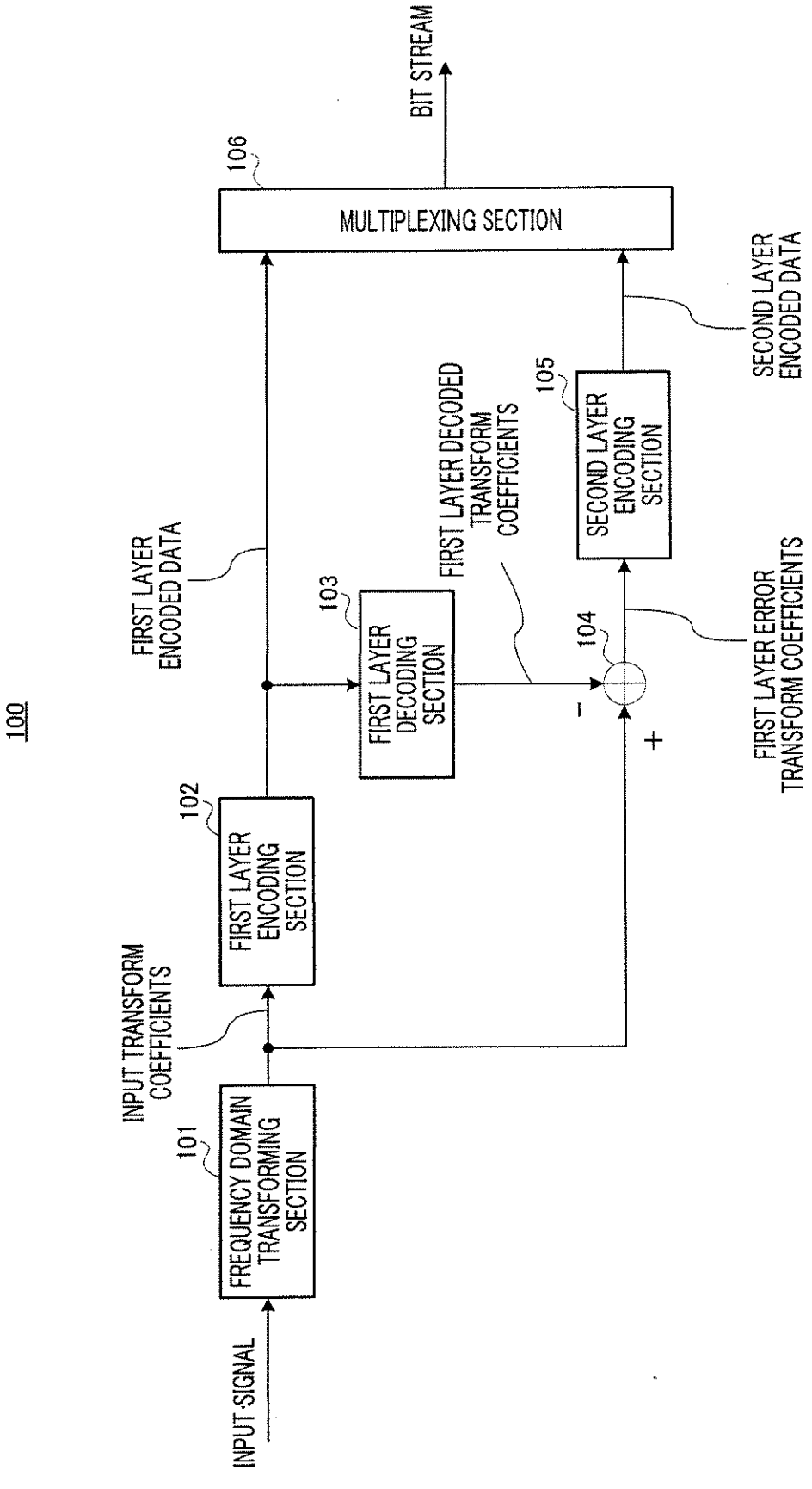

100
INPUT SIGNAL
101
FREQUENCY DOMAIN TRANSFORMING SECTION
INPUT TRANSFORM COEFFICIENTS
102
FIRST LAYER ENCODING SECTION
FIRST LAYER ENCODED DATA
103
FIRST LAYER DECODING SECTION
FIRST LAYER DECODED TRANSFORM COEFFICIENTS
104
-
+
105
SECOND LAYER ENCODING SECTION
FIRST LAYER ERROR TRANSFORM COEFFICIENTS
SECOND LAYER ENCODED DATA
106
MULTIPLEXING SECTION
BIT STREAM

FIG.1

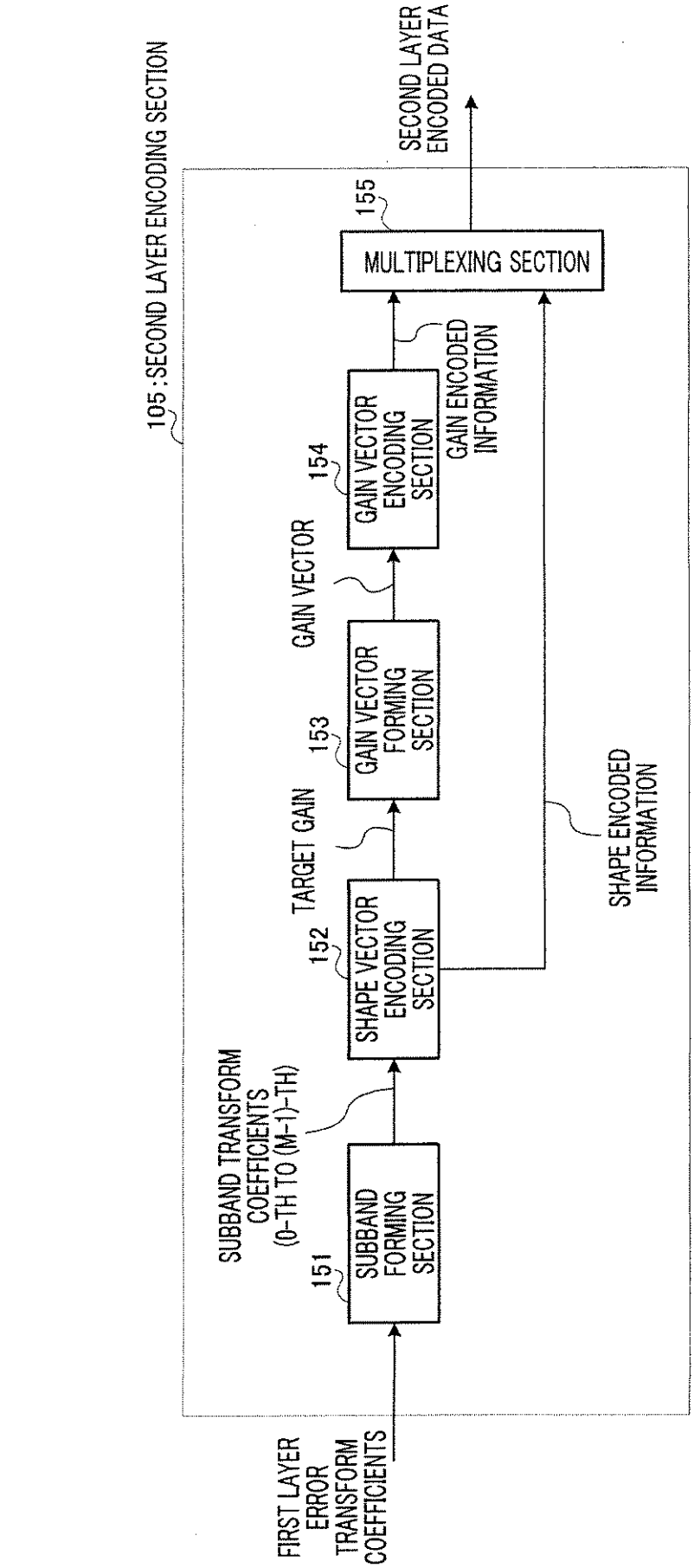

105 : SECOND LAYER ENCODING SECTION
FIRST LAYER ERROR TRANSFORM COEFFICIENTS
151
SUBBAND FORMING SECTION
SUBBAND TRANSFORM COEFFICIENTS (0-TH TO (M-1)-TH)
152
SHAPE VECTOR ENCODING SECTION
TARGET GAIN
153
GAIN VECTOR FORMING SECTION
GAIN VECTOR
154
GAIN VECTOR ENCODING SECTION
GAIN ENCODED INFORMATION
SHAPE ENCODED INFORMATION
155
MULTIPLEXING SECTION
SECOND LAYER ENCODED DATA

FIG.2

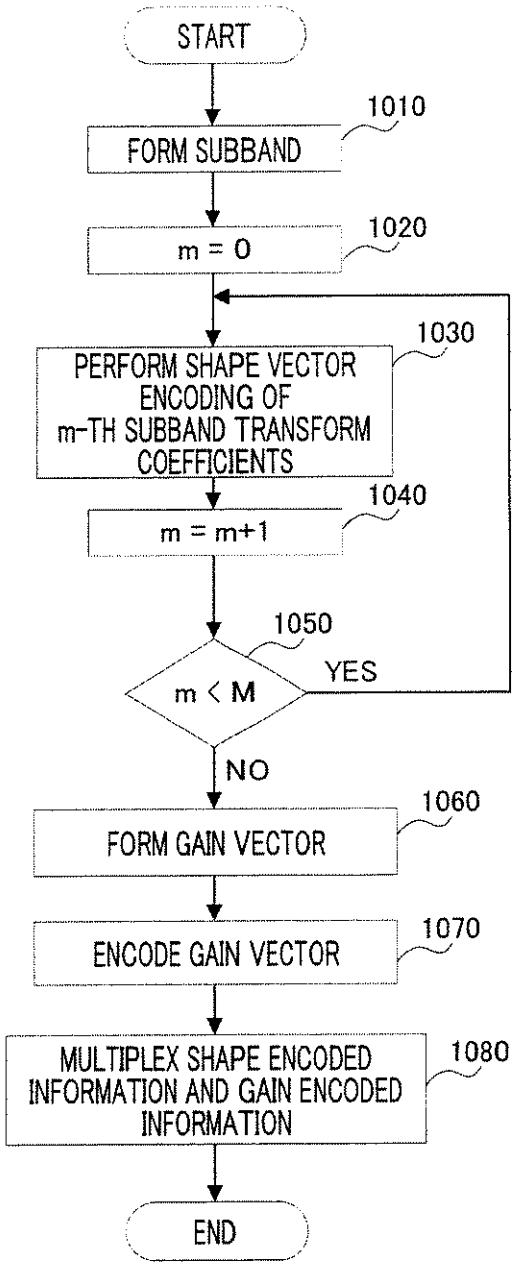

START
1010
FORM SUBBAND
1020
m = 0
1030
PERFORM SHAPE VECTOR ENCODING OF m-TH SUBBAND TRANSFORM COEFFICIENTS
1040
m = m+1
1050
m < M
YES
NO
1060
FORM GAIN VECTOR
1070
ENCODE GAIN VECTOR
1080
MULTIPLEX SHAPE ENCODED INFORMATION AND GAIN ENCODED INFORMATION
END

FIG.3

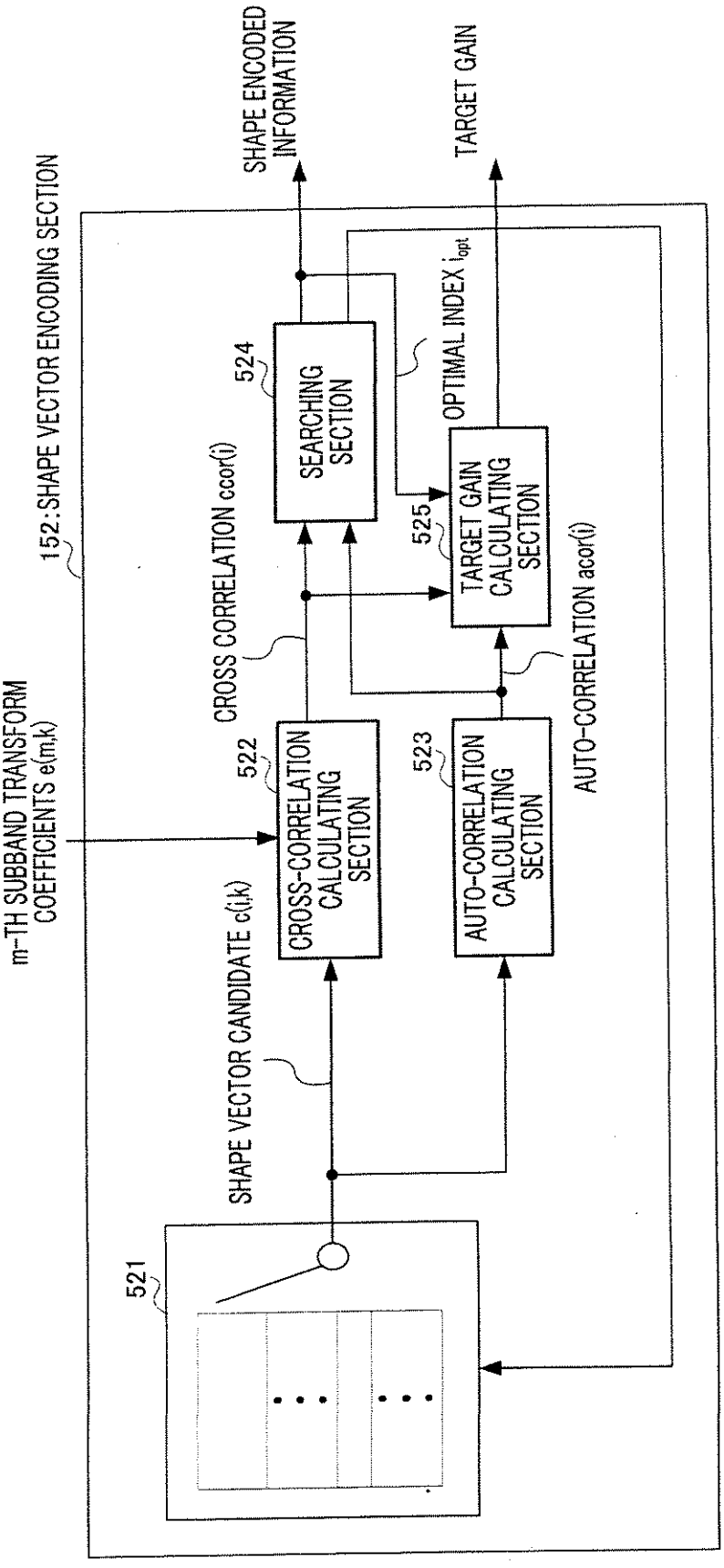

152:SHAPE VECTOR ENCODING SECTION
m-TH SUBBAND TRANSFORM COEFFICIENTS e(m,k)
SHAPE VECTOR CANDIDATE c(i,k)
521
CROSS-CORRELATION CALCULATING SECTION
522
AUTO-CORRELATION CALCULATING SECTION
523
CROSS CORRELATION ccor(i)
AUTO-CORRELATION acor(i)
SEARCHING SECTION
524
TARGET GAIN CALCULATING SECTION
525
OPTIMAL INDEX i_{opt}
SHAPE ENCODED INFORMATION
TARGET GAIN

FIG.4

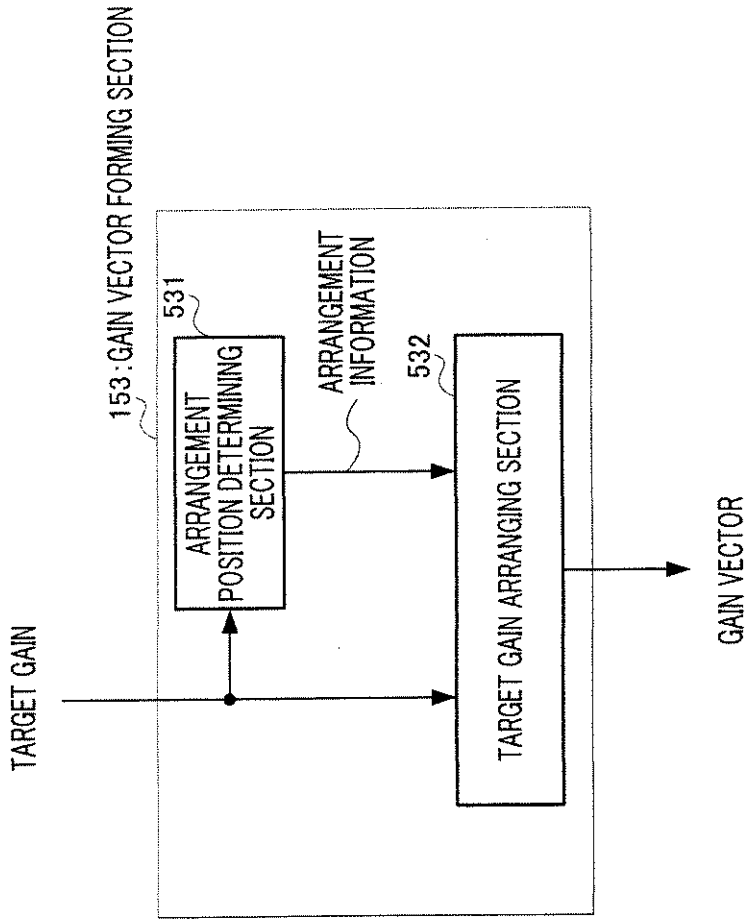

153 : GAIN VECTOR FORMING SECTION
531
ARRANGEMENT POSITION DETERMINING SECTION
ARRANGEMENT INFORMATION
532
TARGET GAIN ARRANGING SECTION
TARGET GAIN
GAIN VECTOR

FIG.5

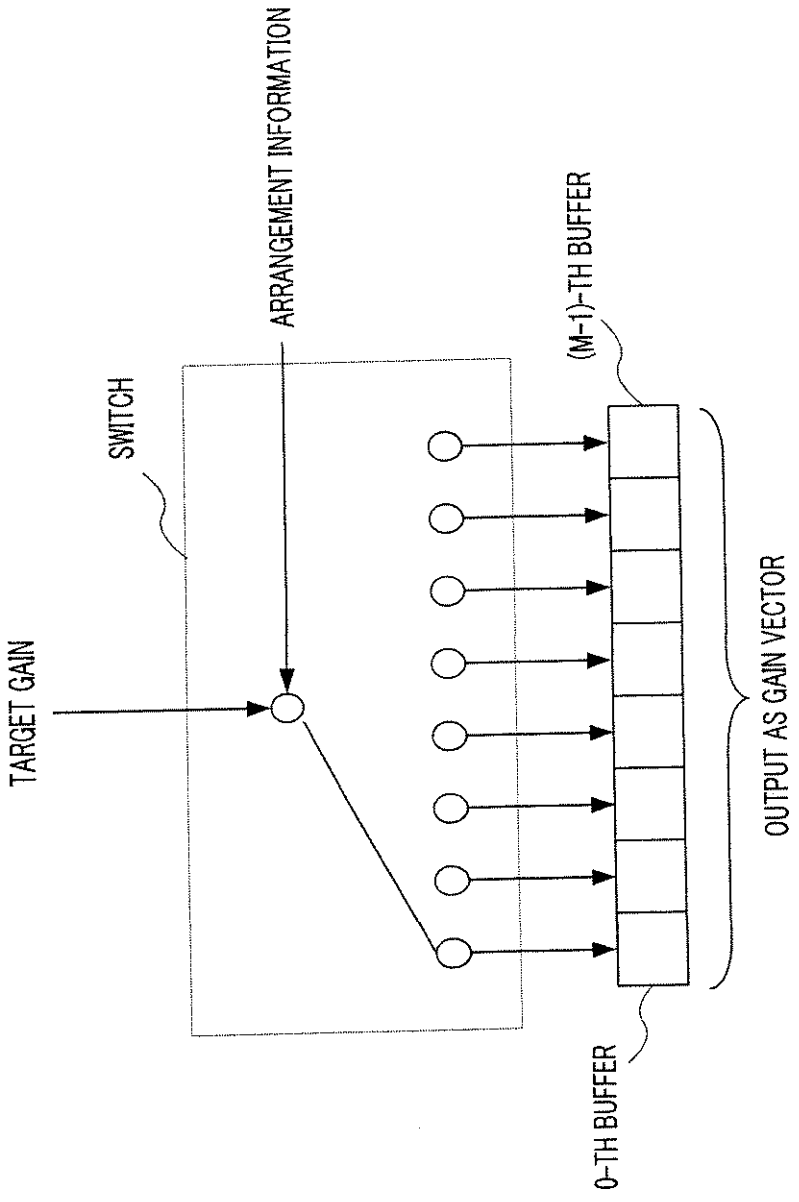

TARGET GAIN
SWITCH
ARRANGEMENT INFORMATION
(M-1)-TH BUFFER
0-TH BUFFER
OUTPUT AS GAIN VECTOR

FIG.6

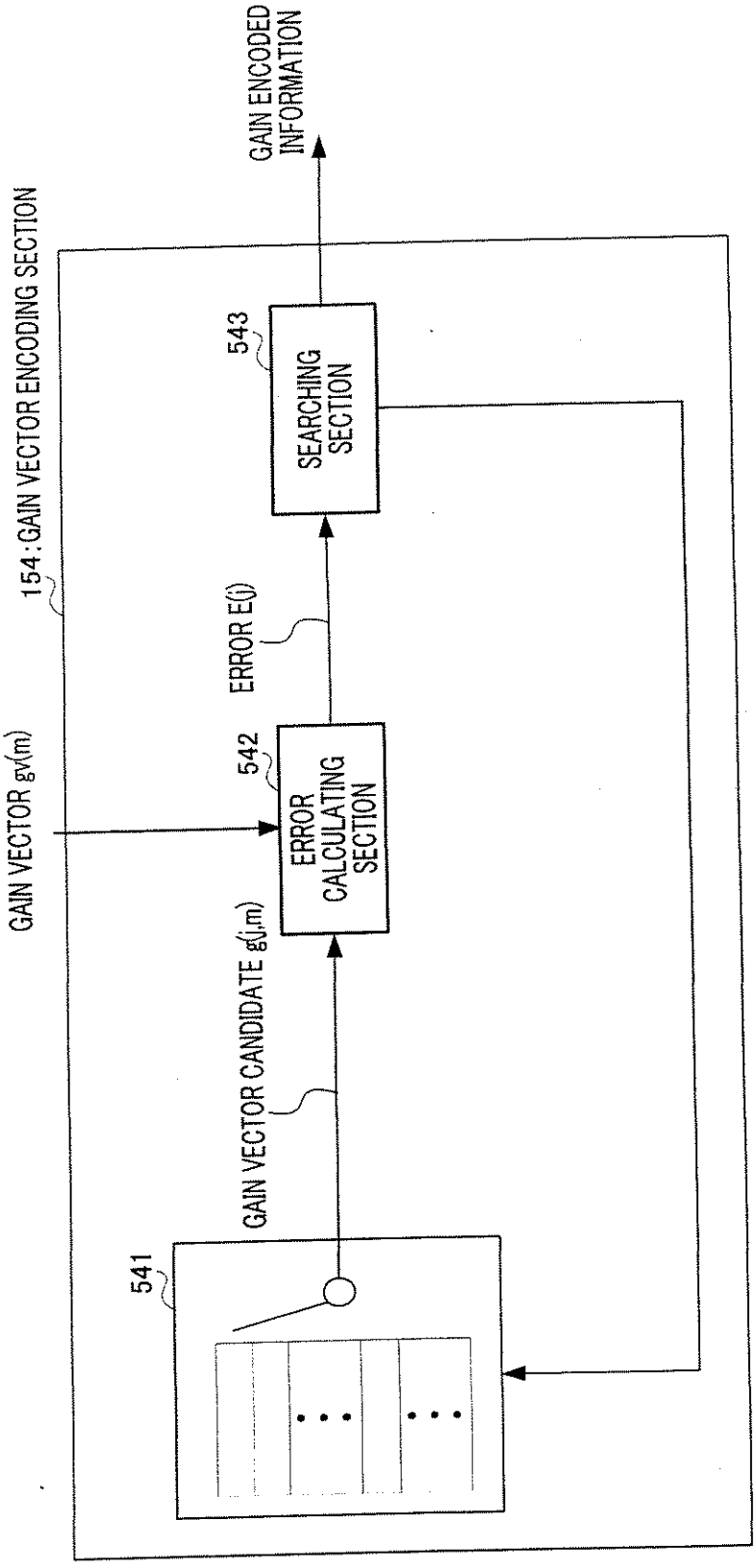

154 : GAIN VECTOR ENCODING SECTION
GAIN ENCODED INFORMATION
543
SEARCHING SECTION
ERROR E(j)
542
ERROR CALCULATING SECTION
GAIN VECTOR gv(m)
GAIN VECTOR CANDIDATE g(j,m)
541

FIG.7

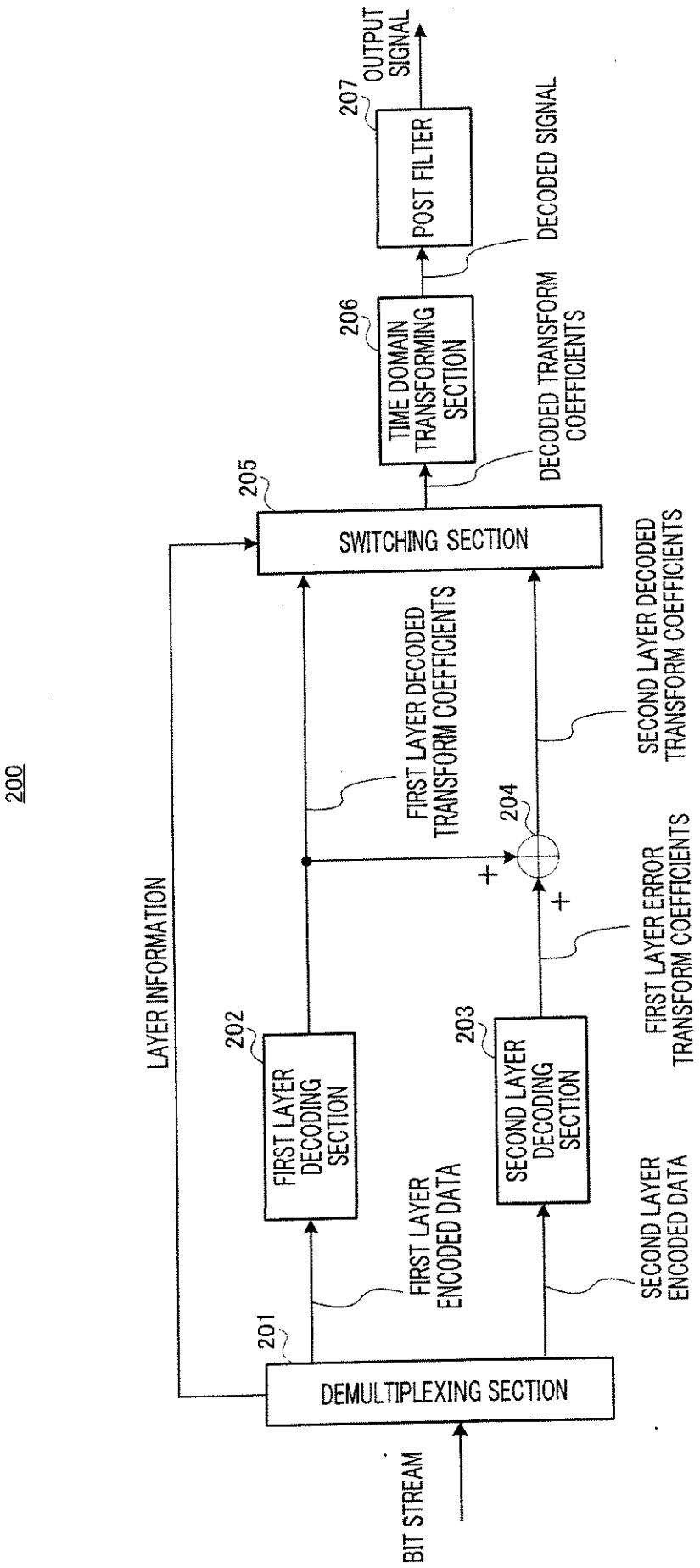

200
BIT STREAM
DEMULTIPLEXING SECTION
201
FIRST LAYER ENCODED DATA
SECOND LAYER ENCODED DATA
FIRST LAYER DECODING SECTION
202
SECOND LAYER DECODING SECTION
203
LAYER INFORMATION
FIRST LAYER DECODED TRANSFORM COEFFICIENTS
FIRST LAYER ERROR TRANSFORM COEFFICIENTS
204
+
+
SECOND LAYER DECODED TRANSFORM COEFFICIENTS
SWITCHING SECTION
205
DECODED TRANSFORM COEFFICIENTS
TIME DOMAIN TRANSFORMING SECTION
206
DECODED SIGNAL
POST FILTER
207
OUTPUT SIGNAL

FIG.8

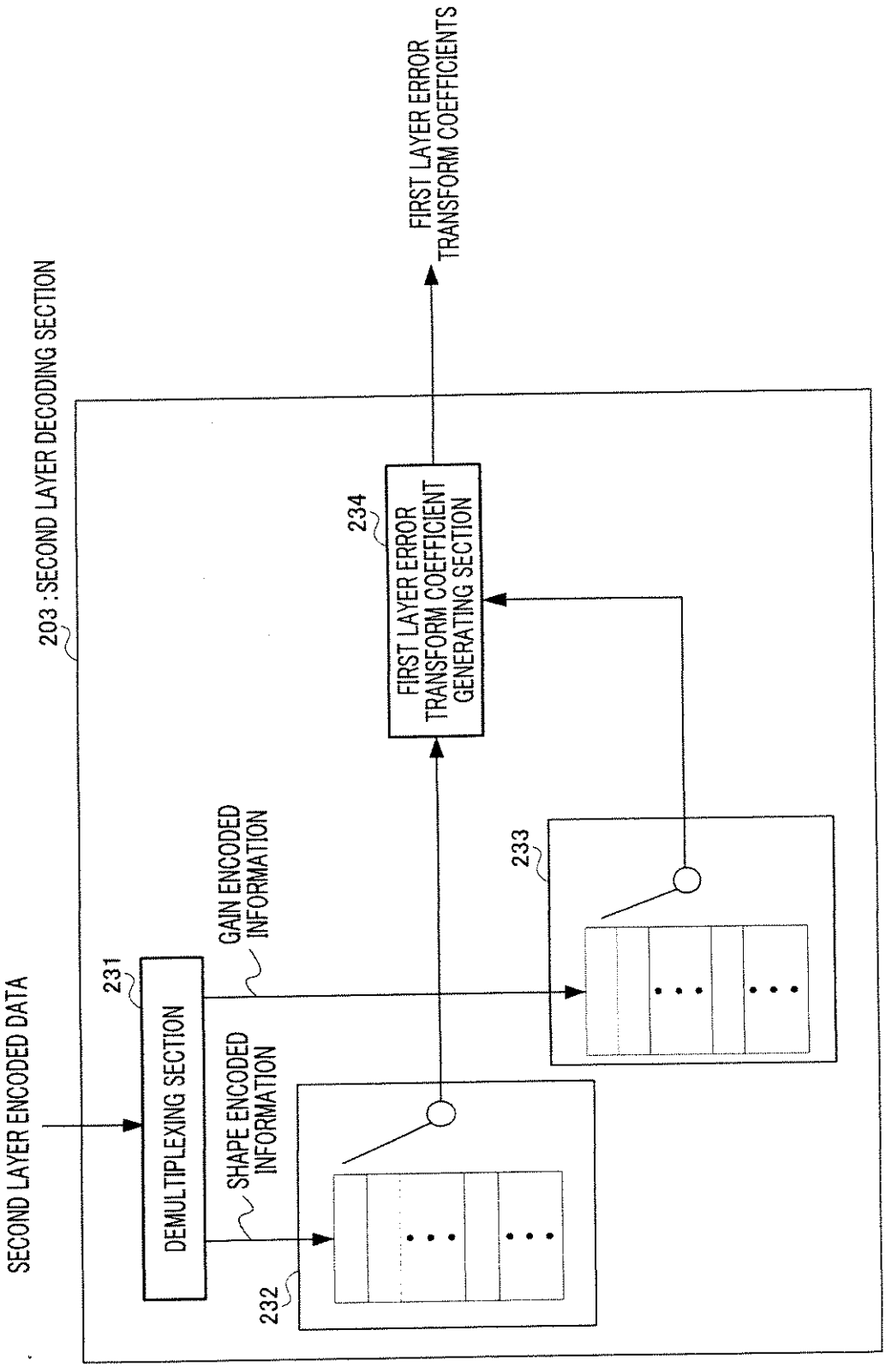

SECOND LAYER ENCODED DATA
203 : SECOND LAYER DECODING SECTION
231
DEMULTIPLEXING SECTION
SHAPE ENCODED INFORMATION
GAIN ENCODED INFORMATION
232
233
234
FIRST LAYER ERROR TRANSFORM COEFFICIENT GENERATING SECTION
FIRST LAYER ERROR TRANSFORM COEFFICIENTS

FIG.9

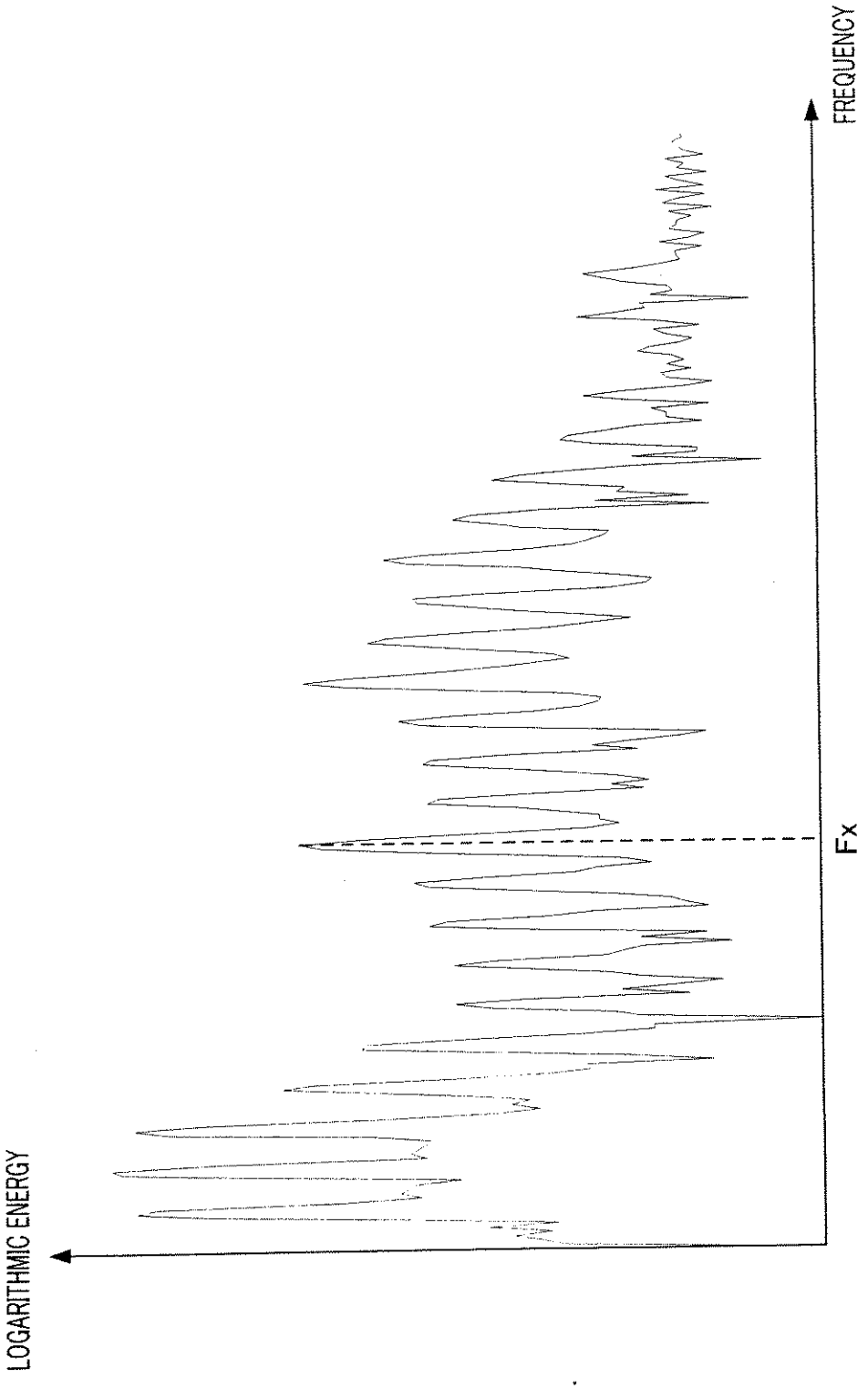


FIG.10

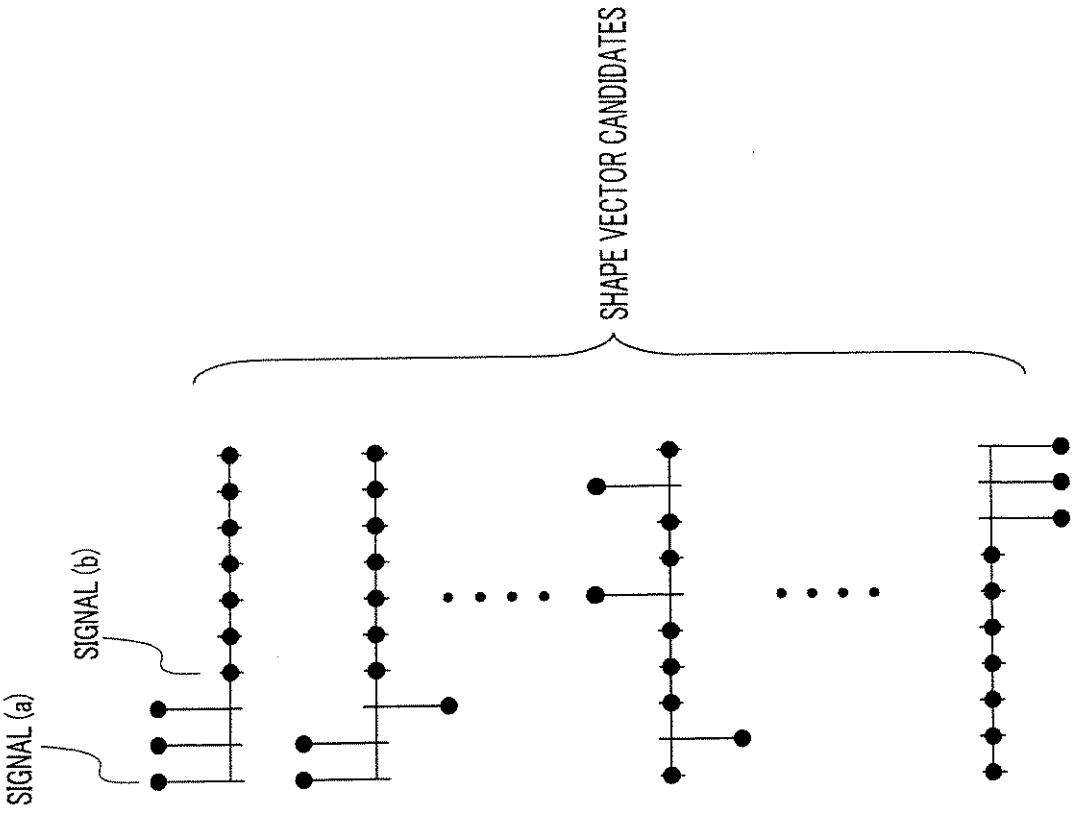


FIG.11

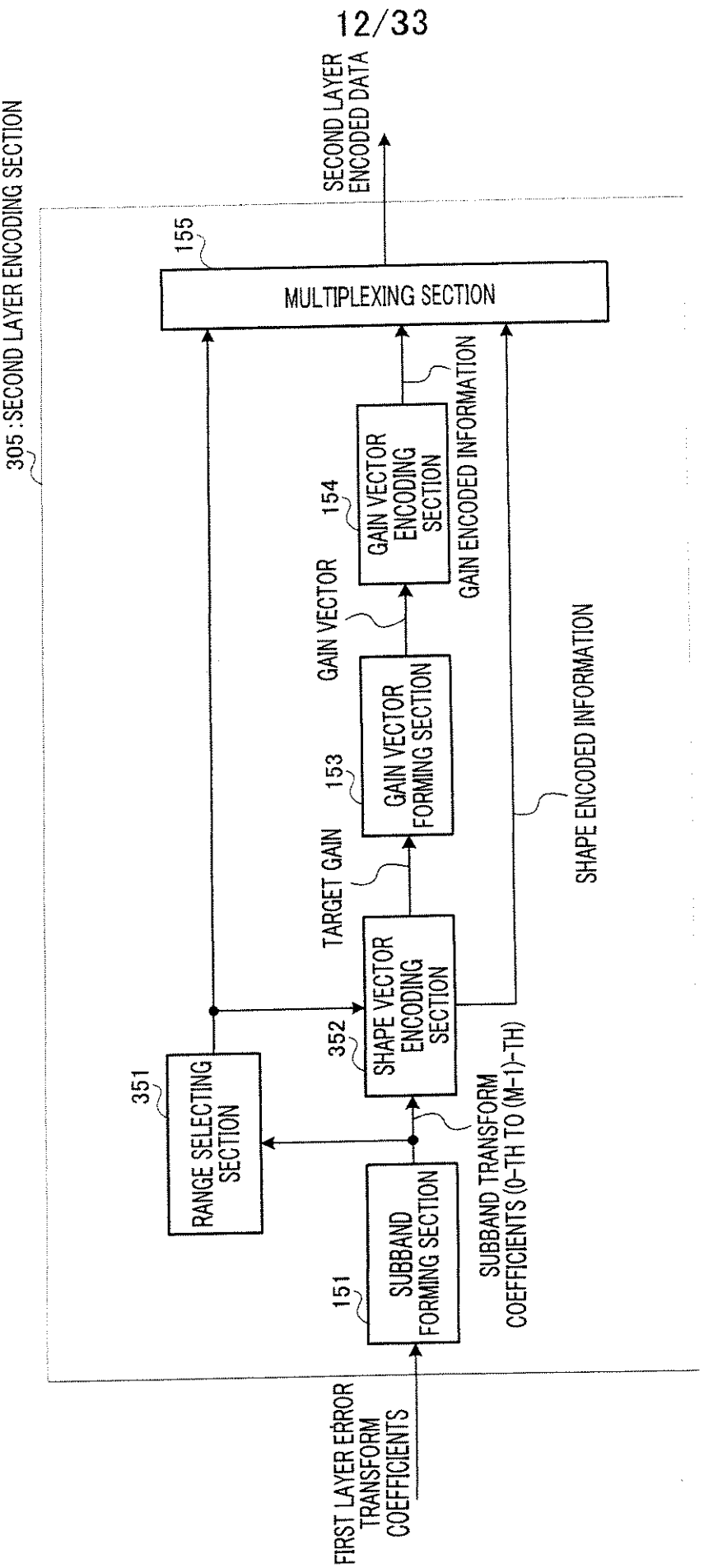

305 :SECOND LAYER ENCODING SECTION
FIRST LAYER ERROR TRANSFORM COEFFICIENTS
151
SUBBAND FORMING SECTION
SUBBAND TRANSFORM COEFFICIENTS (0-TH TO (M-1)-TH)
351
RANGE SELECTING SECTION
352
SHAPE VECTOR ENCODING SECTION
TARGET GAIN
153
GAIN VECTOR FORMING SECTION
GAIN VECTOR
154
GAIN VECTOR ENCODING SECTION
GAIN ENCODED INFORMATION
SHAPE ENCODED INFORMATION
155
MULTIPLEXING SECTION
SECOND LAYER ENCODED DATA

FIG.12

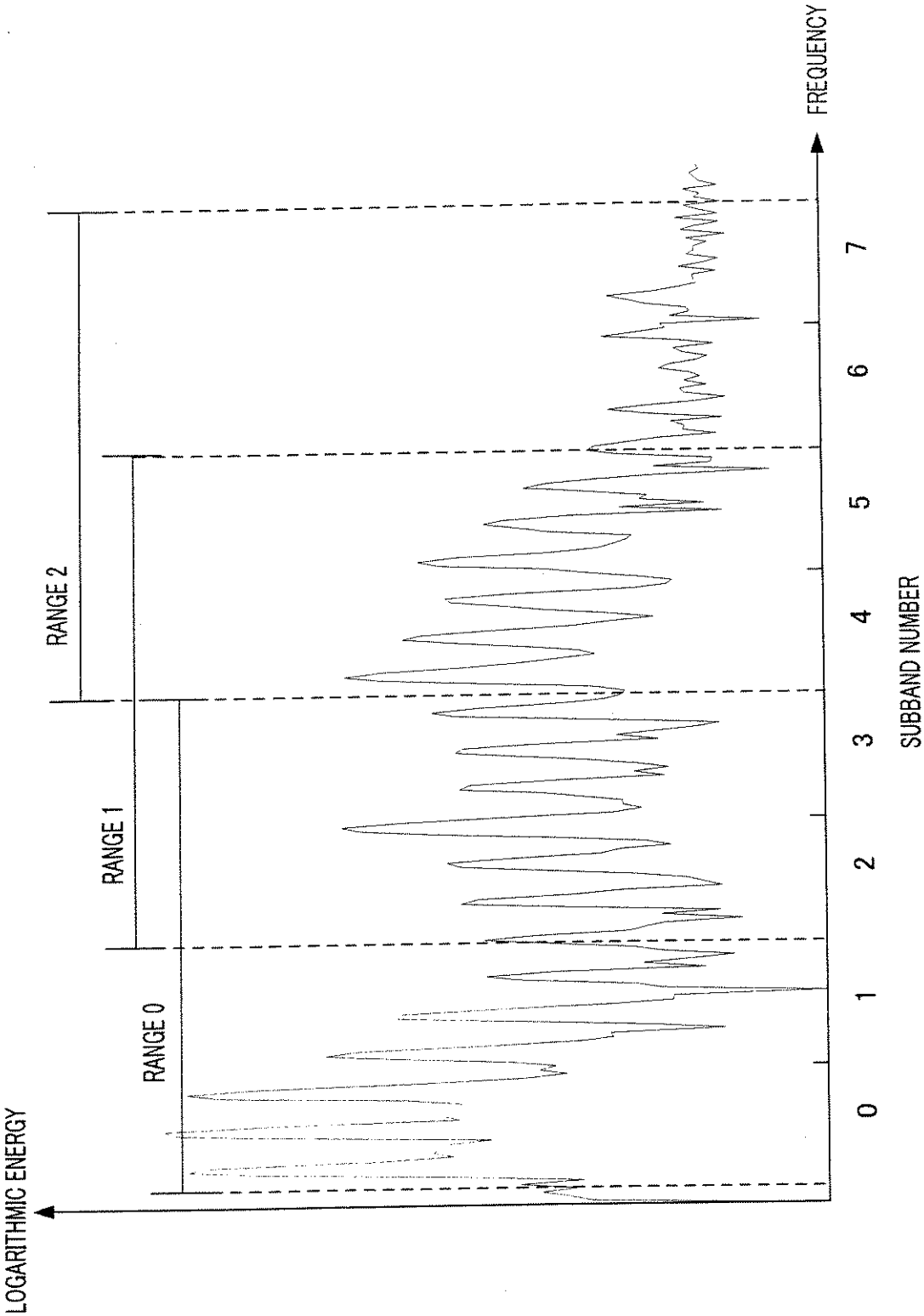

LOGARITHMIC ENERGY
FREQUENCY
SUBBAND NUMBER
RANGE 0
RANGE 1
RANGE 2
0
1
2
3
4
5
6
7

FIG.13

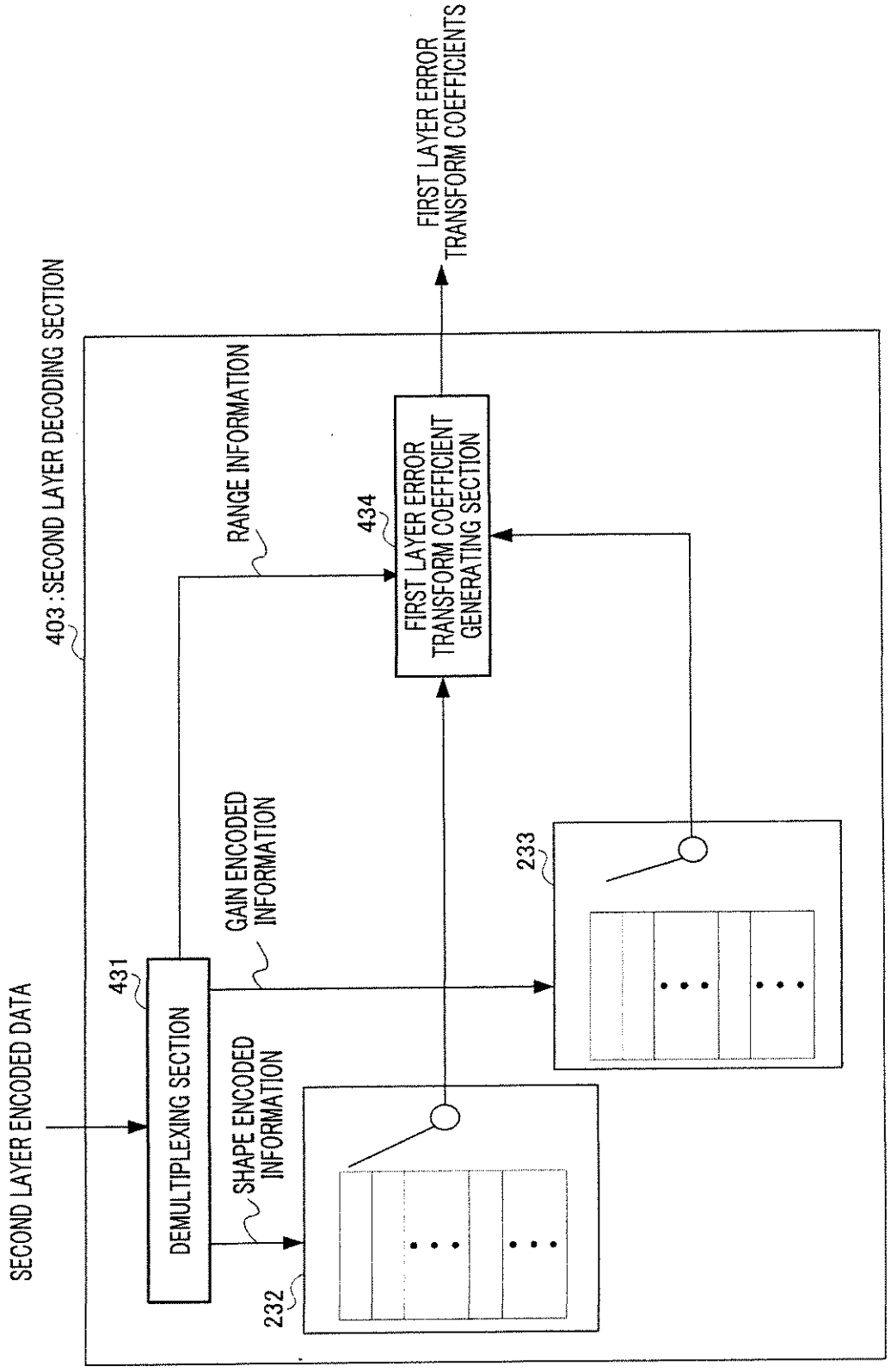

SECOND LAYER ENCODED DATA
403 : SECOND LAYER DECODING SECTION
DEMULTIPLEXING SECTION
431
SHAPE ENCODED INFORMATION
GAIN ENCODED INFORMATION
RANGE INFORMATION
FIRST LAYER ERROR TRANSFORM COEFFICIENT GENERATING SECTION
434
FIRST LAYER ERROR TRANSFORM COEFFICIENTS
232
233

FIG.14

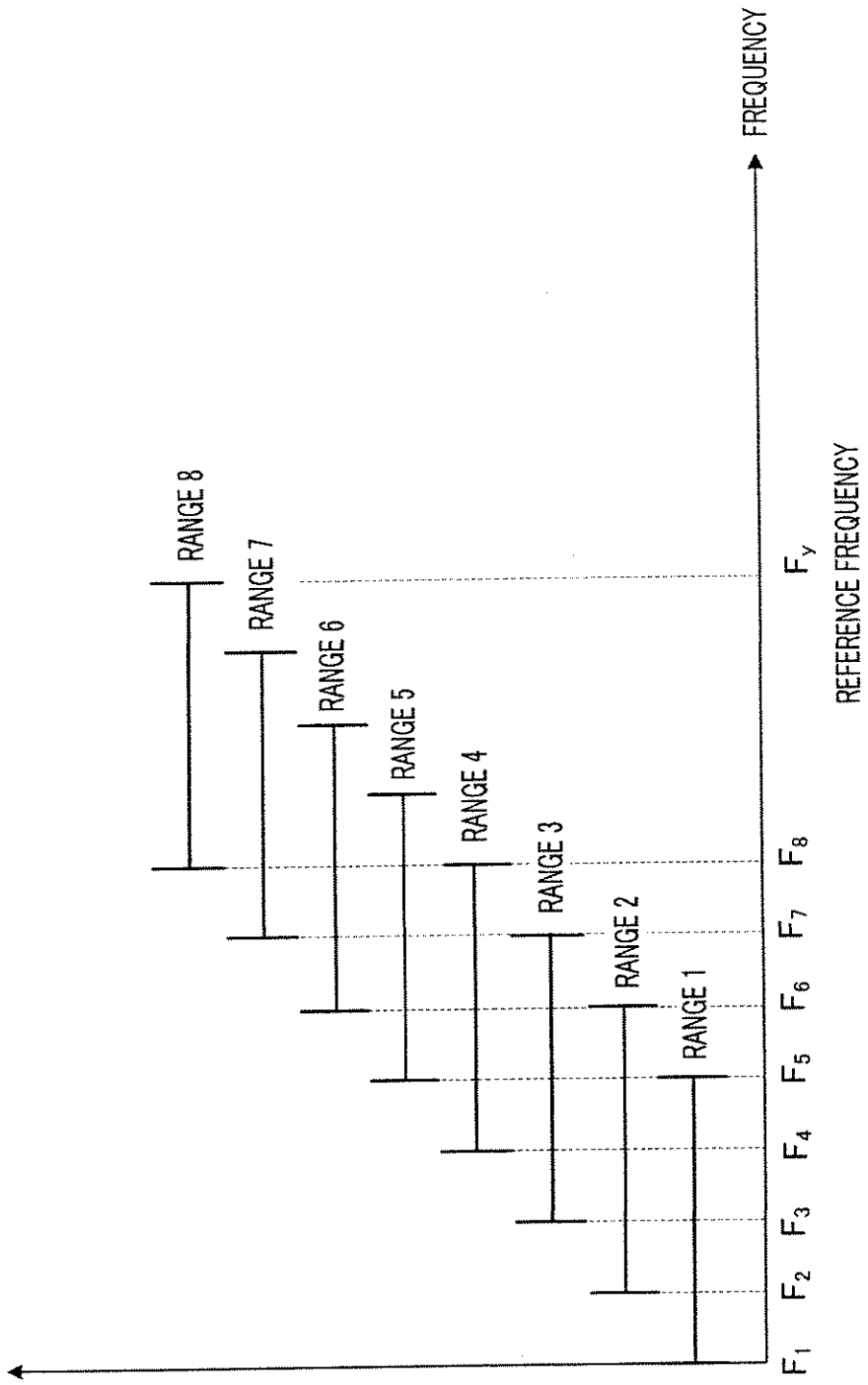

FREQUENCY
RANGE 8
RANGE 7
RANGE 6
RANGE 5
RANGE 4
RANGE 3
RANGE 2
RANGE 1
F_y
REFERENCE FREQUENCY
F_8
F_7
F_6
F_5
F_4
F_3
F_2
F_1

FIG.15

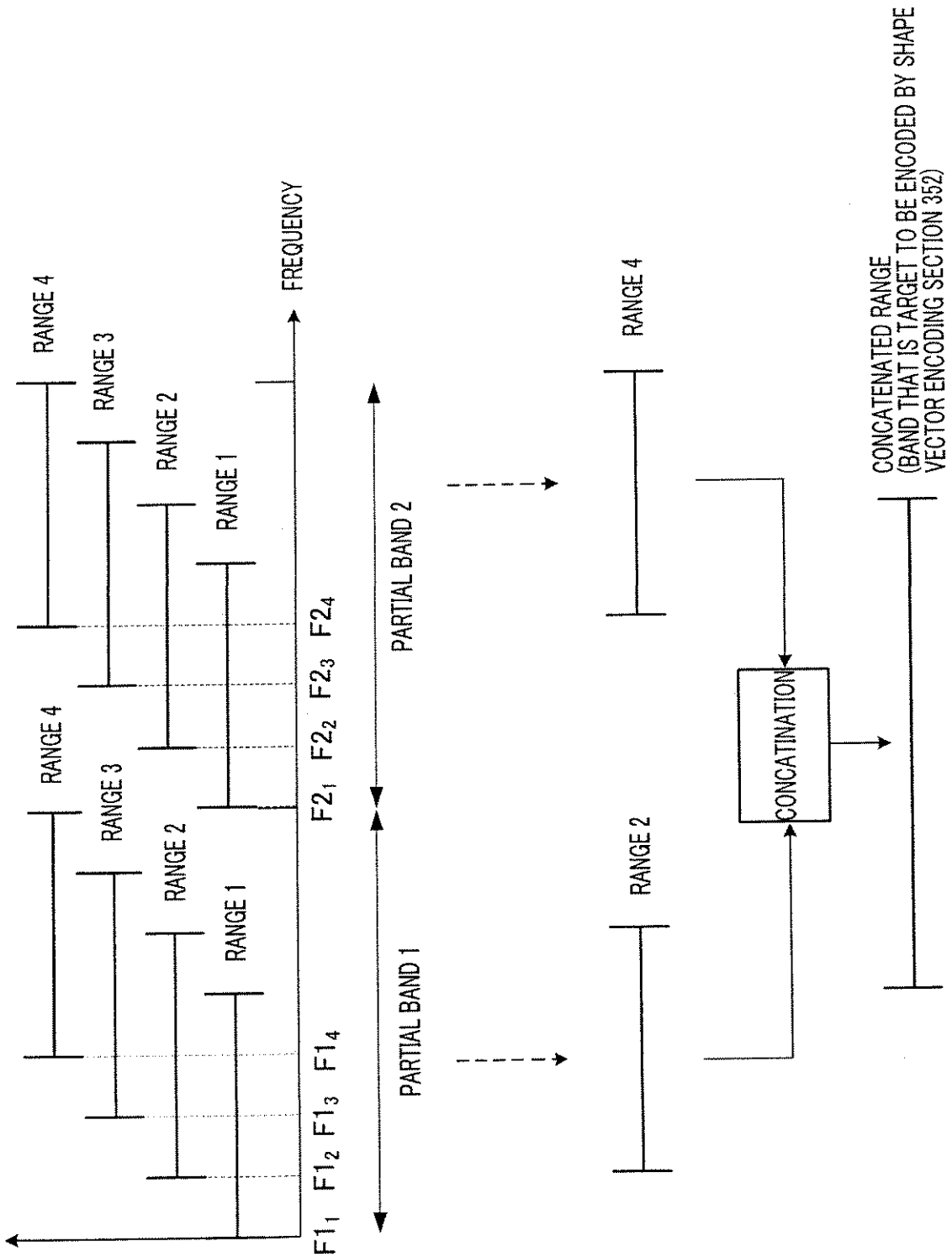

FREQUENCY
RANGE 4
RANGE 3
RANGE 2
RANGE 1
RANGE 4
RANGE 3
RANGE 2
RANGE 1
F1$_1$ F1$_2$ F1$_3$ F1$_4$
F2$_1$ F2$_2$ F2$_3$ F2$_4$
PARTIAL BAND 1
PARTIAL BAND 2
RANGE 4
RANGE 2
CONCATINATION
CONCATENATED RANGE
(BAND THAT IS TARGET TO BE ENCODED BY SHAPE
VECTOR ENCODING SECTION 352)

FIG.16

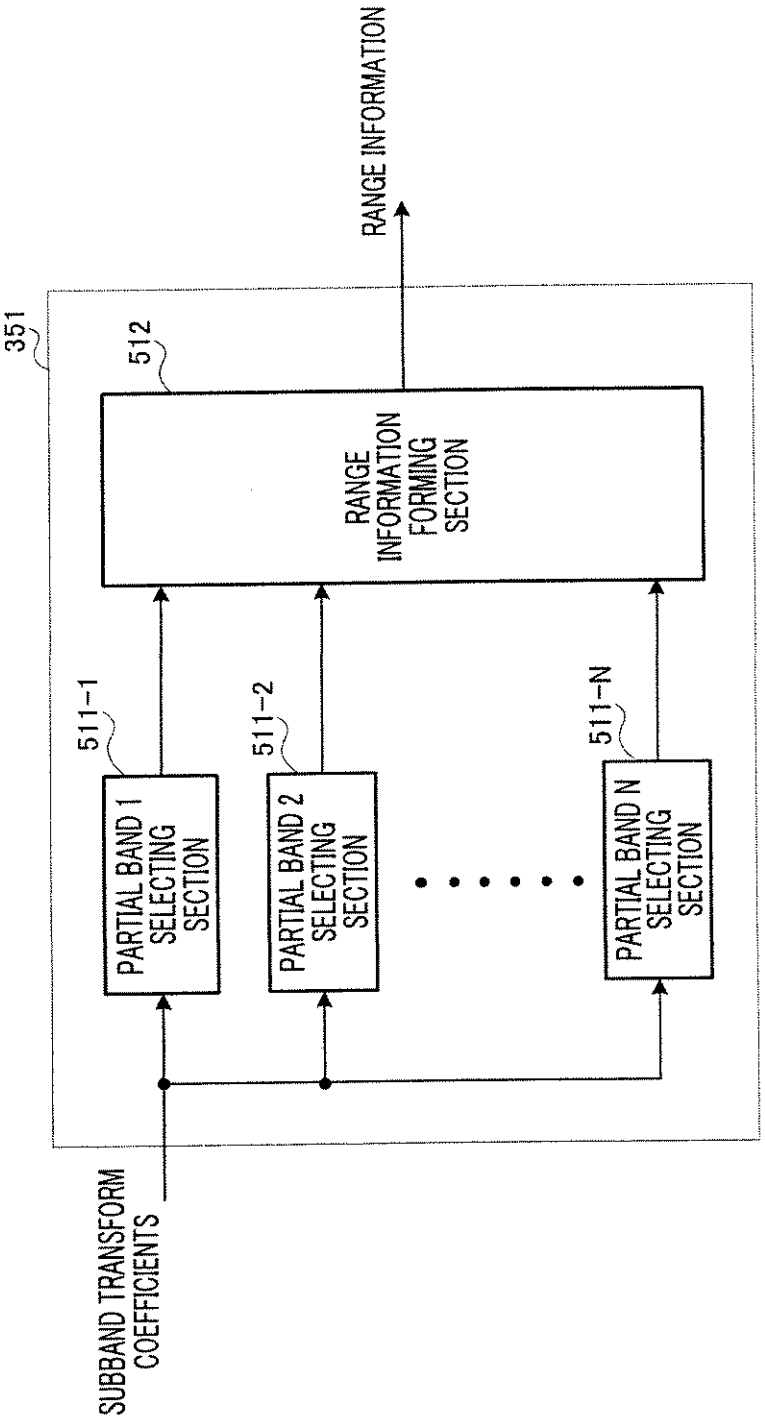

SUBBAND TRANSFORM COEFFICIENTS
351
PARTIAL BAND 1 SELECTING SECTION
511-1
PARTIAL BAND 2 SELECTING SECTION
511-2
PARTIAL BAND N SELECTING SECTION
511-N
RANGE INFORMATION FORMING SECTION
512
RANGE INFORMATION

FIG.17

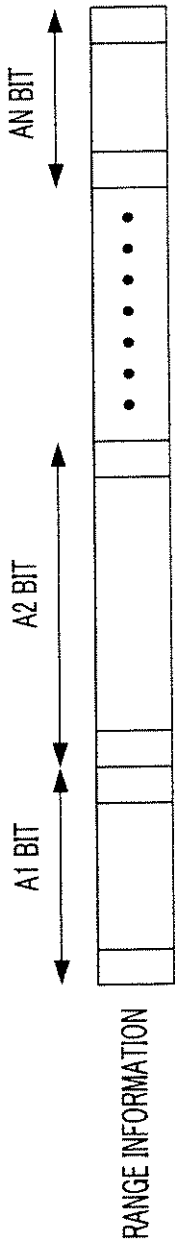


FIG.18

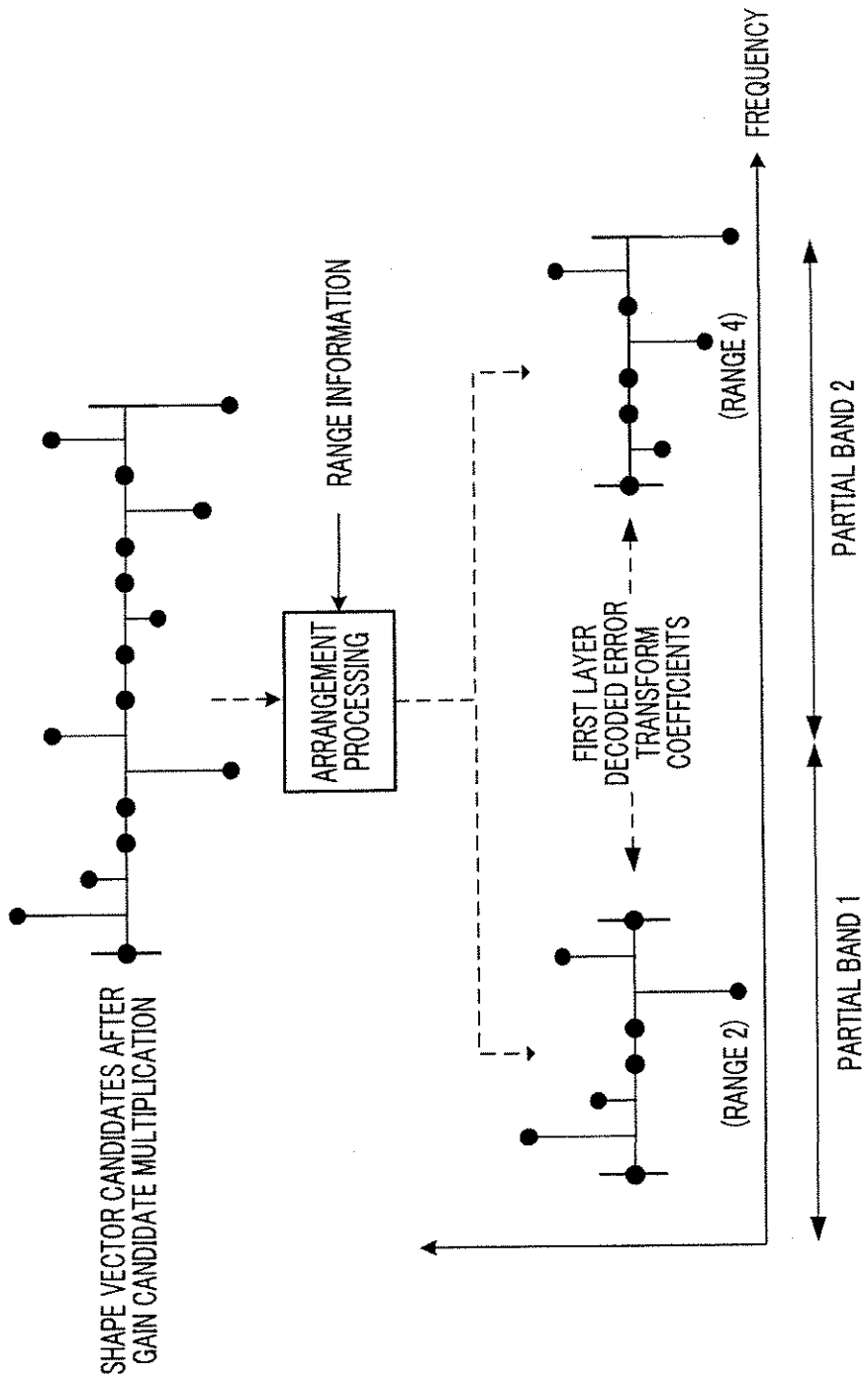

SHAPE VECTOR CANDIDATES AFTER GAIN CANDIDATE MULTIPLICATION
RANGE INFORMATION
ARRANGEMENT PROCESSING
FIRST LAYER DECODED ERROR TRANSFORM COEFFICIENTS
(RANGE 2)
(RANGE 4)
FREQUENCY
PARTIAL BAND 1
PARTIAL BAND 2

FIG.19

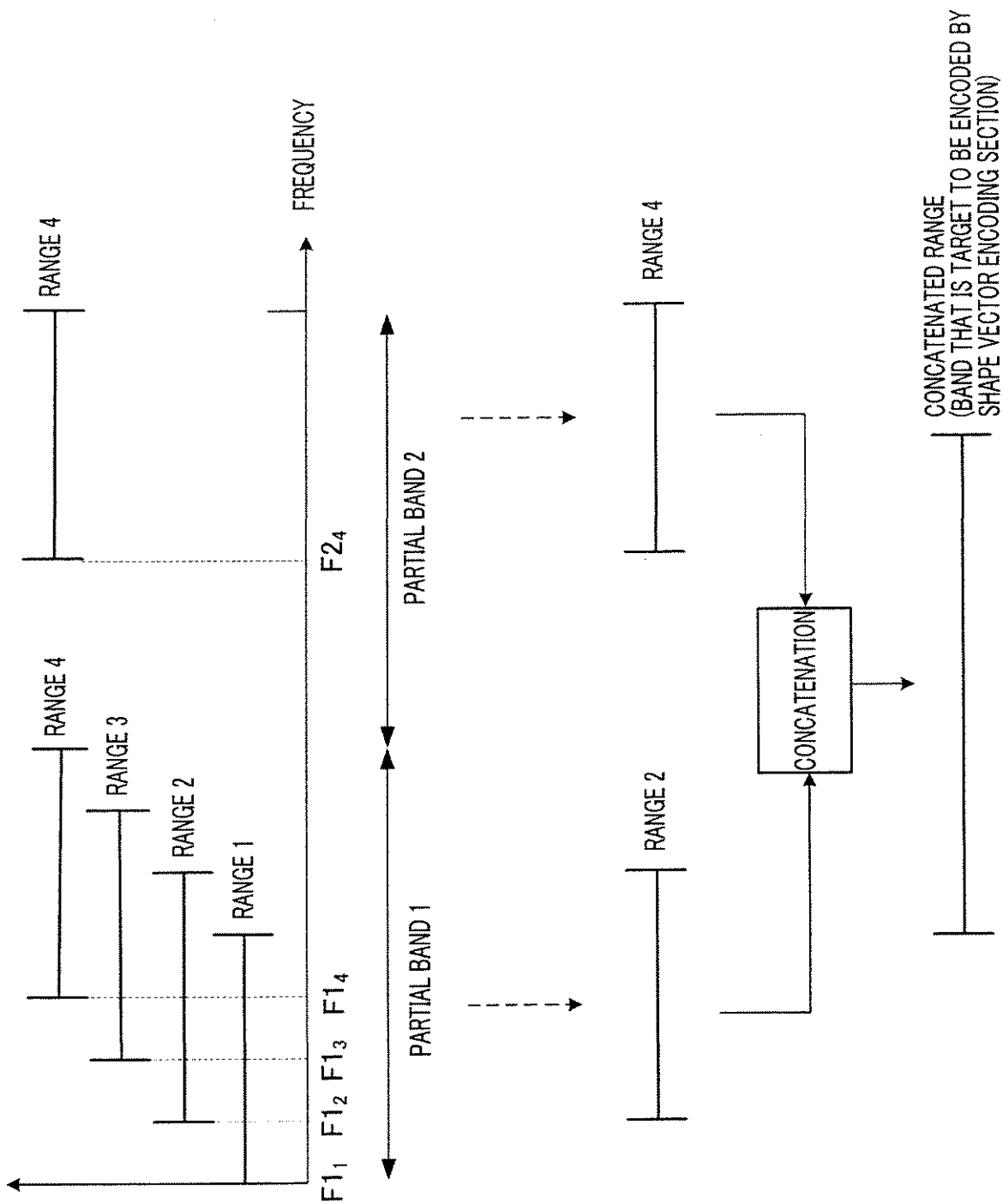

RANGE 4
RANGE 3
RANGE 2
RANGE 1
FREQUENCY
F1₁ F1₂ F1₃ F1₄
F2₄
PARTIAL BAND 1
PARTIAL BAND 2
RANGE 4
RANGE 2
CONCATENATION
CONCATENATED RANGE
(BAND THAT IS TARGET TO BE ENCODED BY
SHAPE VECTOR ENCODING SECTION)

FIG.20

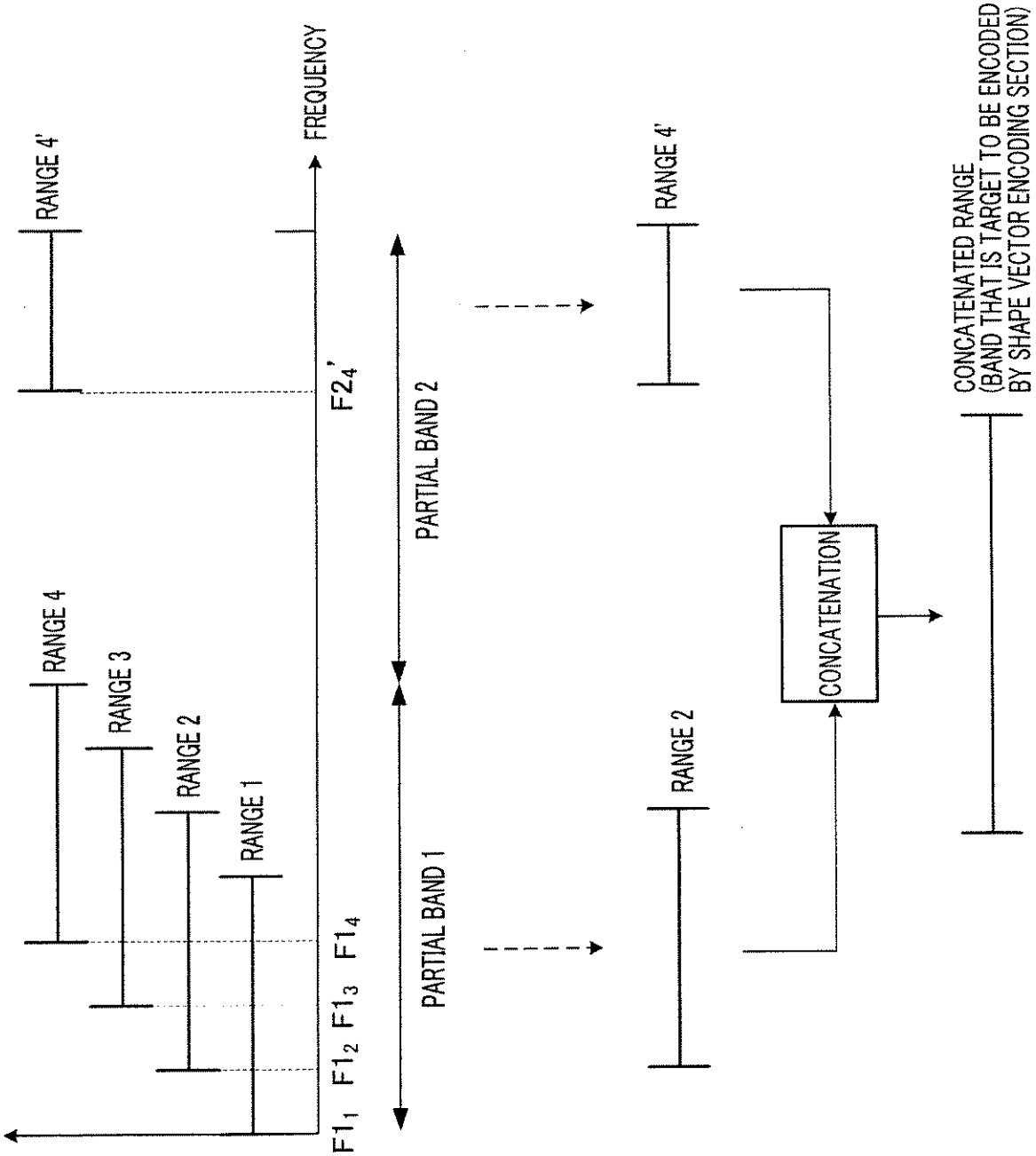

FREQUENCY
RANGE 4'
RANGE 4
RANGE 3
RANGE 2
RANGE 1
F2$_4$'
F1$_1$ F1$_2$ F1$_3$ F1$_4$
PARTIAL BAND 2
PARTIAL BAND 1
RANGE 4'
RANGE 2
CONCATENATION
CONCATENATED RANGE
(BAND THAT IS TARGET TO BE ENCODED
BY SHAPE VECTOR ENCODING SECTION)

FIG.21

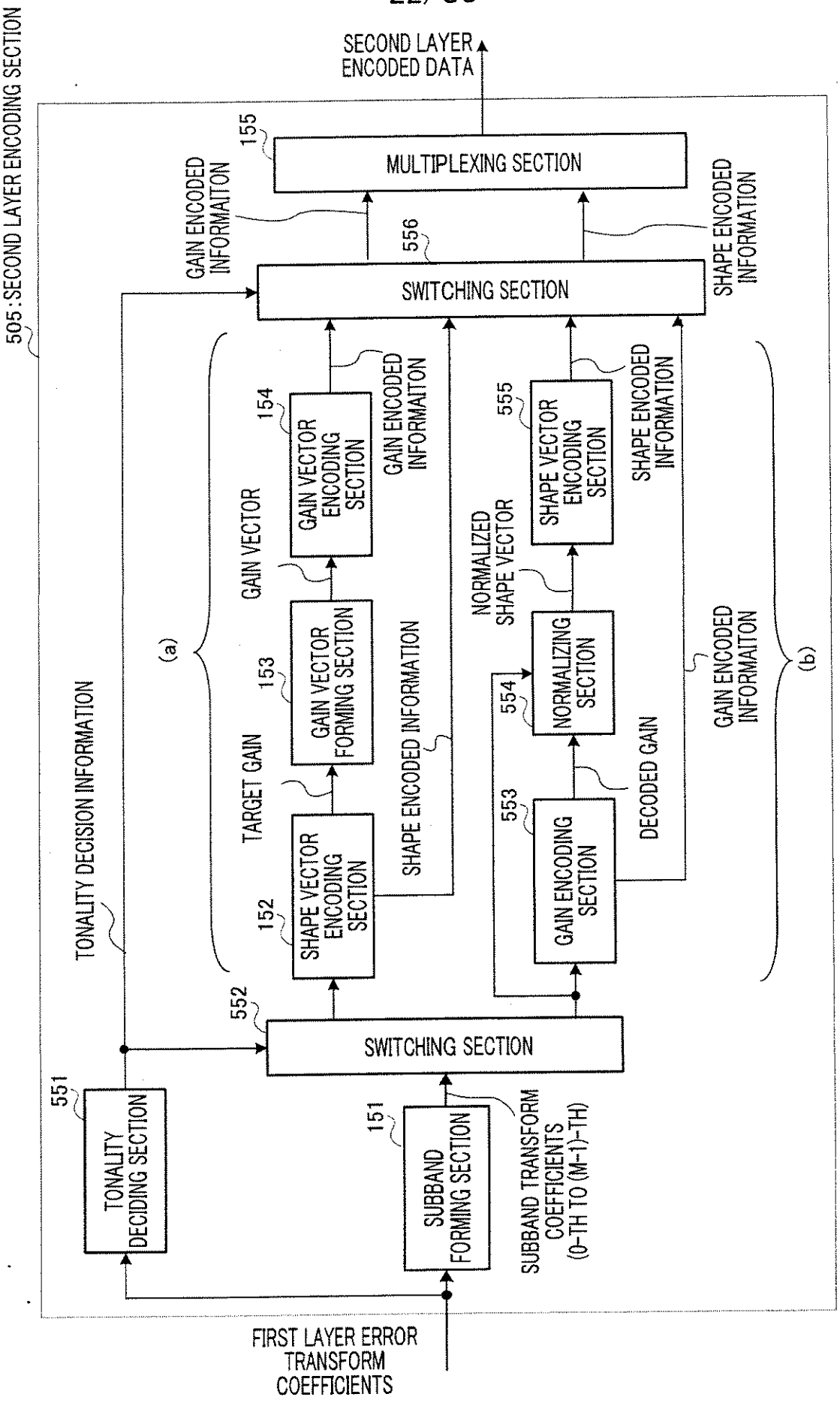

505:SECOND LAYER ENCODING SECTION
SECOND LAYER ENCODED DATA
155
MULTIPLEXING SECTION
GAIN ENCODED INFORMAITON
556
SWITCHING SECTION
SHAPE ENCODED INFORMATION
(a)
154
GAIN VECTOR ENCODING SECTION
GAIN ENCODED INFORMAITON
GAIN VECTOR
153
GAIN VECTOR FORMING SECTION
TARGET GAIN
152
SHAPE VECTOR ENCODING SECTION
SHAPE ENCODED INFORMATION
NORMALIZED SHAPE VECTOR
555
SHAPE VECTOR ENCODING SECTION
SHAPE ENCODED INFORMATION
554
NORMALIZING SECTION
553
GAIN ENCODING SECTION
DECODED GAIN
GAIN ENCODED INFORMAITON
(b)
TONALITY DECISION INFORMATION
552
SWITCHING SECTION
551
TONALITY DECIDING SECTION
151
SUBBAND FORMING SECTION
SUBBAND TRANSFORM COEFFICIENTS (0-TH TO (M-1)-TH)
FIRST LAYER ERROR TRANSFORM COEFFICIENTS

FIG.22

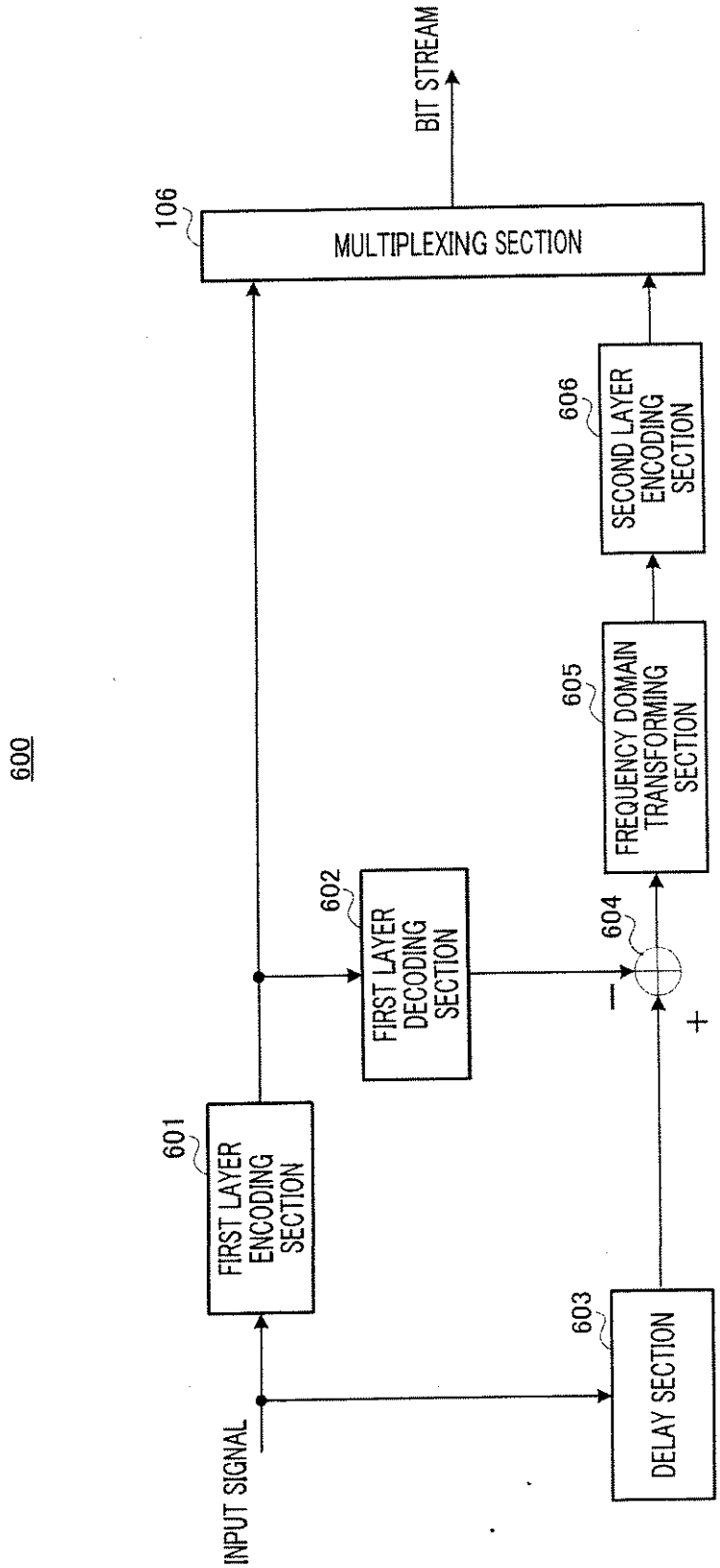

600
INPUT SIGNAL
601
FIRST LAYER ENCODING SECTION
602
FIRST LAYER DECODING SECTION
603
DELAY SECTION
604
−
+
605
FREQUENCY DOMAIN TRANSFORMING SECTION
606
SECOND LAYER ENCODING SECTION
106
MULTIPLEXING SECTION
BIT STREAM

FIG.23

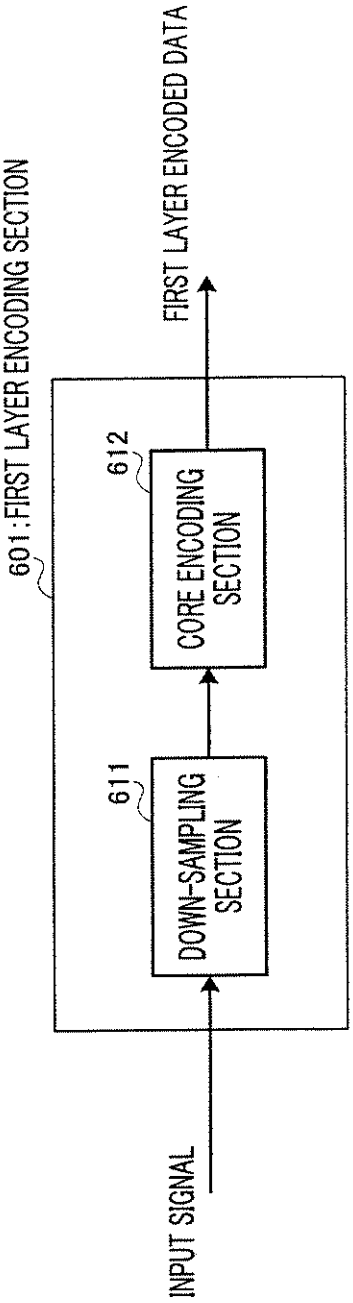

601:FIRST LAYER ENCODING SECTION
611
DOWN-SAMPLING SECTION
612
CORE ENCODING SECTION
INPUT SIGNAL
FIRST LAYER ENCODED DATA

FIG.24

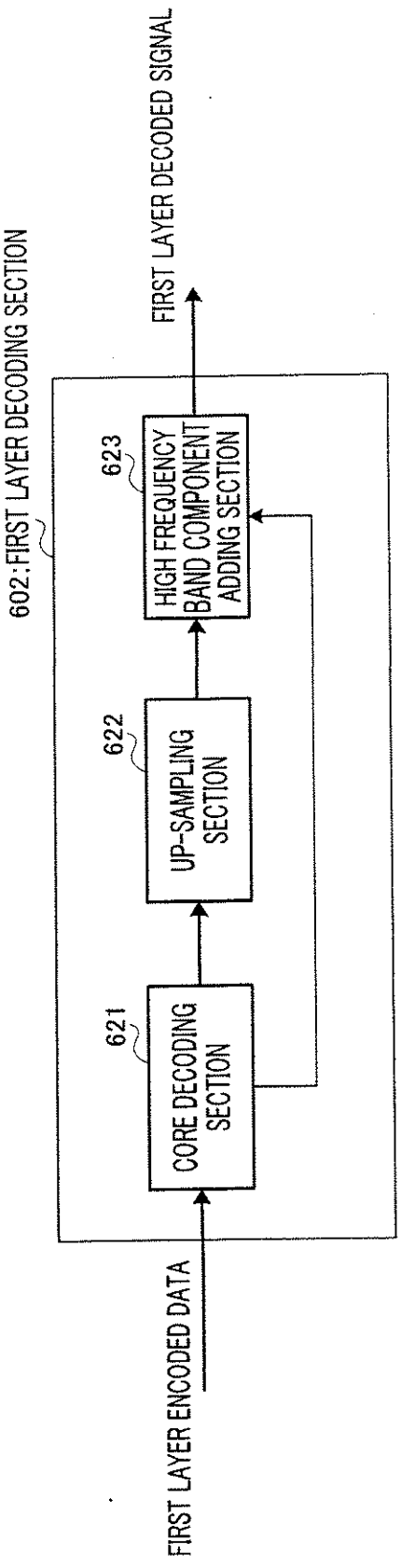

FIRST LAYER ENCODED DATA
602:FIRST LAYER DECODING SECTION
621
CORE DECODING SECTION
622
UP-SAMPLING SECTION
623
HIGH FREQUENCY BAND COMPONENT ADDING SECTION
FIRST LAYER DECODED SIGNAL

FIG.25

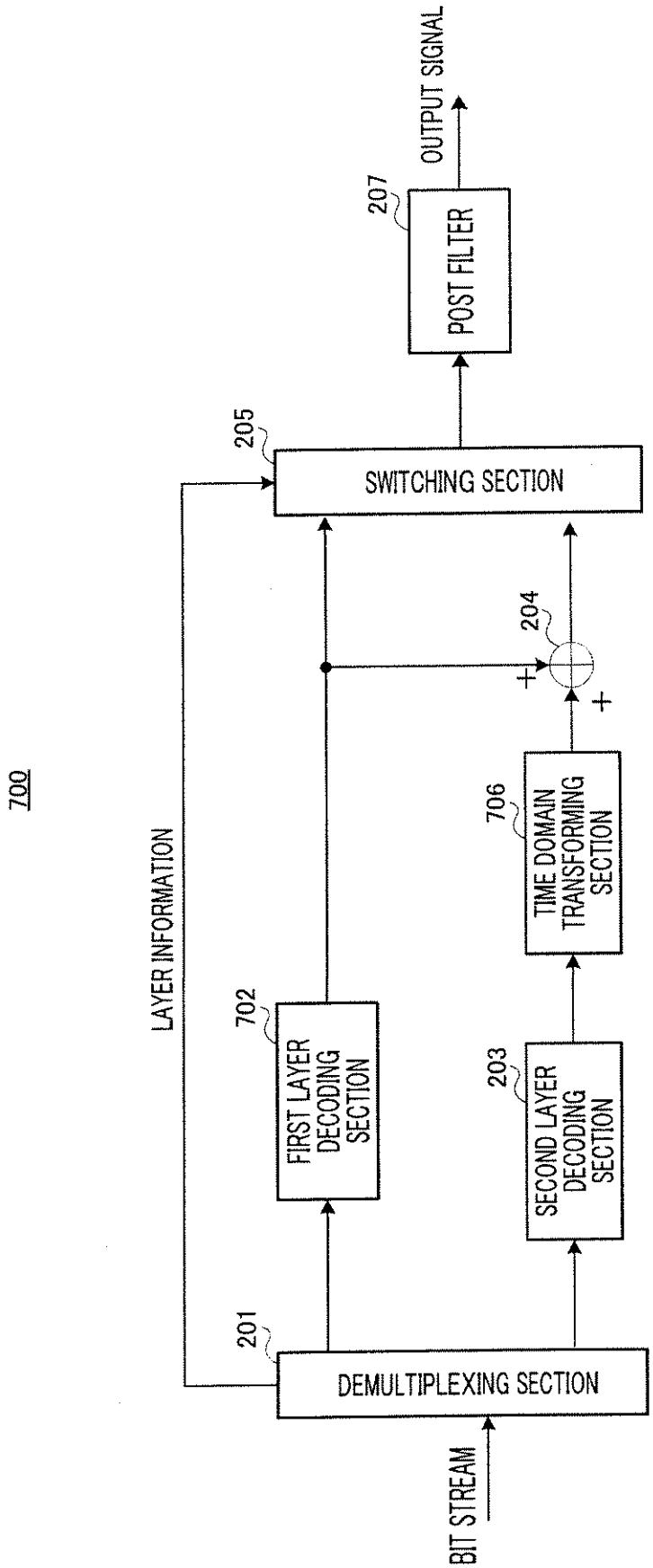

700
BIT STREAM
DEMULTIPLEXING SECTION
201
LAYER INFORMATION
FIRST LAYER DECODING SECTION
702
SECOND LAYER DECODING SECTION
203
TIME DOMAIN TRANSFORMING SECTION
706
204
+
+
SWITCHING SECTION
205
POST FILTER
207
OUTPUT SIGNAL

FIG.26

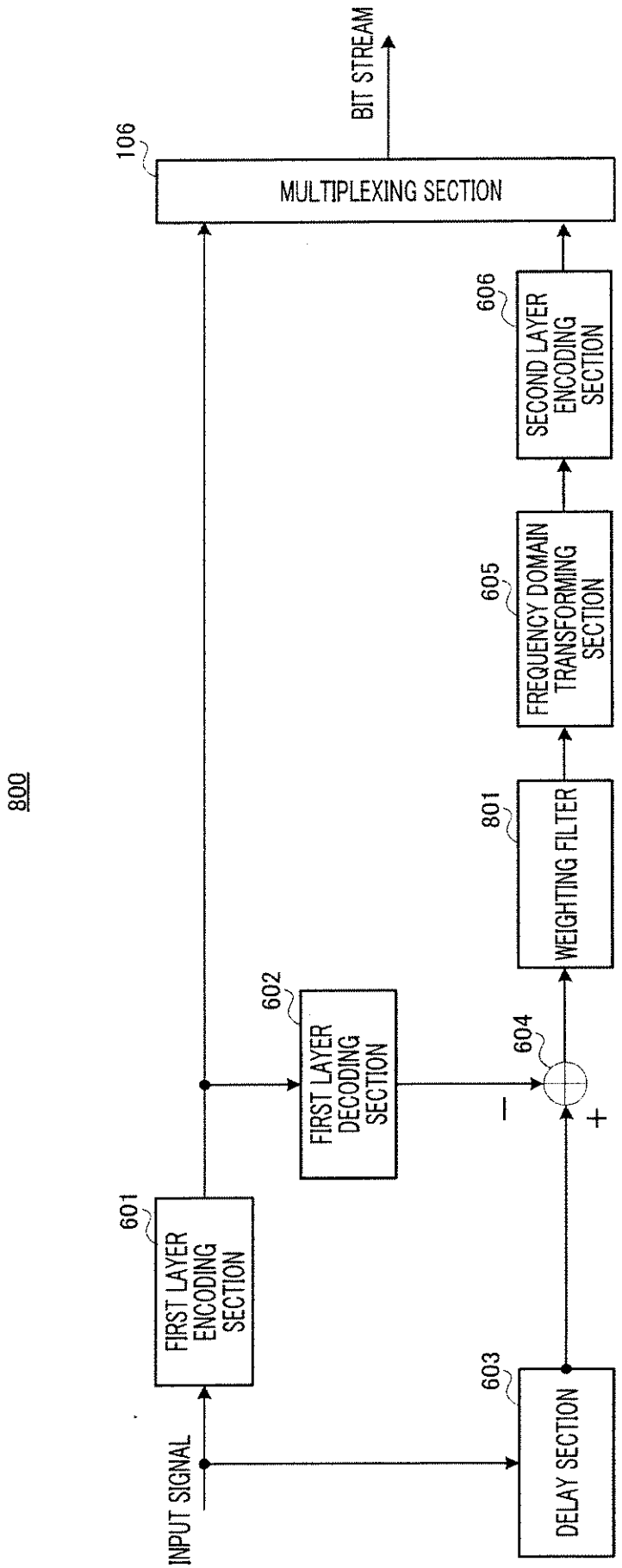

800
INPUT SIGNAL
601
FIRST LAYER ENCODING SECTION
602
FIRST LAYER DECODING SECTION
603
DELAY SECTION
604
−
+
801
WEIGHTING FILTER
605
FREQUENCY DOMAIN TRANSFORMING SECTION
606
SECOND LAYER ENCODING SECTION
106
MULTIPLEXING SECTION
BIT STREAM

FIG.27

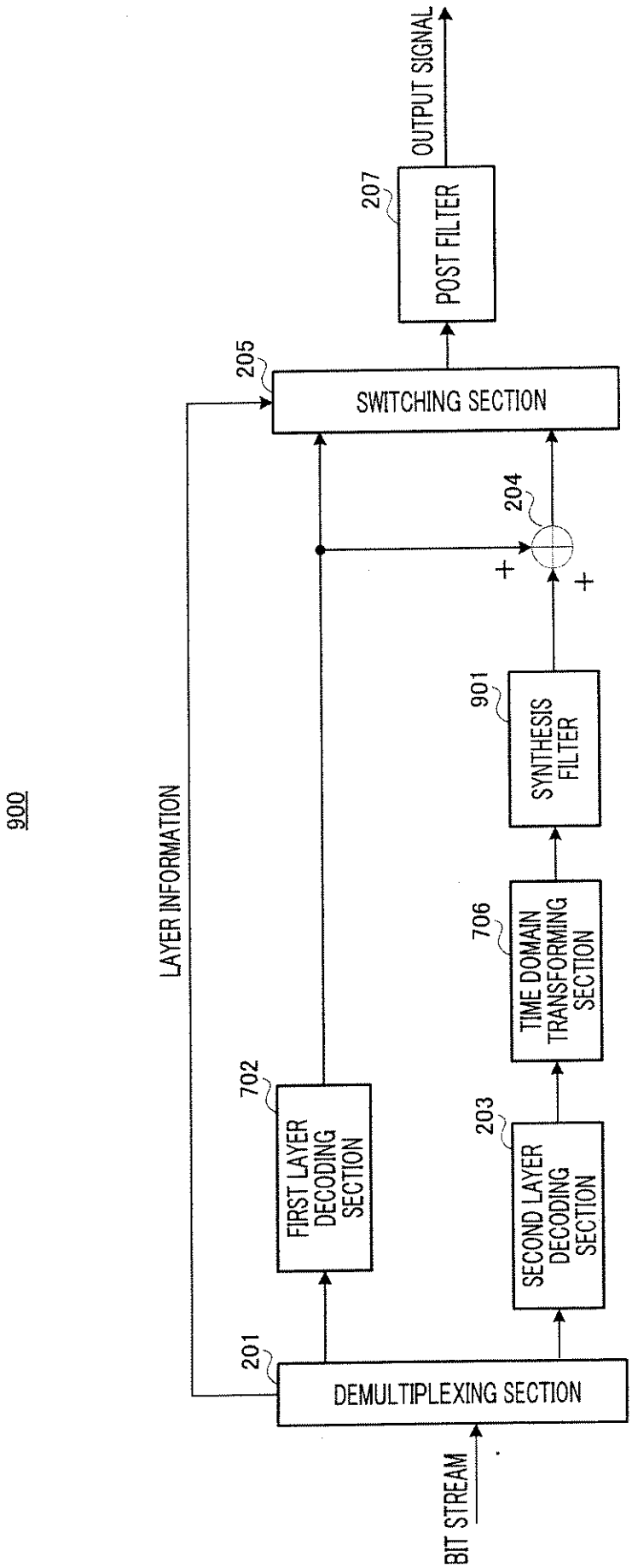

900
BIT STREAM
DEMULTIPLEXING SECTION
201
FIRST LAYER DECODING SECTION
702
SECOND LAYER DECODING SECTION
203
TIME DOMAIN TRANSFORMING SECTION
706
SYNTHESIS FILTER
901
204
+
+
SWITCHING SECTION
205
POST FILTER
207
OUTPUT SIGNAL
LAYER INFORMATION

FIG.28

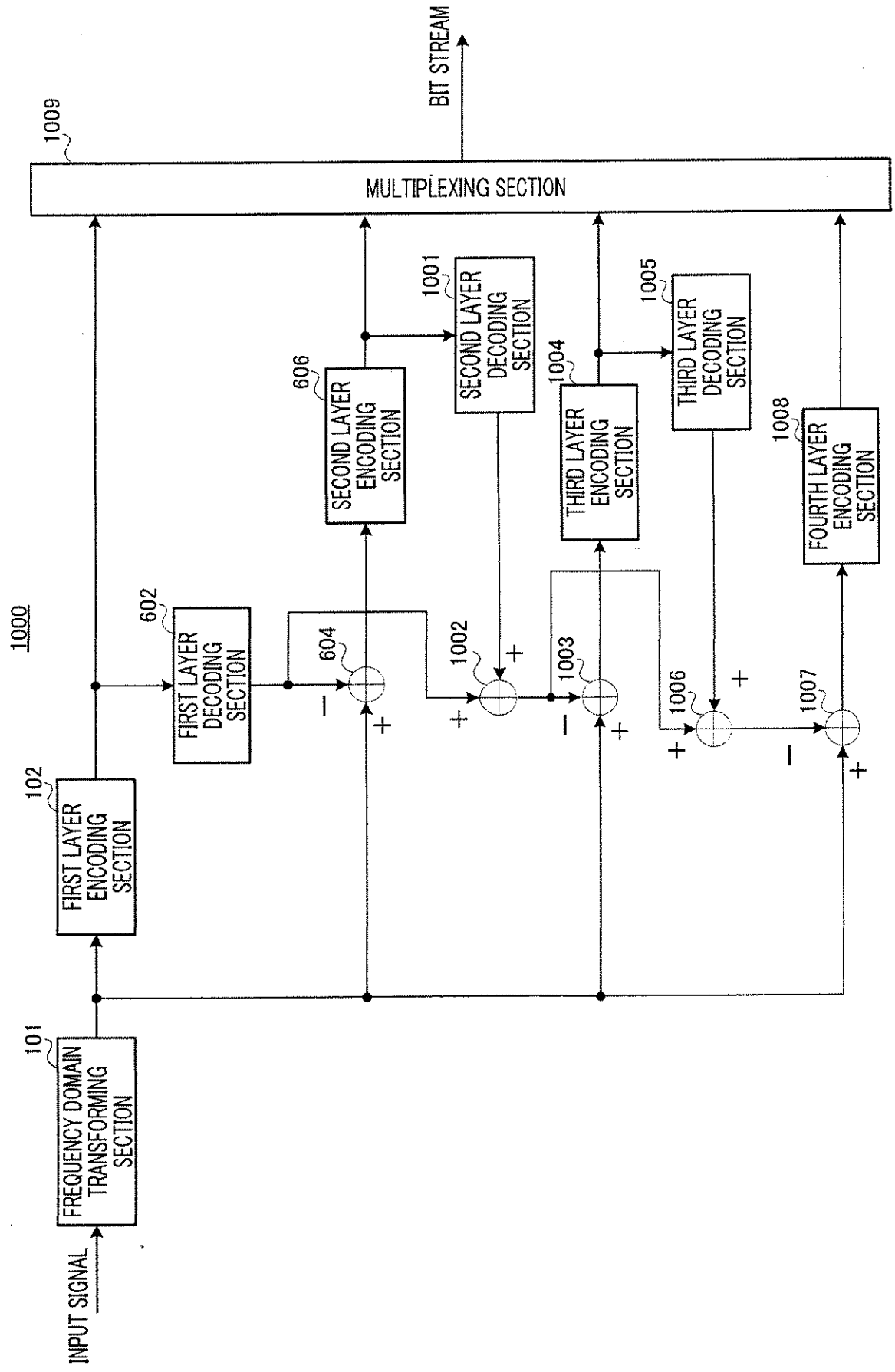

INPUT SIGNAL
FREQUENCY DOMAIN TRANSFORMING SECTION
101
FIRST LAYER ENCODING SECTION
102
1000
FIRST LAYER DECODING SECTION
602
604
SECOND LAYER ENCODING SECTION
606
SECOND LAYER DECODING SECTION
1001
1002
THIRD LAYER ENCODING SECTION
1004
1003
THIRD LAYER DECODING SECTION
1005
1006
FOURTH LAYER ENCODING SECTION
1008
1007
MULTIPLEXING SECTION
1009
BIT STREAM

FIG.29

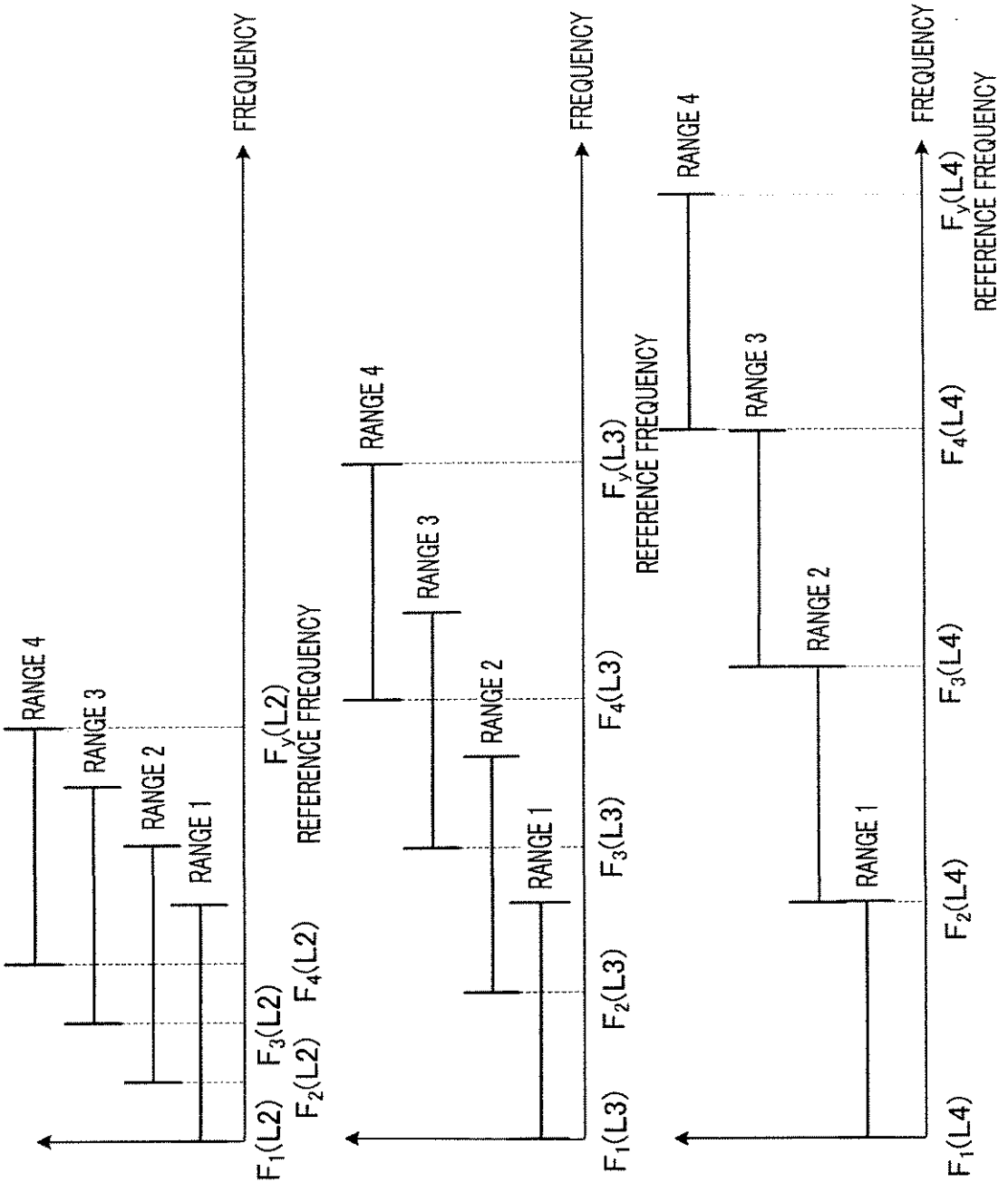


FIG.30A

FIG.30B

FIG.30C

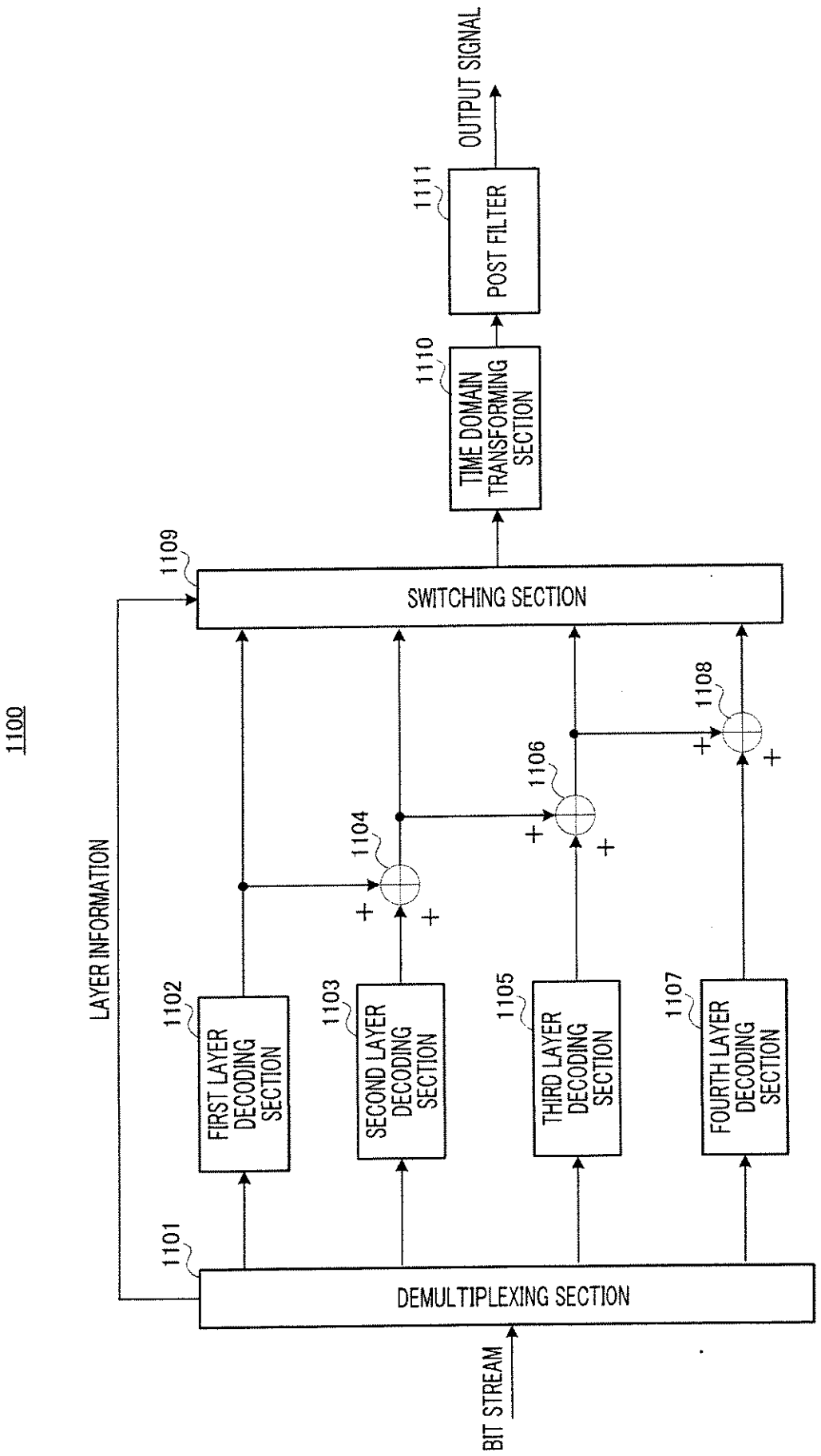

1100
BIT STREAM
DEMULTIPLEXING SECTION
1101
LAYER INFORMATION
FIRST LAYER DECODING SECTION
1102
SECOND LAYER DECODING SECTION
1103
THIRD LAYER DECODING SECTION
1105
FOURTH LAYER DECODING SECTION
1107
1104
1106
1108
SWITCHING SECTION
1109
TIME DOMAIN TRANSFORMING SECTION
1110
POST FILTER
1111
OUTPUT SIGNAL

FIG.31

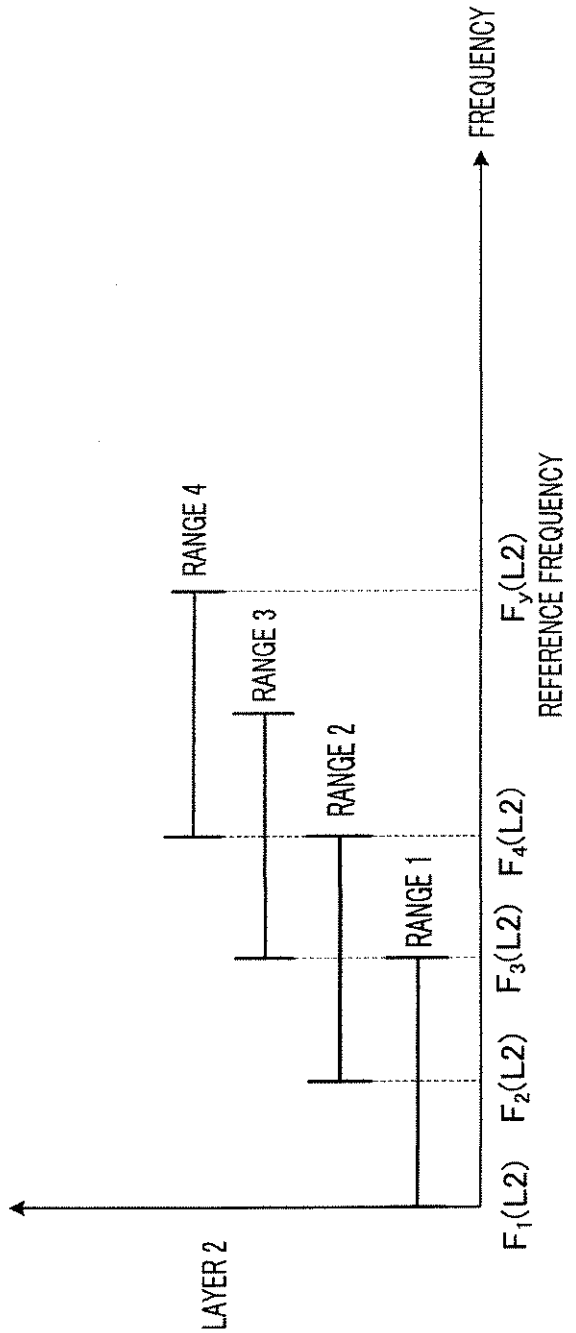


FIG.32A

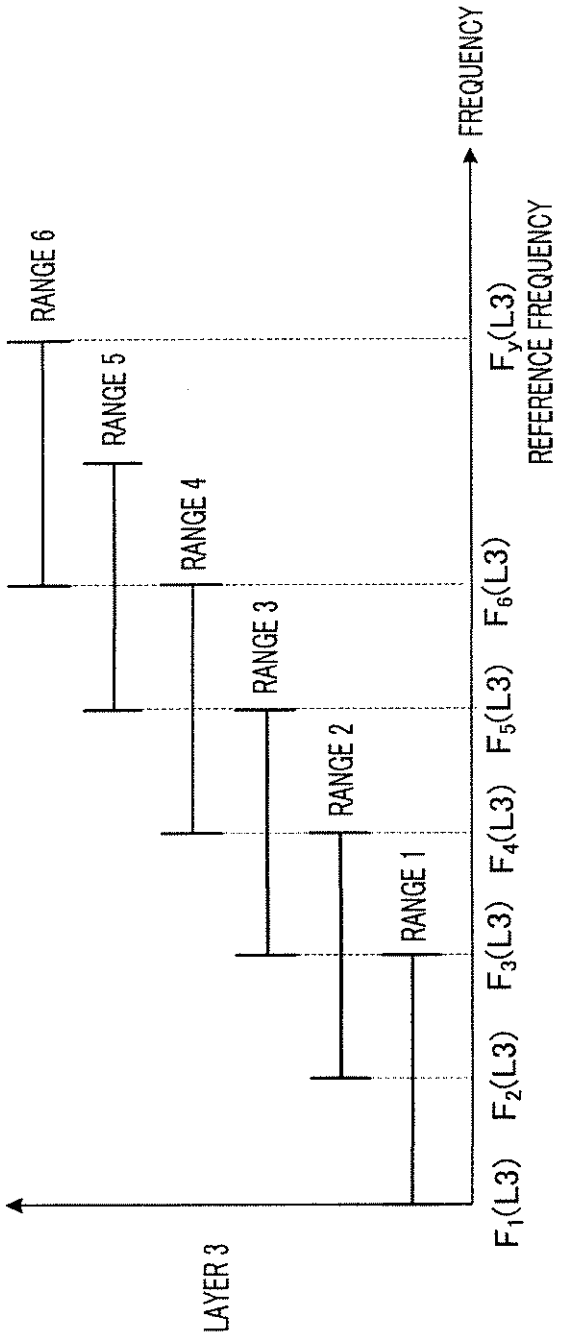


FIG.32B

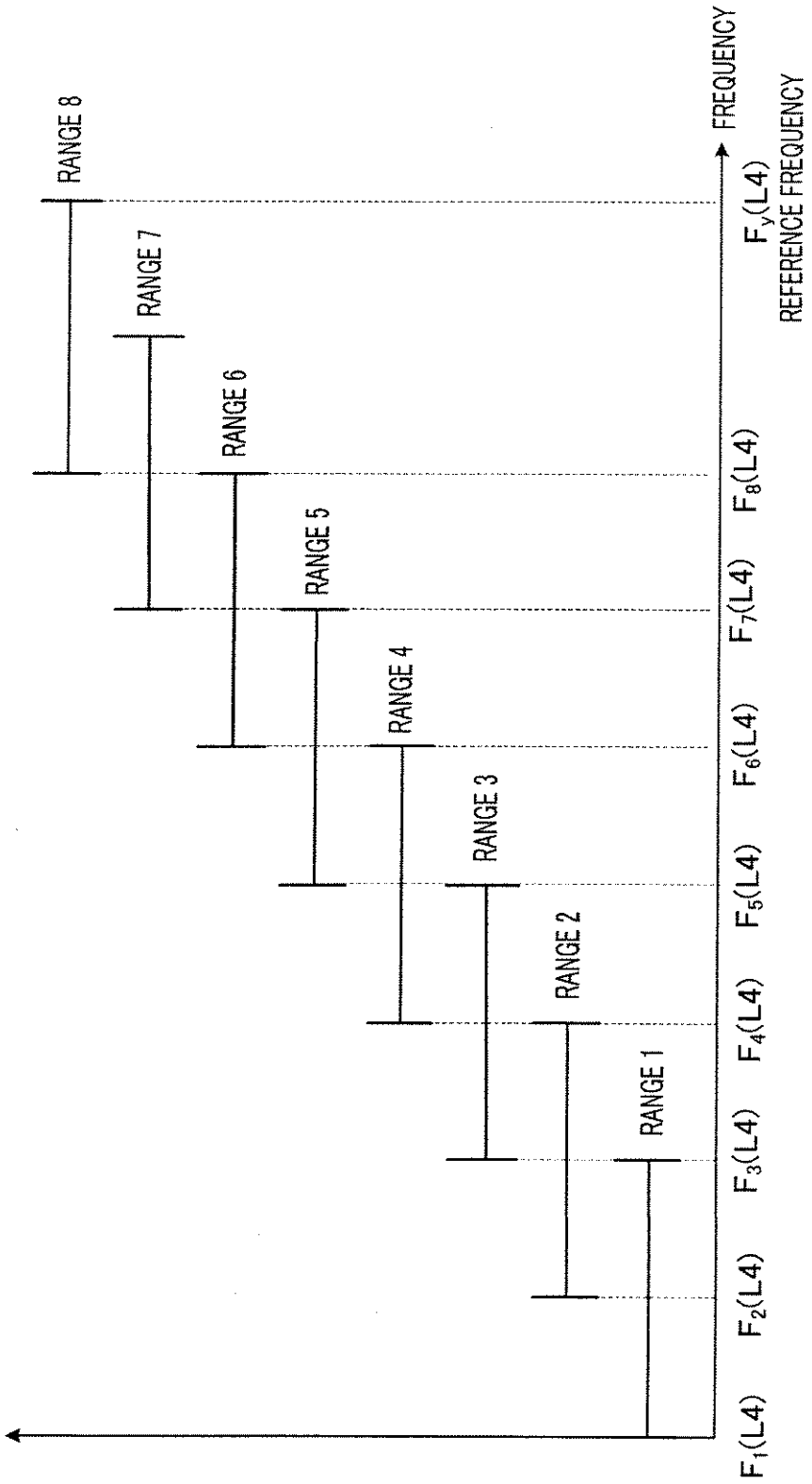

RANGE 8
RANGE 7
RANGE 6
RANGE 5
RANGE 4
RANGE 3
RANGE 2
RANGE 1
FREQUENCY
$F_y(L4)$
REFERENCE FREQUENCY
$F_8(L4)$
$F_7(L4)$
$F_6(L4)$
$F_5(L4)$
$F_4(L4)$
$F_3(L4)$
$F_2(L4)$
$F_1(L4)$

FIG.33