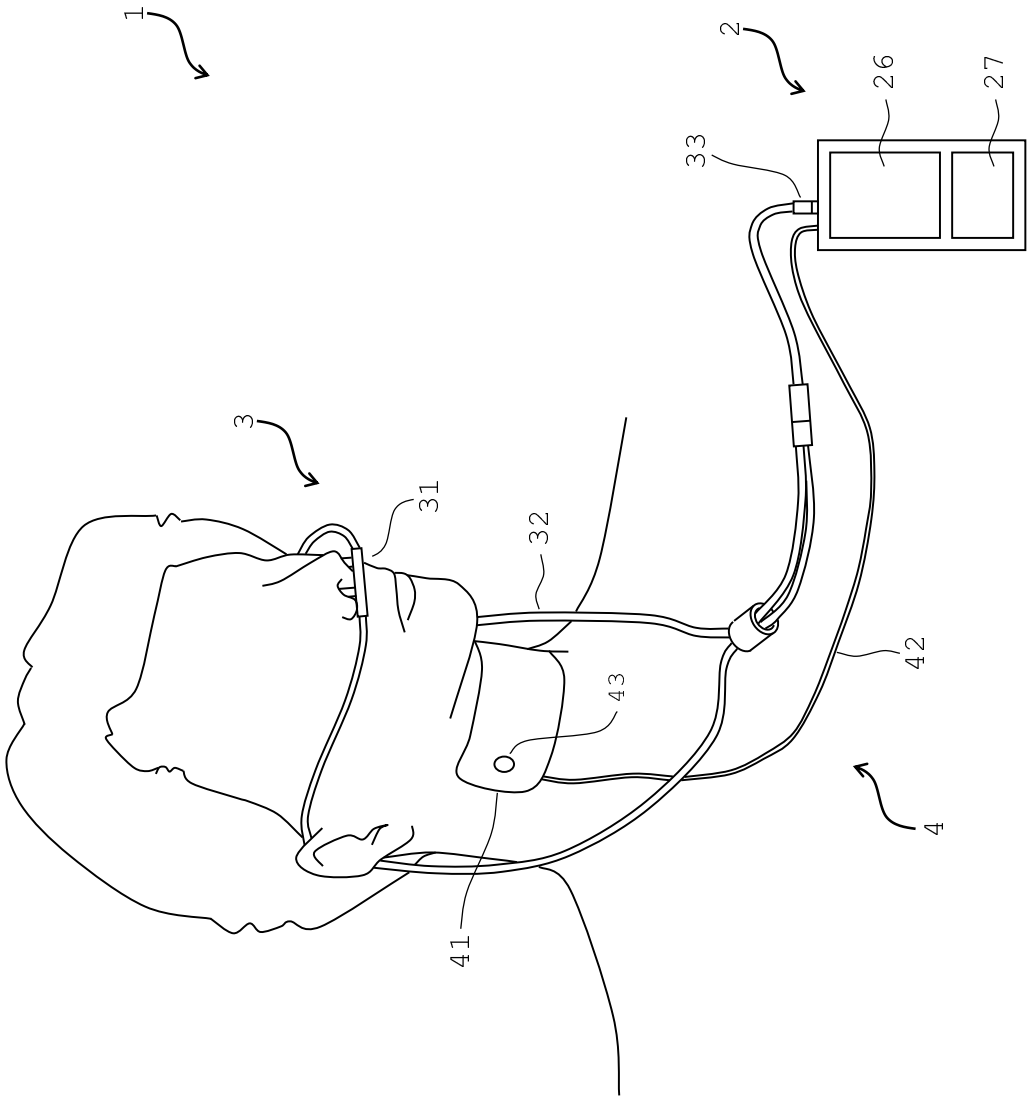
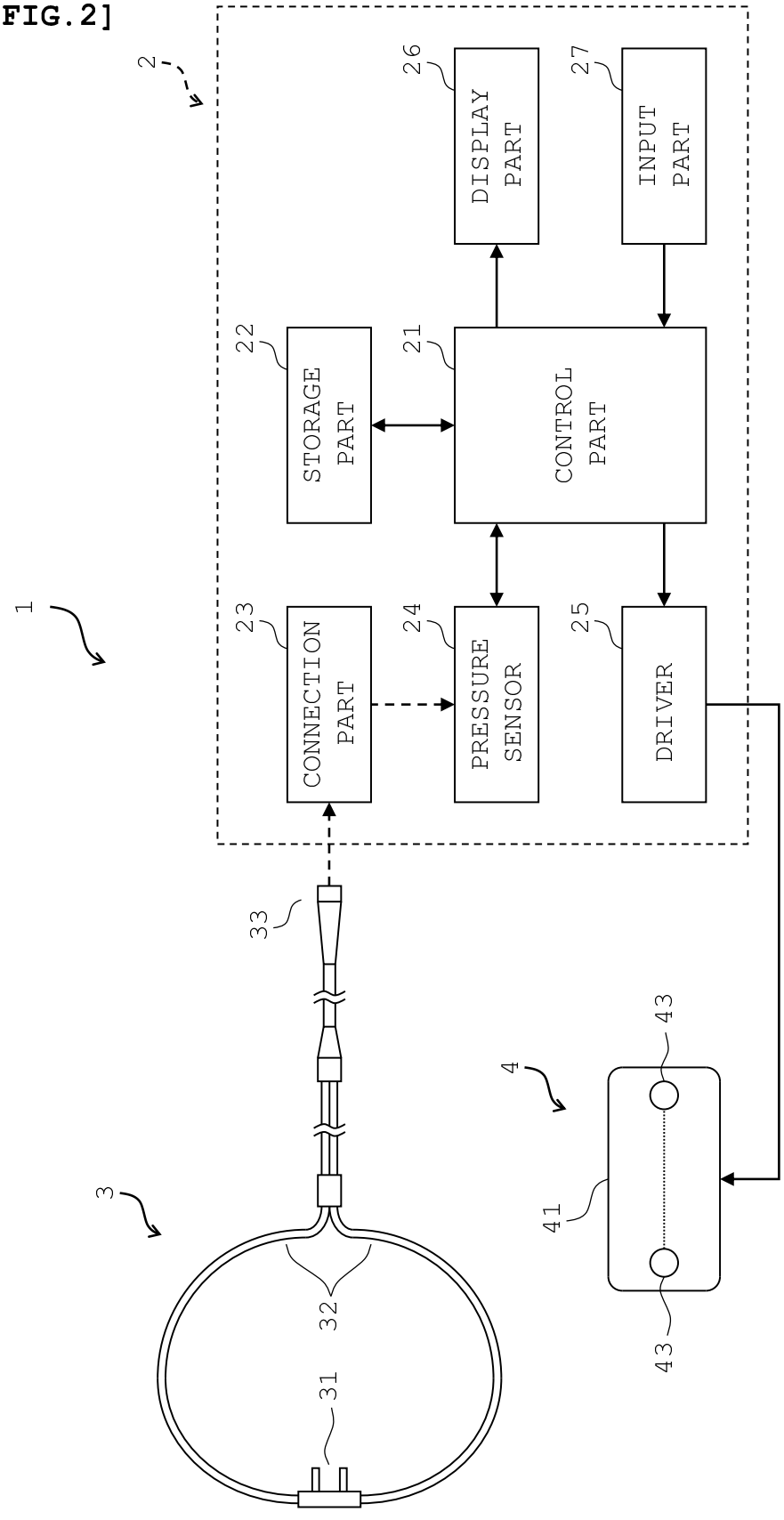
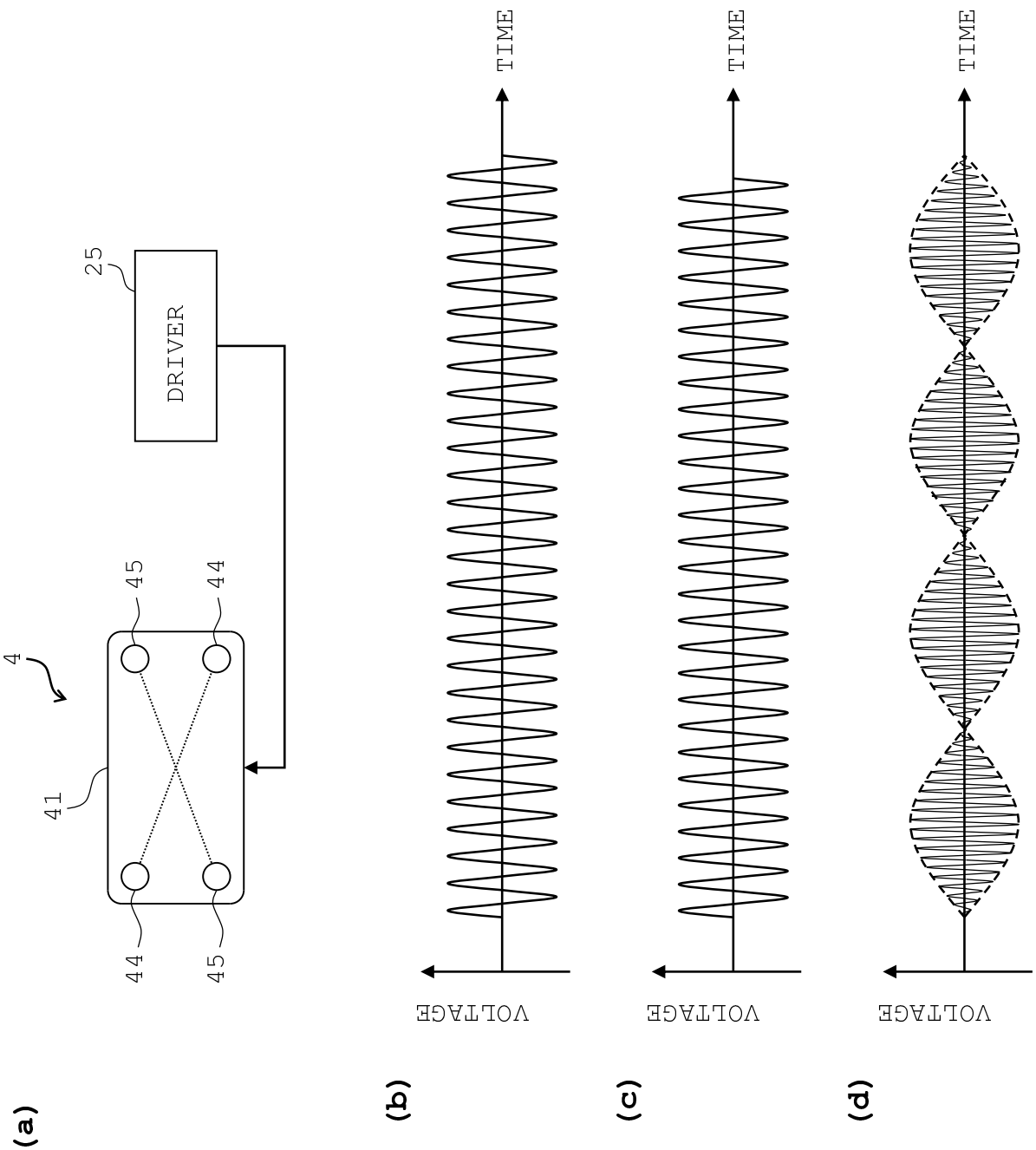
[FIG.1]

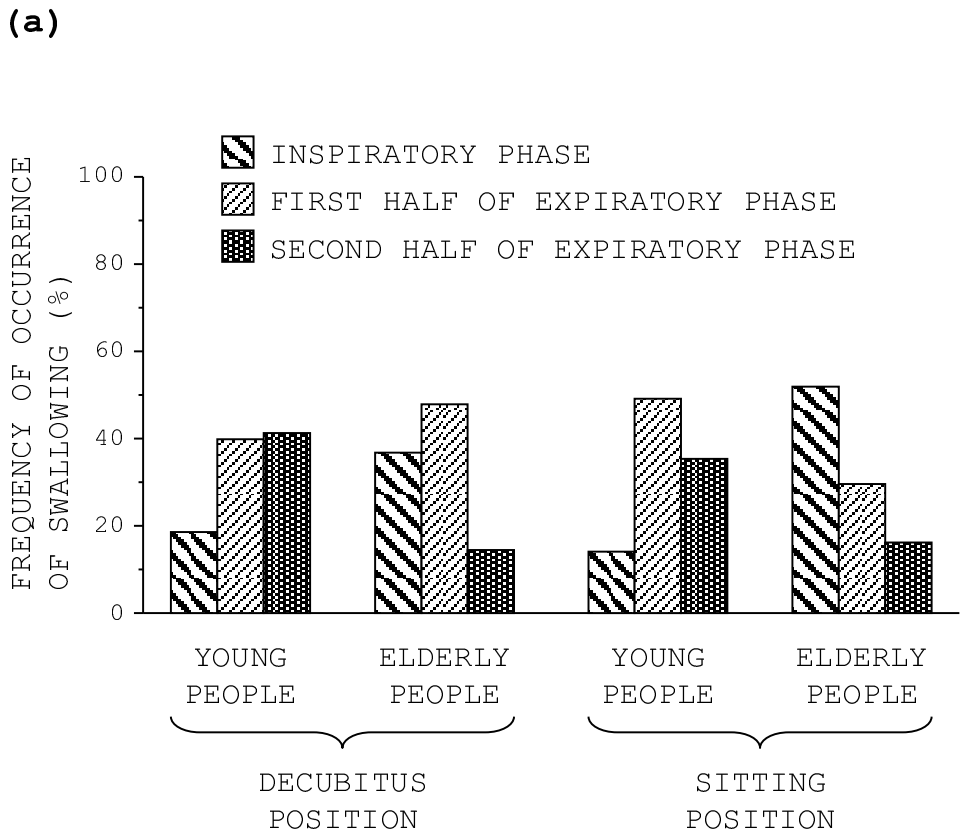


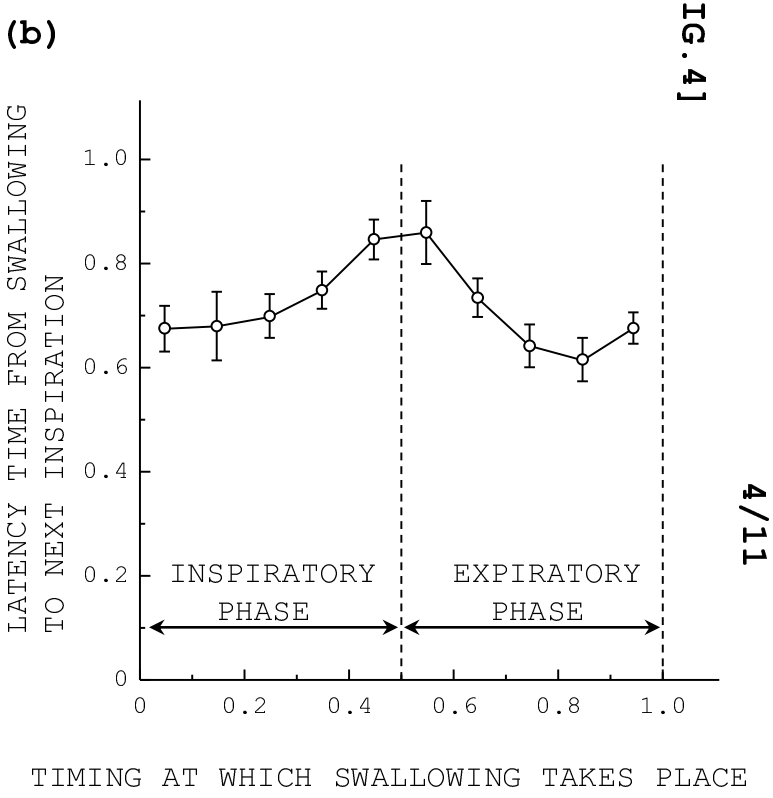
[FIG.2]


1
2
3
4
21
22
23
24
25
26
27
31
32
33
41
43
43
CONTROL PART
STORAGE PART
CONNECTION PART
PRESSURE SENSOR
DRIVER
DISPLAY PART
INPUT PART

[FIG.3]

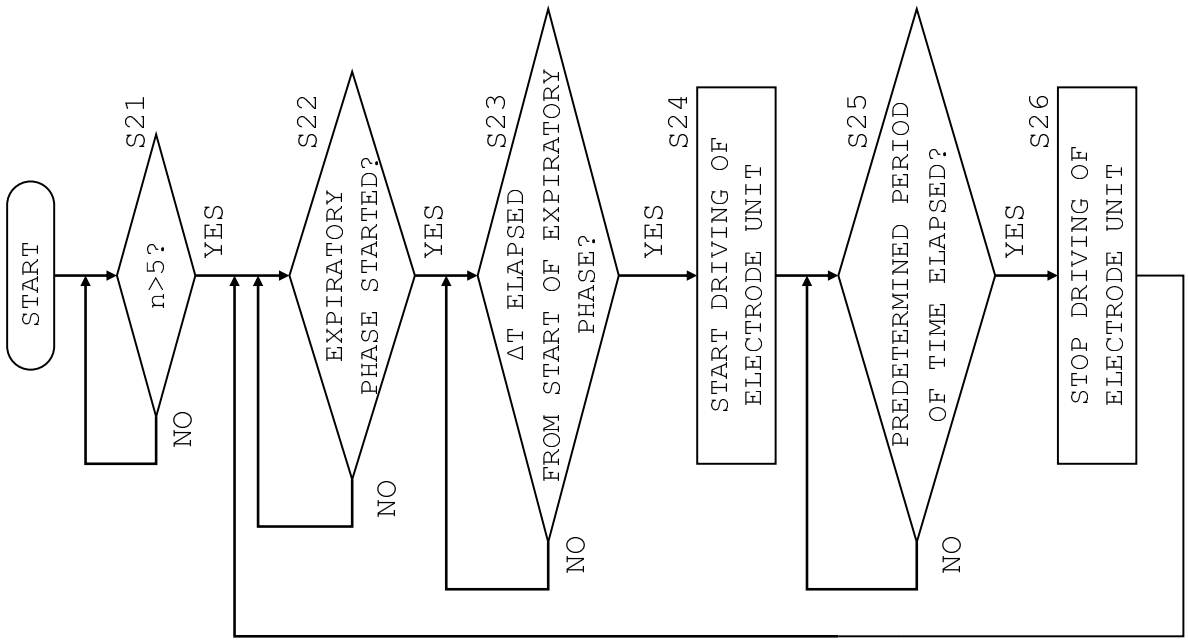

(a)
4
41
45
44
44
45
25
DRIVER
(b)
TIME
VOLTAGE
(c)
TIME
VOLTAGE
(d)
TIME
VOLTAGE


(a)
INSPIRATORY PHASE
FIRST HALF OF EXPIRATORY PHASE
SECOND HALF OF EXPIRATORY PHASE
FREQUENCY OF OCCURRENCE OF SWALLOWING (%)
100
80
60
40
20
0
YOUNG PEOPLE
ELDERLY PEOPLE
YOUNG PEOPLE
ELDERLY PEOPLE
DECUBITUS POSITION
SITTING POSITION

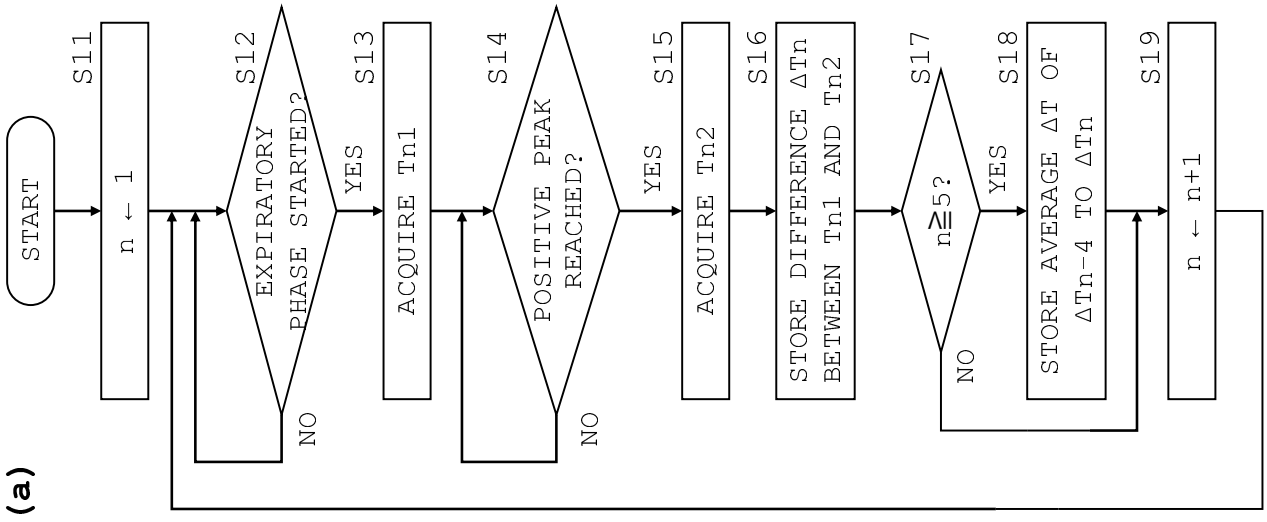

(b)
LATENCY TIME FROM SWALLOWING TO NEXT INSPIRATION
1.0
0.8
0.6
0.4
0.2
0
INSPIRATORY PHASE
EXPIRATORY PHASE
0
0.2
0.4
0.6
0.8
1.0
TIMING AT WHICH SWALLOWING TAKES PLACE

[FIG.4]

[FIG.5]

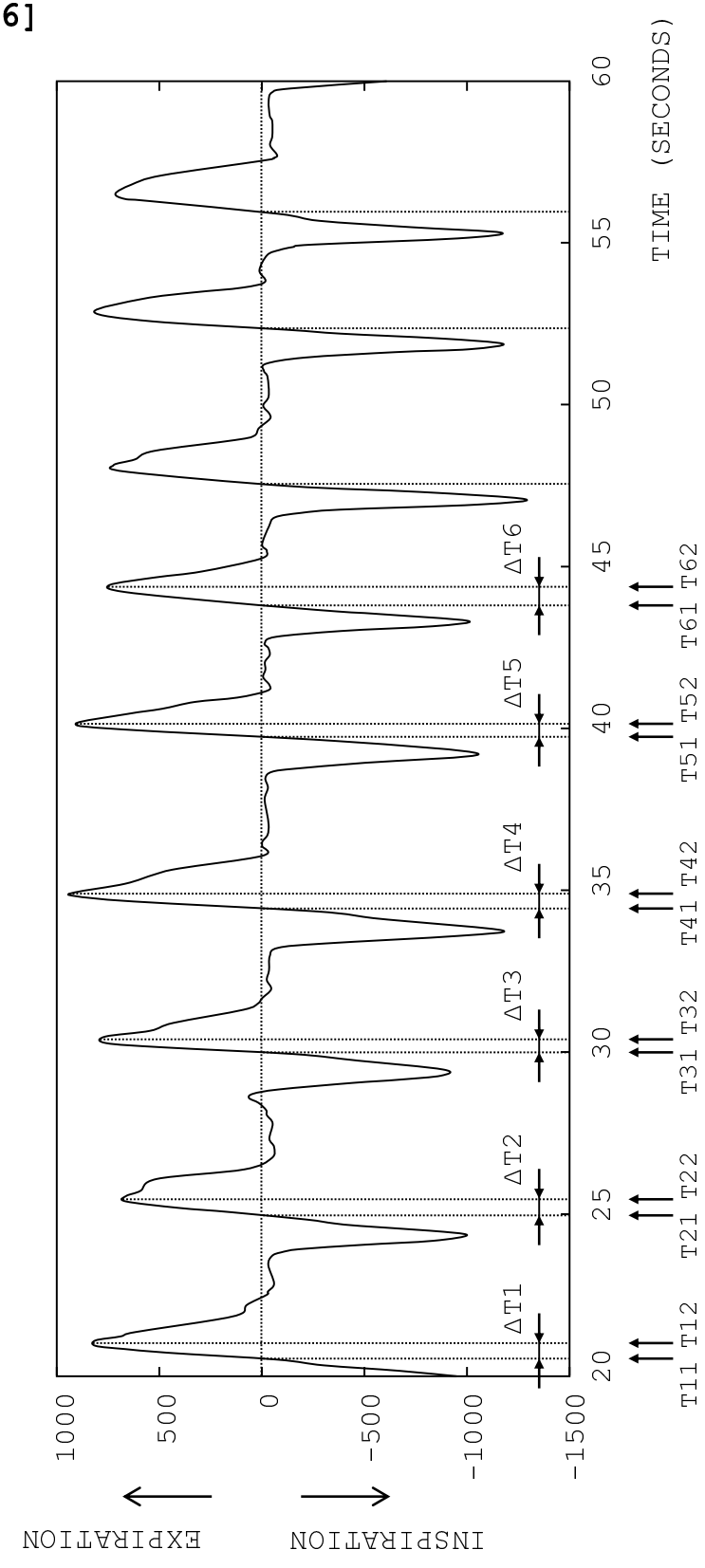

START
S21
n>5?
YES
NO
S22
EXPIRATORY PHASE STARTED?
YES
NO
S23
ΔT ELAPSED FROM START OF EXPIRATORY PHASE?
YES
NO
S24
START DRIVING OF ELECTRODE UNIT
S25
PREDETERMINED PERIOD OF TIME ELAPSED?
YES
NO
S26
STOP DRIVING OF ELECTRODE UNIT

(b)

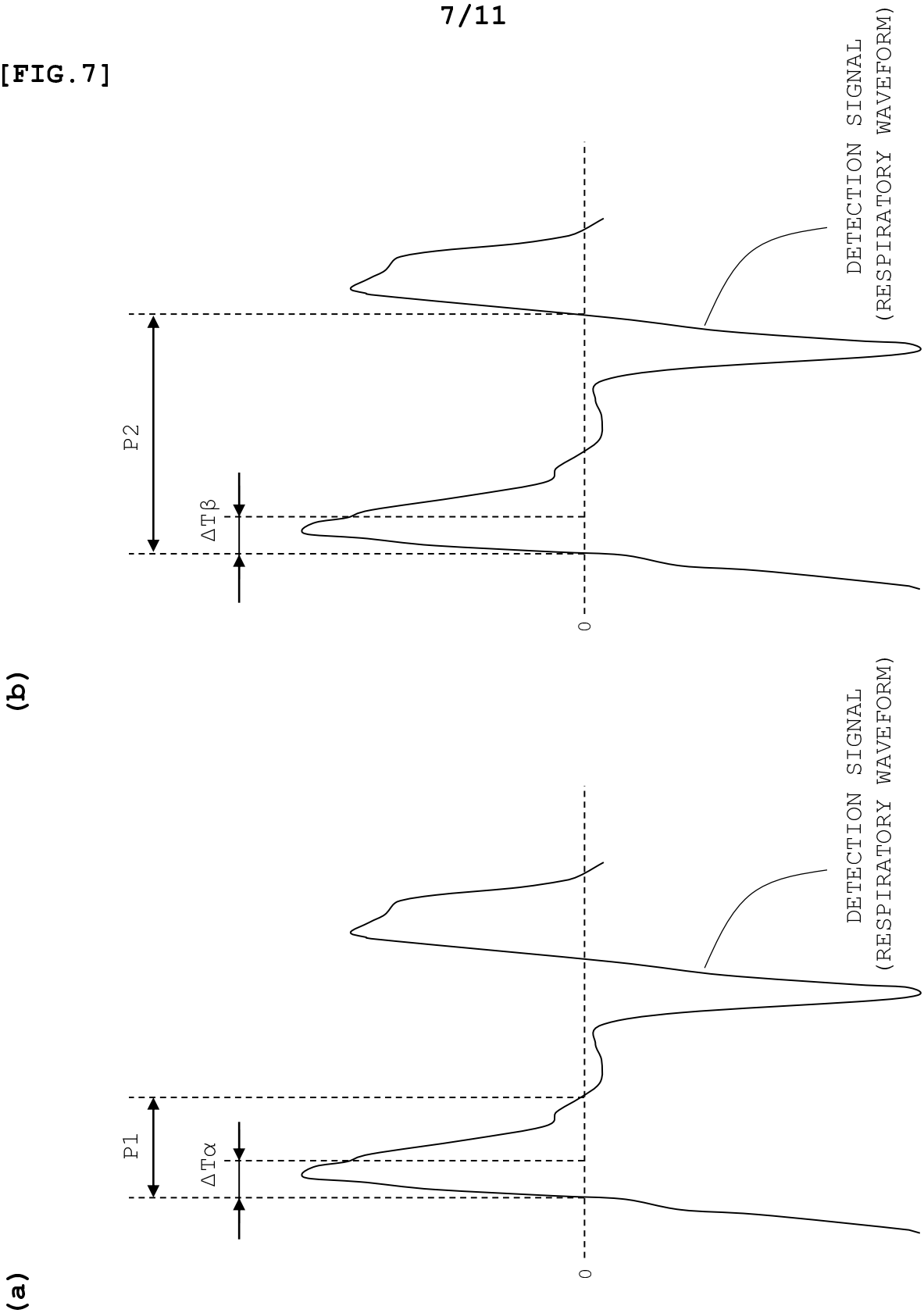

START
S11
n ← 1
S12
EXPIRATORY PHASE STARTED?
YES
NO
S13
ACQUIRE Tn1
S14
POSITIVE PEAK REACHED?
YES
NO
S15
ACQUIRE Tn2
S16
STORE DIFFERENCE ΔTn BETWEEN Tn1 AND Tn2
S17
n≧5?
YES
NO
S18
STORE AVERAGE ΔT OF ΔTn-4 TO ΔTn
S19
n ← n+1

(a)

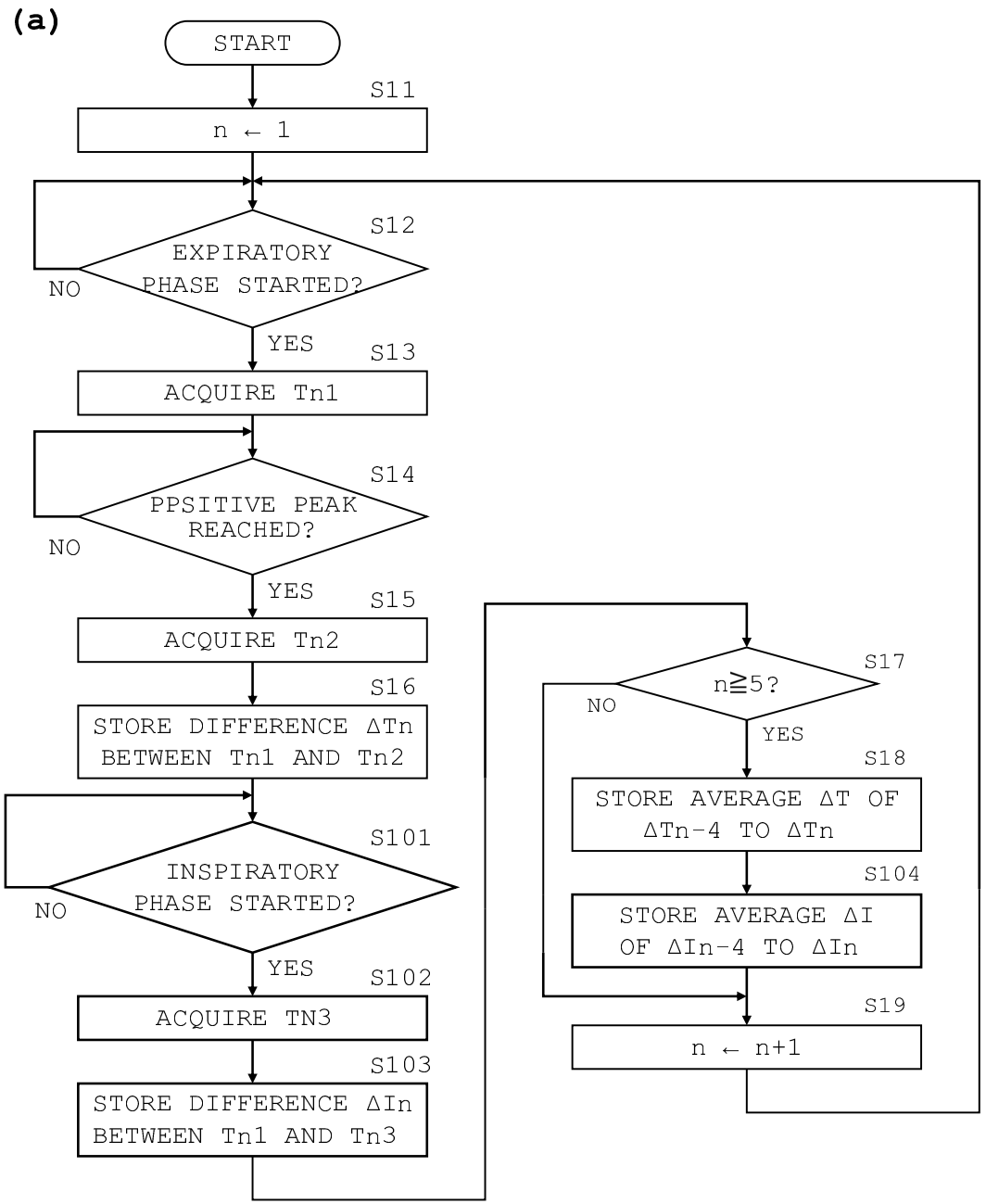
[FIG.6]

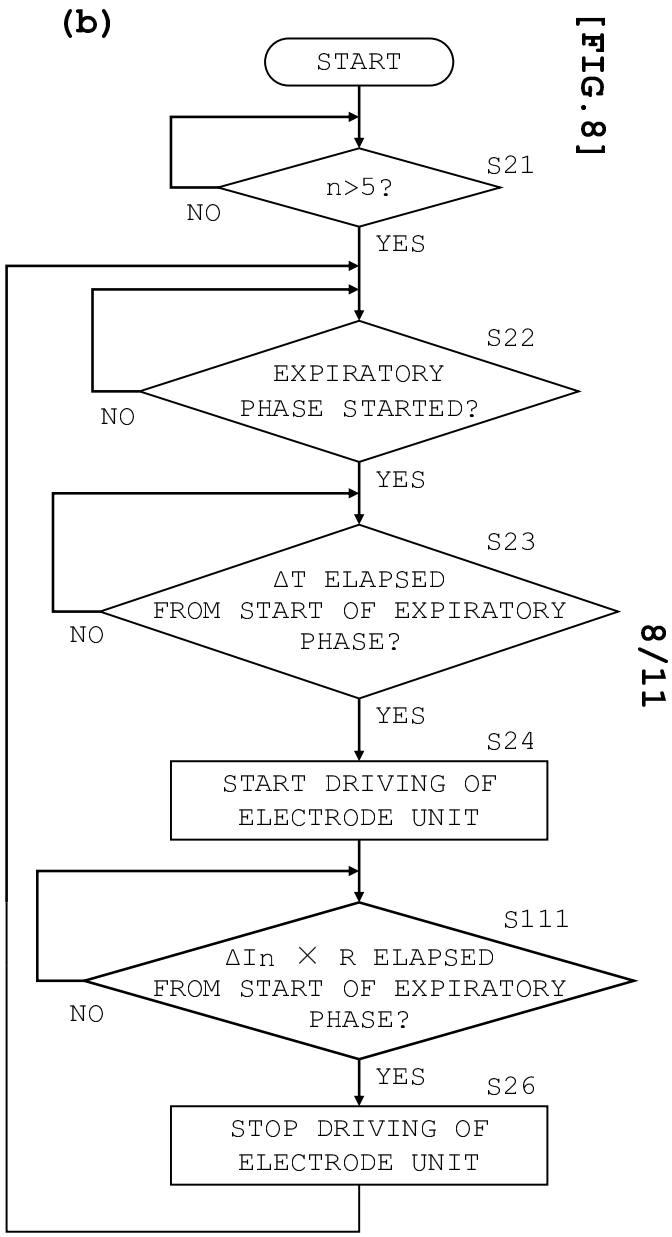

1000
500
0
-500
-1000
-1500
EXPIRATION
INSPIRATION
20
25
30
35
40
45
50
55
60
TIME (SECONDS)
ΔT1
ΔT2
ΔT3
ΔT4
ΔT5
ΔT6
T11 T12
T21 T22
T31 T32
T41 T42
T51 T52
T61 T62

[FIG.7]

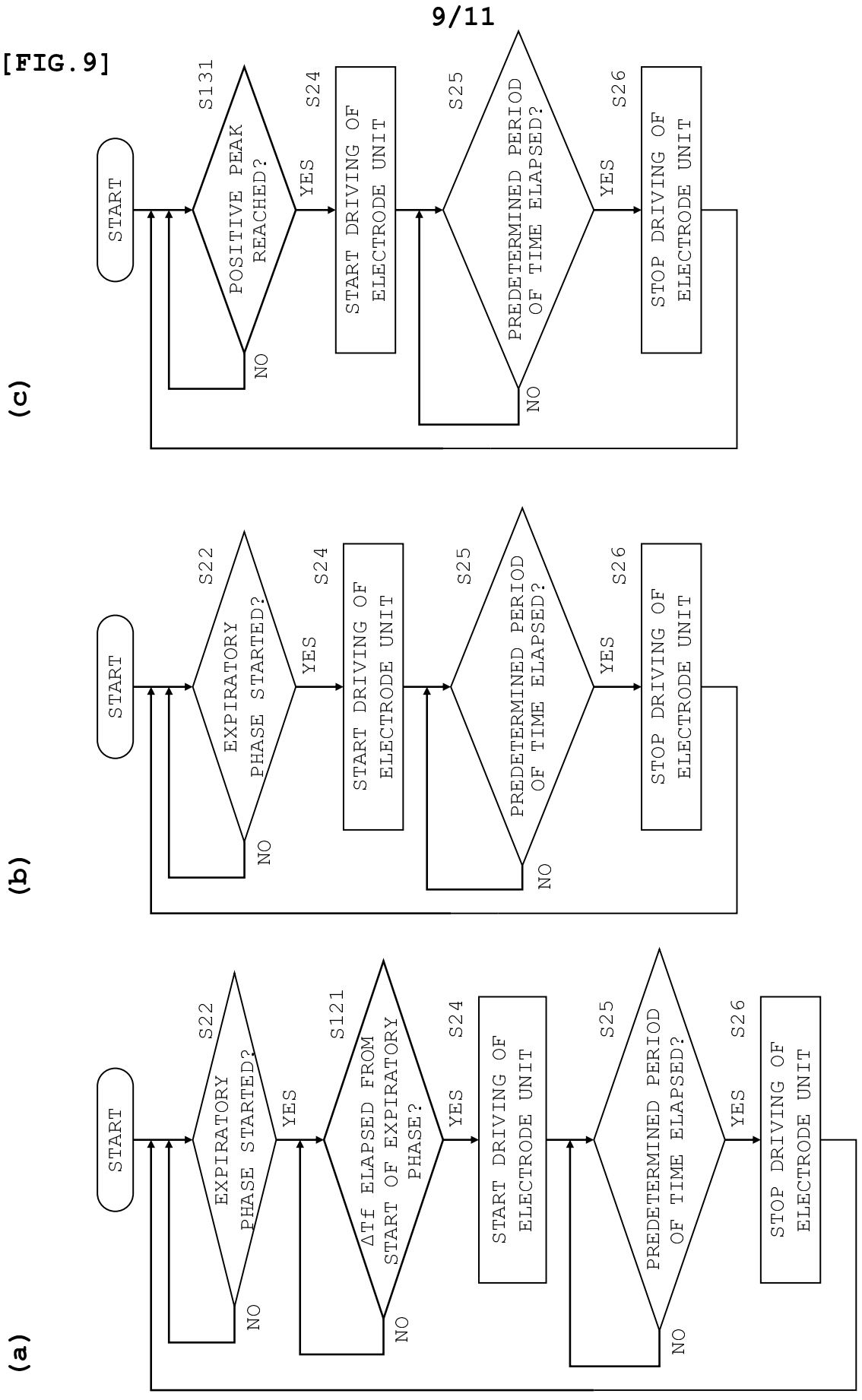

(a)
DETECTION SIGNAL
(RESPIRATORY WAVEFORM)
P1
ΔTα
0
(b)
DETECTION SIGNAL
(RESPIRATORY WAVEFORM)
P2
ΔTβ
0

[FIG.8]

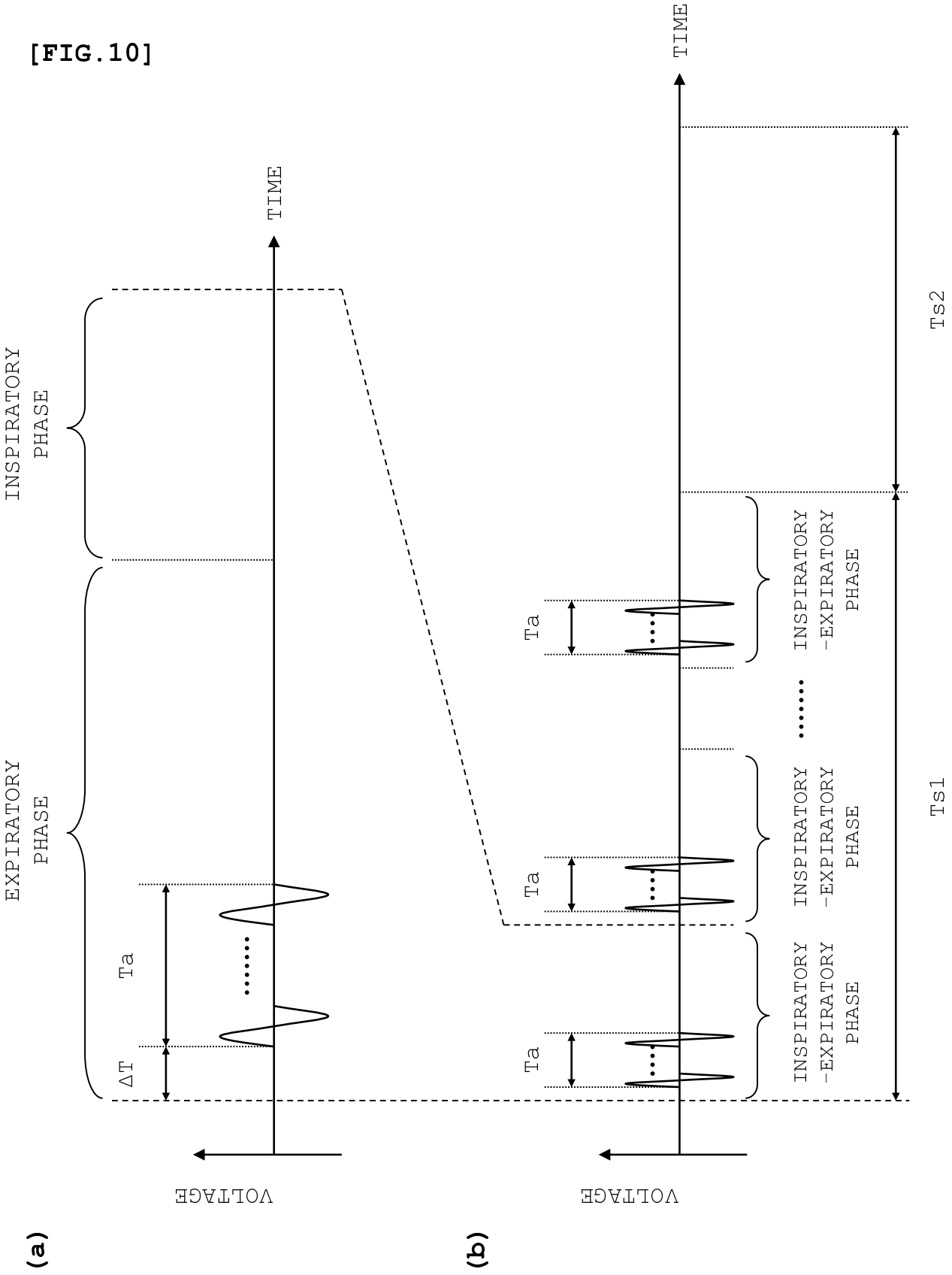

(a)
START
S11
n ← 1
S12
EXPIRATORY PHASE STARTED?
NO
YES
S13
ACQUIRE Tn1
S14
PPSITIVE PEAK REACHED?
NO
YES
S15
ACQUIRE Tn2
S16
STORE DIFFERENCE ΔTn BETWEEN Tn1 AND Tn2
S101
INSPIRATORY PHASE STARTED?
NO
YES
S102
ACQUIRE TN3
S103
STORE DIFFERENCE ΔIn BETWEEN Tn1 AND Tn3
S17
n≧5?
NO
YES
S18
STORE AVERAGE ΔT OF ΔTn-4 TO ΔTn
S104
STORE AVERAGE ΔI OF ΔIn-4 TO ΔIn
S19
n ← n+1


(b)
START
S21
n>5?
NO
YES
S22
EXPIRATORY PHASE STARTED?
NO
YES
S23
ΔT ELAPSED FROM START OF EXPIRATORY PHASE?
NO
YES
S24
START DRIVING OF ELECTRODE UNIT
S111
ΔIn × R ELAPSED FROM START OF EXPIRATORY PHASE?
NO
YES
S26
STOP DRIVING OF ELECTRODE UNIT

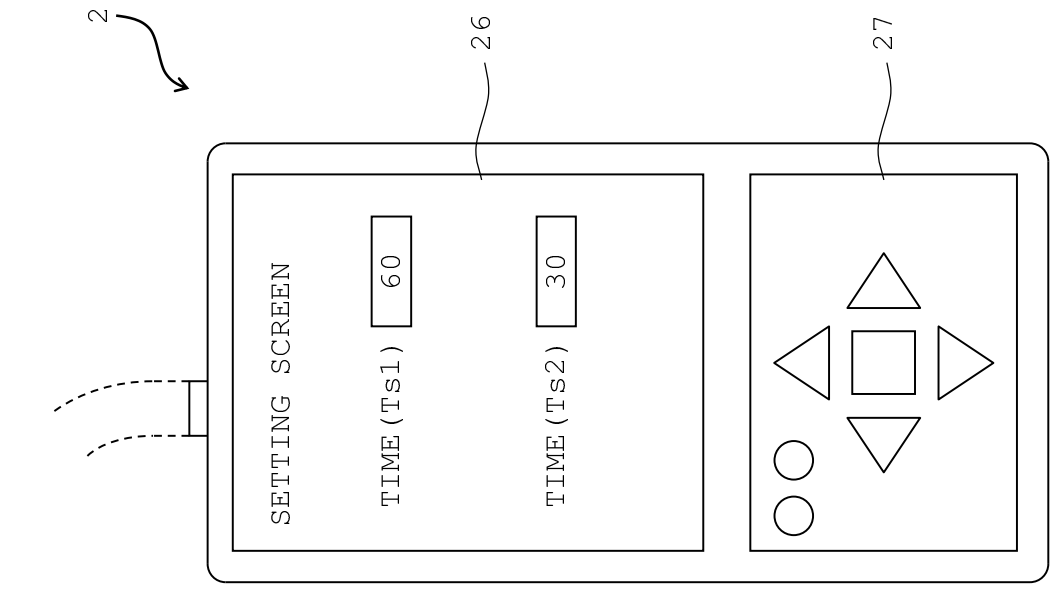
[FIG.9]


(a)
START
S22
EXPIRATORY PHASE STARTED?
NO
YES
S121
ΔTf ELAPSED FROM START OF EXPIRATORY PHASE?
NO
YES
S24
START DRIVING OF ELECTRODE UNIT
S25
PREDETERMINED PERIOD OF TIME ELAPSED?
NO
YES
S26
STOP DRIVING OF ELECTRODE UNIT
(b)
START
S22
EXPIRATORY PHASE STARTED?
NO
YES
S24
START DRIVING OF ELECTRODE UNIT
S25
PREDETERMINED PERIOD OF TIME ELAPSED?
NO
YES
S26
STOP DRIVING OF ELECTRODE UNIT
(c)
START
S131
POSITIVE PEAK REACHED?
NO
YES
S24
START DRIVING OF ELECTRODE UNIT
S25
PREDETERMINED PERIOD OF TIME ELAPSED?
NO
YES
S26
STOP DRIVING OF ELECTRODE UNIT

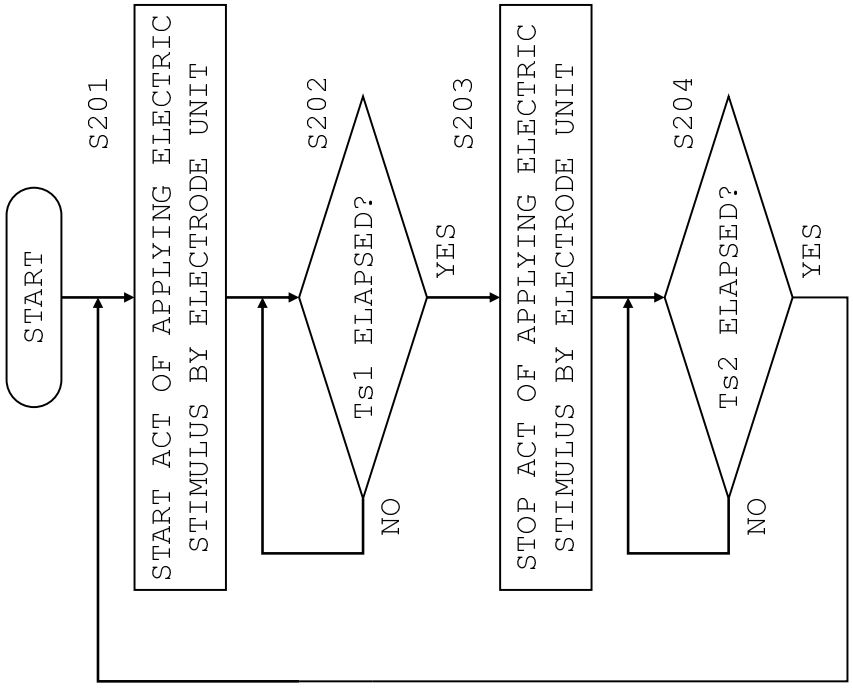
[FIG.10]


(a)
VOLTAGE
TIME
EXPIRATORY PHASE
INSPIRATORY PHASE
ΔT
Ta
(b)
VOLTAGE
TIME
Ts1
Ts2
INSPIRATORY -EXPIRATORY PHASE
INSPIRATORY -EXPIRATORY PHASE
INSPIRATORY -EXPIRATORY PHASE
Ta
Ta
Ta

[FIG.11]


2
26
27
SETTING SCREEN
TIME(Ts1)
60
TIME(Ts2)
30

(b)


START
S201
START ACT OF APPLYING ELECTRIC STIMULUS BY ELECTRODE UNIT
S202
Ts1 ELAPSED?
NO
YES
S203
STOP ACT OF APPLYING ELECTRIC STIMULUS BY ELECTRODE UNIT
S204
Ts2 ELAPSED?
NO
YES

(a)