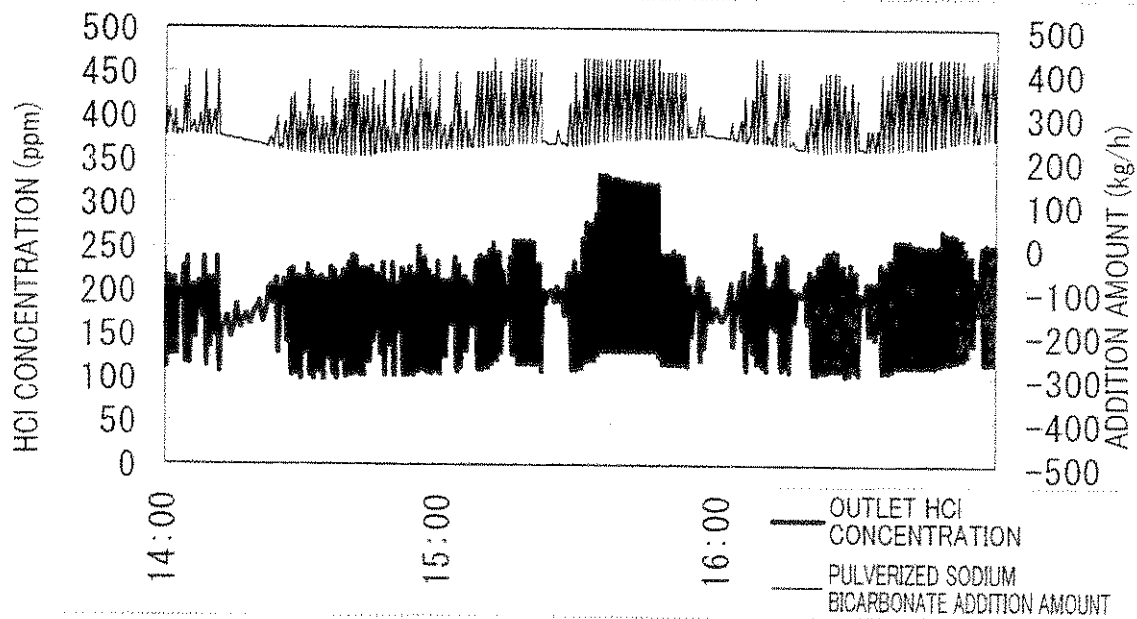


FIG 36

EXAMPLE 21

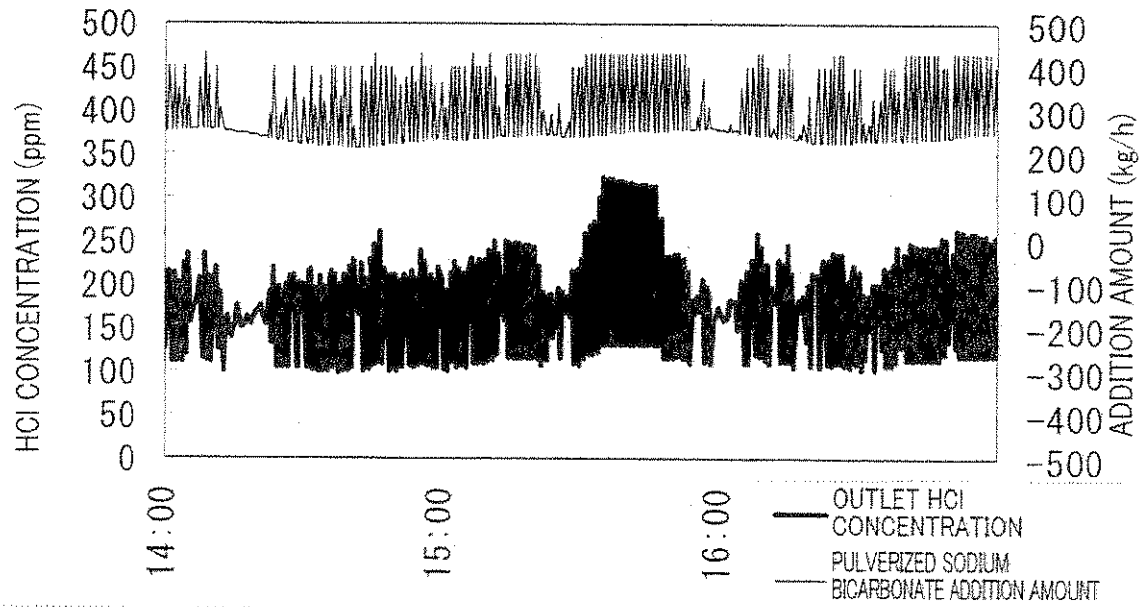


FIG 37

EXAMPLE 22

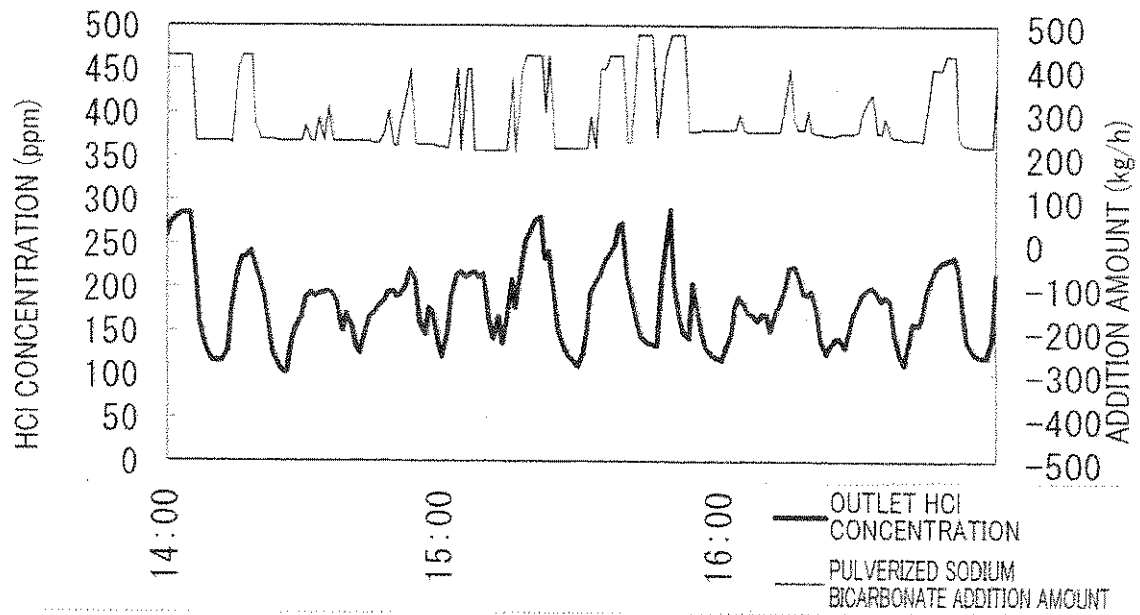
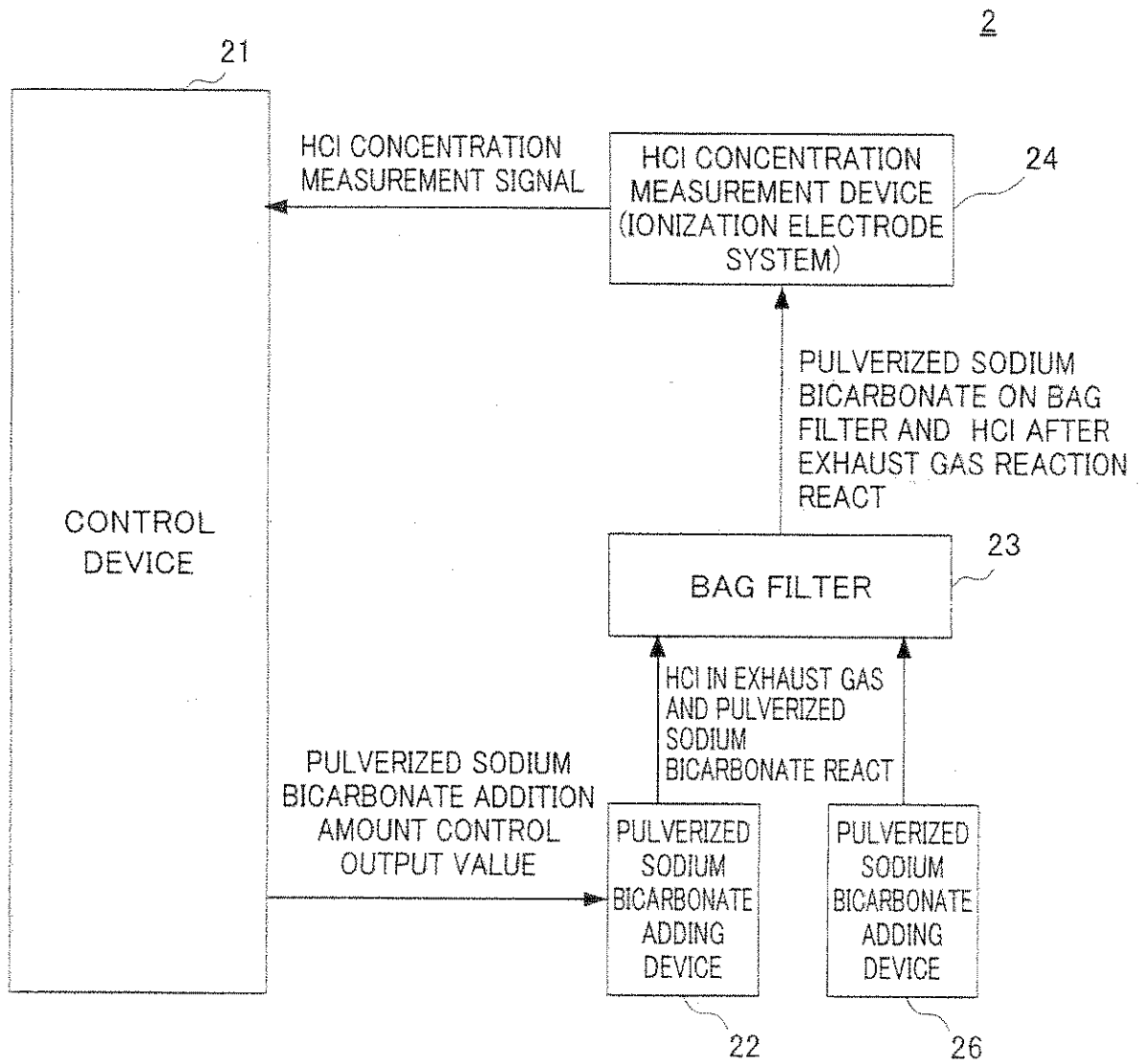


FIG 38



ACTUAL EQUIPMENT INVESTIGATION RESULTS

	ADDING DEVICE 1		ADDING DEVICE 2						BF INLET [LASER]		BF OUTLET [IONIC ELECTROMETRY]						INLET HCl CONCENTRATION RELATIVE TO ADDED EQUIVALENTS [MEASURED VALUE]				
	ALKALI AGENT	FIXED QUANTITY ADDITION	FEEDBACK CONTROL						HCl	SOx	HCl CONCENTRATION O ₂ CONVERTED							ADDITION AMOUNT			
			CONTROL FORMAT	BASAL ADDITION AMOUNT	BASAL ADDITION COEFFICIENT	CONTROL TARGET VALUE					OUTLET HCl CONCENTRATION ACCORDING TO 1-HOUR AVERAGE VALUE	O ₂ CONVERTED VALUE	O ₂ CONVERTED VALUE	1-HOUR AVERAGE MAXIMUM	1-HOUR AVERAGE MINIMUM	INSTANTANEOUS MAXIMUM			INSTANTANEOUS MINIMUM	O ₂ CONVERTED VALUE	
						WHEN SLOPE OF HCl > 0	WHEN SLOPE OF HCl ≤ 0														
						(kg/h)	(%)														(ppm)
COMPARATIVE EXAMPLES 5	PULVERIZED SODIUM BICARBONATE	180	PID	-	-	200	200	-	-	904	1,295	0	154	165	246	138	61	0	253	0.95	-
COMPARATIVE EXAMPLES 6	PULVERIZED SODIUM BICARBONATE	180	STEP	-	-	180	220	-	-	975	1,434	0	194	211	283	177	115	0	265	0.90	-
EXAMPLES 23	PULVERIZED SODIUM BICARBONATE	180	STEP	30 min	70%	180	220	>213ppm 300 kg/h	-	1,102	1,565	0	186	198	279	164	128	0	265	0.82	-
EXAMPLES 24	SLAKED LIME	170	STEP	30 min	70%	180	220	>213ppm 300 kg/h	-	1,057	1,515	0	178	196	267	144	79	0	88	0.28	1.2

FIG. 39

FIG 40

COMPARATIVE EXAMPLE 5

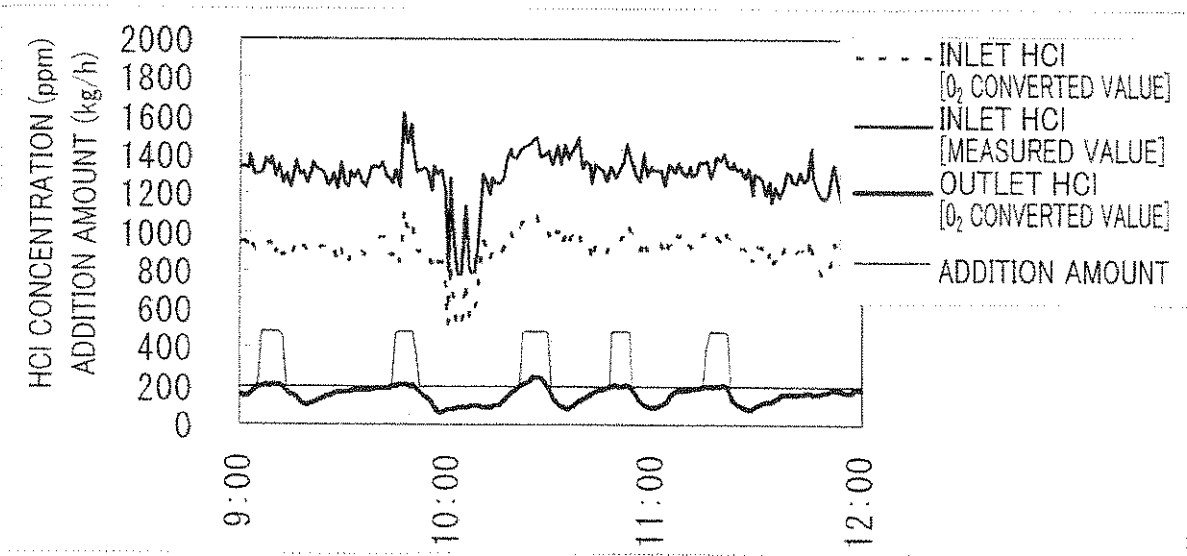


FIG. 41

COMPARATIVE EXAMPLE 6, AND EXAMPLES 23, 24 SETTINGS OF ADDING DEVICE 2 (FEEDBACK CONTROL)

		SETTING	HCl SLOPE > 0 SETTING	HCl SLOPE = < 0 SETTING	COMPARATIVE EXAMPLE 6				CONTROL OUTPUT ADDITION AMOUNT Ag (kg/h)	CONTROL OUTPUT ADDITION AMOUNT Ag (kg/h)	CONTROL OUTPUT ADDITION AMOUNT Ag1 (kg/h)
					MEASUREMENT SIGNAL (PV)	TABLE OF CONTROL OUTPUT FOR HCl SLOPE > 0 INPUT HCl VALUE	TABLE OF CONTROL OUTPUT FOR HCl SLOPE = < 0 INPUT HCl VALUE	CONTROL OUTPUT ADDITION AMOUNT Ag (kg/h)			
SV	CONTROL HCl VALUE DATA, 2000, 20										

NOTE: EXAMPLES 23 AND 24 ADD 300 kg/h WHEN 1-H AVERAGE VALUE OF OUTLET HCl CONCENTRATION IS AT LEAST 243 ppm.

IN ADDITION TO PRESENT SETTING

$$[FORMULA 1] \text{ Ag} = (LM1-LO) / 20 \times (PV-SV) / (SM1-SV) \times 20$$

FIG 42

COMPARATIVE EXAMPLE 6

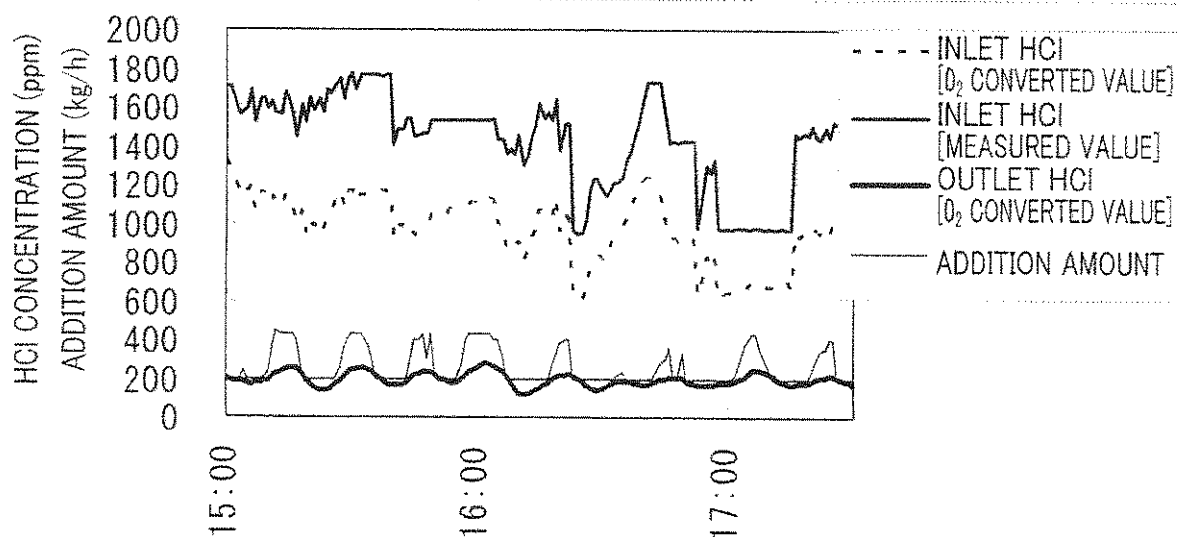


FIG 43

EXAMPLE 23

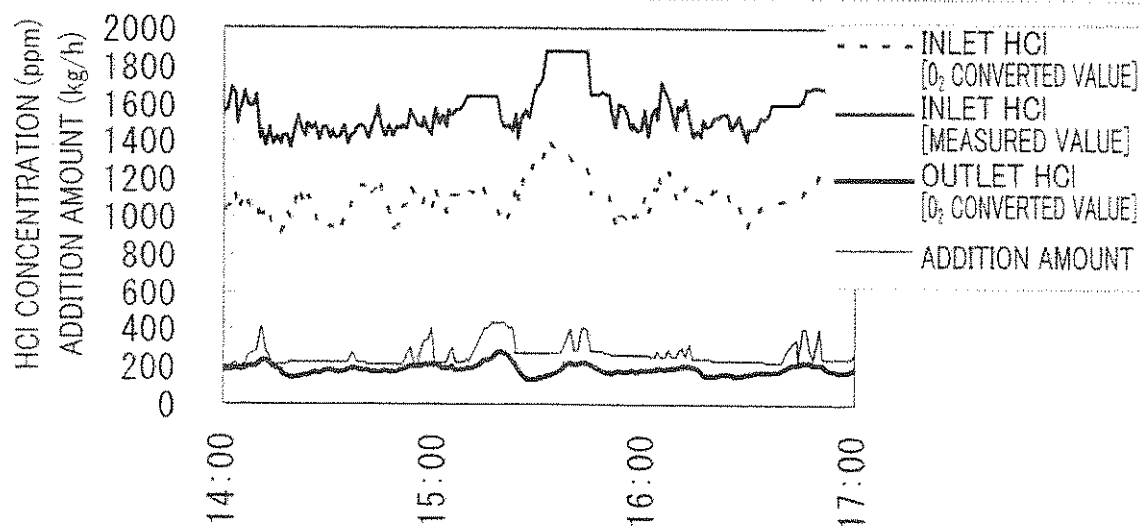


FIG 44

EXAMPLE 24

