

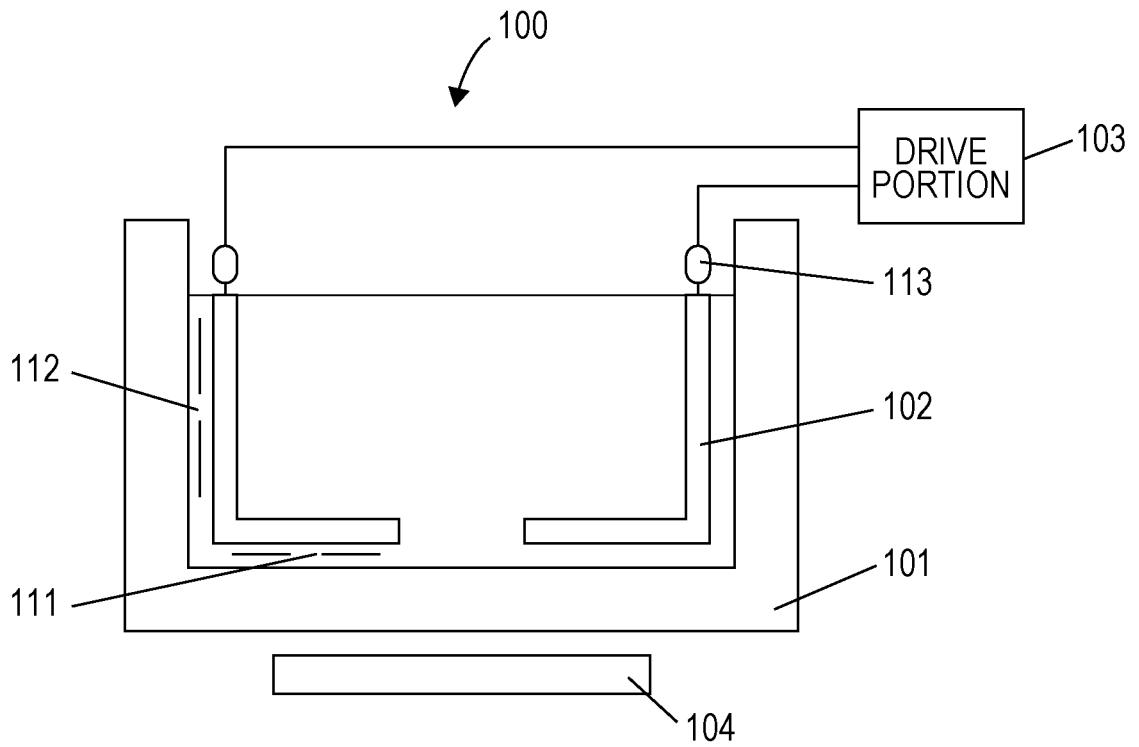
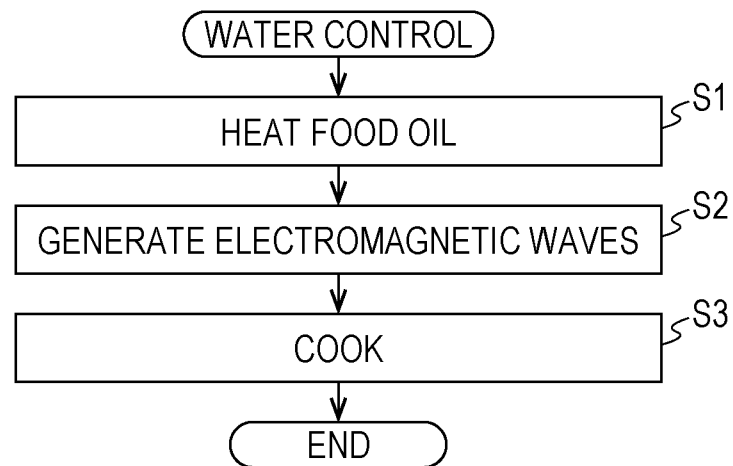
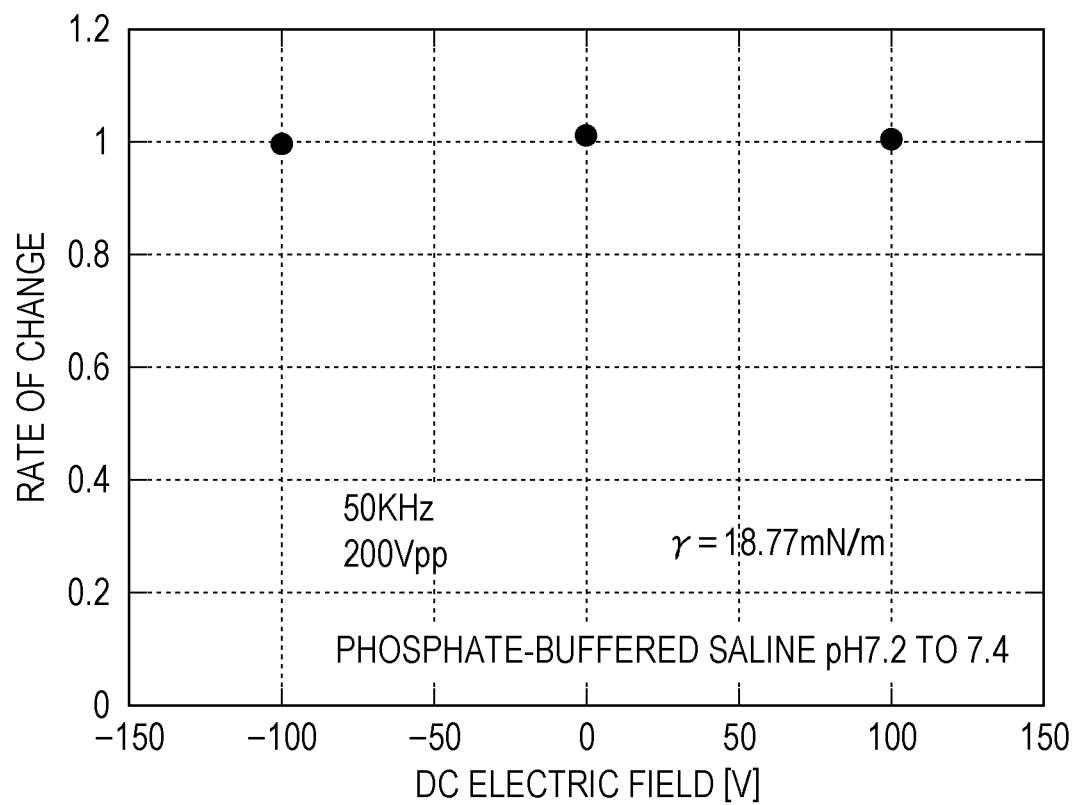
FIG. 1**FIG. 2**

FIG. 3

(a)



(b)

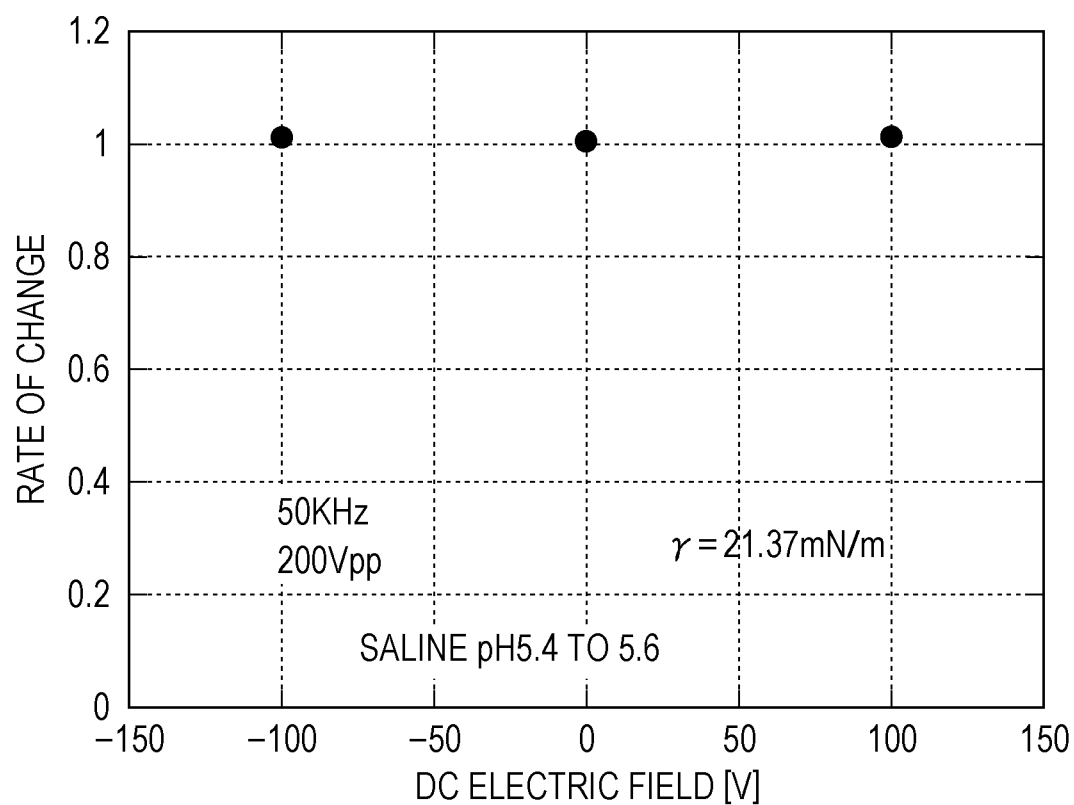


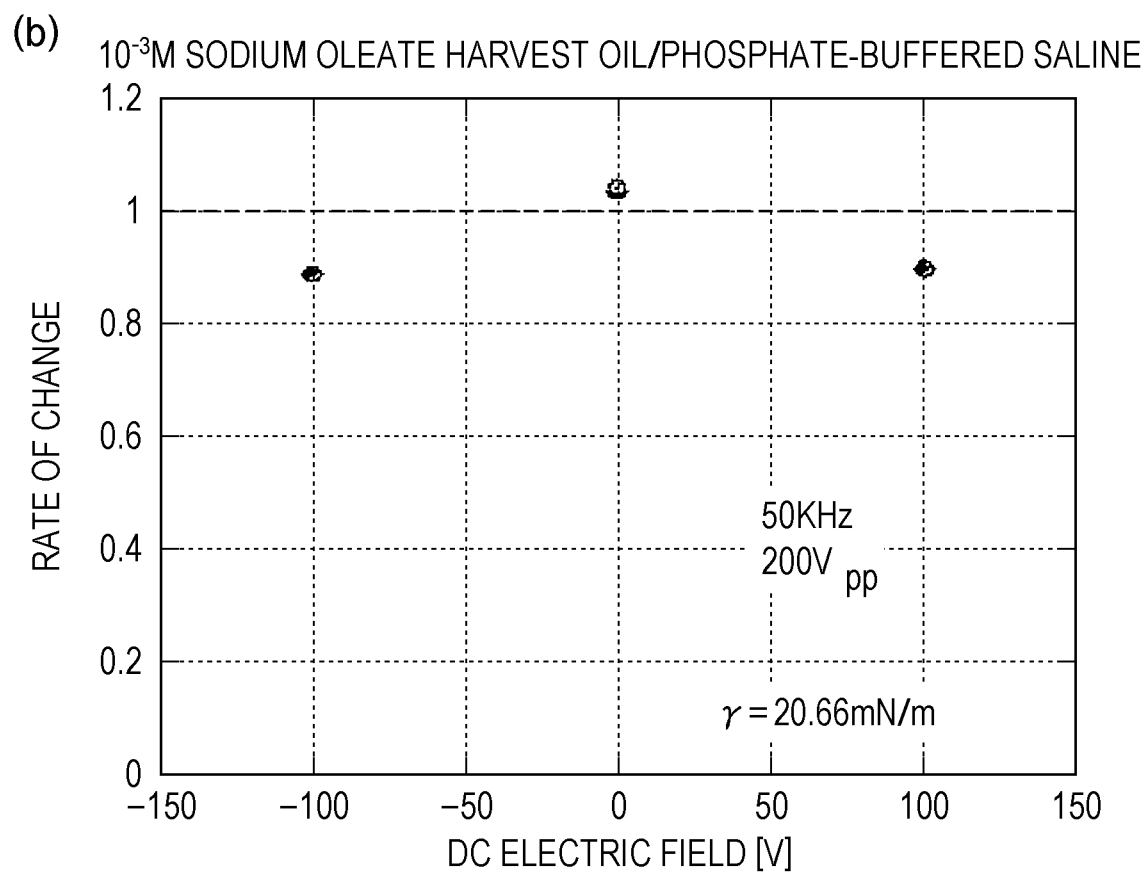
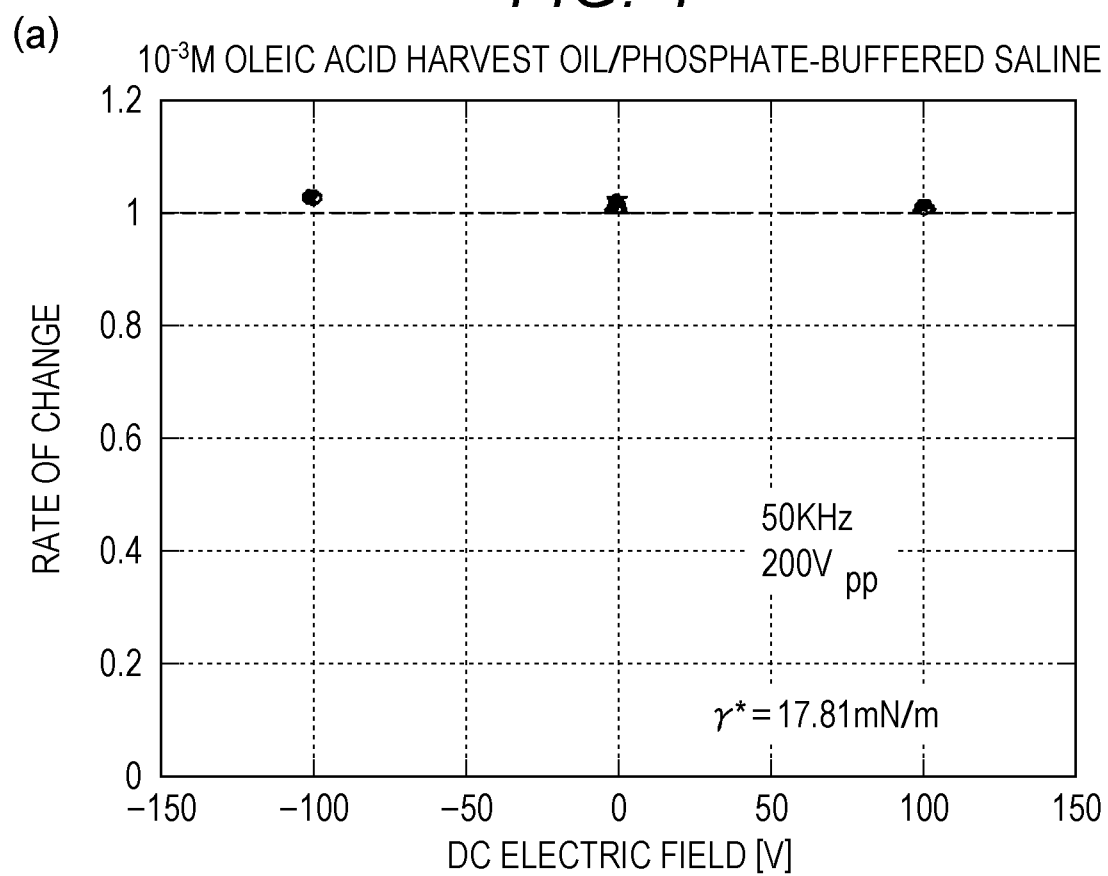
FIG. 4

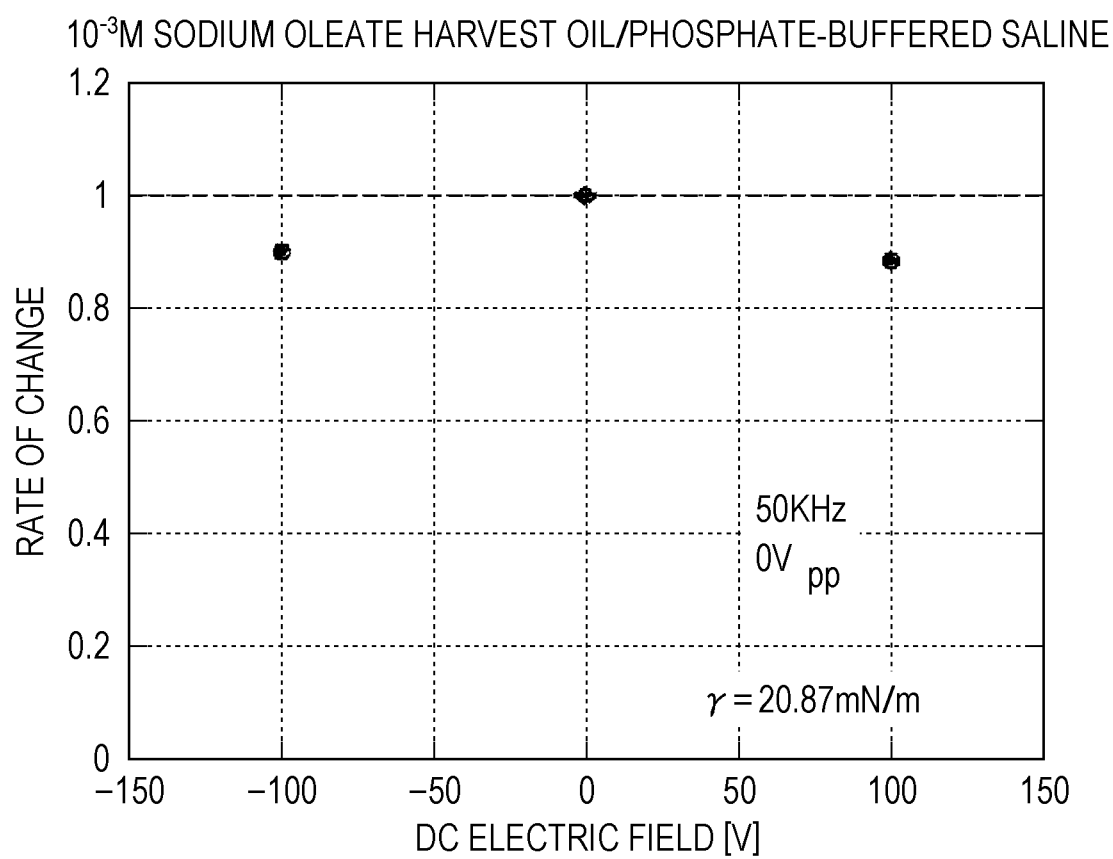
FIG. 5

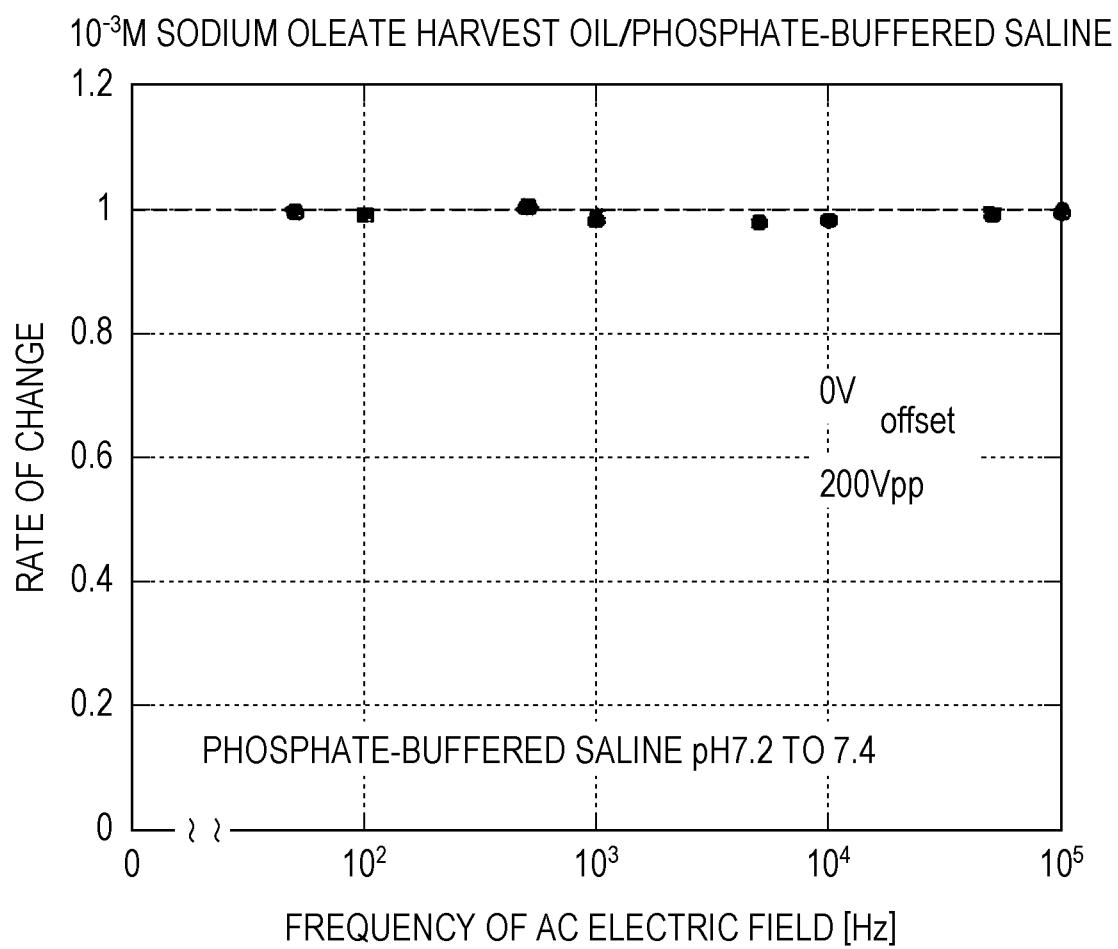
FIG. 6

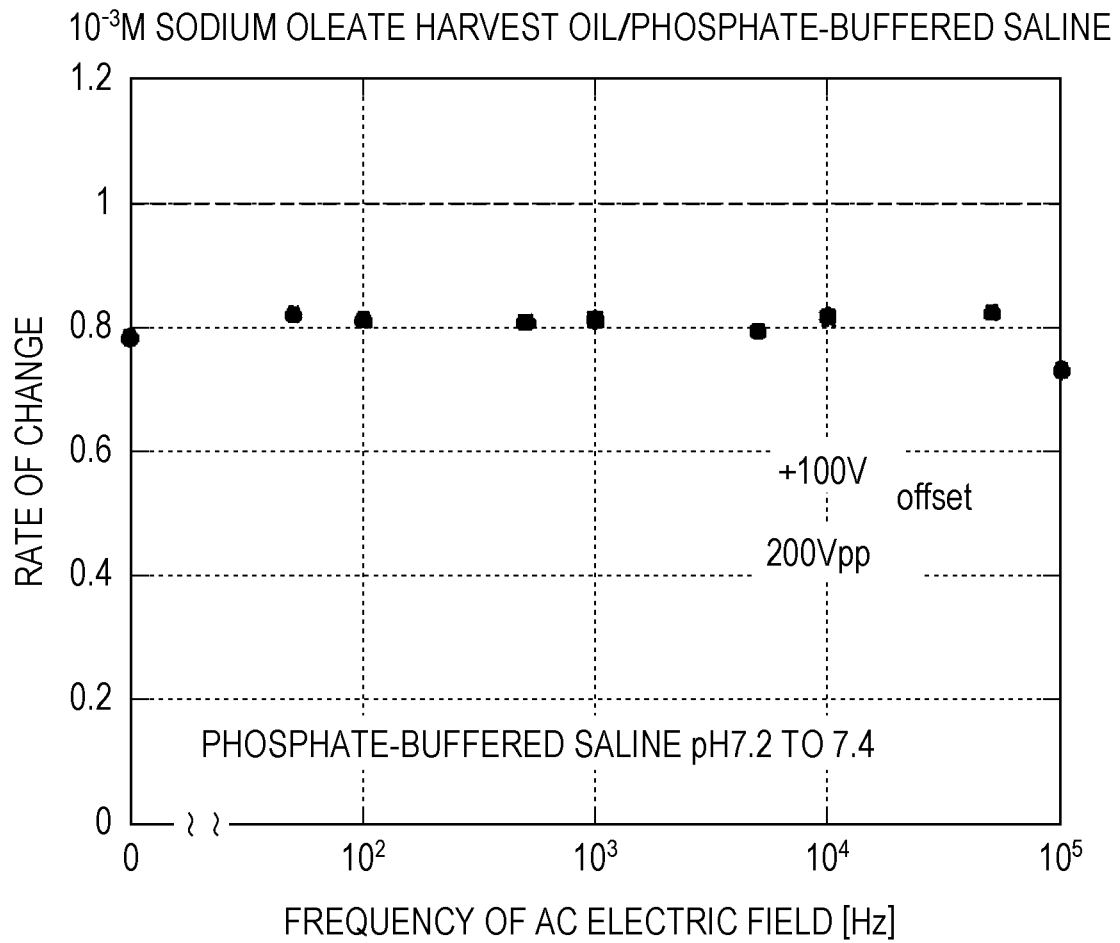
FIG. 7

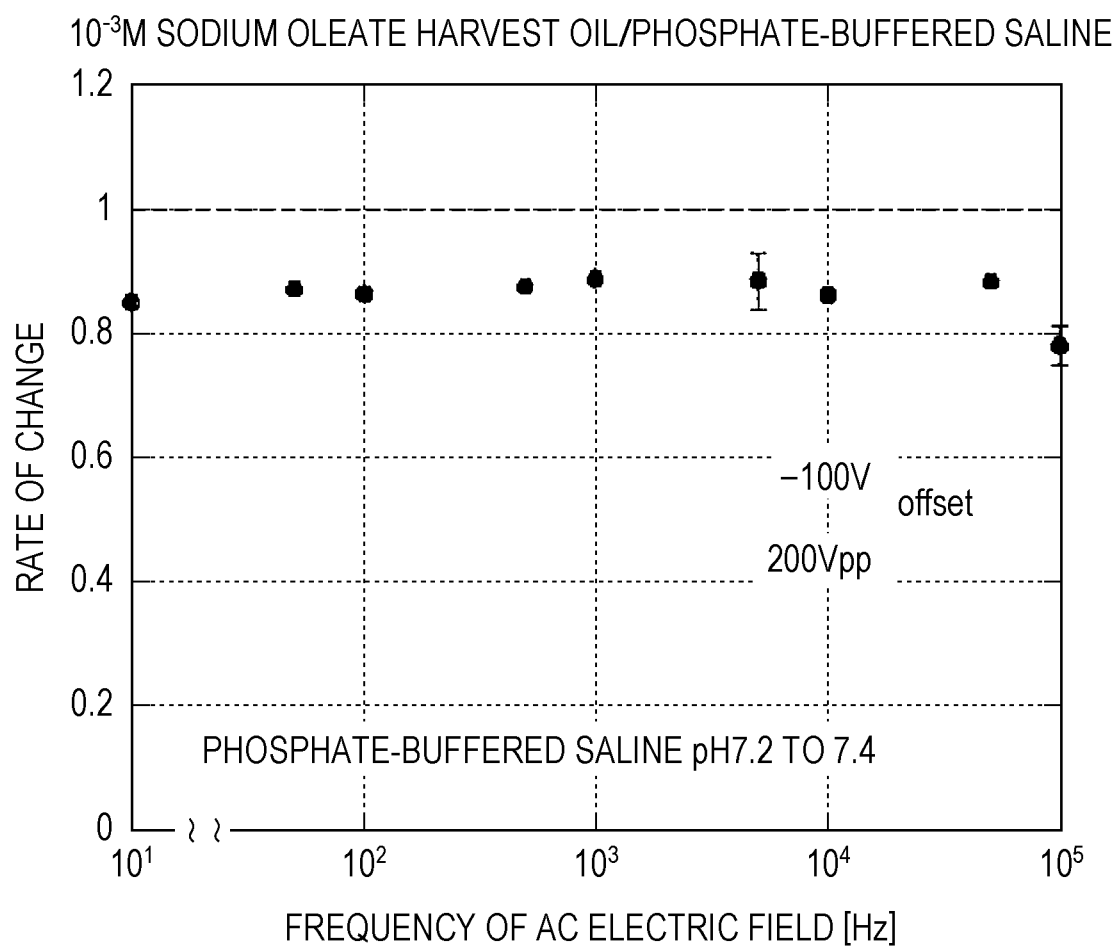
FIG. 8

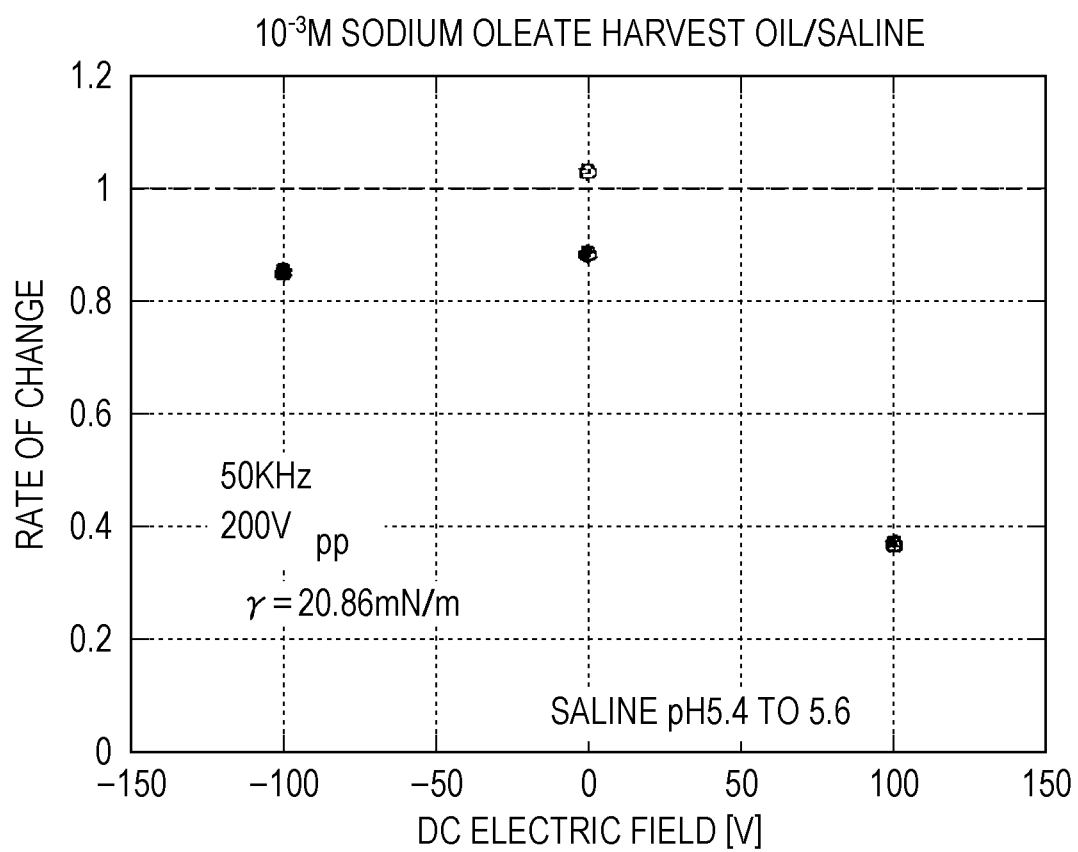
FIG. 9

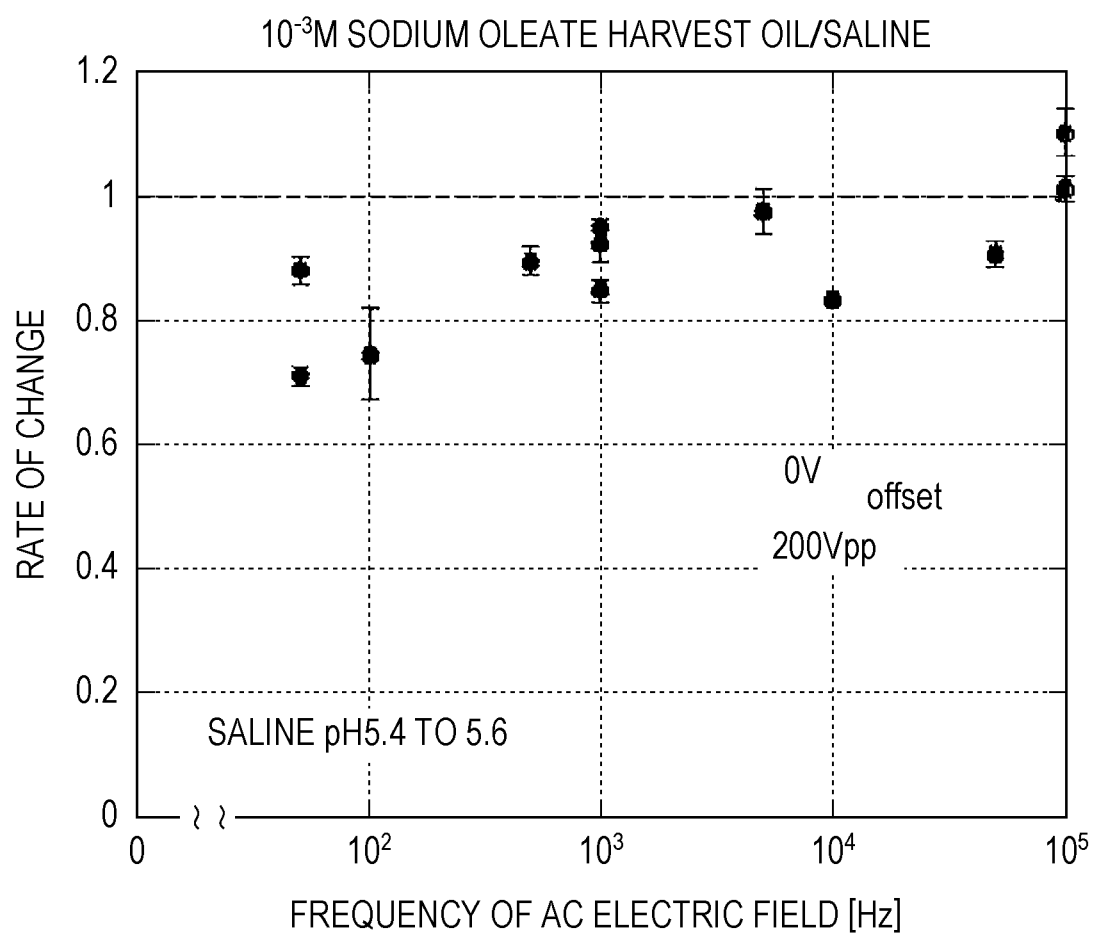
FIG. 10

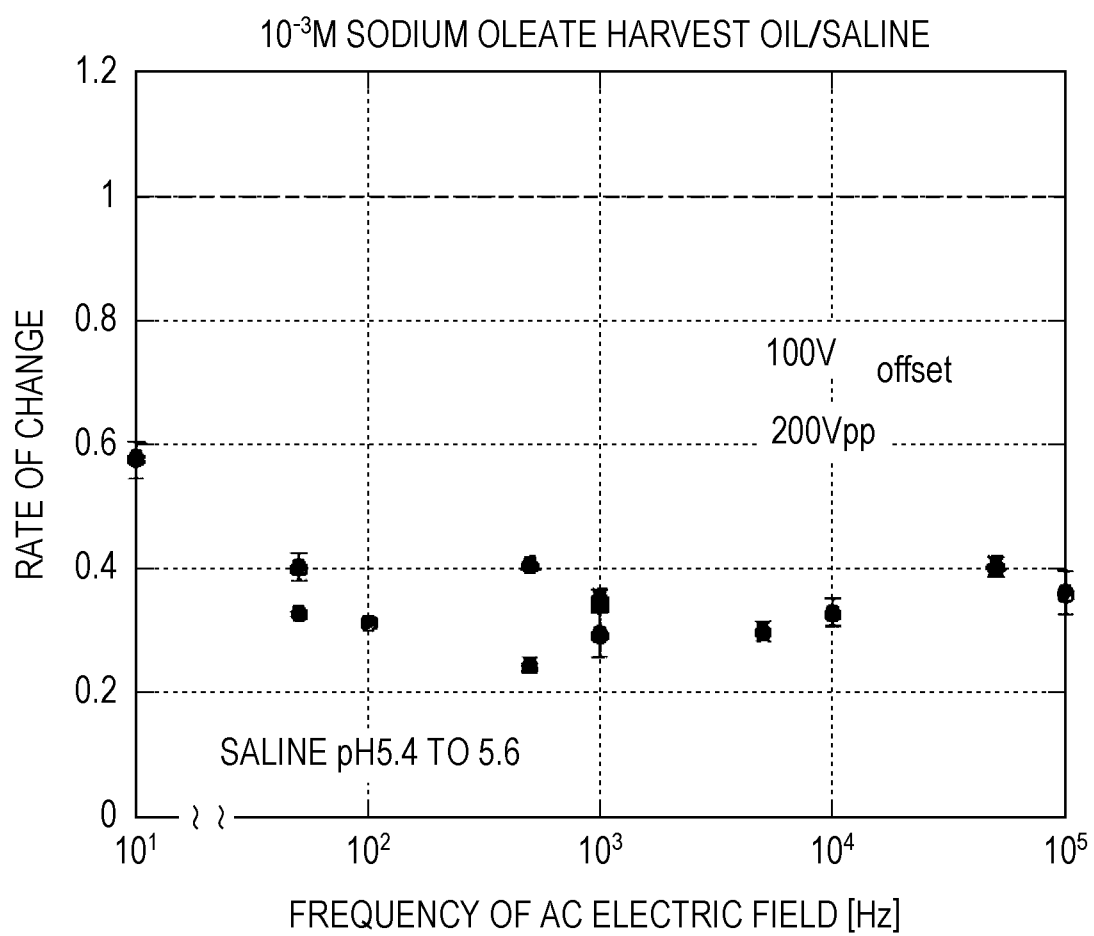
FIG. 11

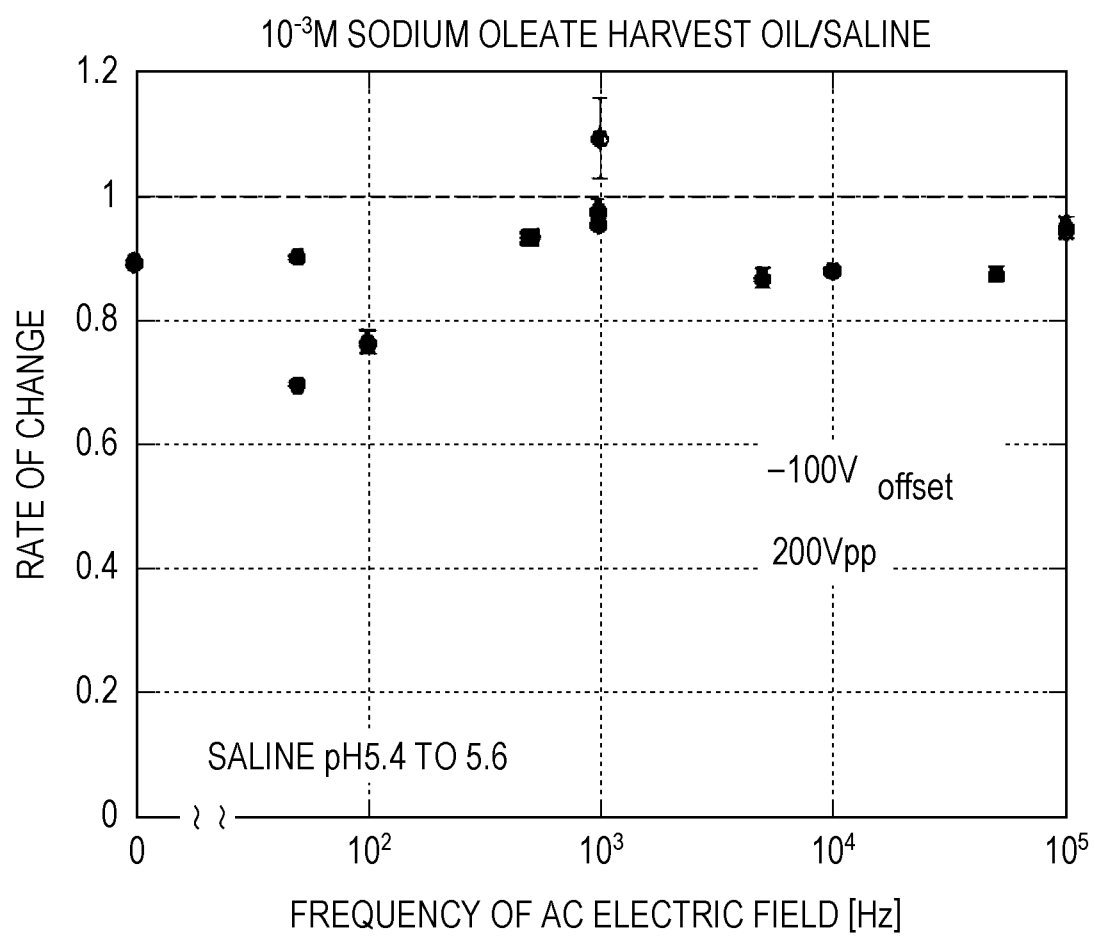
FIG. 12

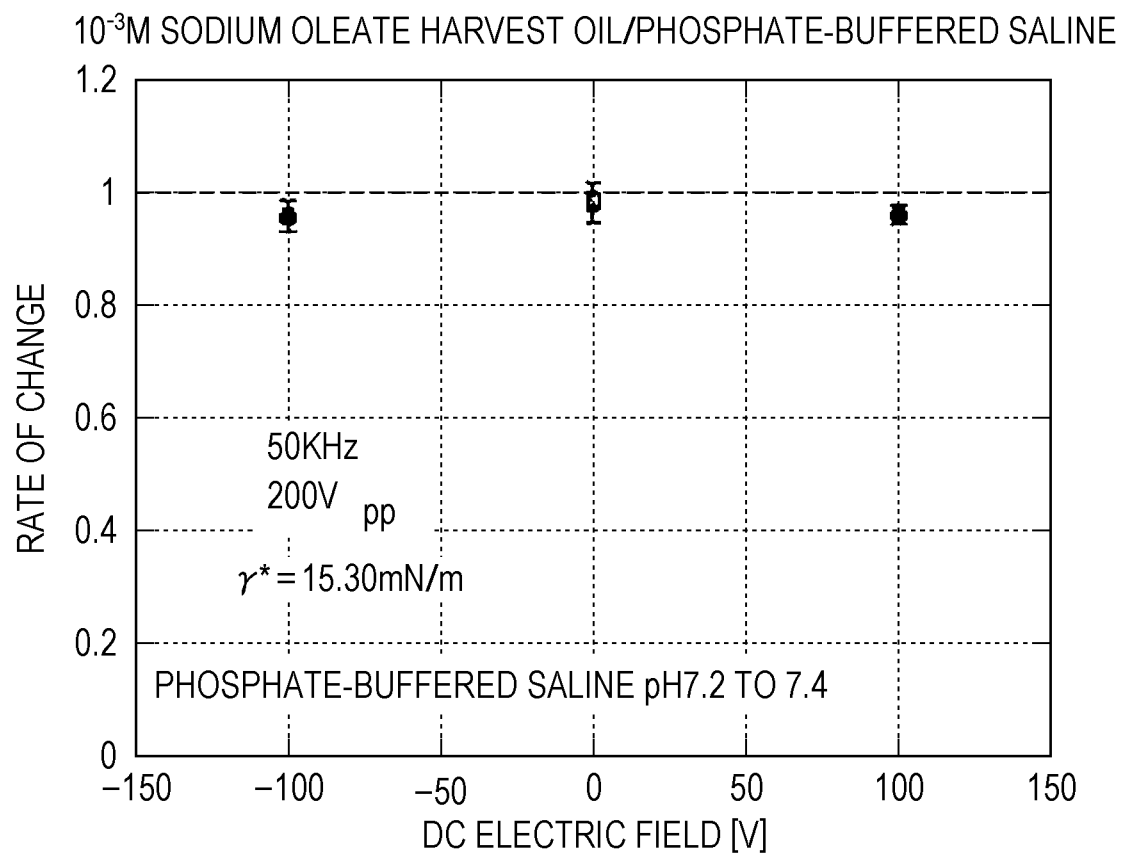
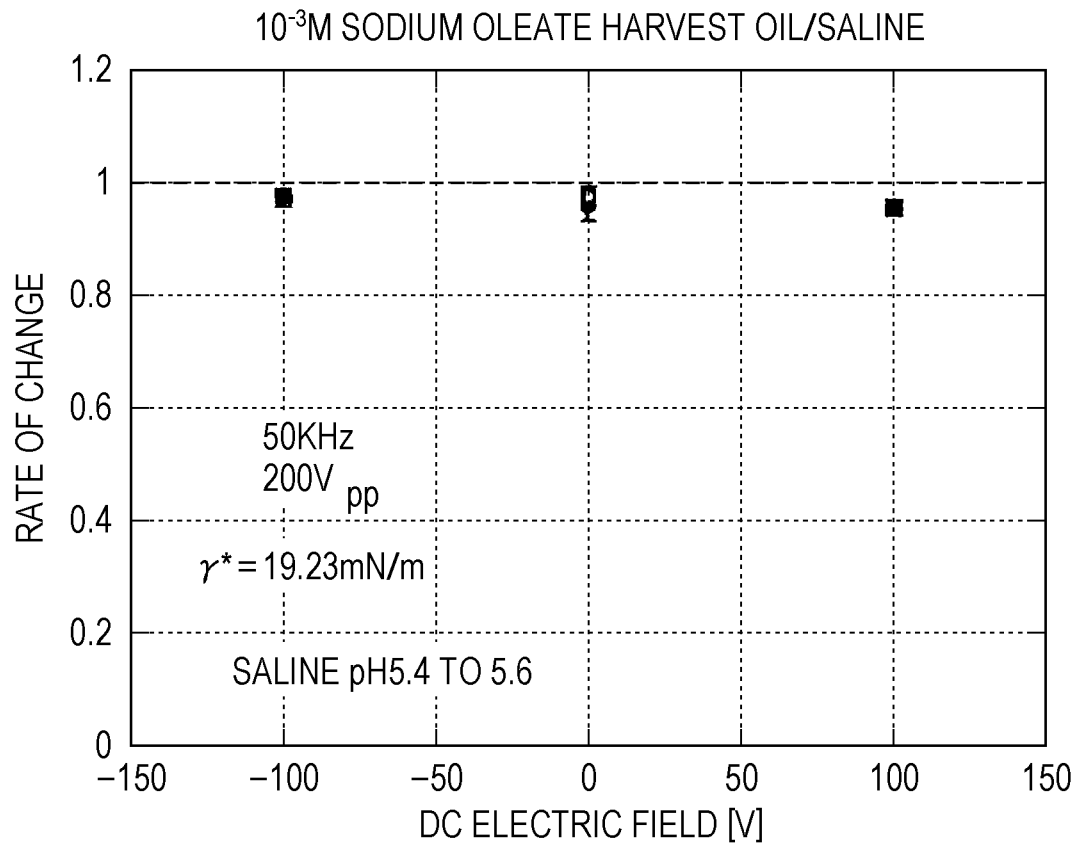
FIG. 13

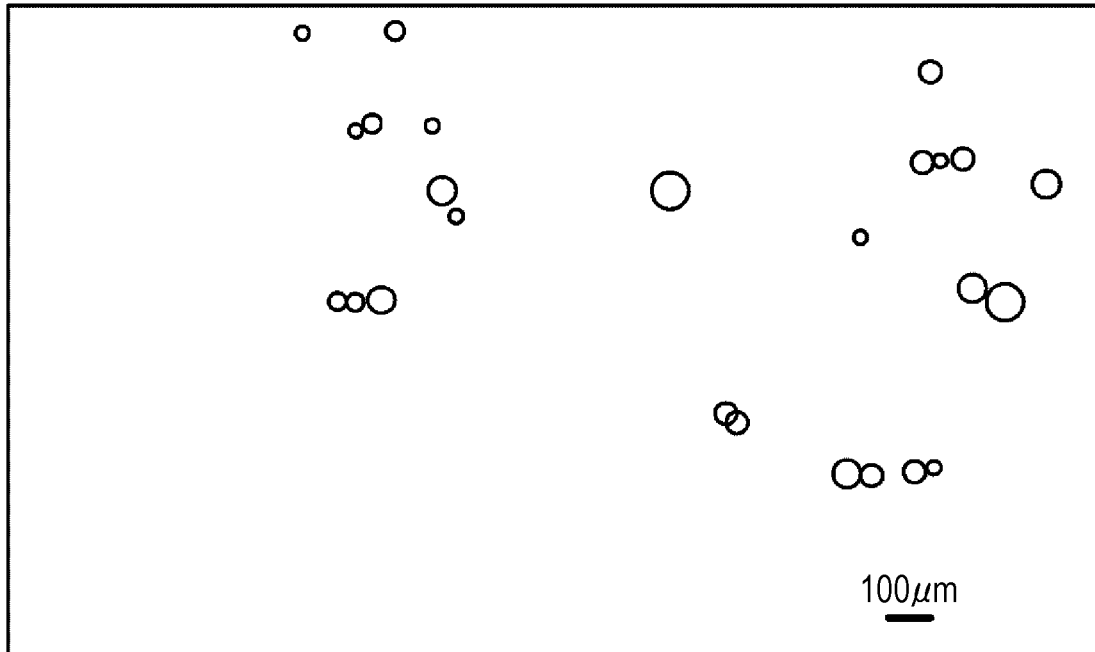
FIG. 14**FIG. 15**

E, V _{pp} /cm (50kHz, 0V _{offset})	HARVEST OIL		HARVEST OIL/SODIUM OLEATE	
	pH7.2 TO 7.4 PHOSPHATE-BUFFERED SALINE	pH5.4 TO 5.6 SALINE	pH7.2 TO 7.4 PHOSPHATE-BUFFERED SALINE	pH5.4 TO 5.6 SALINE
0	×	×	×	×
200	×	×	△	△
500	×	×	○	○
1000	×	×	○	○
2000	×	×	—	—

○ : FORMATION OF
PEARL CHAINS△ : RESPONDED TO
ELECTRIC FIELD

× : NOT CHANGED

— : UNOBSERVABLE DUE TO
FLOW GENERATION

FIG. 16**FIG. 17**

(a) PHOSPHATE-BUFFERED SALINE (pH7.2 TO 7.4)

V _{pp} /cm	50Hz	100Hz	500Hz	1kHz	5kHz	10kHz	50kHz	100kHz
0	×	×	×	×	×	×	×	×
200	×	×	×	×	×	×	×	×
500	×	×	×	×	×	×	×	×
1000	×	×	×	×	×	×	×	×
2000	×	×	×	×	×	×	×	×

(b) SALINE (pH5.4 TO 5.6)

V _{pp} /cm	50Hz	100Hz	500Hz	1kHz	5kHz	10kHz	50kHz	100kHz
0	×	×	×	×	×	×	×	×
200	×	×	×	×	×	×	×	×
500	×	×	×	×	×	×	×	×
1000	×	×	×	×	×	×	×	×
2000	×	×	×	×	×	×	×	×

○ : FORMATION OF PEARL CHAINS

△ : RESPONDED TO ELECTRIC FIELD

× : NOT CHANGED

— : UNOBSERVABLE DUE TO FLOW GENERATION

FIG. 18

(a) PHOSPHATE-BUFFERED SALINE (pH7.2 TO 7.4)

V _{pp} /cm	50Hz	100Hz	500Hz	1kHz	5kHz	10kHz	50kHz	100kHz
0	×	×	×	×	×	×	×	×
200	△	△	△	△	△	△	△	×
500	○/—	○/—	○	○	○	○	○	○
1000	—	—	○/—	○/—	○/—	○	○	○
2000	—	—	—	—	—	—	—	○

(b) SALINE (pH5.4 TO 5.6)

V _{pp} /cm	50Hz	100Hz	500Hz	1kHz	5kHz	10kHz	50kHz	100kHz
0	×	×	×	×	×	×	×	×
200	△	△	△	△	△	△	△	×
500	○	○	○	○	○	○	○	○
1000	—	—	—	○/—	○/—	○	○	○
2000	—	—	—	—	—	—	—	○

○ : FORMATION OF
PEARL CHAINS△ : RESPONDED TO
ELECTRIC FIELD

× : NOT CHANGED

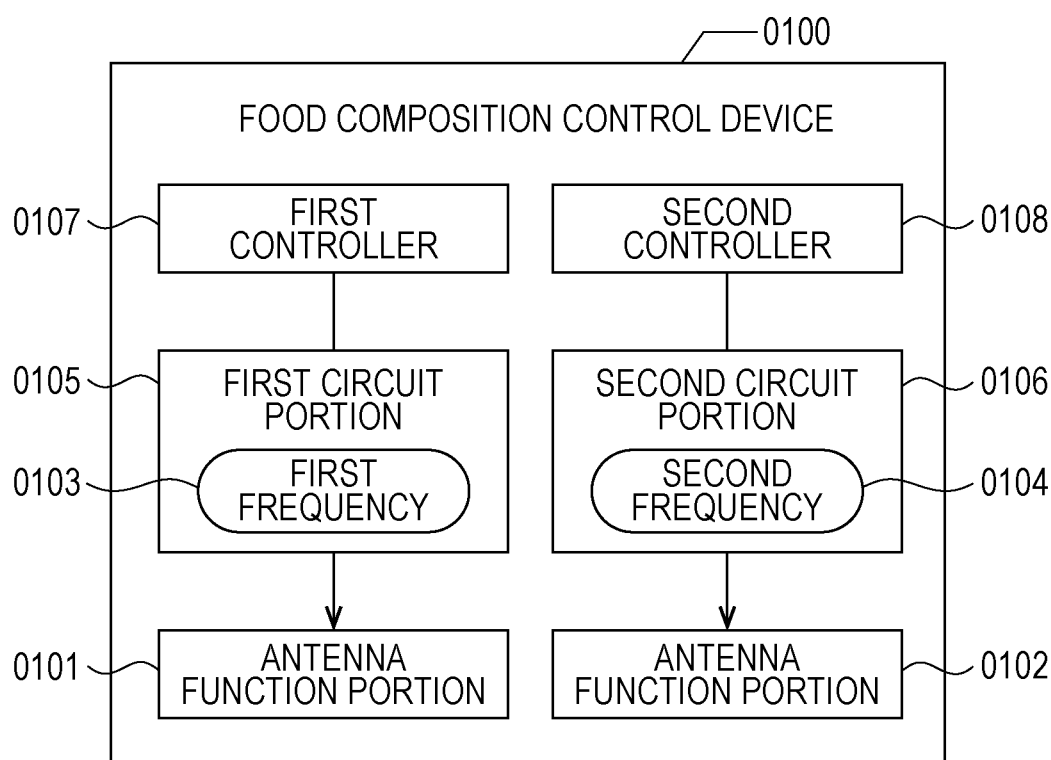
— : UNOBSERVABLE DUE TO
FLOW GENERATION**FIG. 19**

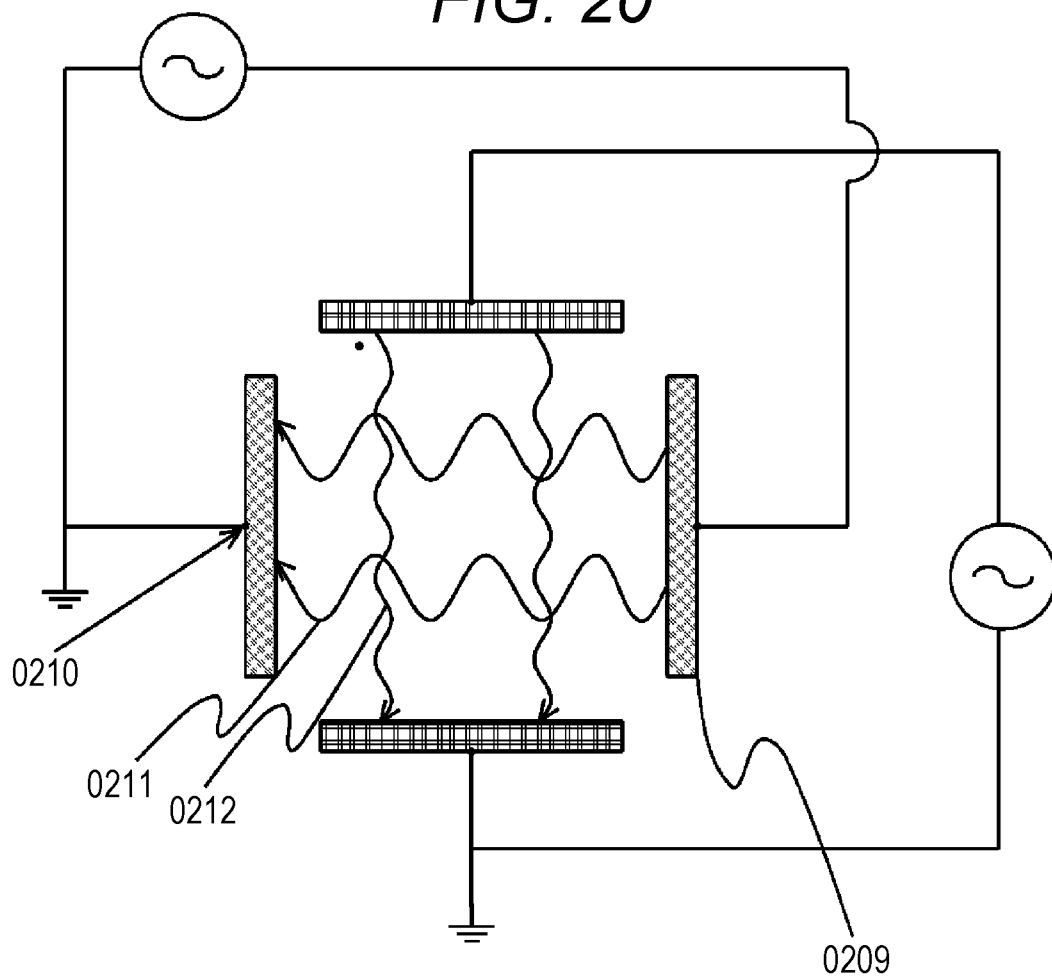
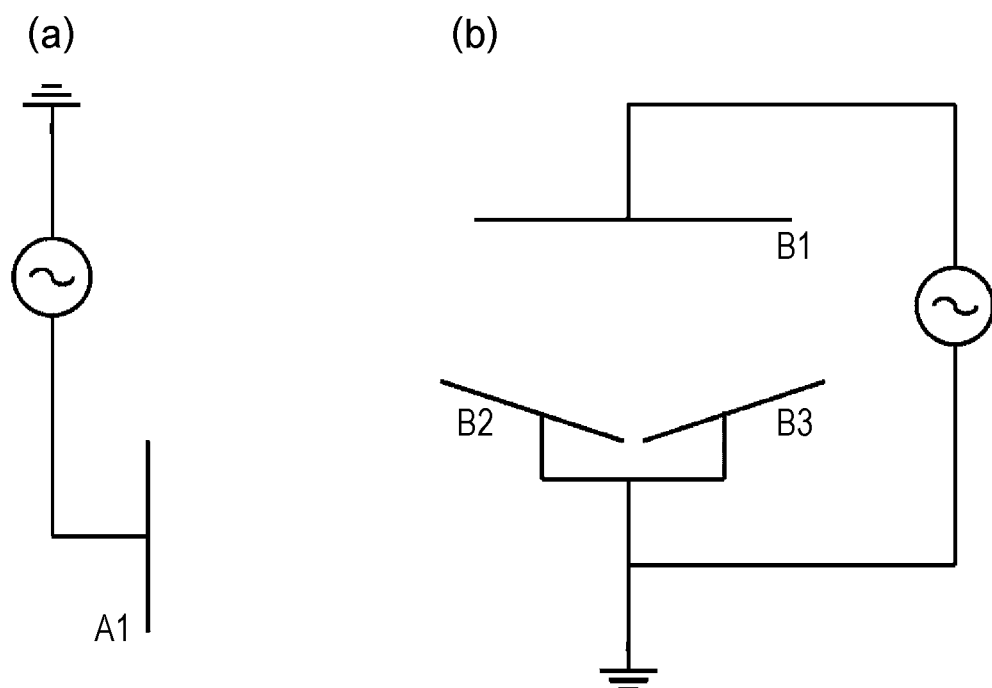
FIG. 20*FIG. 21*

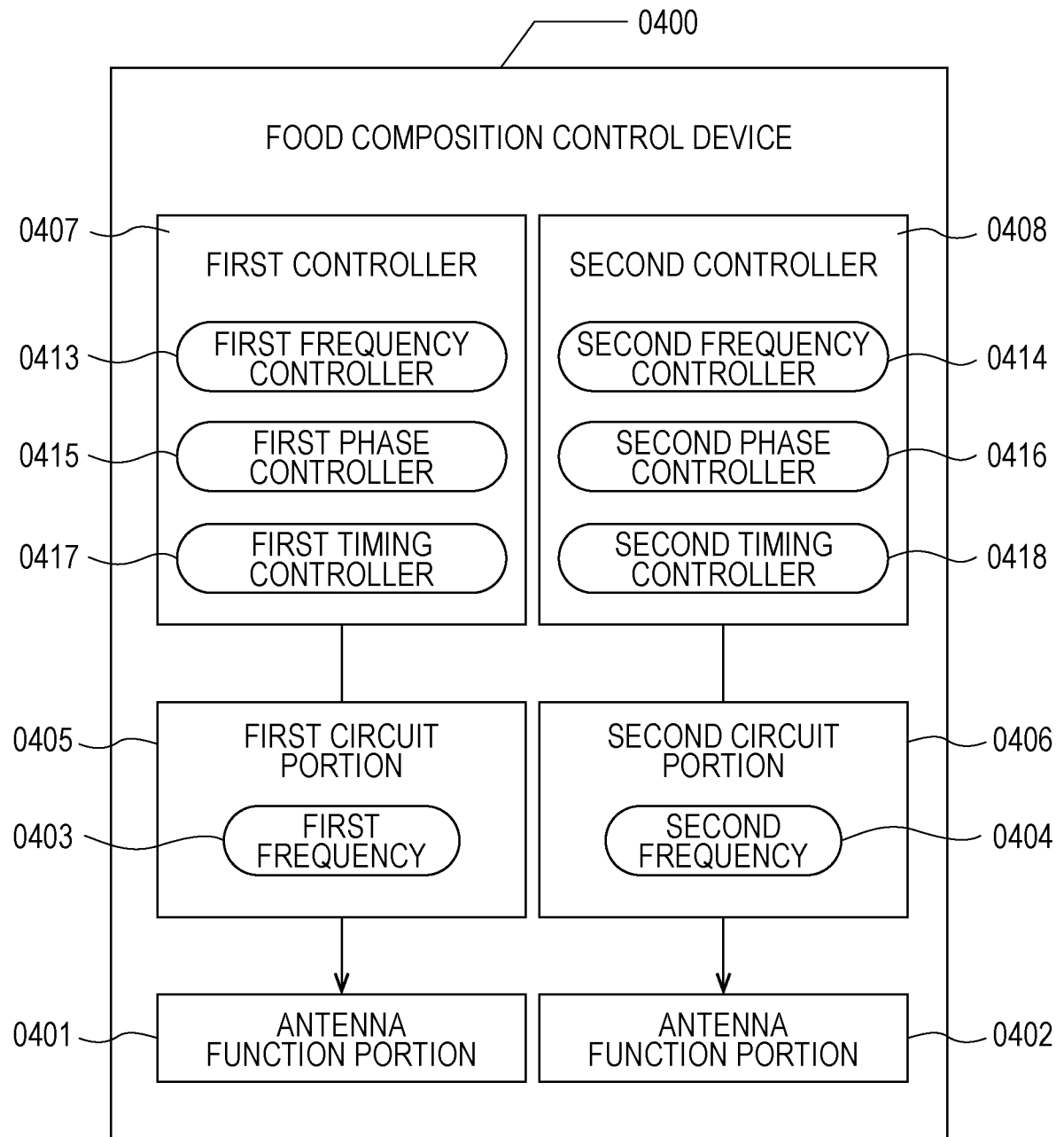
FIG. 22

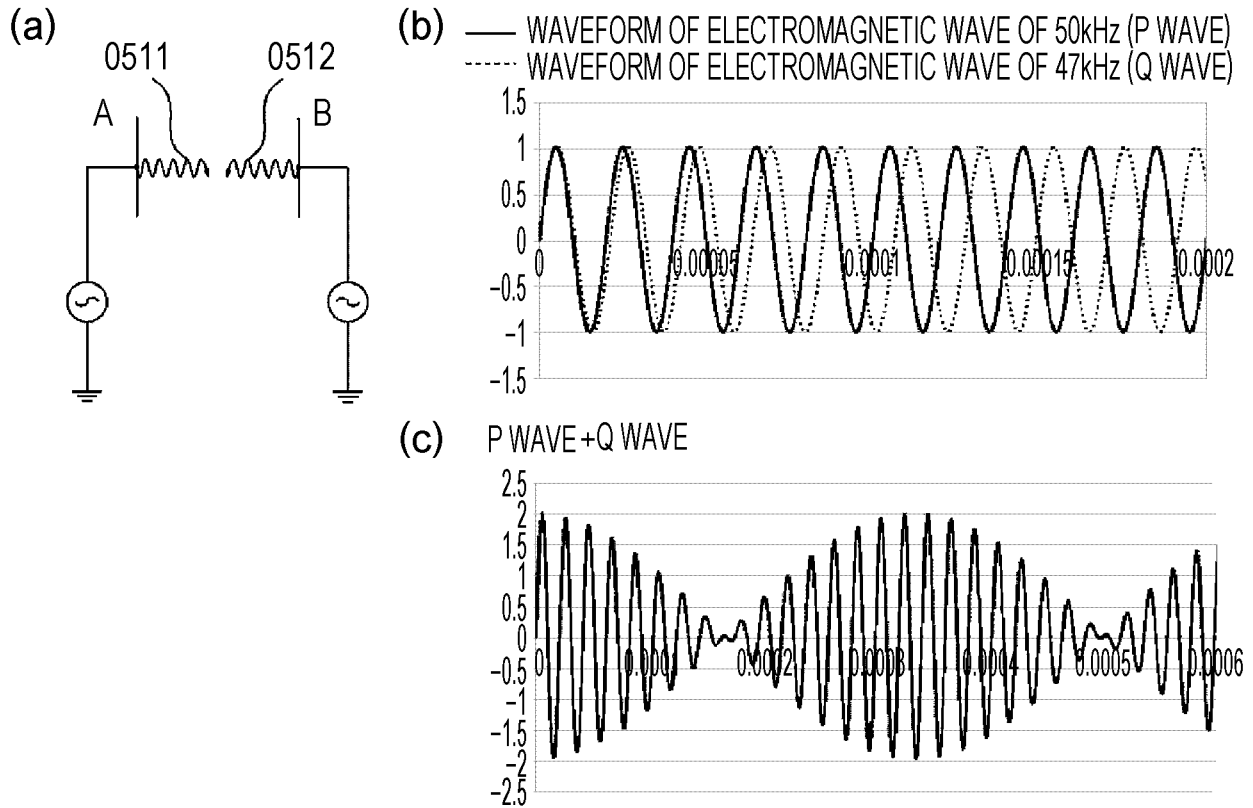
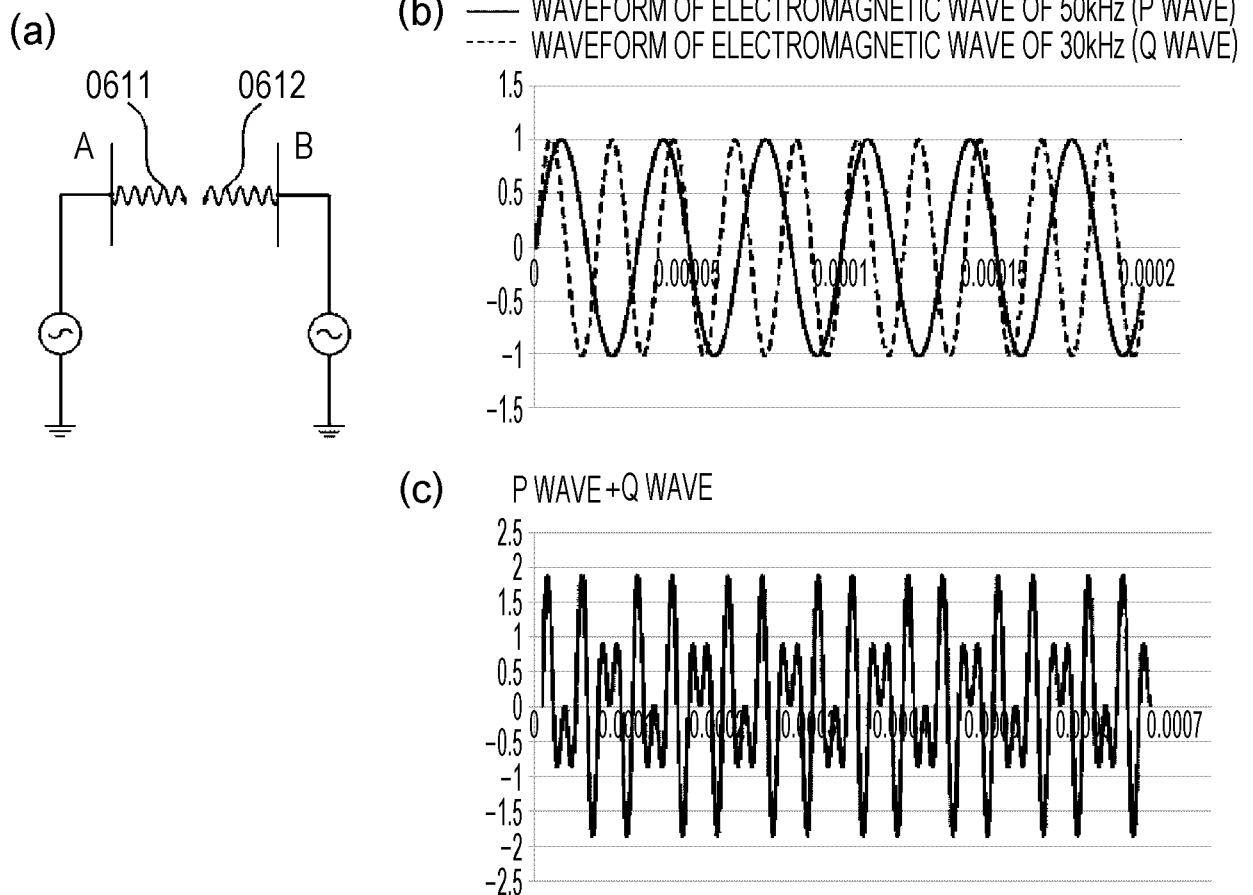
FIG. 23**FIG. 24**

FIG. 25

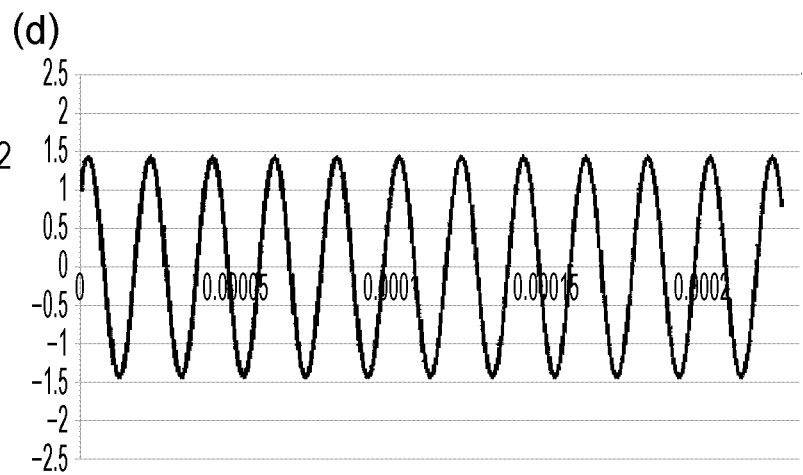
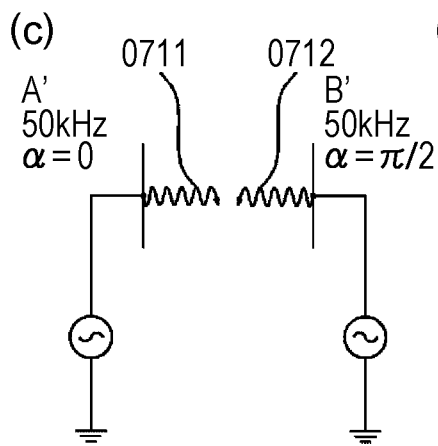
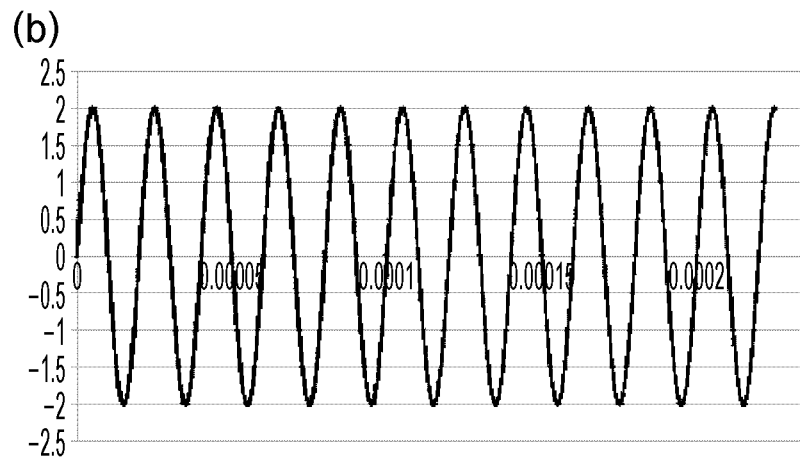
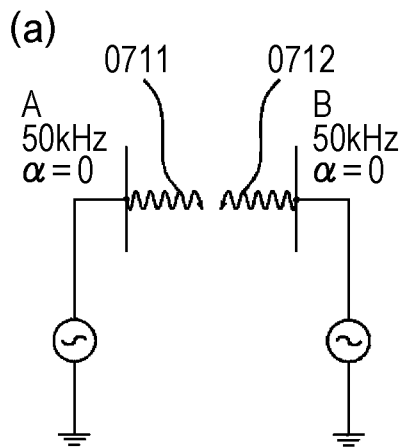


FIG. 26

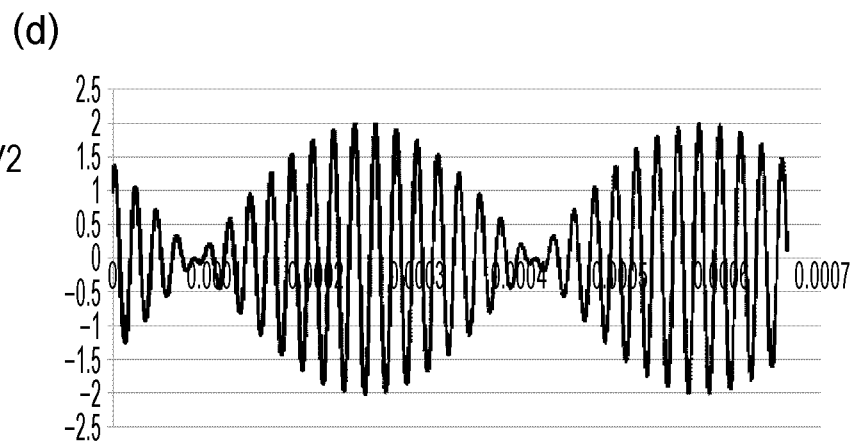
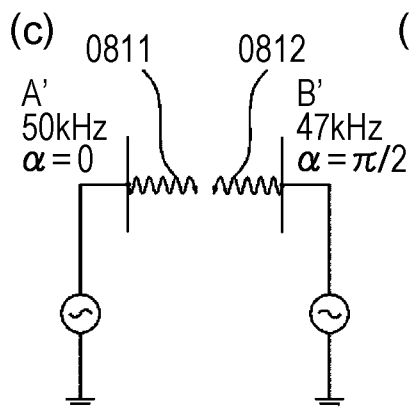
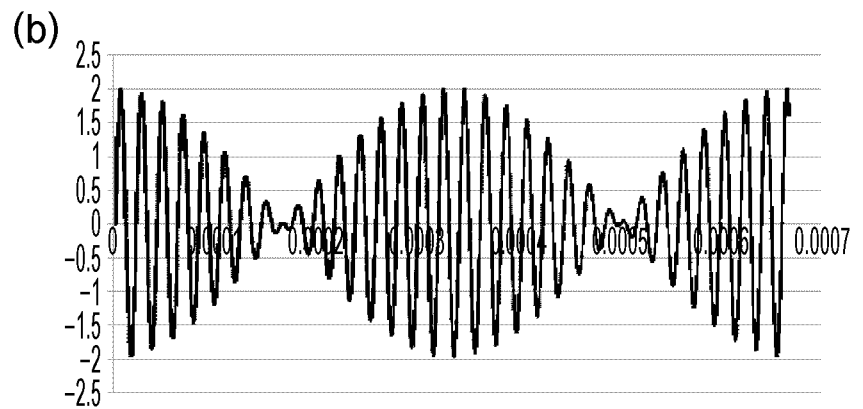
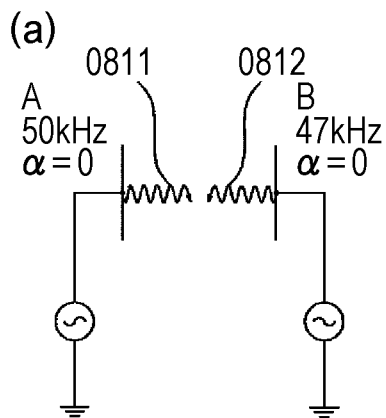


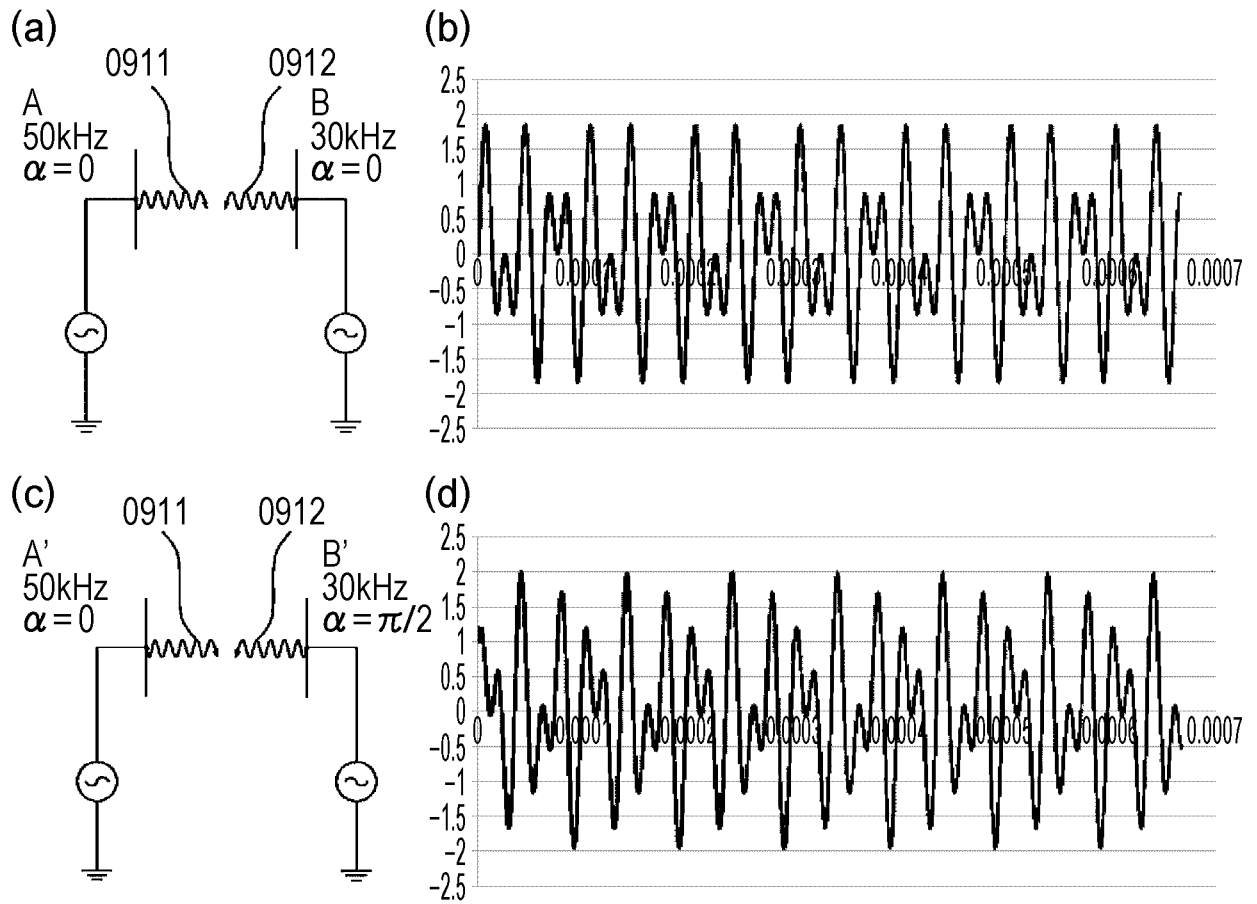
FIG. 27

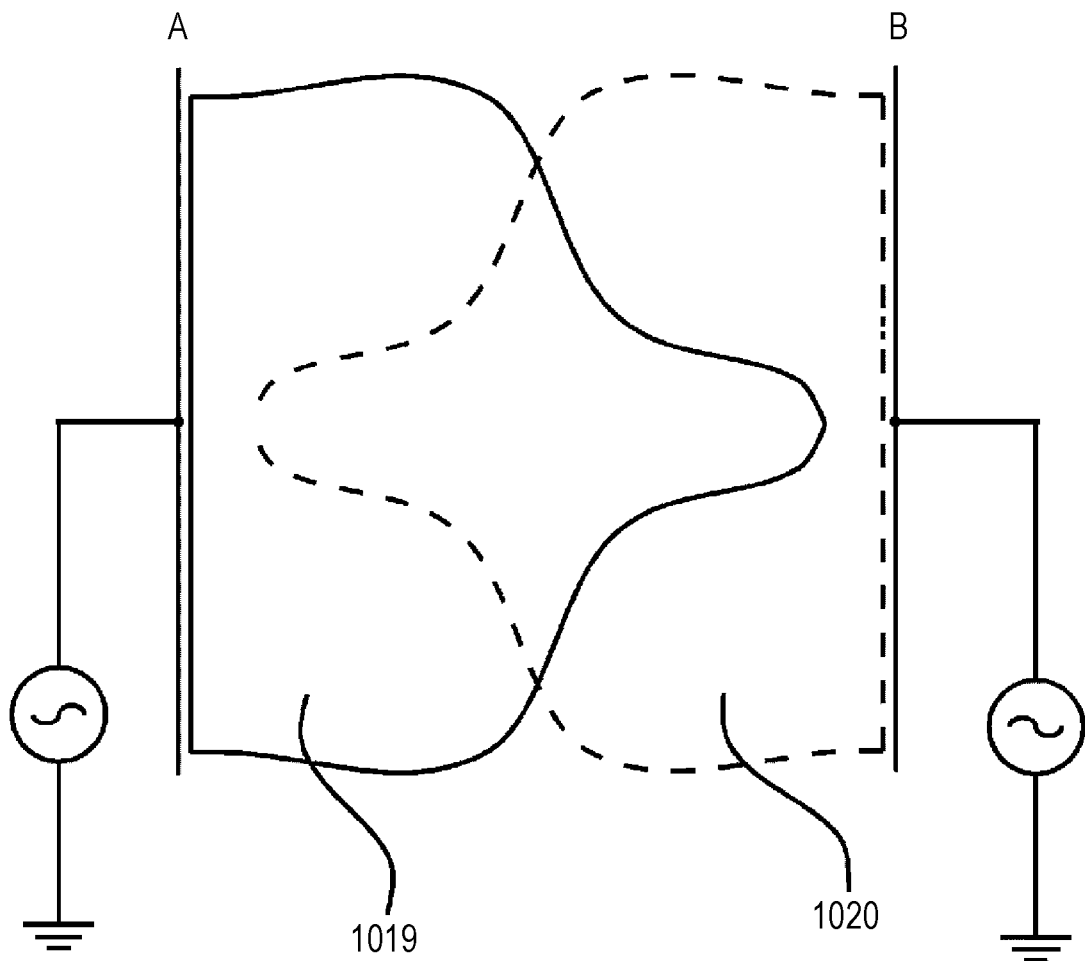
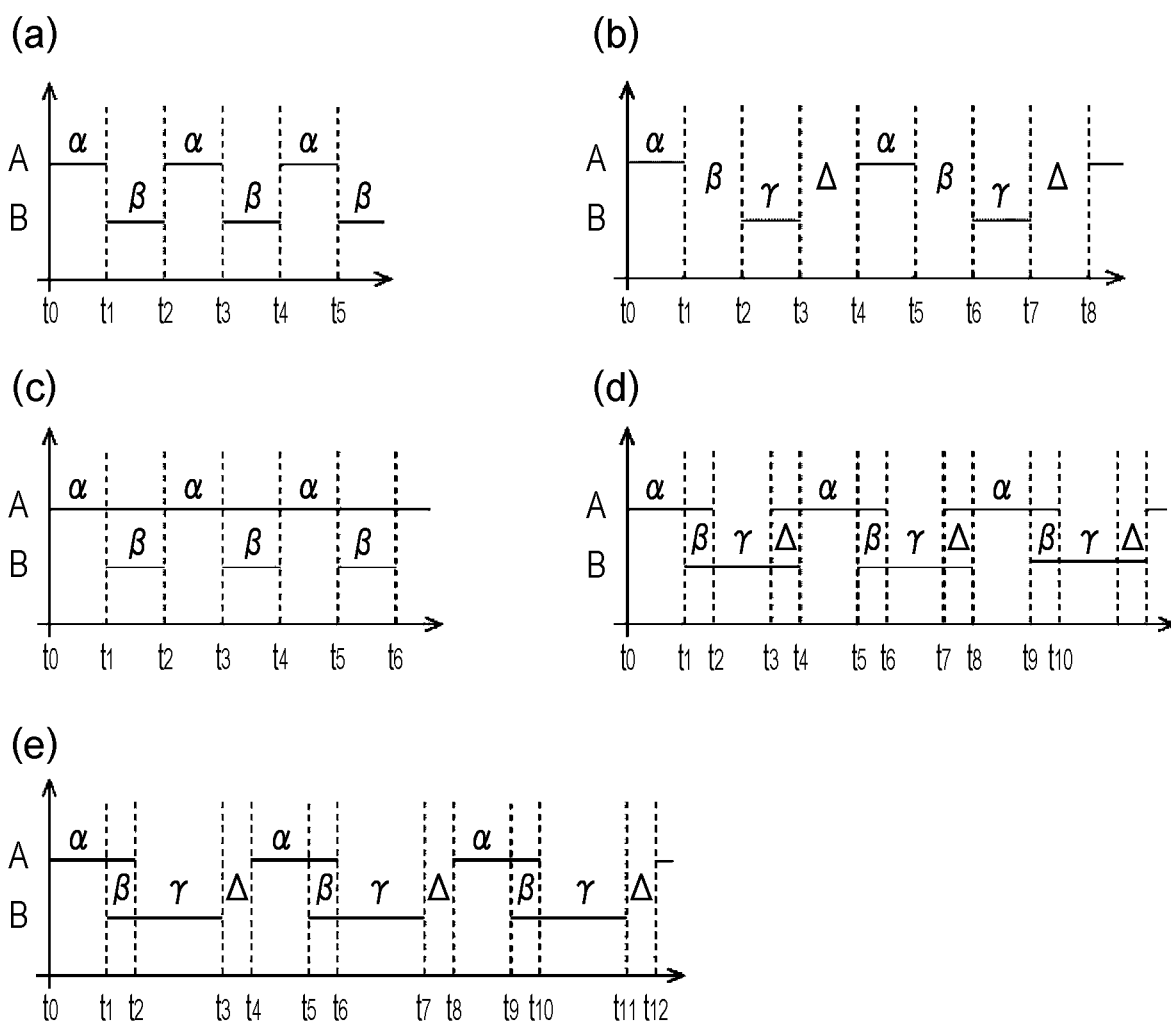
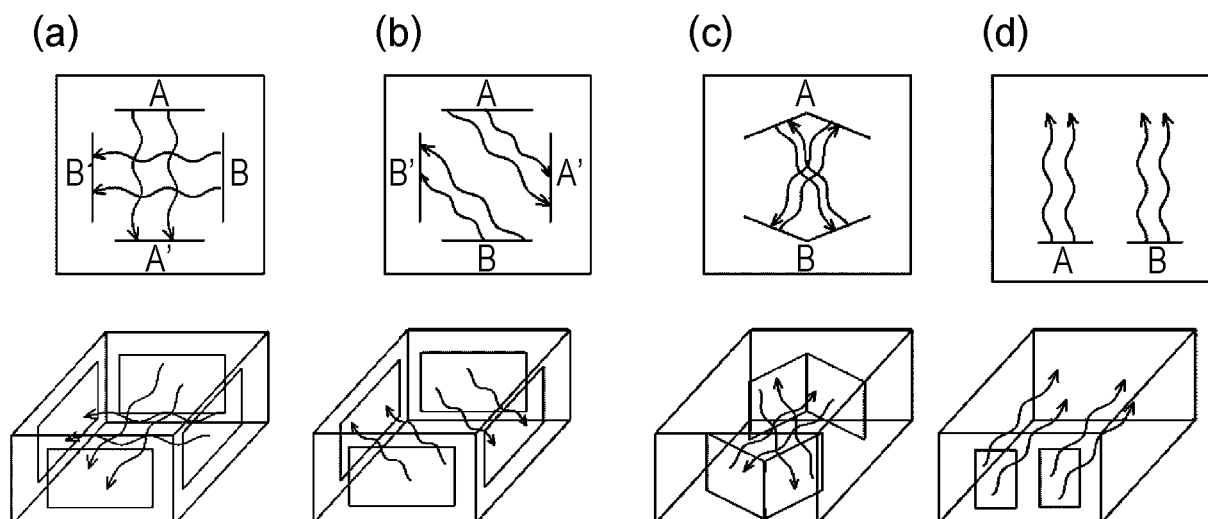
FIG. 28A

FIG. 28B**FIG. 29A**

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FIG. 29B

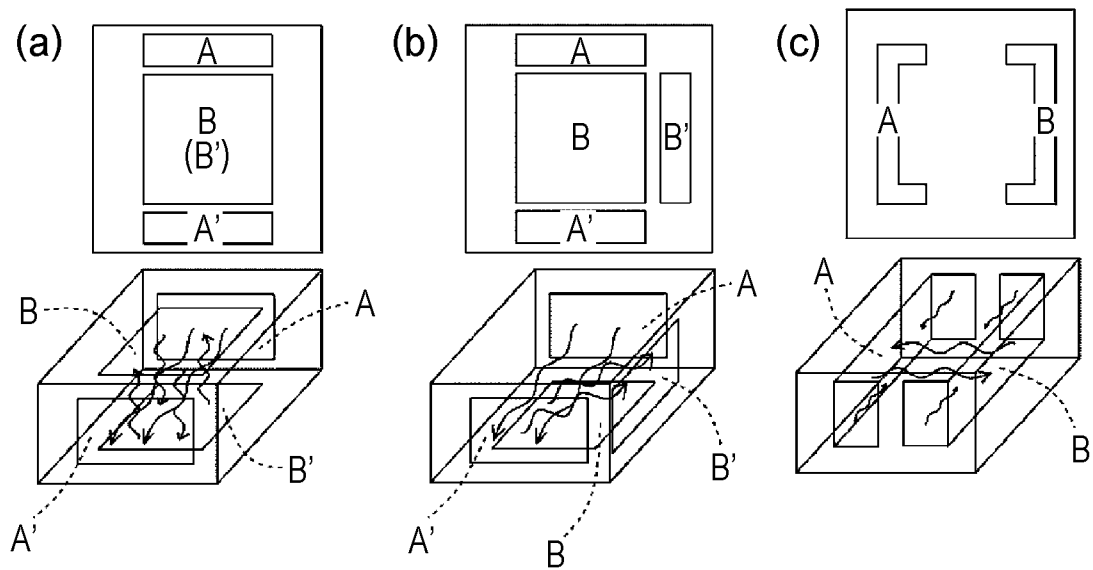


FIG. 29C

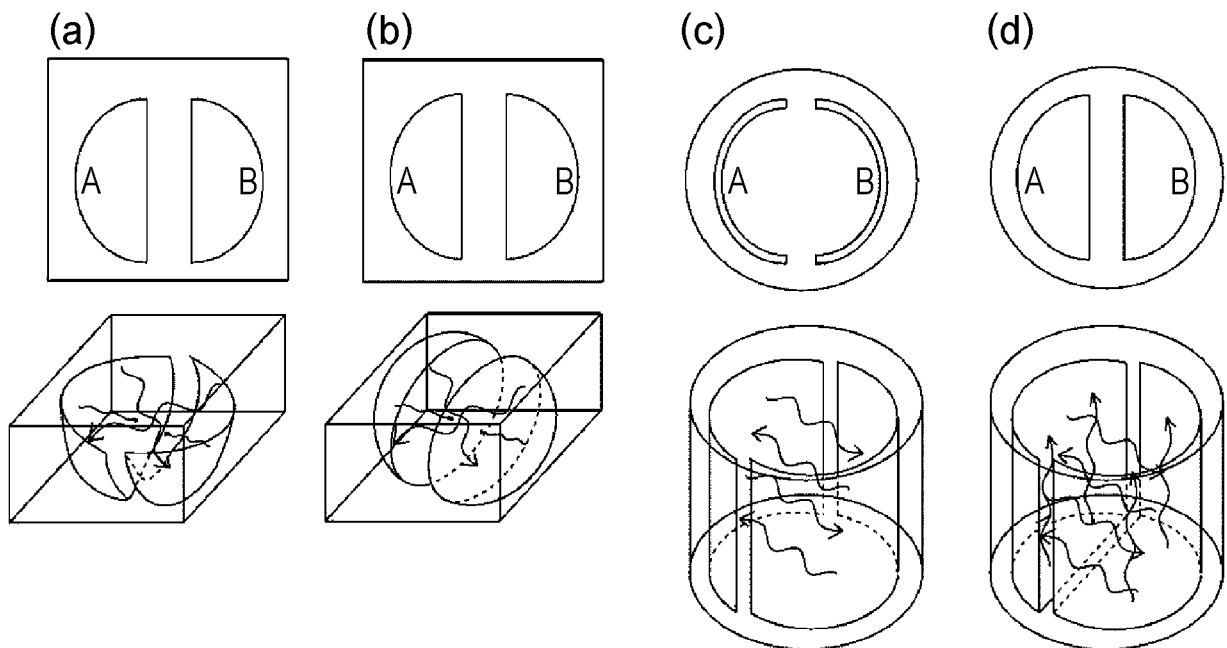


FIG. 30

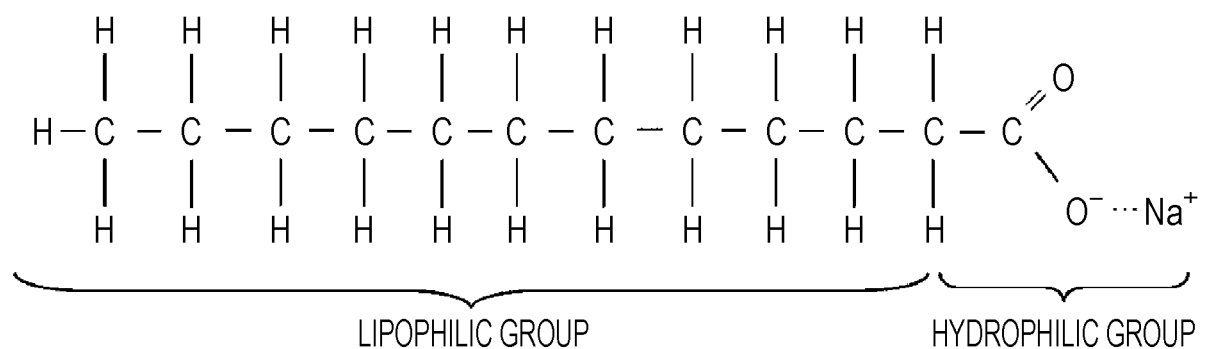


FIG. 31

HARDWARE DIAGRAM

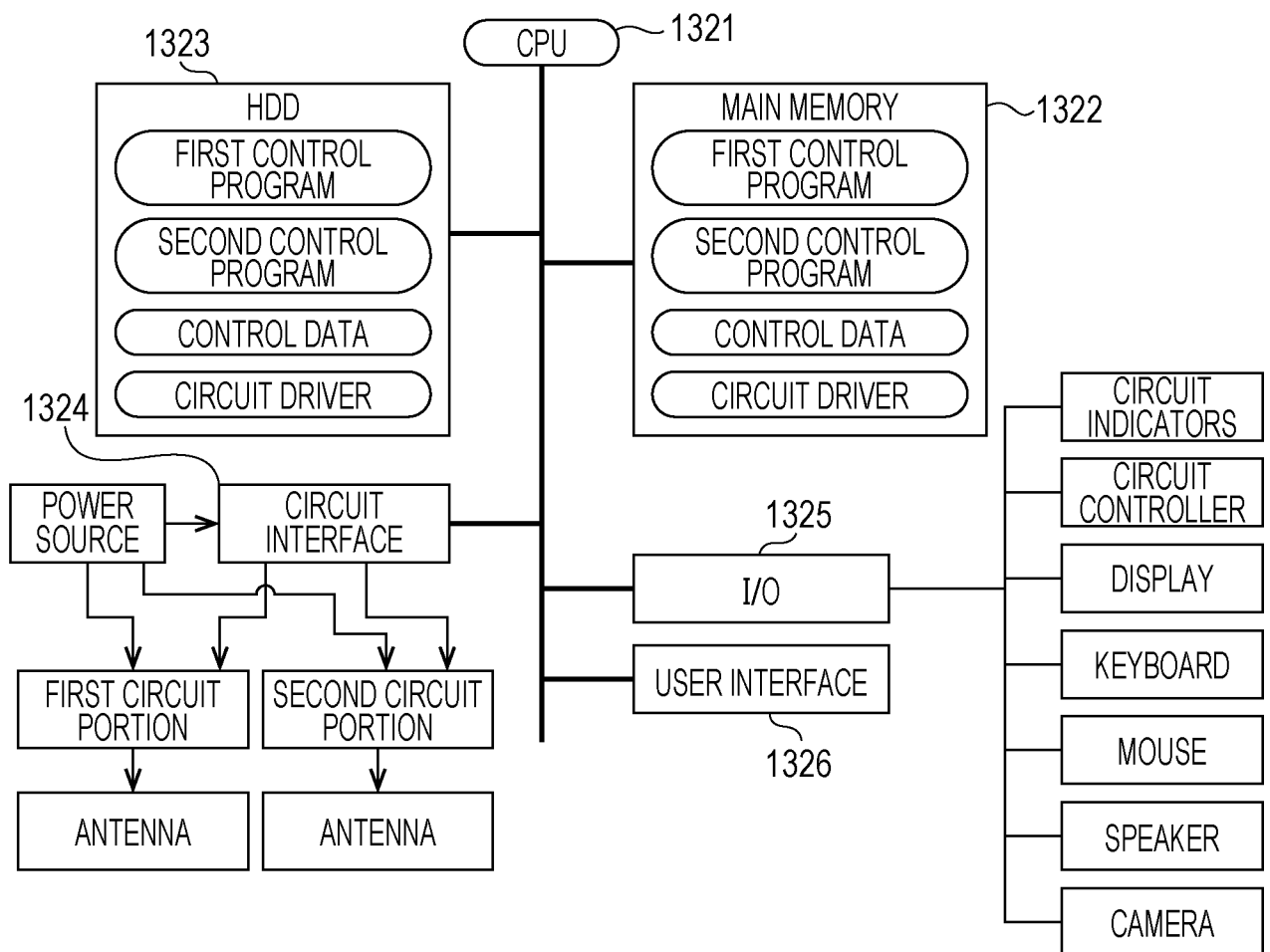


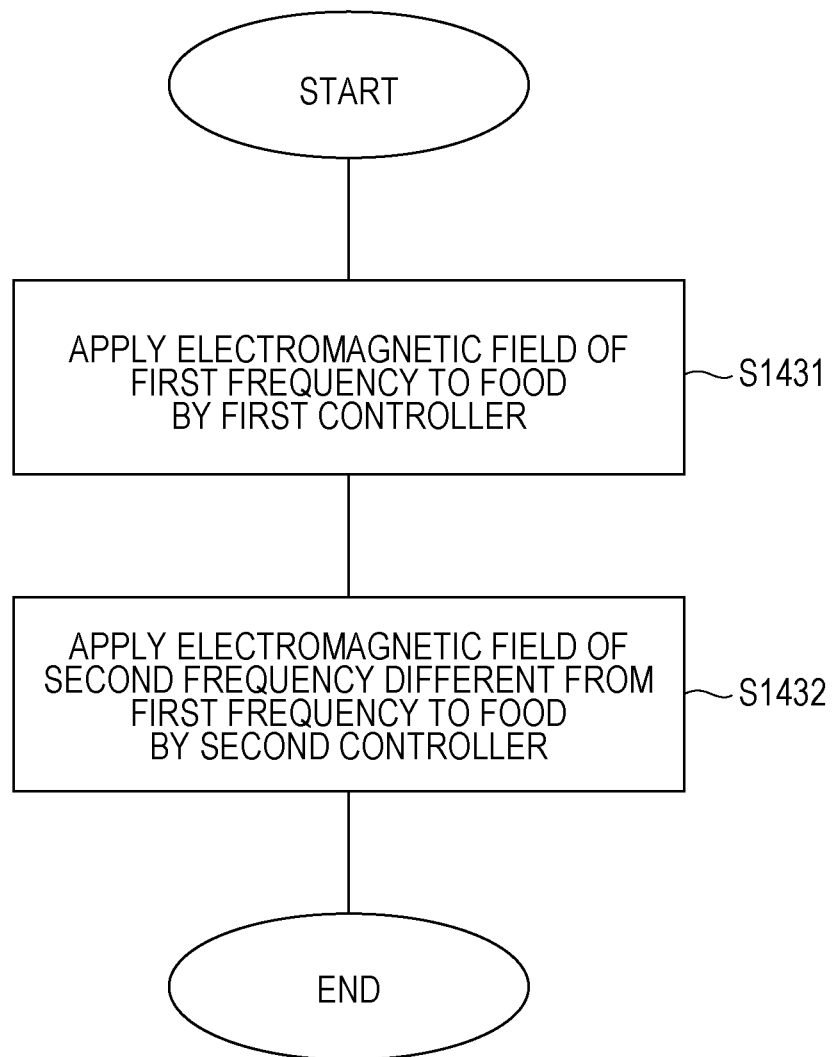
FIG. 32

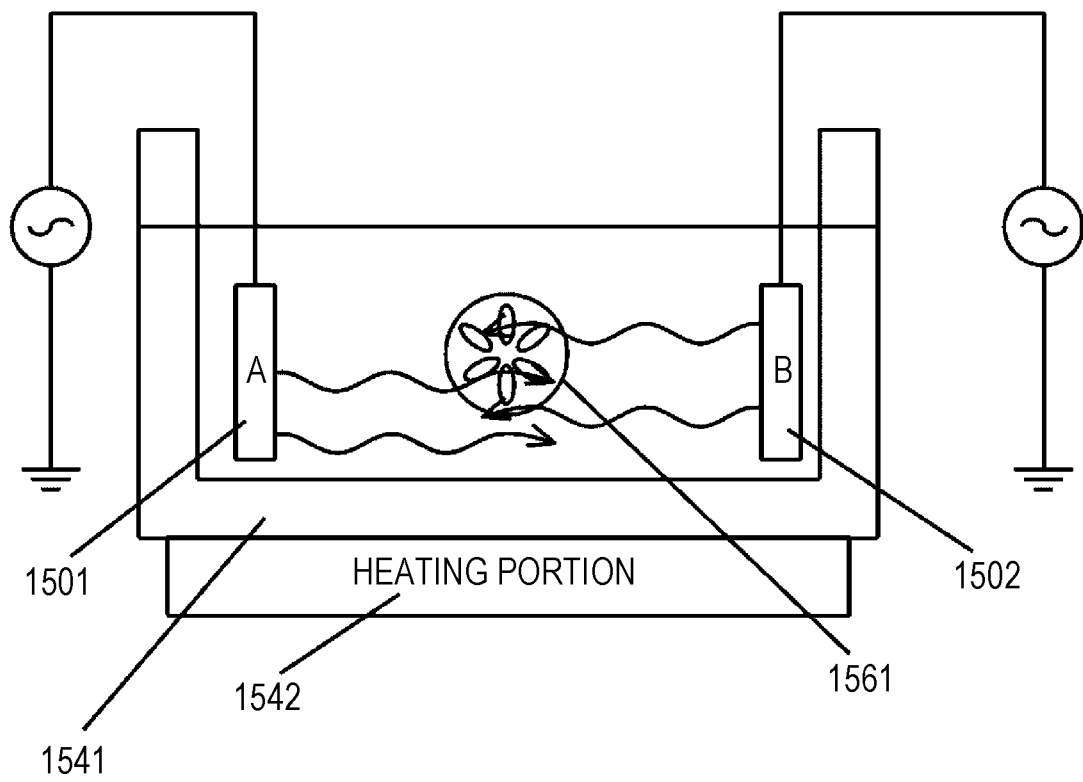
FIG. 33A

FIG. 33B

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	13	14	22	32	41	37	32	33	26
	5kHz	14	27	39	41	52	51	55	36	24
	7.5kHz	22	39	42	59	69	59	51	47	46
	10kHz	32	41	59	71	83	77	65	61	42
	50kHz	41	52	69	83	93	87	73	53	46
	100kHz	37	51	59	77	87	91	84	60	32
	150kHz	32	55	51	65	73	84	74	56	28
	175kHz	33	36	47	61	53	60	56	49	21
	200kHz	26	24	46	42	46	32	28	21	35
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 85 POINTS (+1)		

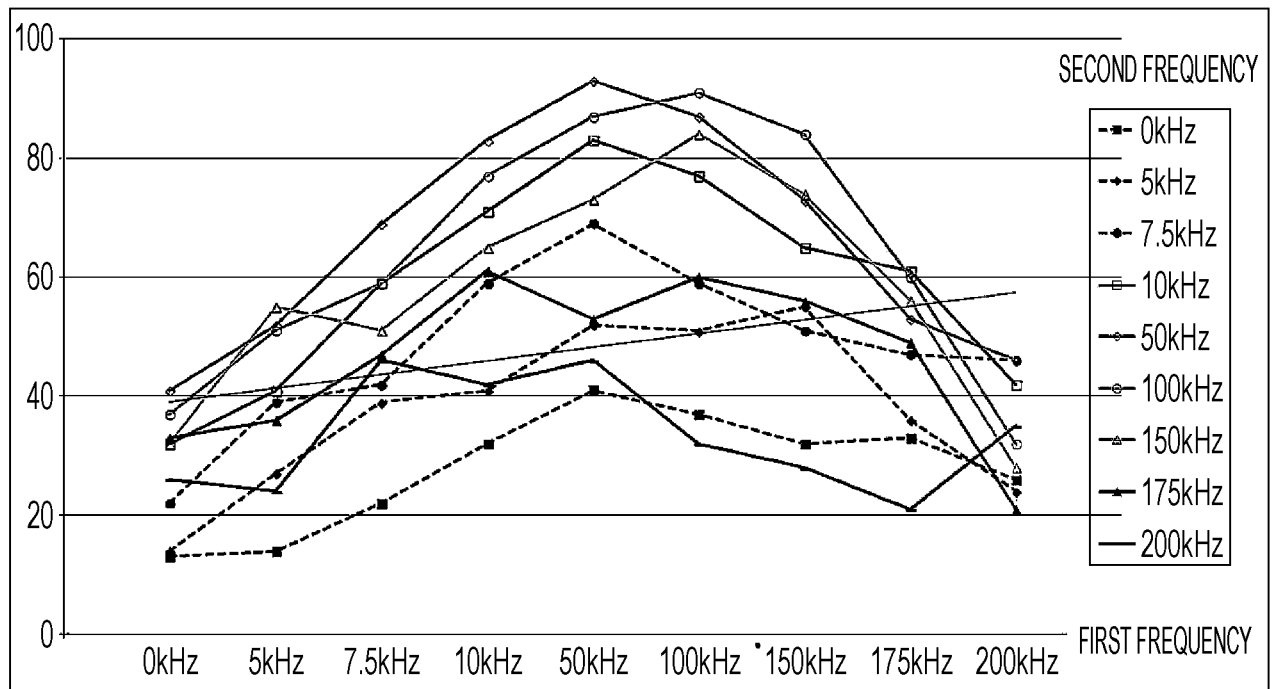


FIG. 33C

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	40	45	42	46	45	44	45	44	40
	5kHz	45	51	52	48	53	55	58	51	44
	7.5kHz	42	52	58	59	61	62	61	55	46
	10kHz	46	48	59	70	78	72	74	62	55
	50kHz	45	53	61	78	82	83	79	65	50
	100kHz	44	55	62	72	83	89	81	64	52
	150kHz	45	58	61	74	79	81	79	59	46
	175kHz	44	51	55	62	65	64	59	49	44
	200kHz	40	44	46	55	50	52	46	44	45
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 82 POINTS (+1)		

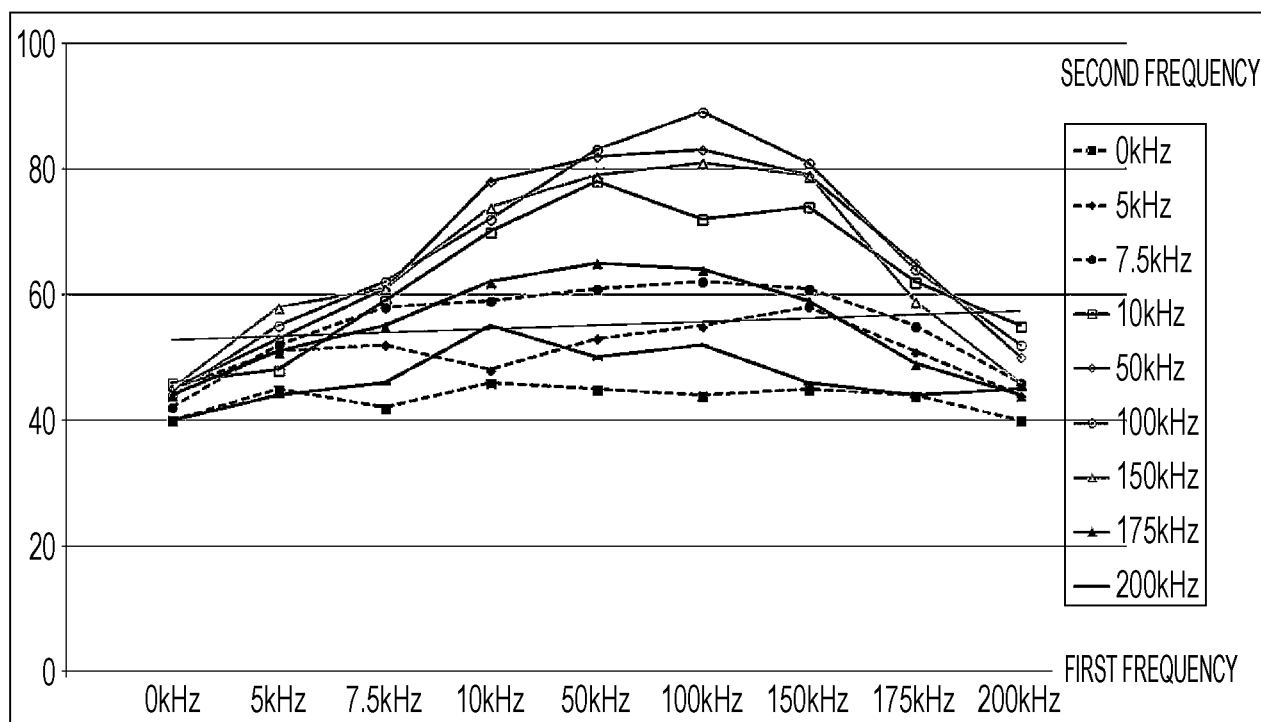


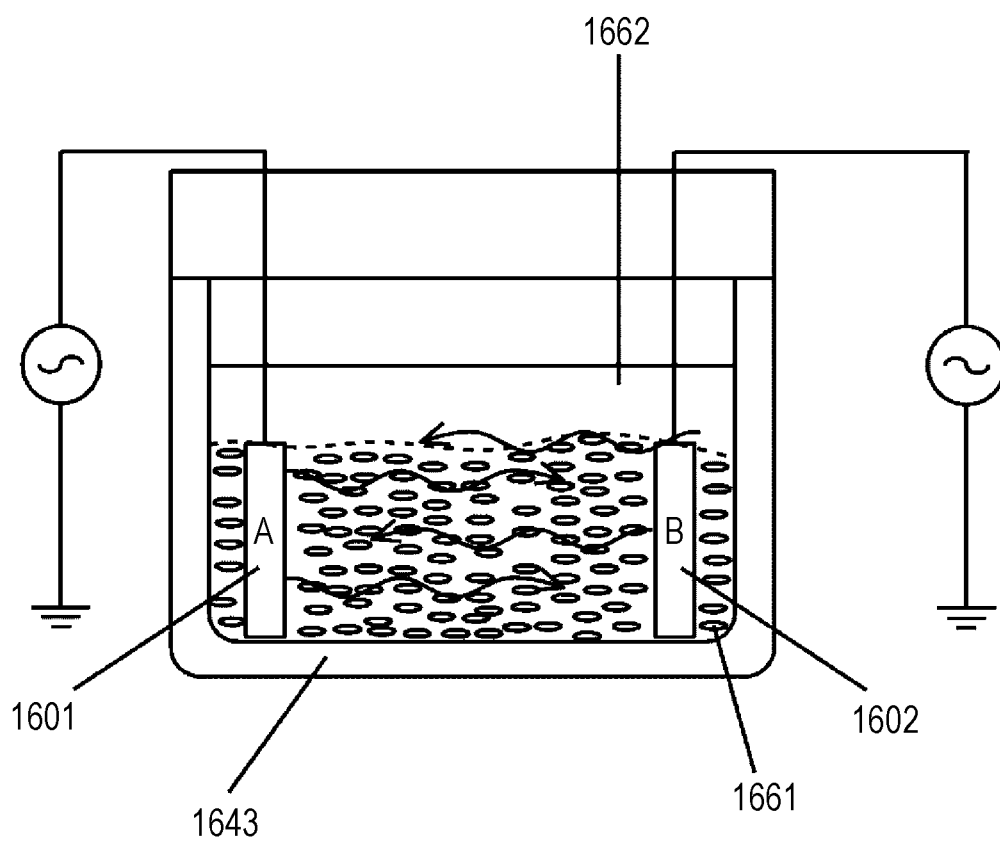
FIG. 34A

FIG. 34B

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	33	38	42	41	45	41	45	37	34
	5kHz	38	40	45	50	48	51	52	40	38
	7.5kHz	42	45	50	58	62	55	54	47	44
	10kHz	41	50	58	70	72	75	80	68	50
	50kHz	45	48	62	72	84	89	78	60	51
	100kHz	41	51	55	75	89	92	82	60	51
	150kHz	45	52	54	80	78	82	81	57	43
	175kHz	37	40	47	68	60	60	57	50	41
	200kHz	34	38	44	50	51	51	43	41	33
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 83 POINTS (+1)		

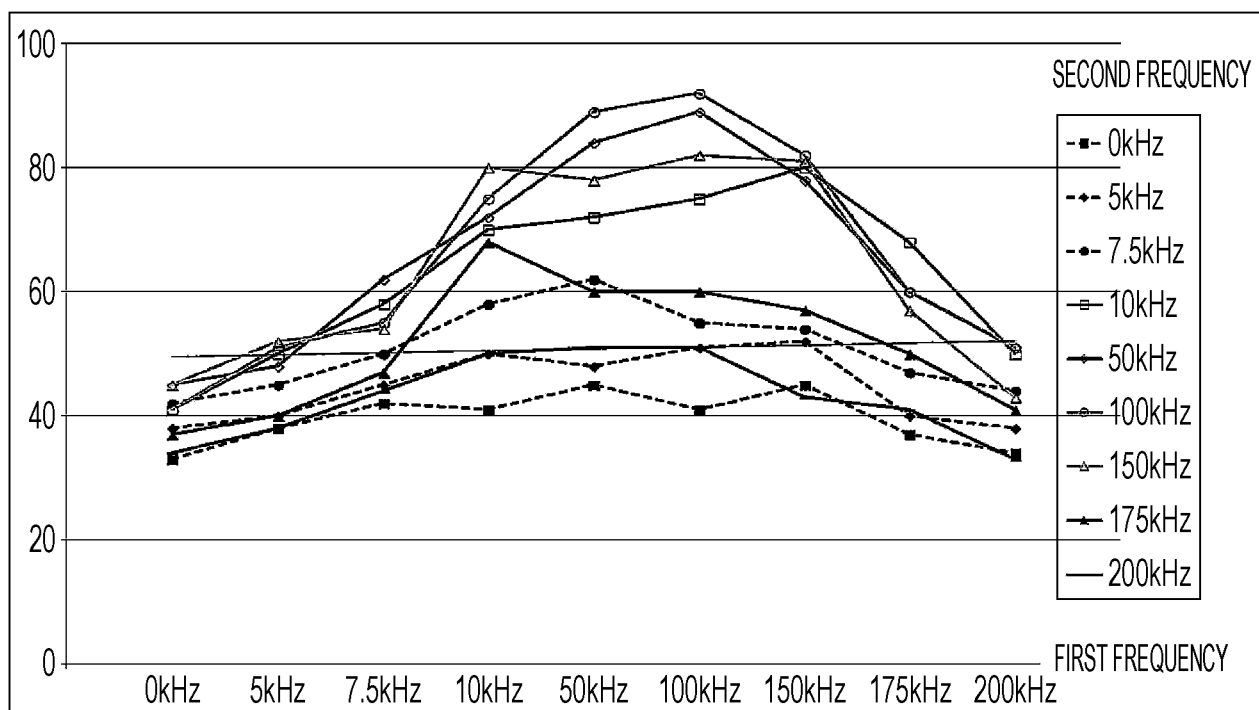


FIG. 34C

PHASE DIFFERENCE 0		FIRST FREQUENCY									
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz	
SECOND FREQUENCY	0kHz	40	45	44	50	48	50	49	38	40	
	5kHz	45	49	51	55	59	58	52	50	45	
	7.5kHz	44	51	50	61	66	69	61	53	51	
	10kHz	50	55	61	75	81	78	77	61	53	
	50kHz	48	59	66	81	80	89	78	60	40	
	100kHz	50	58	69	78	89	90	81	60	47	
	150kHz	49	52	61	77	78	81	79	58	46	
	175kHz	38	50	53	61	60	60	58	52	42	
	200kHz	40	45	51	53	40	47	46	42	41	
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz					SECOND FREQUENCY 150kHz			EVALUATION RESULT 82 POINTS (+1)	

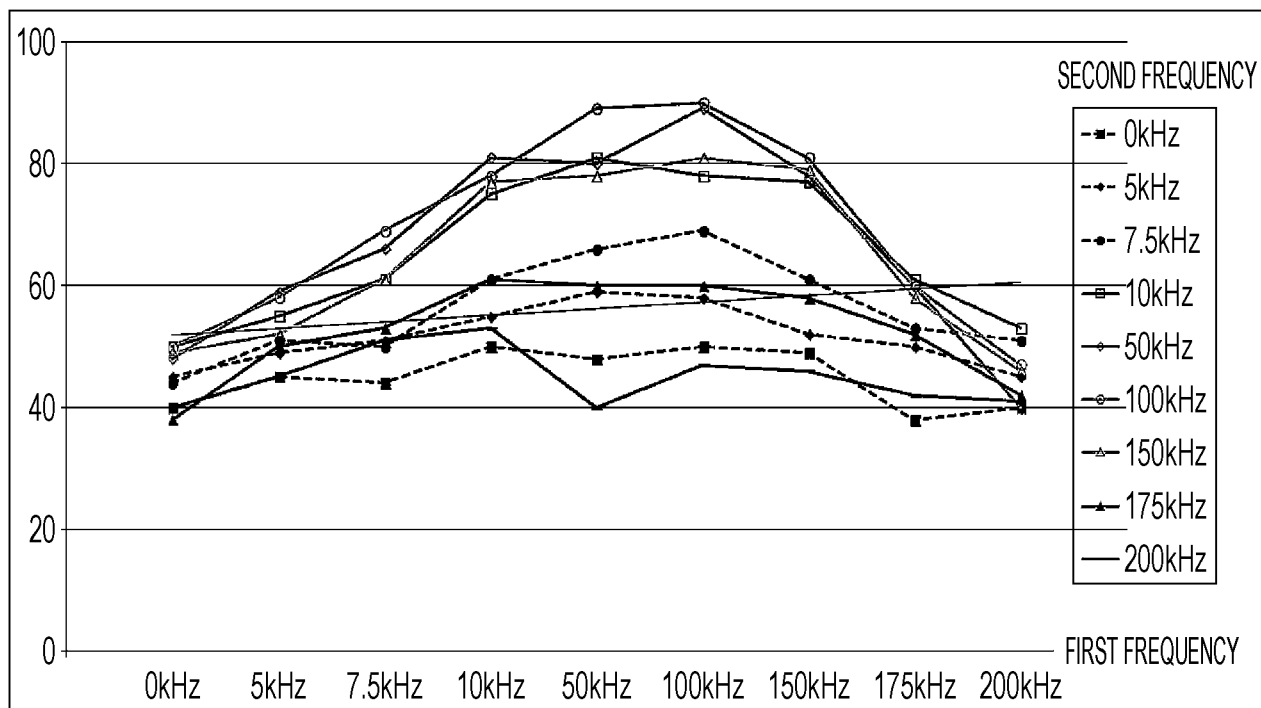


FIG. 34D

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	38	39	41	45	45	47	44	41	42
	5kHz	39	45	47	51	55	51	48	42	41
	7.5kHz	41	47	49	60	62	66	51	57	47
	10kHz	45	51	60	72	77	71	68	61	52
	50kHz	45	55	62	77	81	79	75	63	54
	100kHz	47	51	66	71	79	81	76	60	48
	150kHz	44	48	61	68	75	76	71	63	51
	175kHz	41	42	57	61	63	60	63	57	41
	200kHz	42	41	47	52	54	48	51	41	40
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 77 POINTS (+1)		

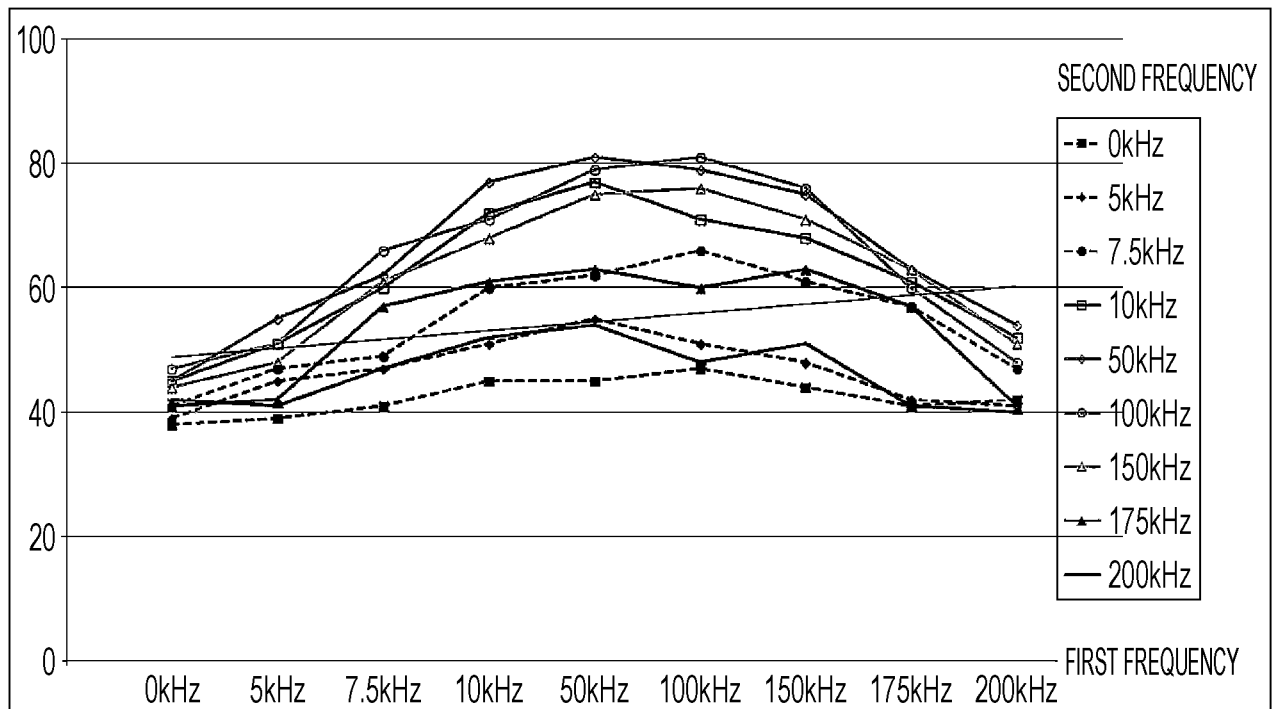


FIG. 34E

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	19	22	35	40	38	36	31	27	20
	5kHz	22	30	40	40	44	43	37	28	24
	7.5kHz	35	40	50	51	62	54	46	40	38
	10kHz	40	40	51	64	77	72	66	56	48
	50kHz	38	44	62	77	79	74	69	57	48
	100kHz	36	43	54	72	74	81	72	62	44
	150kHz	31	37	46	66	69	72	75	58	47
	175kHz	27	28	40	56	57	62	58	48	37
	200kHz	20	24	38	48	48	44	47	37	28
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 73 POINTS (+1)		

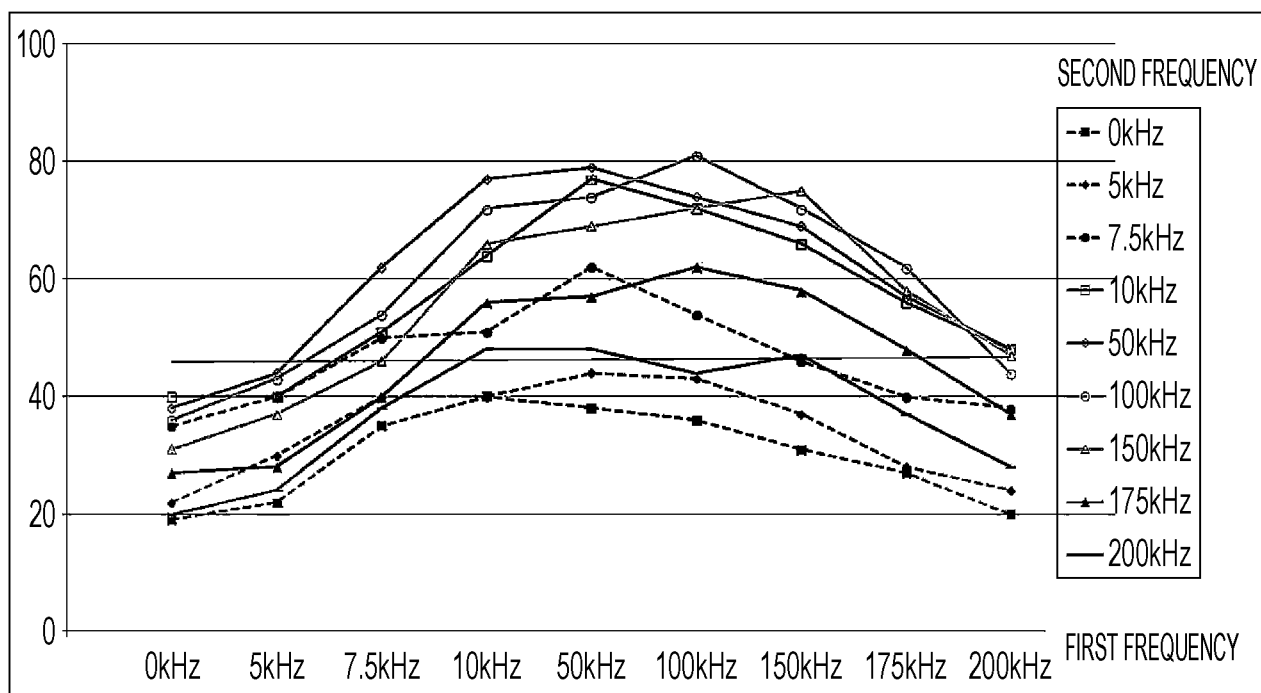


FIG. 34F

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	18	20	22	30	37	40	36	32	32
	5kHz	20	31	40	50	65	50	45	42	35
	7.5kHz	22	40	42	52	60	64	48	38	42
	10kHz	30	50	52	65	77	85	83	64	52
	50kHz	37	65	60	77	90	92	87	71	58
	100kHz	40	50	64	85	92	94	88	60	52
	150kHz	36	45	48	83	87	88	81	59	48
	175kHz	32	42	38	64	71	60	59	61	48
	200kHz	32	35	42	52	58	52	48	48	32
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 90 POINTS (+2)		

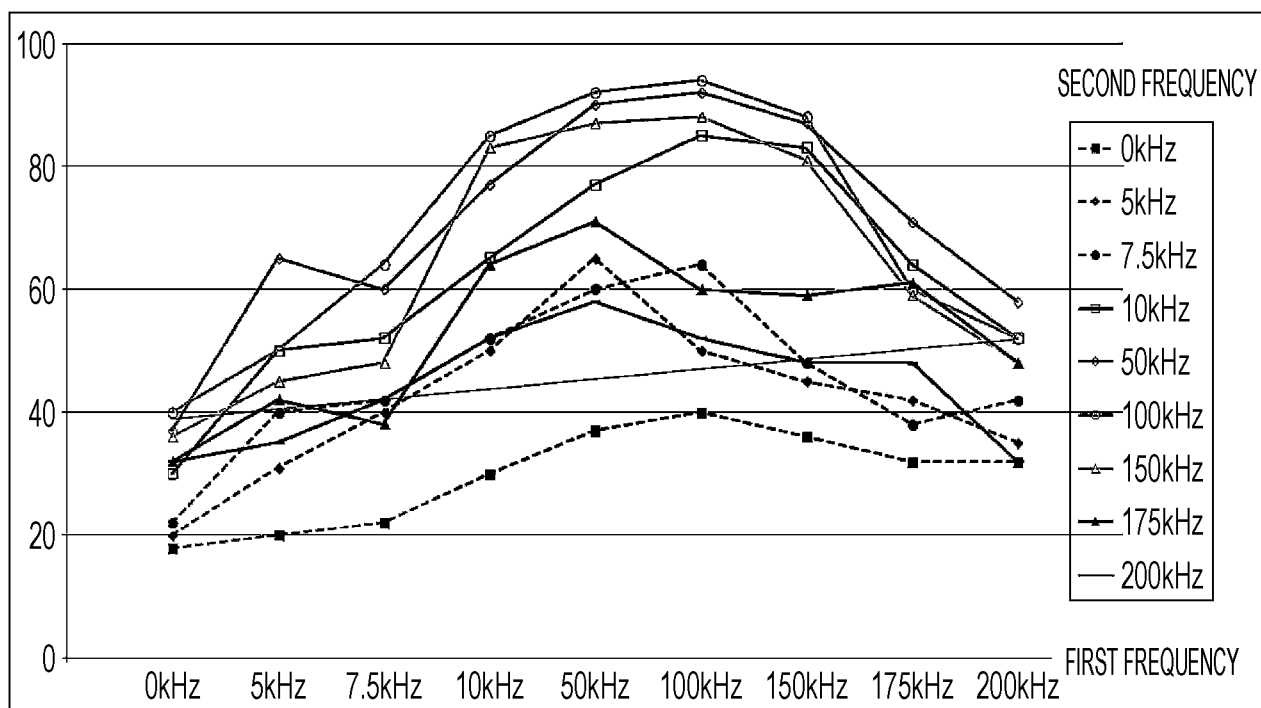


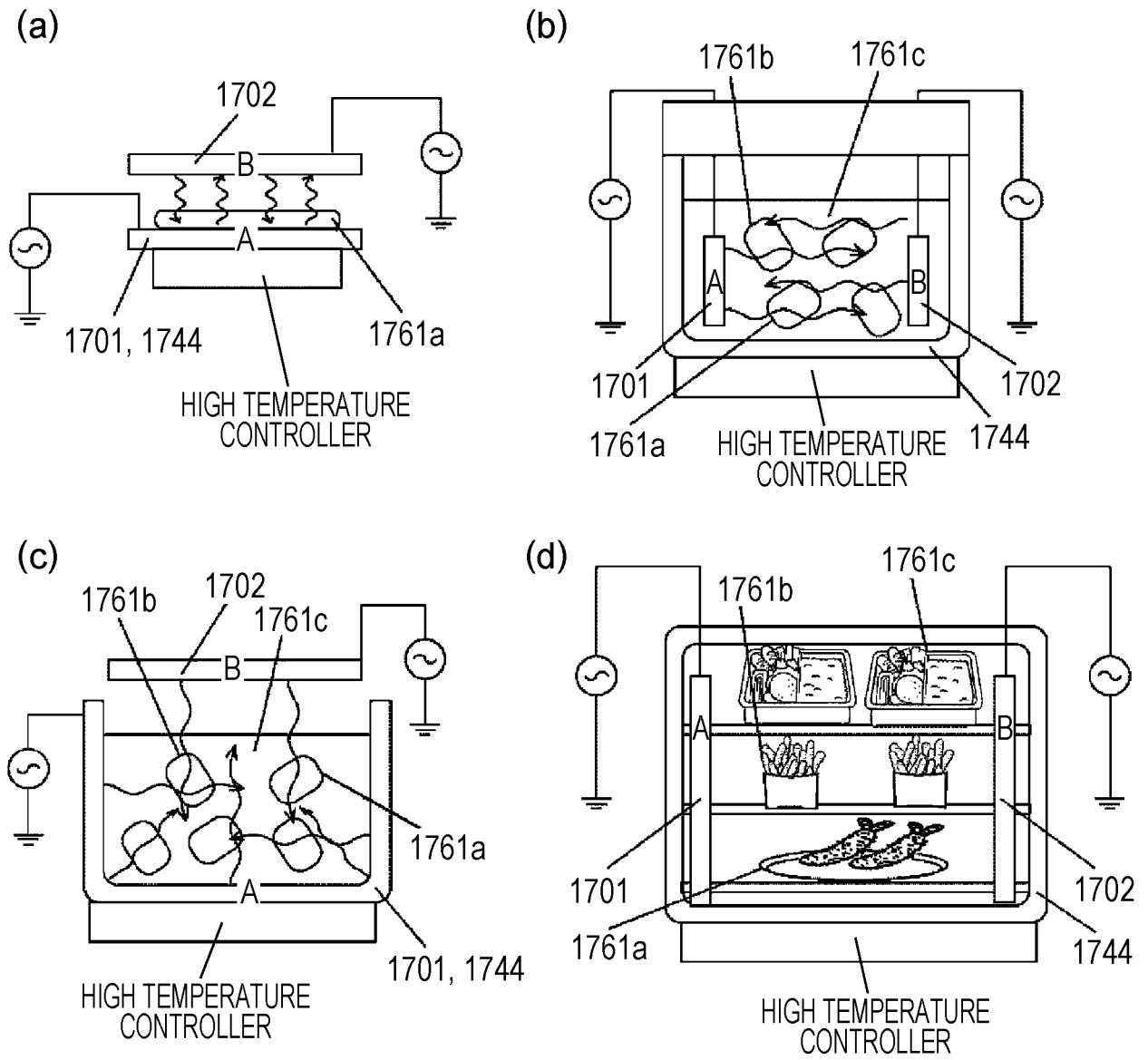
FIG. 35A

FIG. 35B

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	52	54	57	62	56	54	57	52	54
	5kHz	54	61	58	64	68	65	62	66	61
	7.5kHz	57	58	61	65	69	67	61	68	62
	10kHz	62	64	65	77	81	82	81	67	58
	50kHz	56	68	69	81	91	90	81	72	61
	100kHz	54	65	67	82	90	94	83	60	59
	150kHz	57	62	61	81	81	83	79	61	61
	175kHz	52	66	68	67	72	60	61	59	57
	200kHz	54	61	62	58	61	59	61	57	55
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 84 POINTS (+1)		

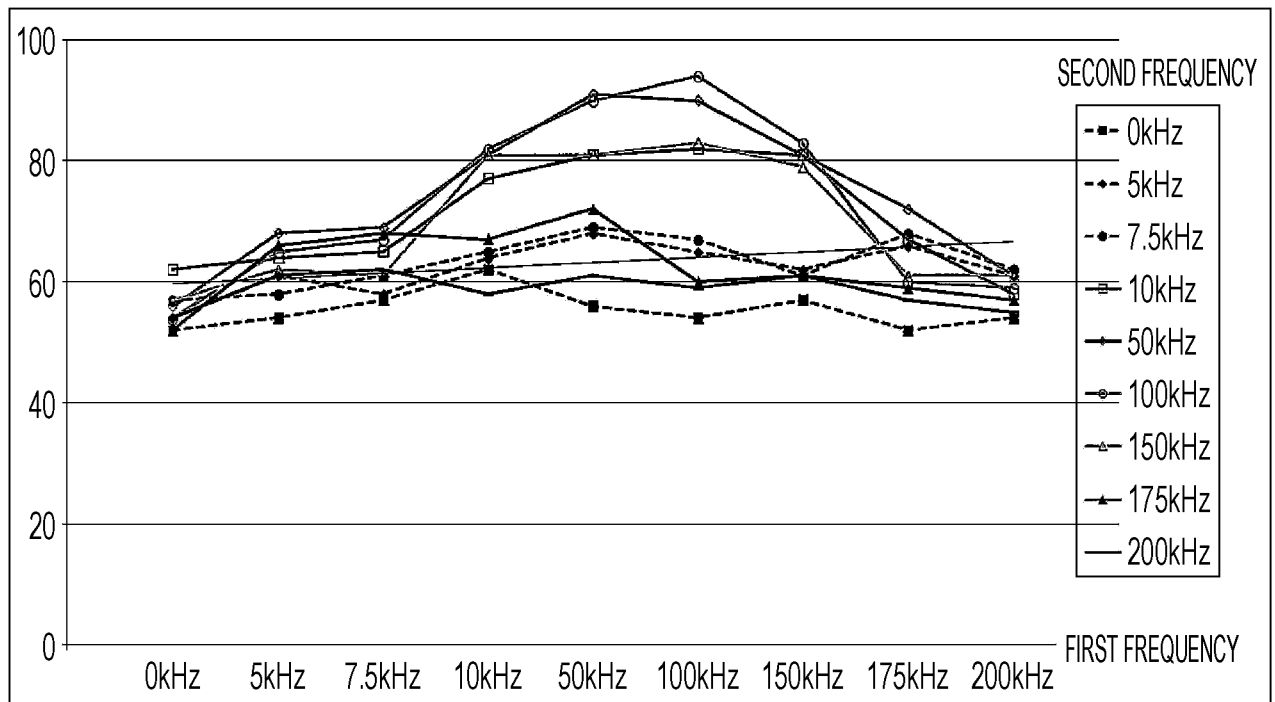


FIG. 35C

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	23	23	32	45	47	49	42	32	25
	5kHz	23	30	35	43	44	51	51	41	21
	7.5kHz	32	35	47	61	62	58	52	44	38
	10kHz	45	43	61	71	70	67	64	61	49
	50kHz	47	44	62	70	89	82	70	57	51
	100kHz	49	51	58	67	82	80	65	60	47
	150kHz	42	51	52	64	70	65	60	62	43
	175kHz	32	41	44	61	57	60	62	51	42
	200kHz	25	21	38	49	51	47	43	42	36
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 65 POINTS (+1)		

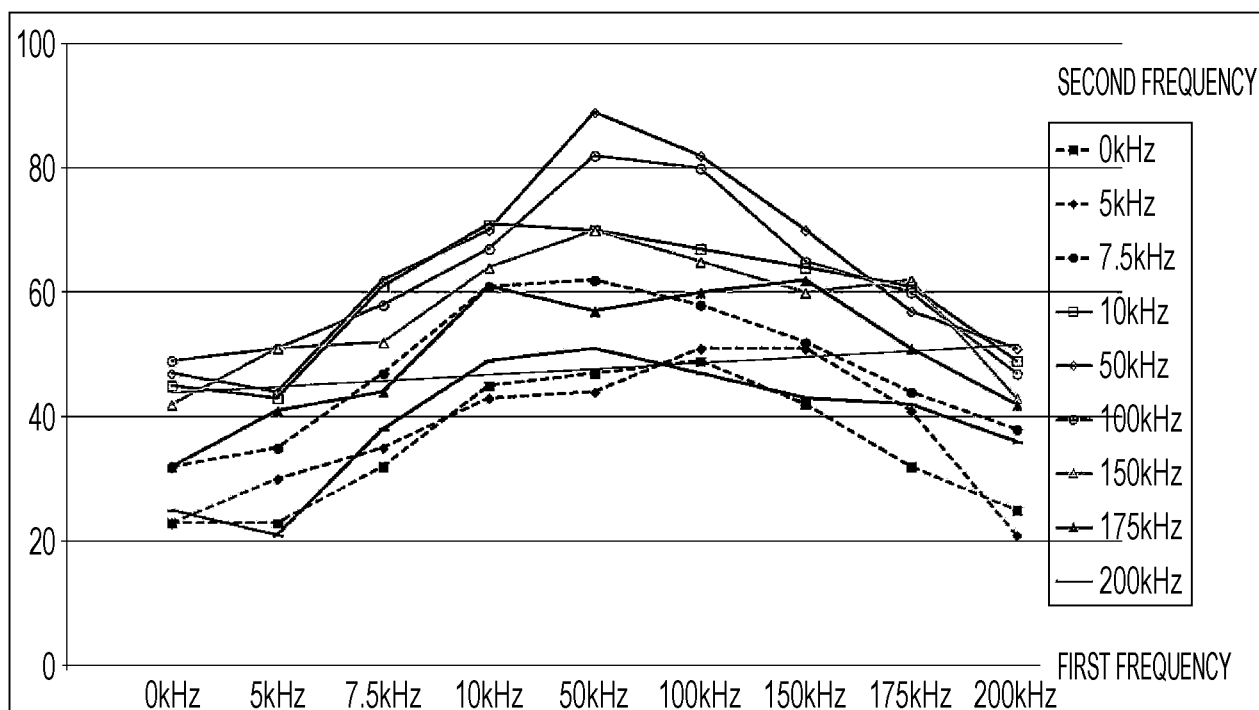


FIG. 35D

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	24	26	25	28	30	35	32	27	29
	5kHz	26	32	35	38	45	42	41	38	35
	7.5kHz	25	35	41	57	59	58	52	49	36
	10kHz	28	38	57	68	72	71	70	58	47
	50kHz	30	45	59	72	90	80	70	55	50
	100kHz	35	42	58	71	80	81	78	60	51
	150kHz	32	41	52	70	70	78	76	60	54
	175kHz	27	38	49	58	55	60	60	52	38
	200kHz	29	35	36	47	50	51	54	38	41
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 79 POINTS (+1)		

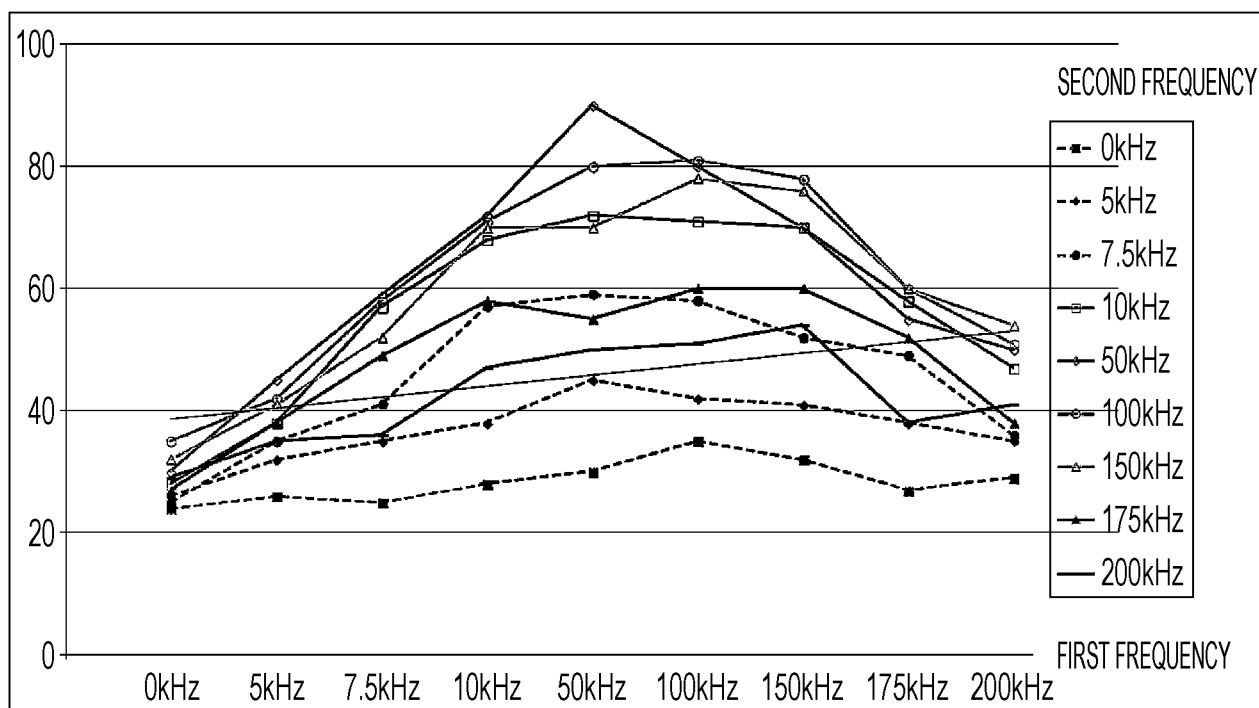


FIG. 36A

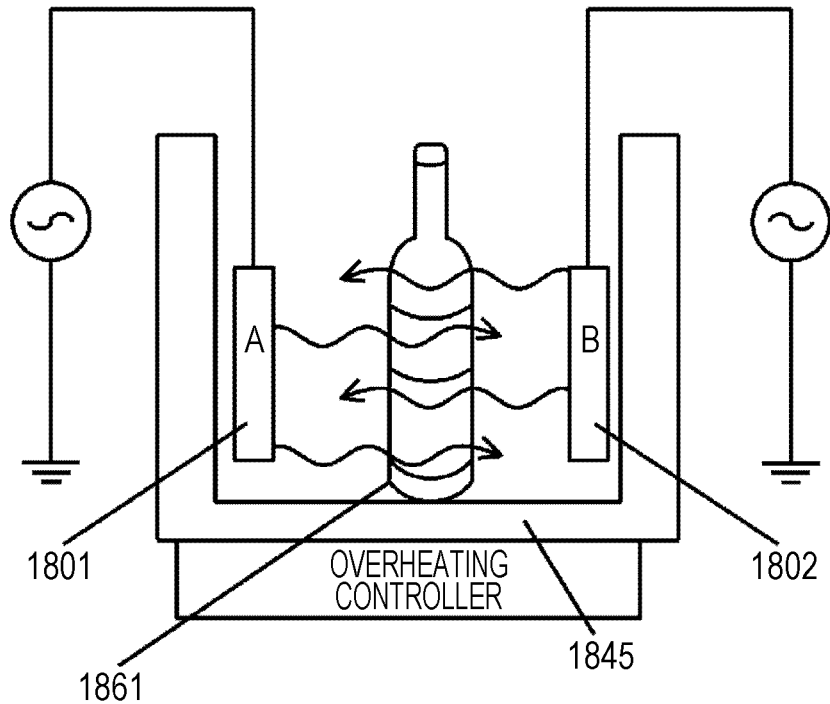


FIG. 36B

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	12	20	32	47	48	47	38	39	35
	5kHz	20	20	35	48	49	47	42	40	37
	7.5kHz	32	35	38	57	58	59	55	47	45
	10kHz	47	48	57	61	76	85	79	59	44
	50kHz	48	49	58	76	84	89	75	55	50
	100kHz	47	47	59	85	89	91	78	56	54
	150kHz	38	42	55	79	75	78	74	57	50
	175kHz	39	40	47	59	55	56	57	43	43
	200kHz	35	37	45	44	50	54	50	43	32
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 79 POINTS(+1)		

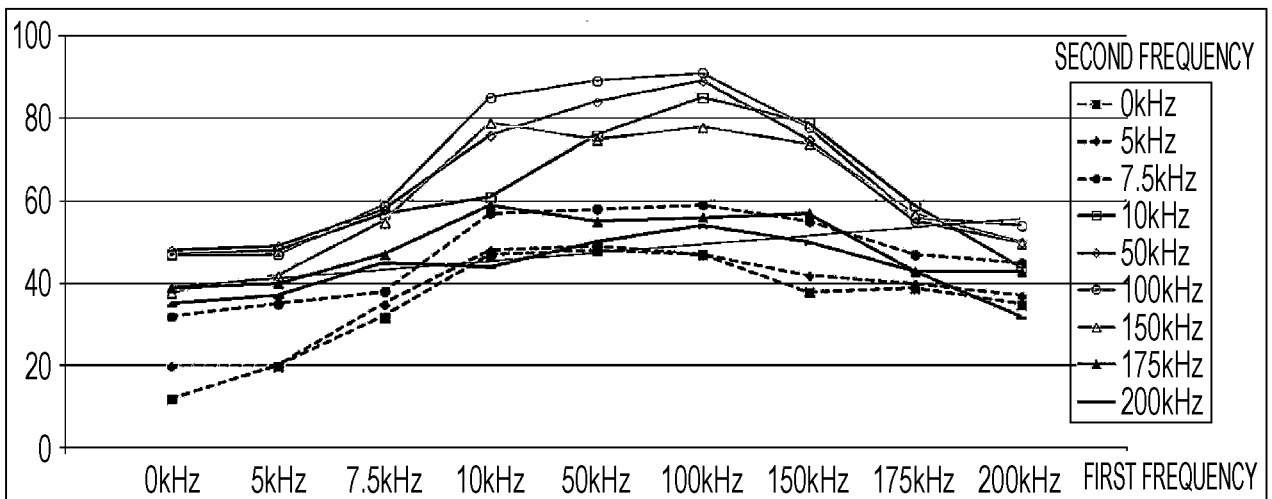


FIG. 36C

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	43	45	44	47	46	45	44	46	43
	5kHz	45	43	50	52	55	57	53	51	48
	7.5kHz	44	50	60	59	61	62	55	55	51
	10kHz	47	52	59	72	75	77	73	59	54
	50kHz	46	55	61	75	82	84	78	59	51
	100kHz	45	57	62	77	84	83	74	61	49
	150kHz	44	53	55	73	78	74	76	55	47
	175kHz	46	51	55	59	59	61	55	60	45
	200kHz	43	48	51	54	51	49	47	45	43
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 75 POINTS (+)		

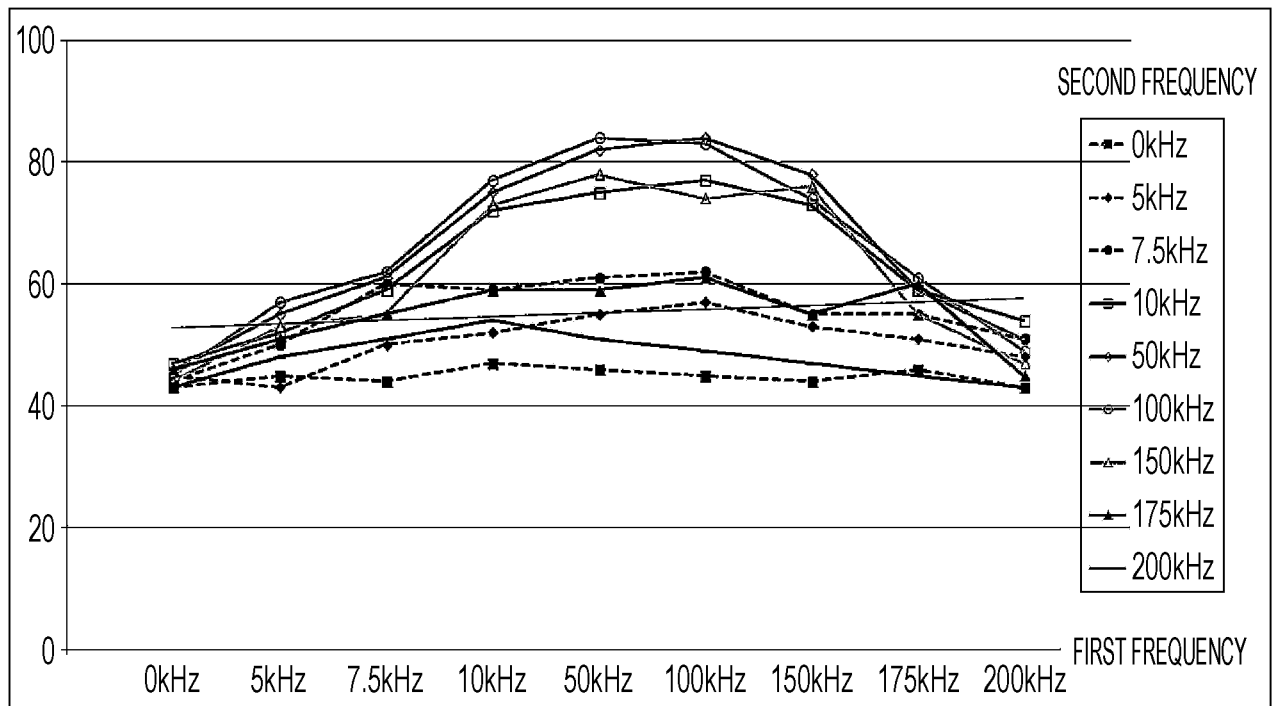


FIG. 37A

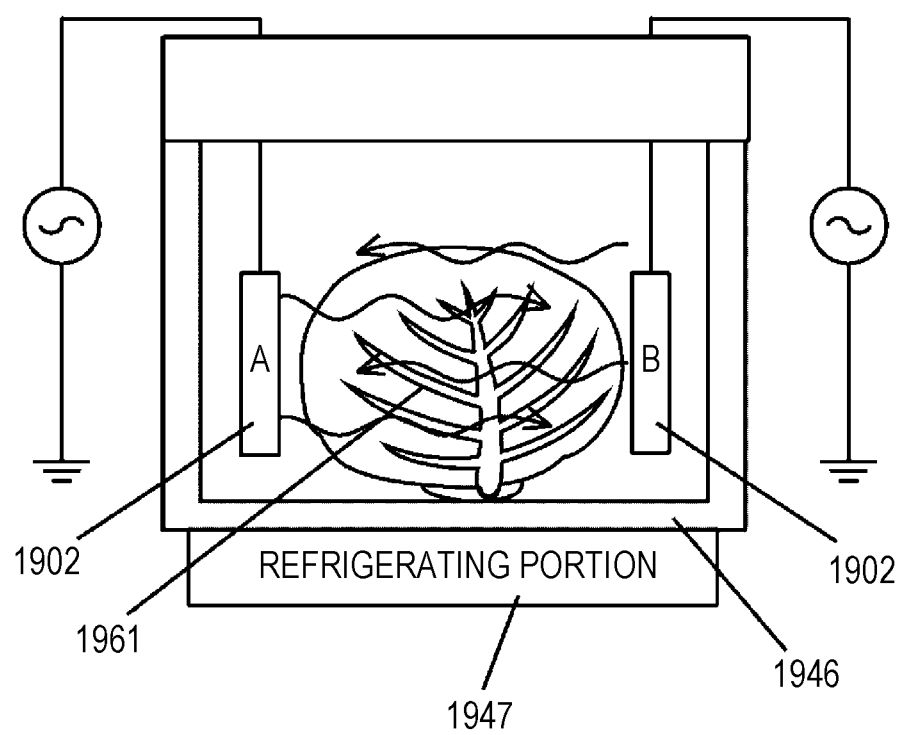


FIG. 37B

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	31	35	37	41	47	50	52	42	32
	5kHz	35	33	43	52	52	53	51	54	48
	7.5kHz	37	43	46	59	61	61	64	47	45
	10kHz	41	52	59	72	77	70	78	63	46
	50kHz	47	52	61	77	81	84	81	61	45
	100kHz	50	53	61	70	84	88	79	60	49
	150kHz	52	51	64	78	81	79	76	61	44
	175kHz	42	54	47	63	61	60	61	48	42
	200kHz	32	48	45	46	45	49	44	42	36
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 80 POINTS (+1)		

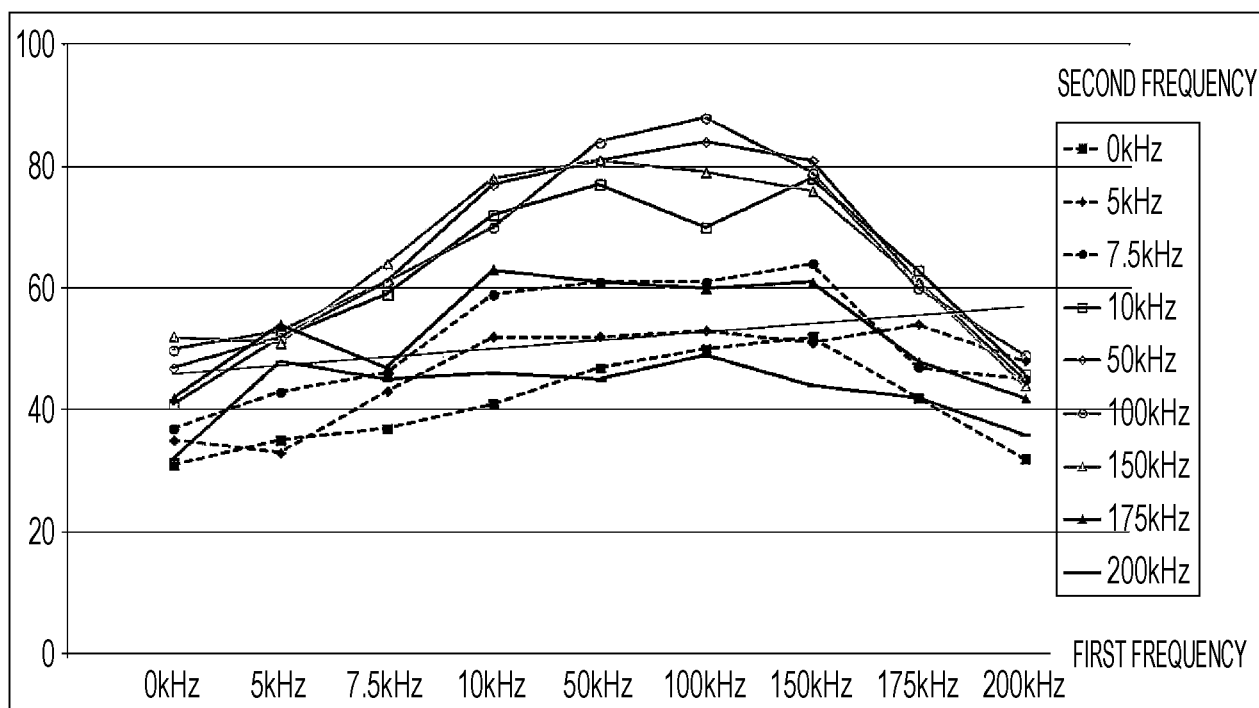


FIG. 37C

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	36	38	41	47	47	44	41	35	37
	5kHz	38	40	46	46	52	52	46	40	39
	7.5kHz	41	46	51	61	63	59	62	51	43
	10kHz	47	46	61	74	78	79	77	61	49
	50kHz	47	52	63	78	86	81	75	59	51
	100kHz	44	52	59	79	81	83	79	61	44
	150kHz	41	46	62	77	75	79	72	61	45
	175kHz	35	40	51	61	59	61	61	62	42
	200kHz	37	39	43	49	51	44	45	42	38
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 80 POINTS (+1)		

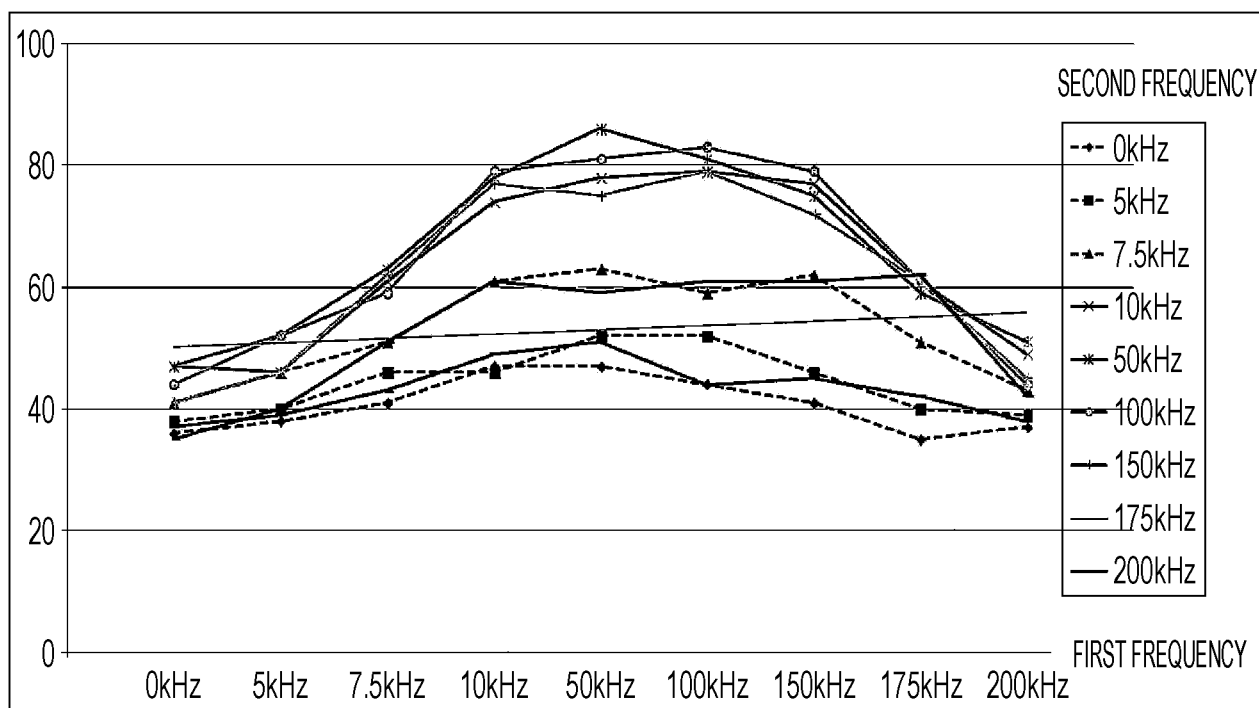


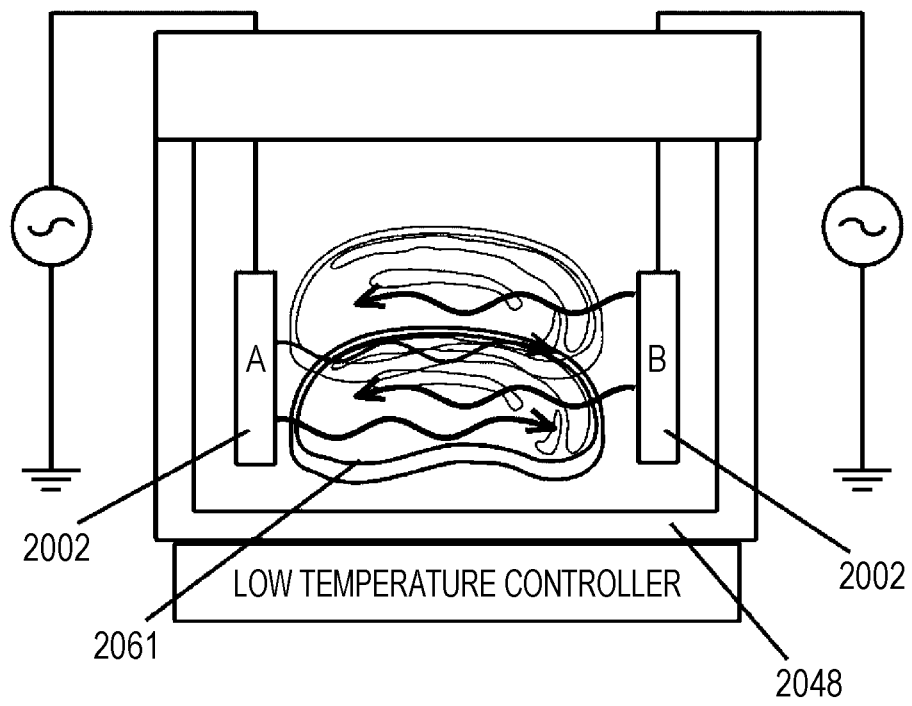
FIG. 38A

FIG. 38B

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	30	31	32	41	42	40	35	33	30
	5kHz	31	33	36	42	44	48	51	36	31
	7.5kHz	32	36	47	56	59	57	53	41	38
	10kHz	41	42	56	61	73	72	67	62	49
	50kHz	42	44	59	73	80	78	74	54	44
	100kHz	40	48	57	72	78	79	68	55	48
	150kHz	35	51	53	67	74	68	72	55	45
	175kHz	33	36	41	62	54	55	55	47	41
	200kHz	30	31	38	49	44	48	45	41	35
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 69 POINTS (+1)		

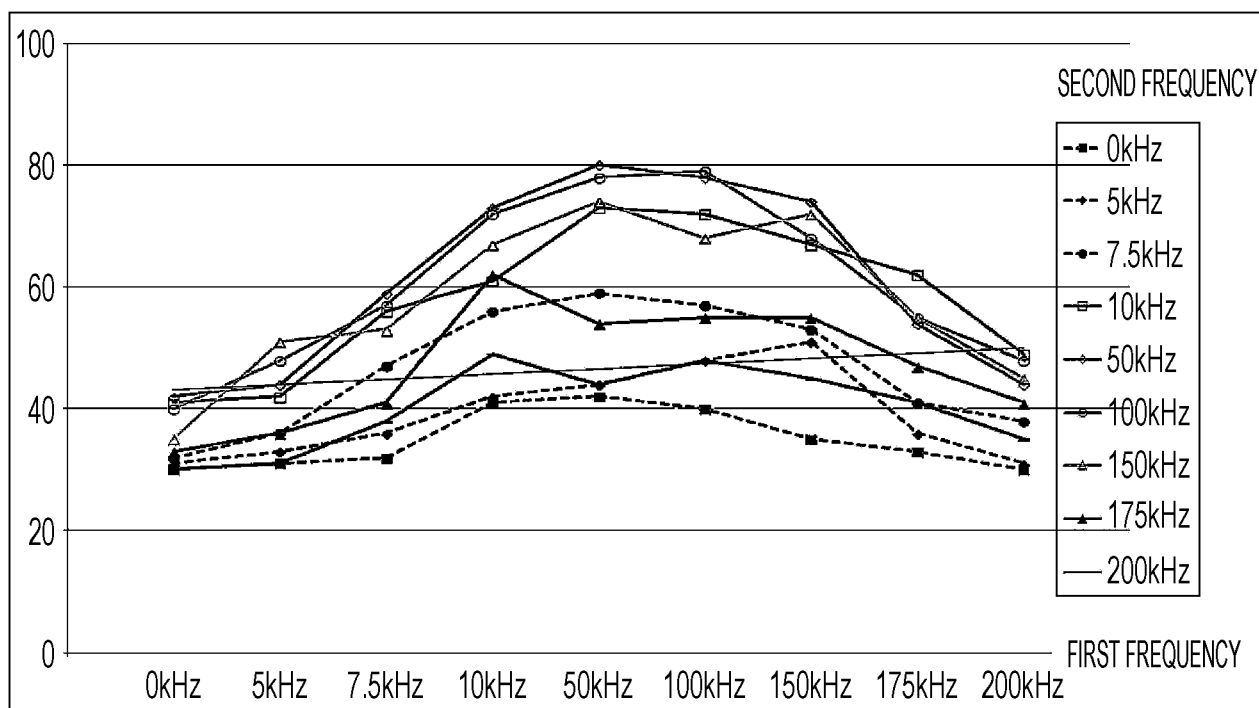


FIG. 39A

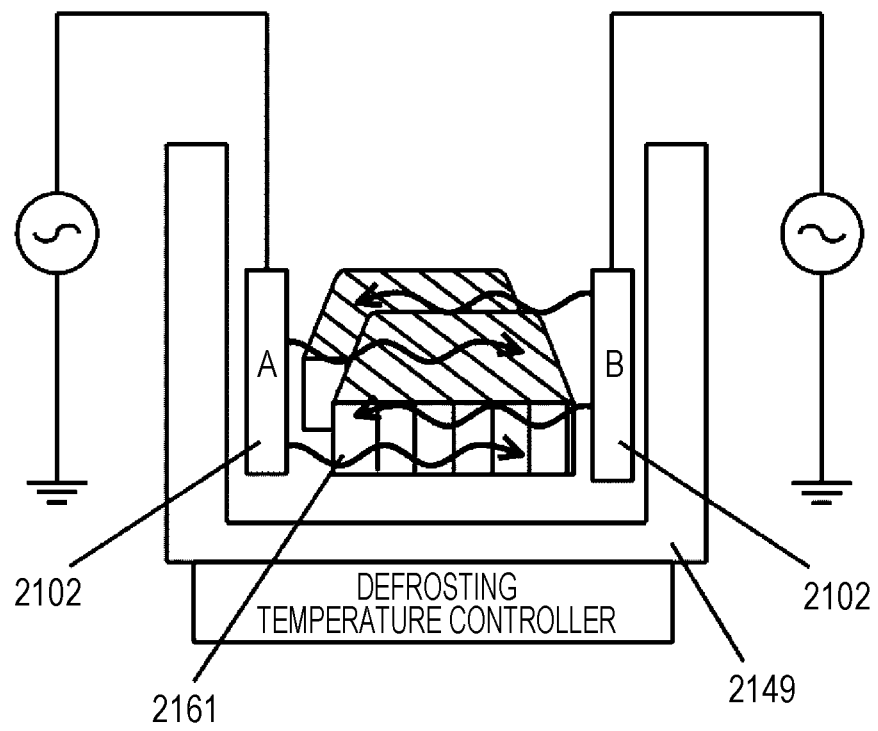


FIG. 39B

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	31	33	35	32	41	46	45	35	33
	5kHz	33	42	46	45	58	55	56	40	38
	7.5kHz	35	46	48	62	59	61	63	53	42
	10kHz	32	45	62	68	65	72	78	60	49
	50kHz	41	58	59	65	82	78	75	58	46
	100kHz	46	55	61	72	78	83	78	60	51
	150kHz	45	56	63	78	75	78	75	62	51
	175kHz	35	40	53	60	58	60	62	57	42
	200kHz	33	38	42	49	46	51	51	42	38
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 79 POINTS (+1)		

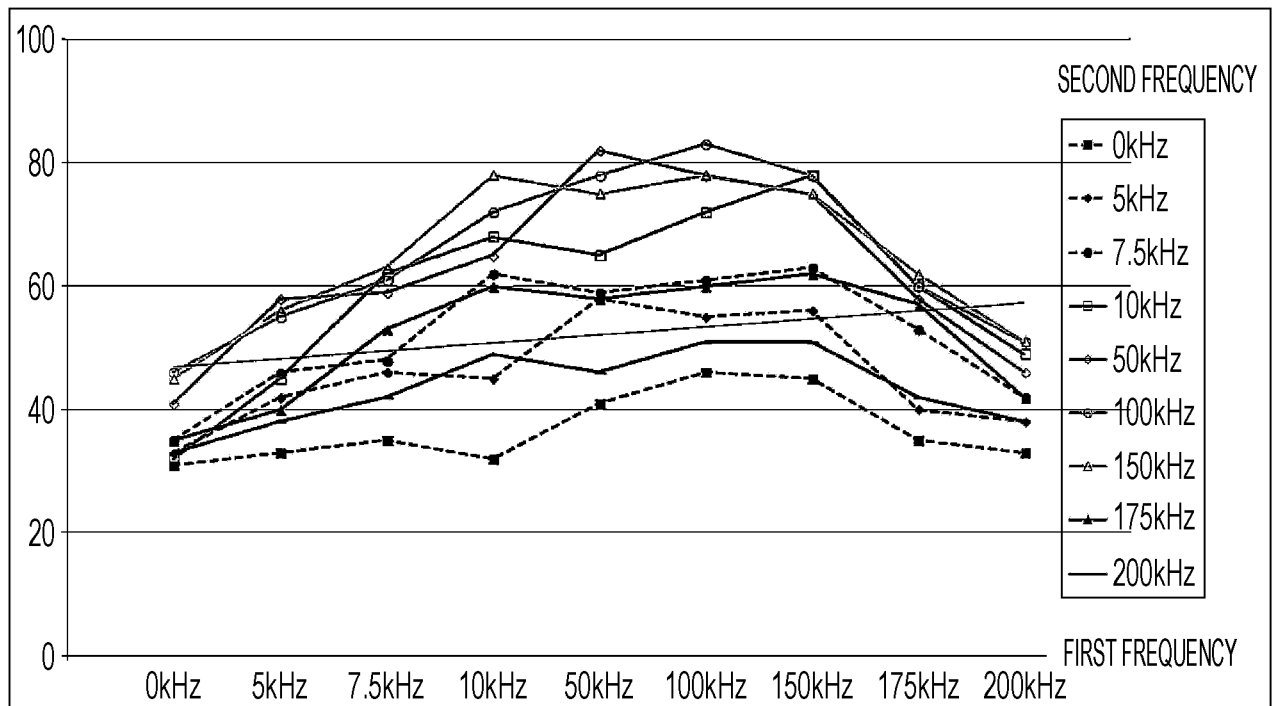


FIG. 40A

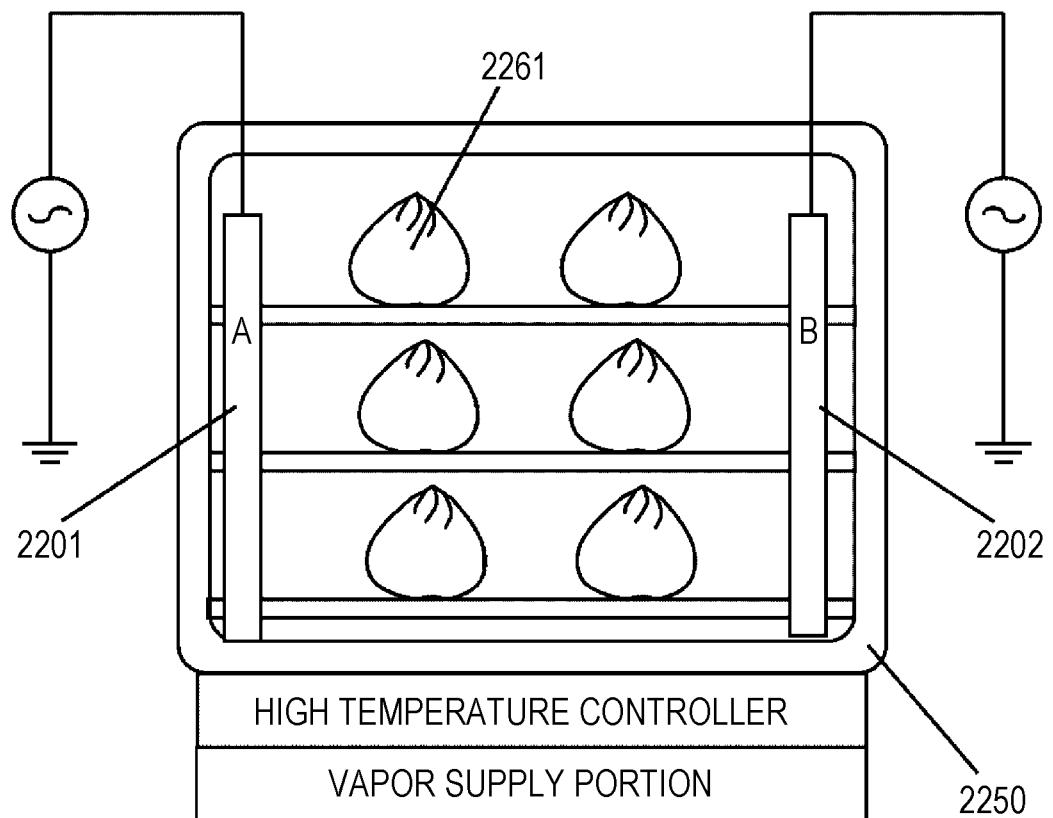


FIG. 40B

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	31	36	42	47	51	49	50	38	34
	5kHz	36	39	47	49	55	52	51	41	36
	7.5kHz	42	47	48	57	68	71	61	48	40
	10kHz	47	49	57	73	82	78	74	57	41
	50kHz	51	55	68	82	88	91	79	63	50
	100kHz	49	52	71	78	91	90	78	63	52
	150kHz	50	51	61	74	79	78	81	61	53
	175kHz	38	41	48	57	63	63	61	45	42
	200kHz	34	36	40	41	50	52	53	42	36
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 79 POINTS (+1)		

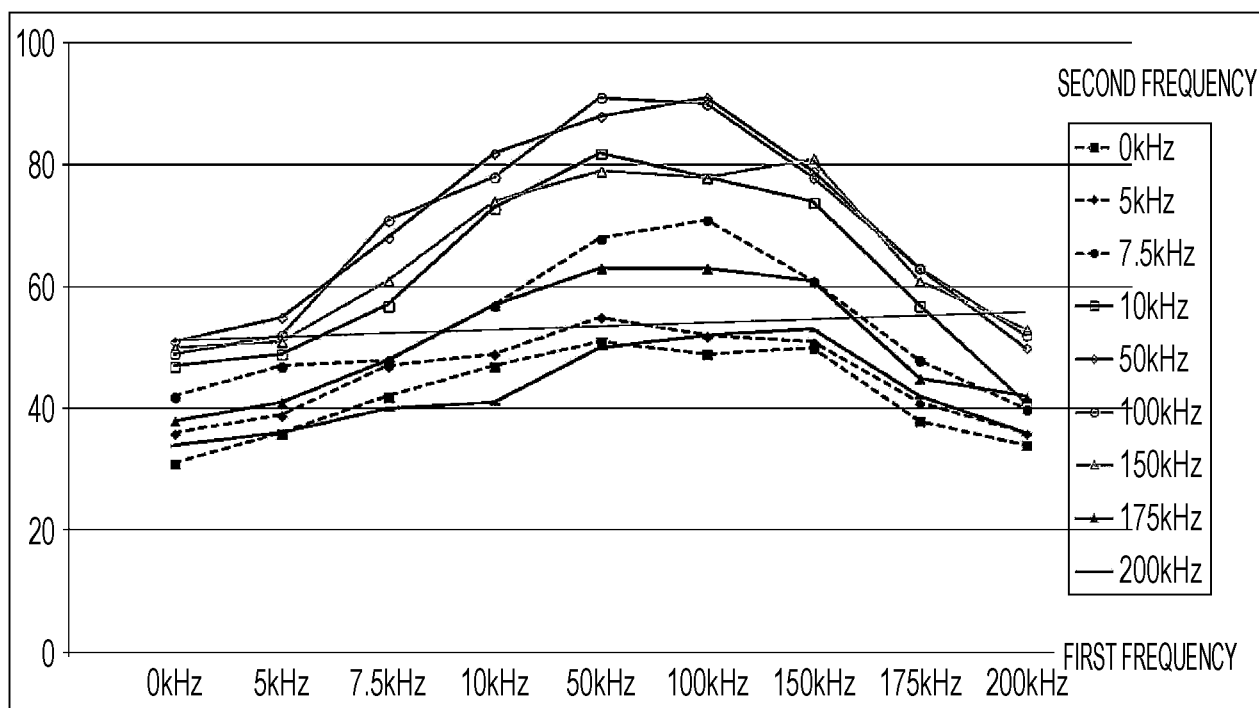


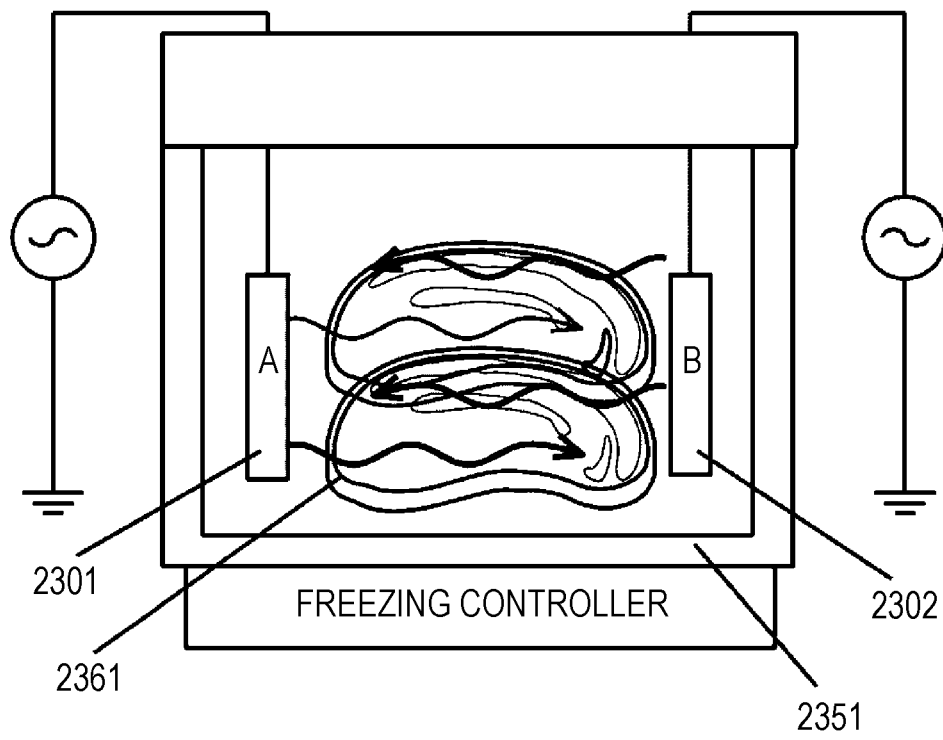
FIG. 41A

FIG. 41B

PHASE DIFFERENCE 0		FIRST FREQUENCY								
		0kHz	5kHz	7.5kHz	10kHz	50kHz	100kHz	150kHz	175kHz	200kHz
SECOND FREQUENCY	0kHz	18	21	25	28	22	24	19	20	19
	5kHz	21	27	36	38	44	41	38	41	24
	7.5kHz	25	36	41	48	61	53	52	44	23
	10kHz	28	38	48	64	75	74	67	60	49
	50kHz	22	44	61	75	81	78	82	58	51
	100kHz	24	41	53	74	78	86	81	55	49
	150kHz	19	38	52	67	82	81	74	58	41
	175kHz	20	41	44	60	58	55	58	47	37
	200kHz	19	24	23	49	51	49	41	37	26
PHASE DIFFERENCE $\pi/2$		FIRST FREQUENCY 100kHz			SECOND FREQUENCY 150kHz			EVALUATION RESULT 82 POINTS (+1)		

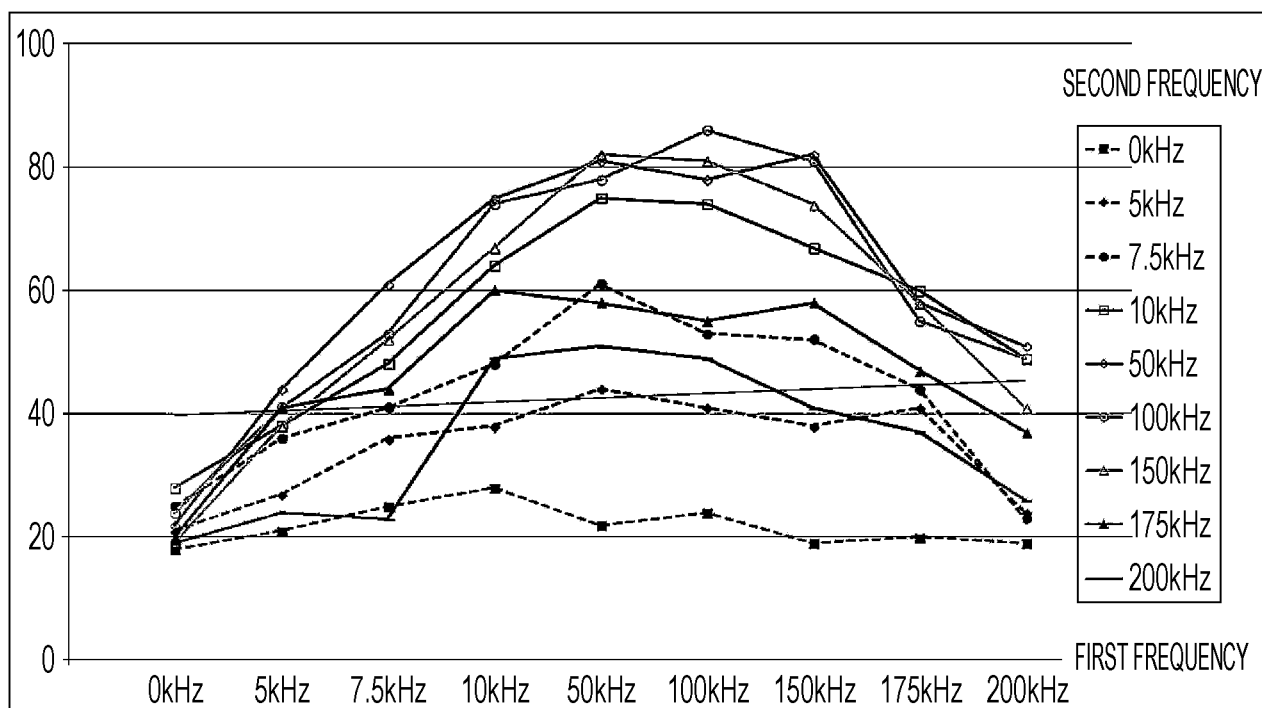


FIG. 42

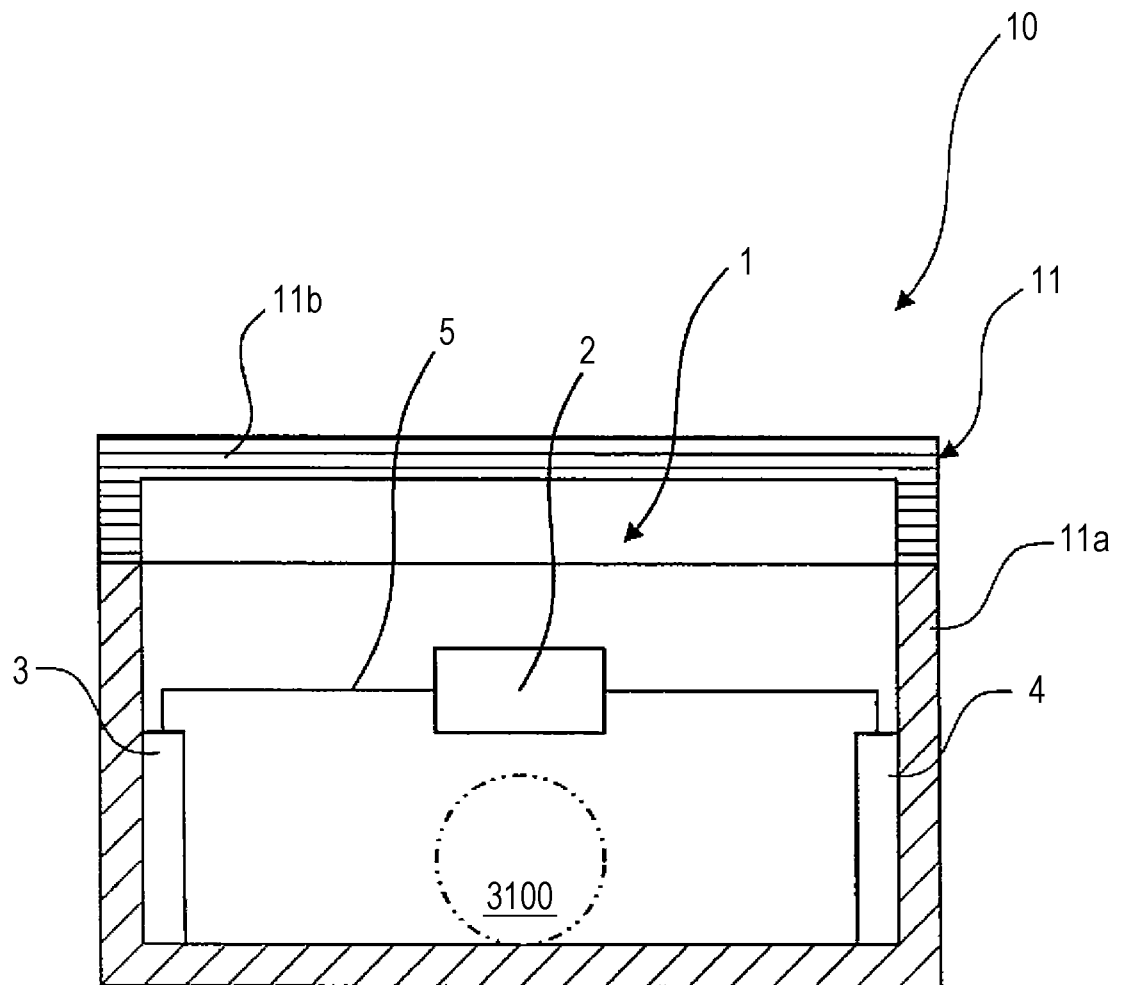
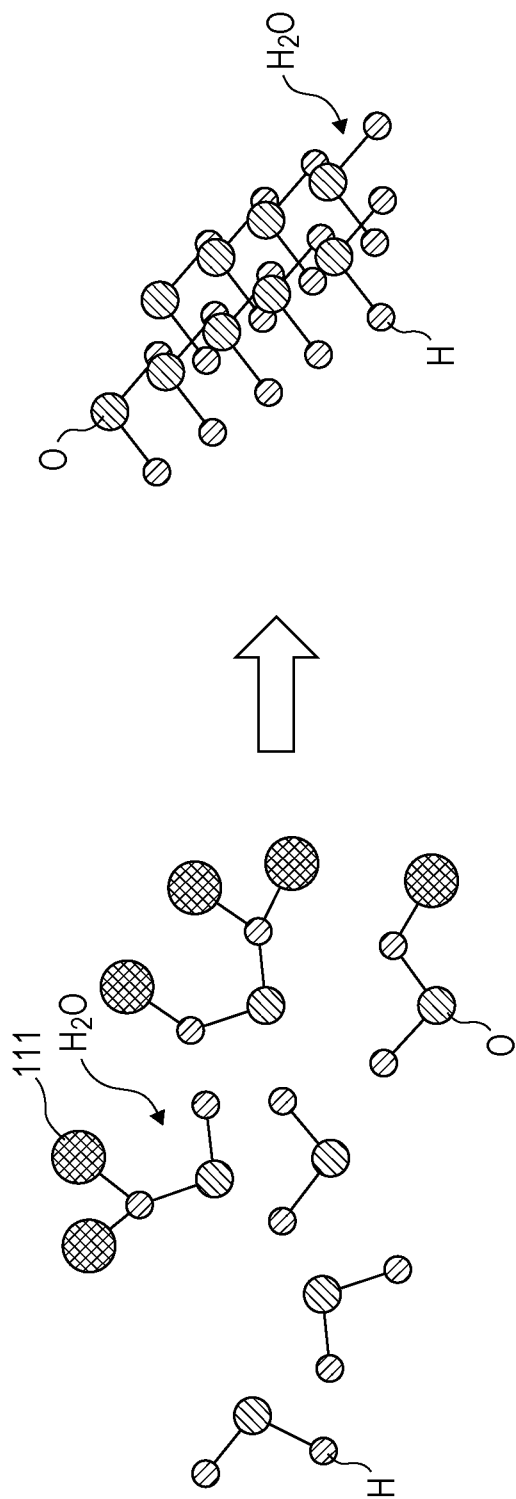


FIG. 43



(a)

(b)

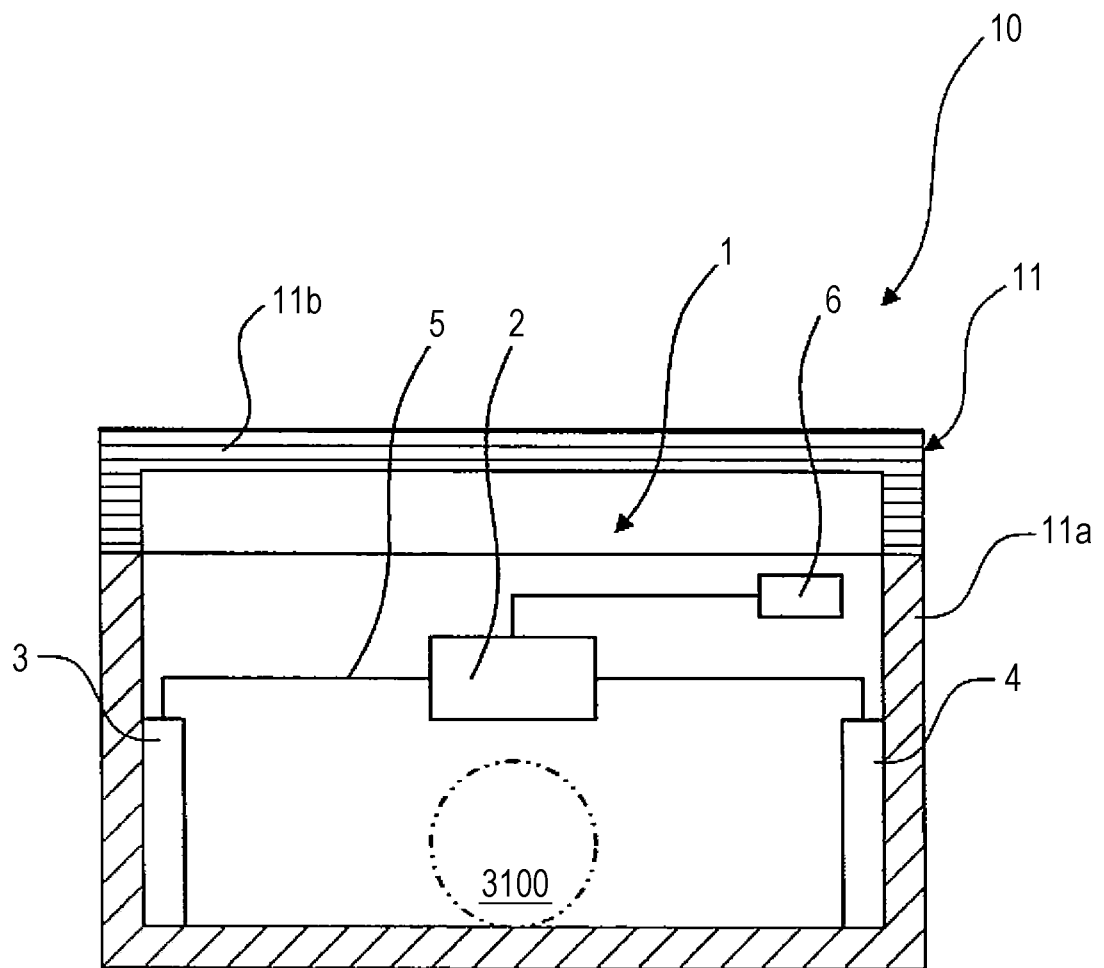
FIG. 44

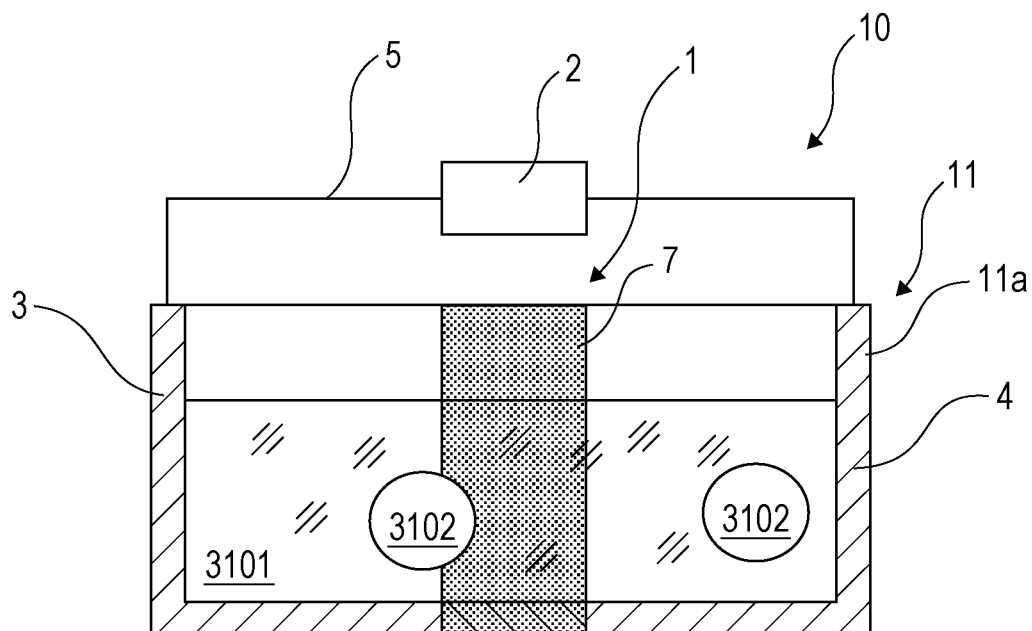
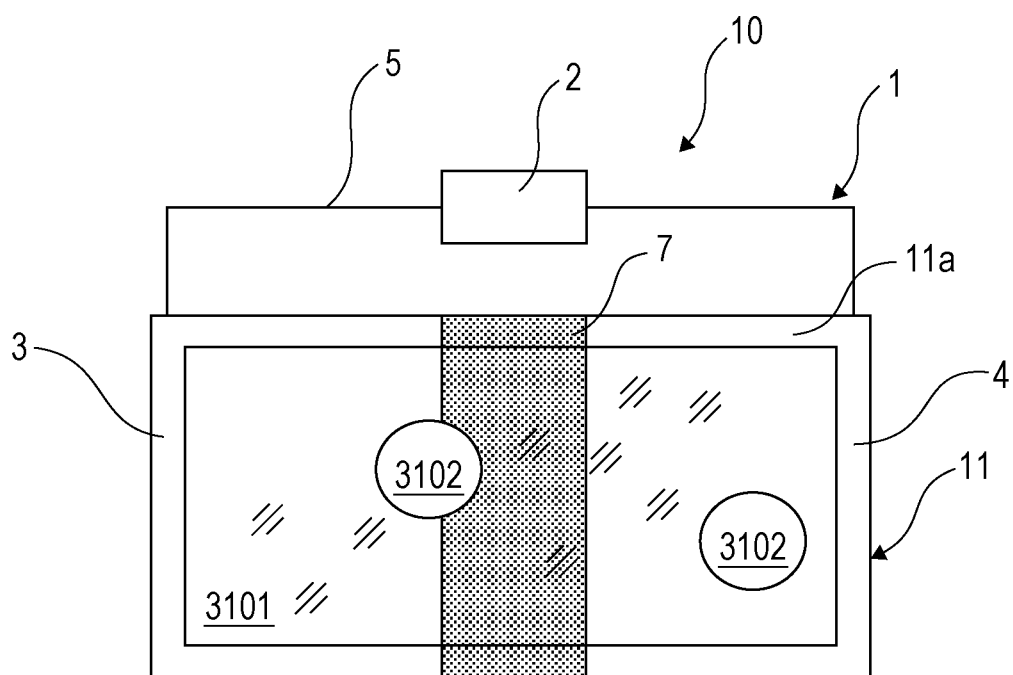
FIG. 45**(a)****(b)**

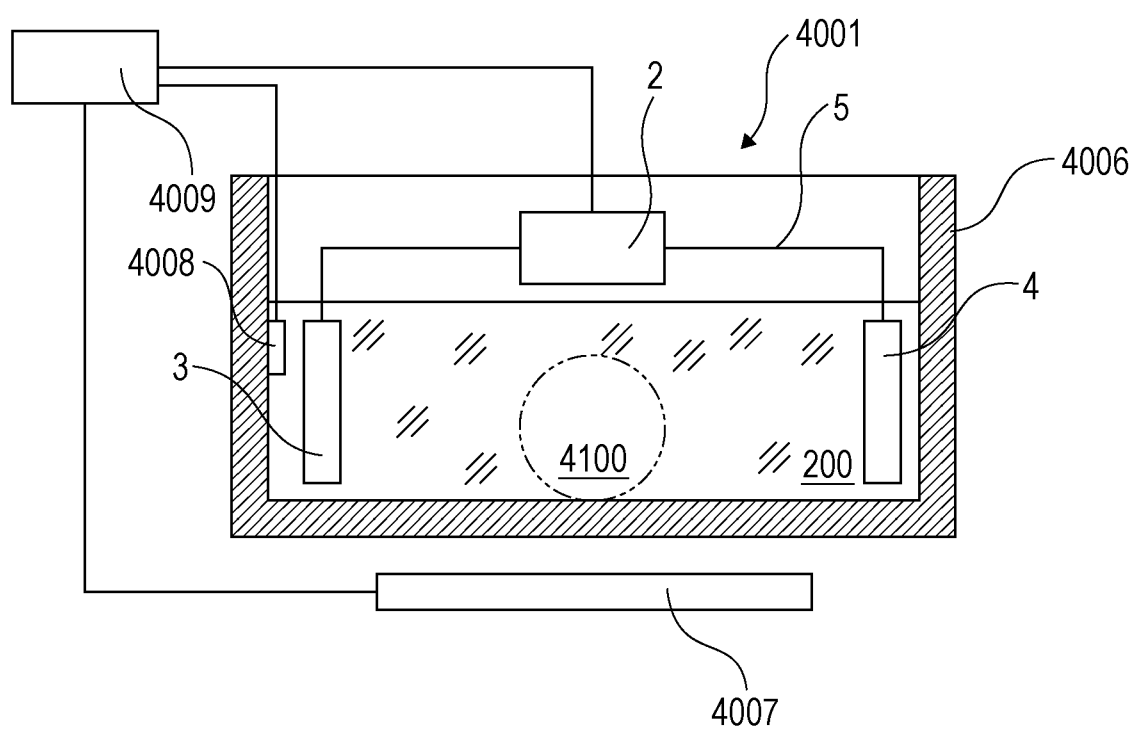
FIG. 46

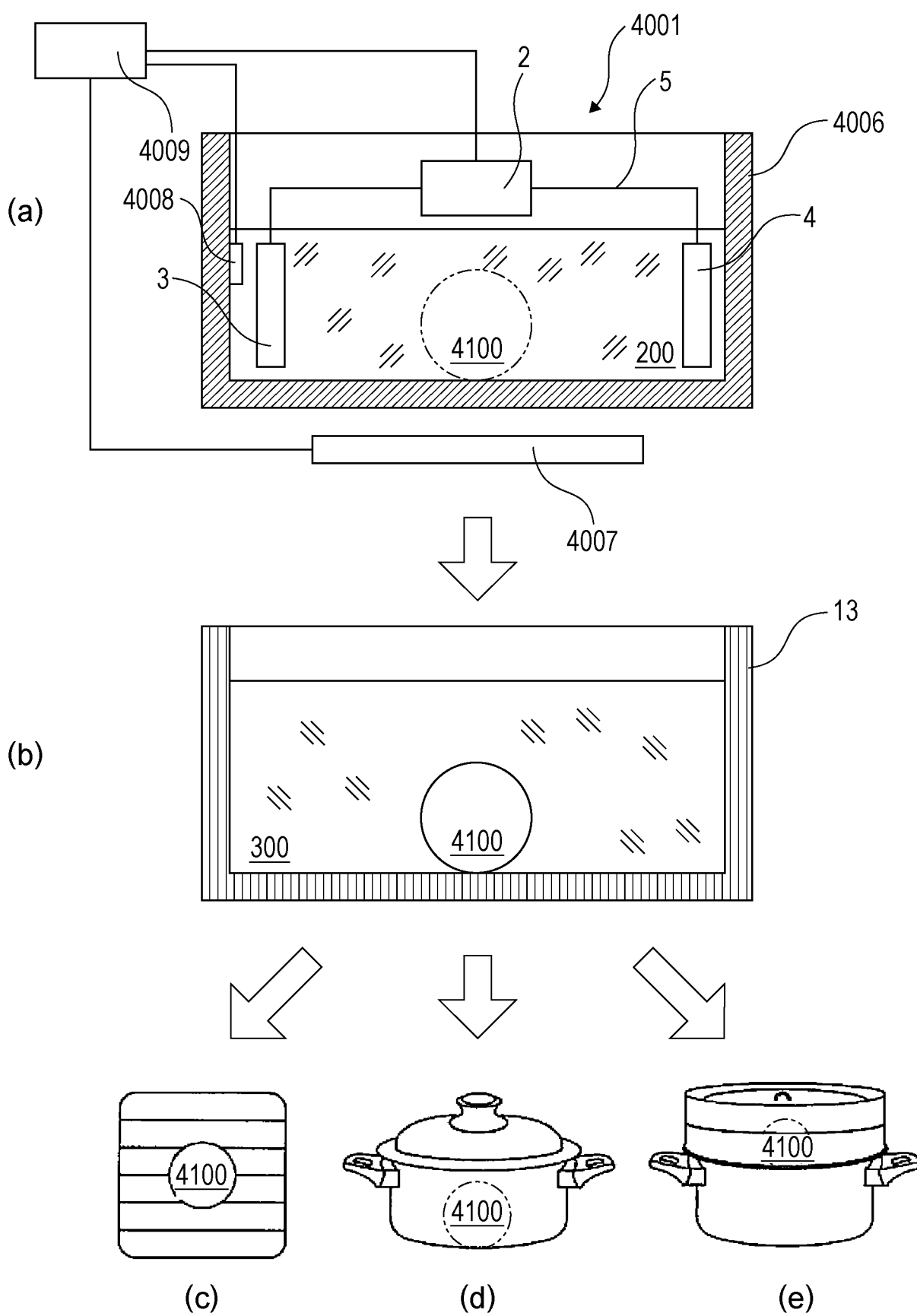
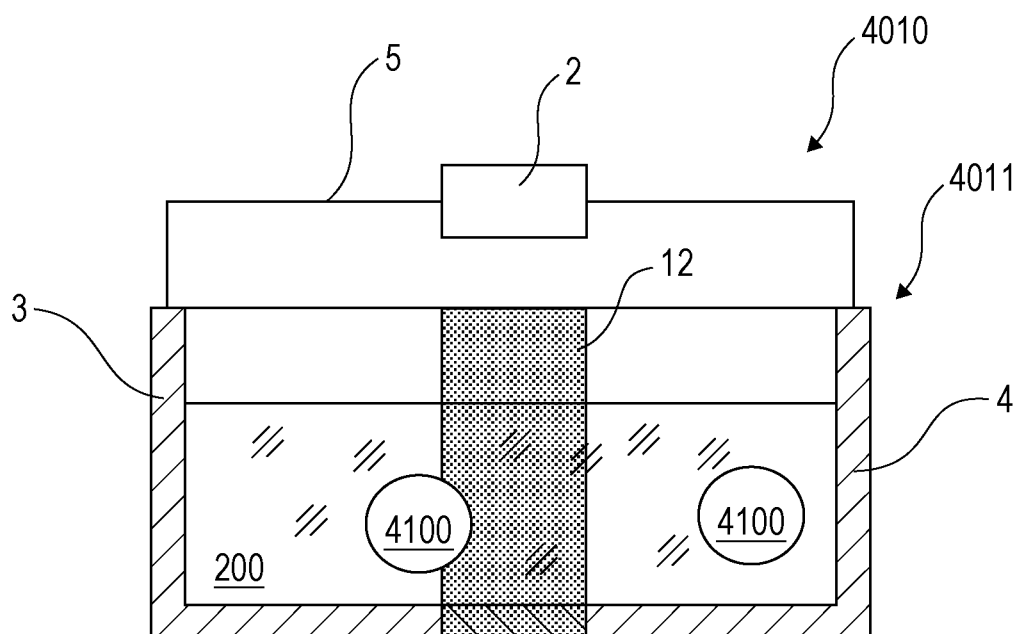
FIG. 47

FIG. 48**(a)**