Fig. 1A

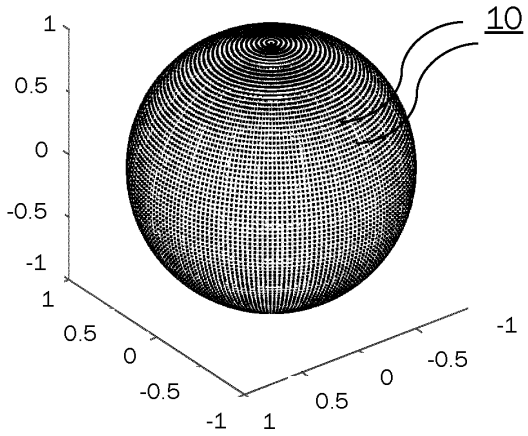


Fig. 1B

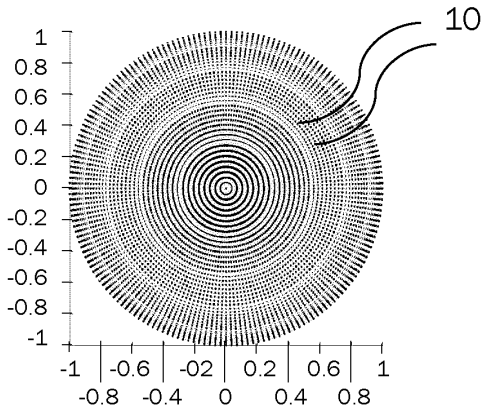
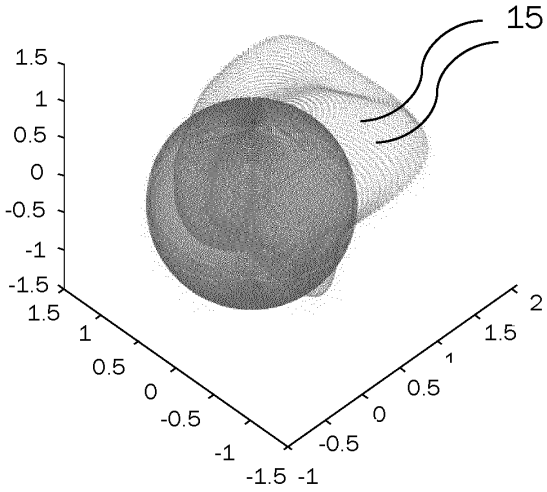


Fig. 1C



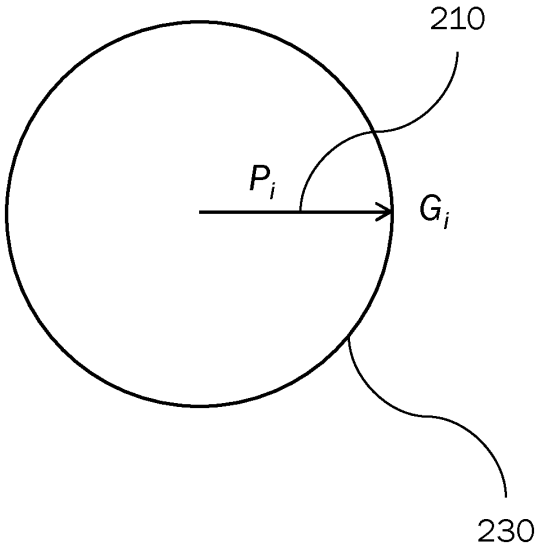


Fig. 2

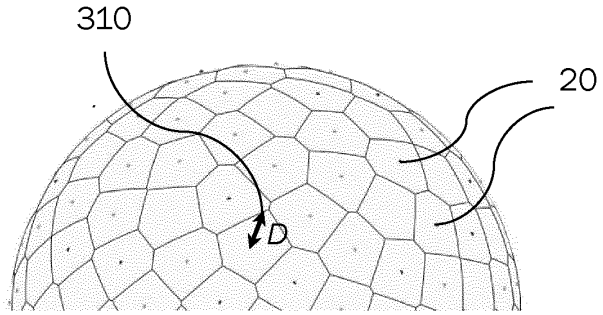


Fig. 3

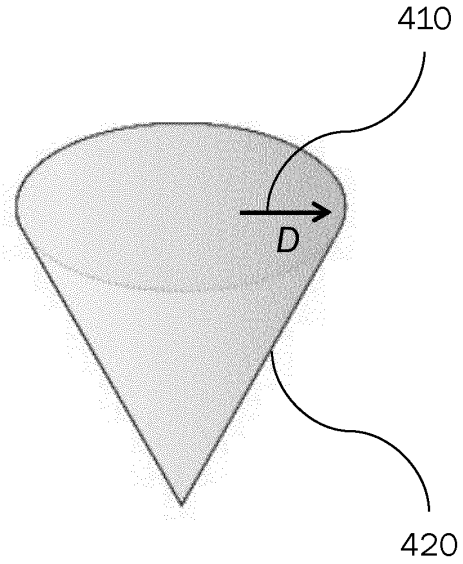


Fig. 4

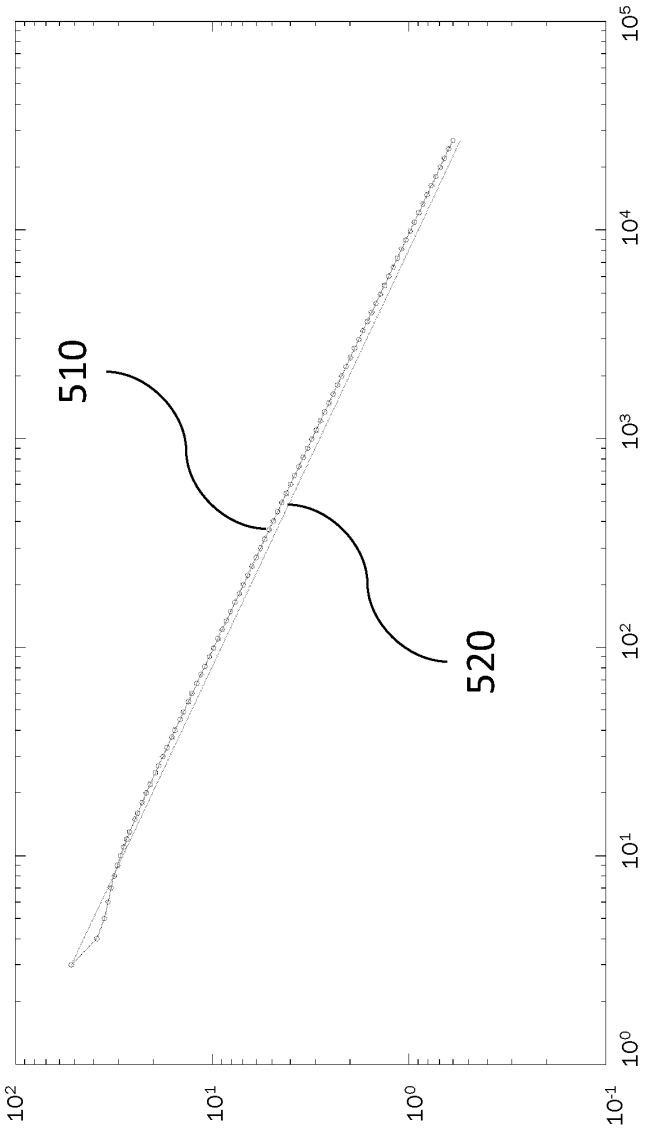
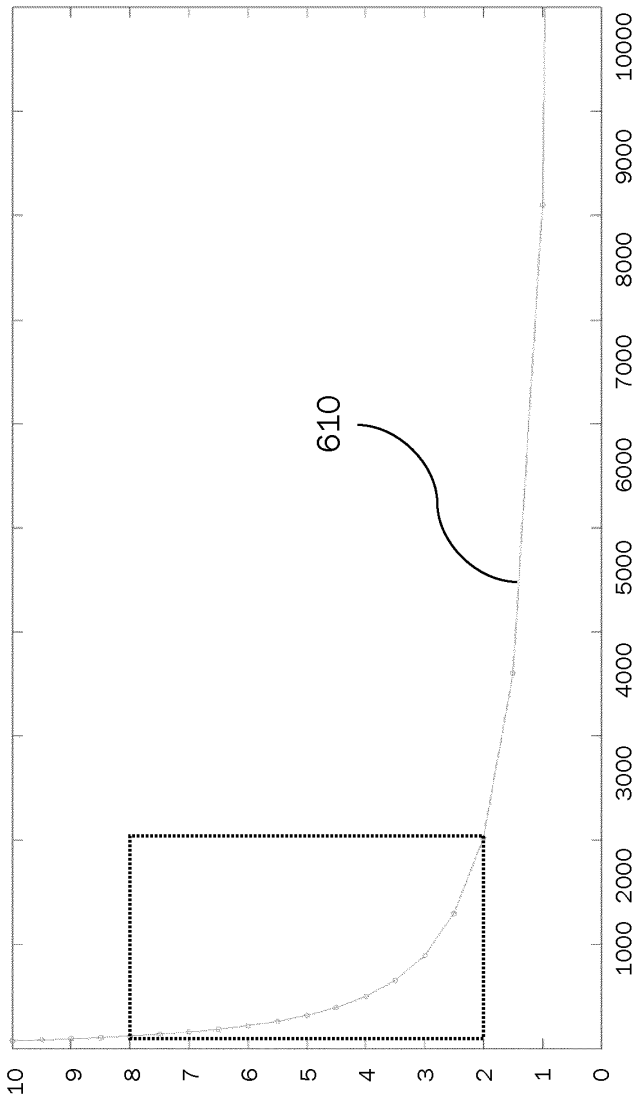


Fig. 5


610
0
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2000
3000
4000
5000
6000
7000
8000
9000
10000
0
1
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3
4
5
6
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8
9
10

Fig. 6

Fig. 7A

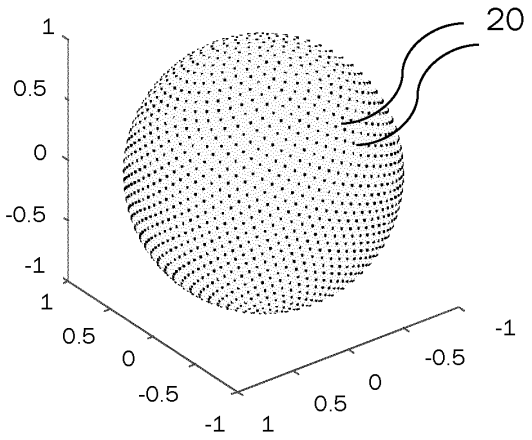


Fig. 7B

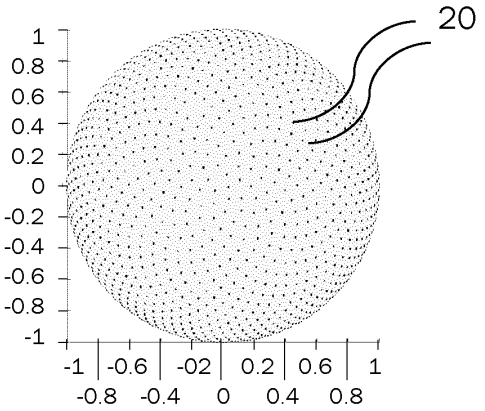
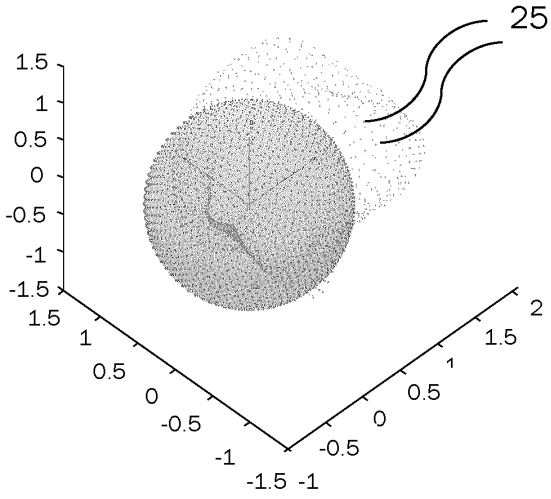


Fig. 7C



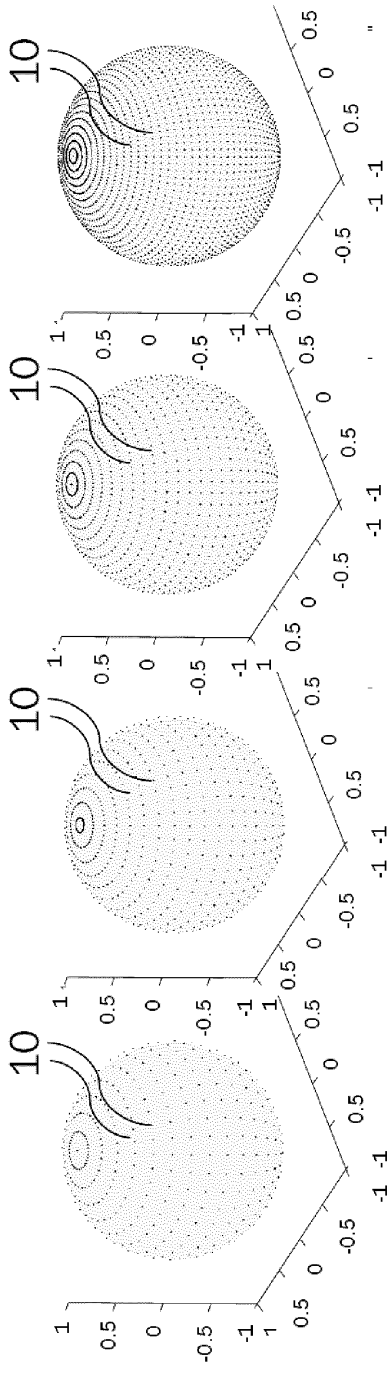


Fig. 8A

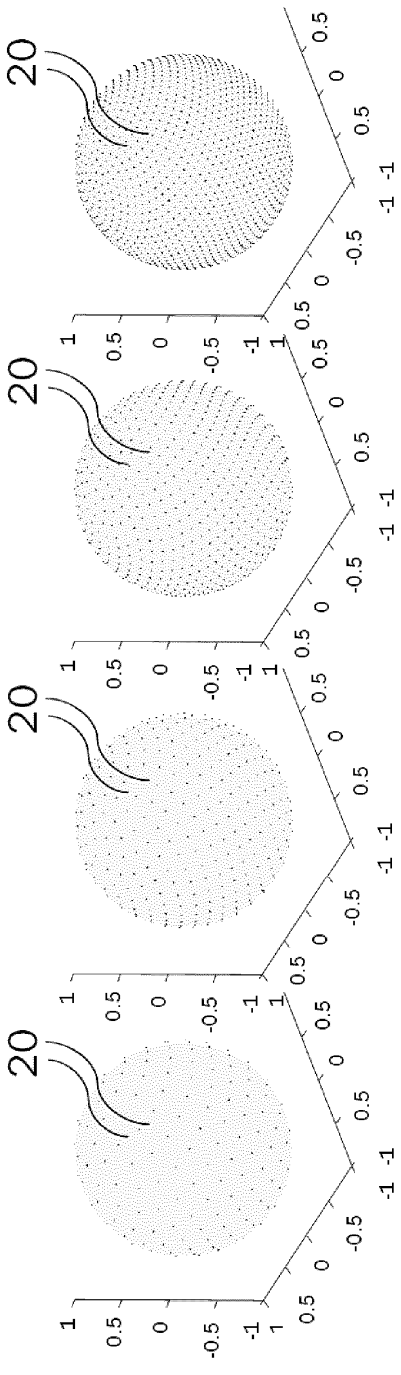


Fig. 8B

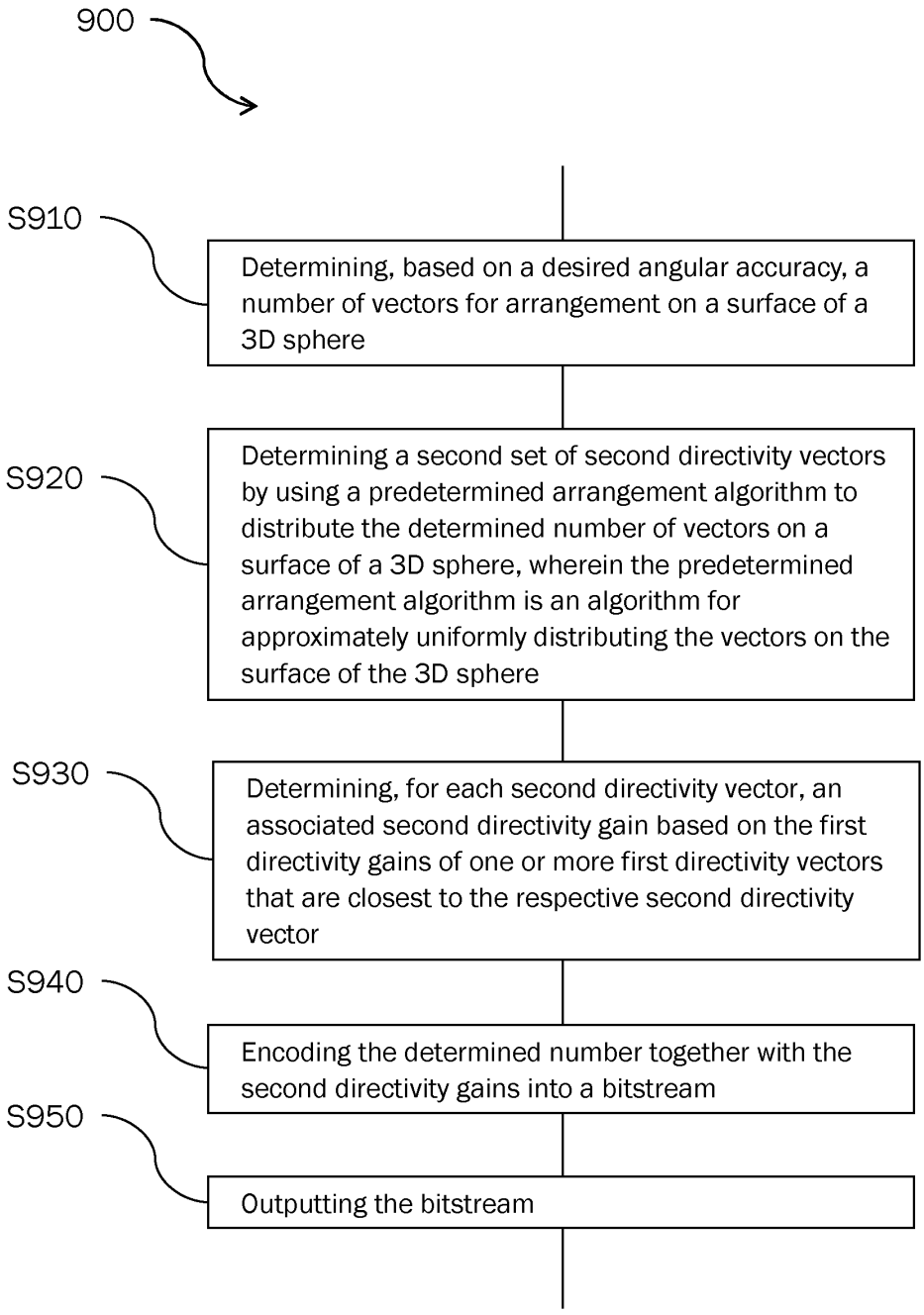

900
S910
Determining, based on a desired angular accuracy, a number of vectors for arrangement on a surface of a 3D sphere
S920
Determining a second set of second directivity vectors by using a predetermined arrangement algorithm to distribute the determined number of vectors on a surface of a 3D sphere, wherein the predetermined arrangement algorithm is an algorithm for approximately uniformly distributing the vectors on the surface of the 3D sphere
S930
Determining, for each second directivity vector, an associated second directivity gain based on the first directivity gains of one or more first directivity vectors that are closest to the respective second directivity vector
S940
Encoding the determined number together with the second directivity gains into a bitstream
S950
Outputting the bitstream

Fig. 9

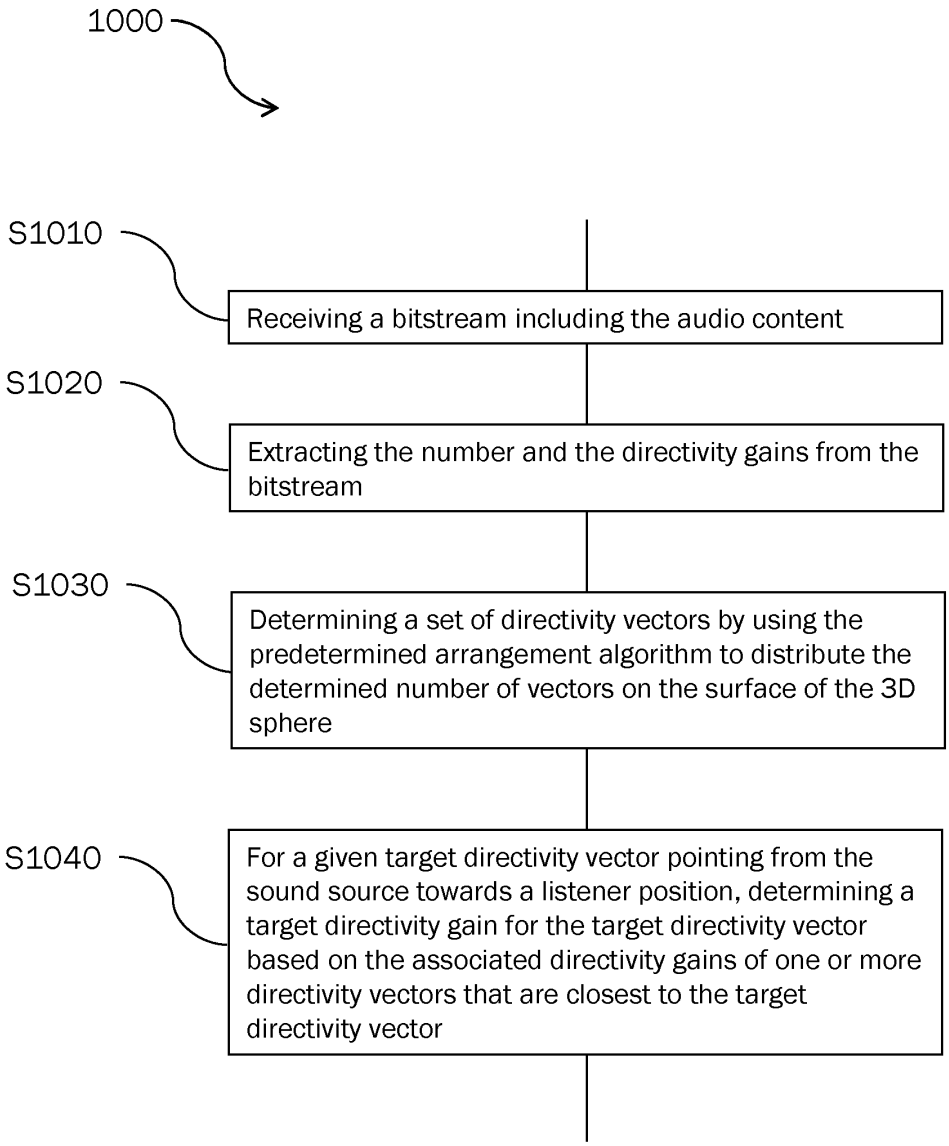

1000
S1010
Receiving a bitstream including the audio content
S1020
Extracting the number and the directivity gains from the bitstream
S1030
Determining a set of directivity vectors by using the predetermined arrangement algorithm to distribute the determined number of vectors on the surface of the 3D sphere
S1040
For a given target directivity vector pointing from the sound source towards a listener position, determining a target directivity gain for the target directivity vector based on the associated directivity gains of one or more directivity vectors that are closest to the target directivity vector

Fig. 10

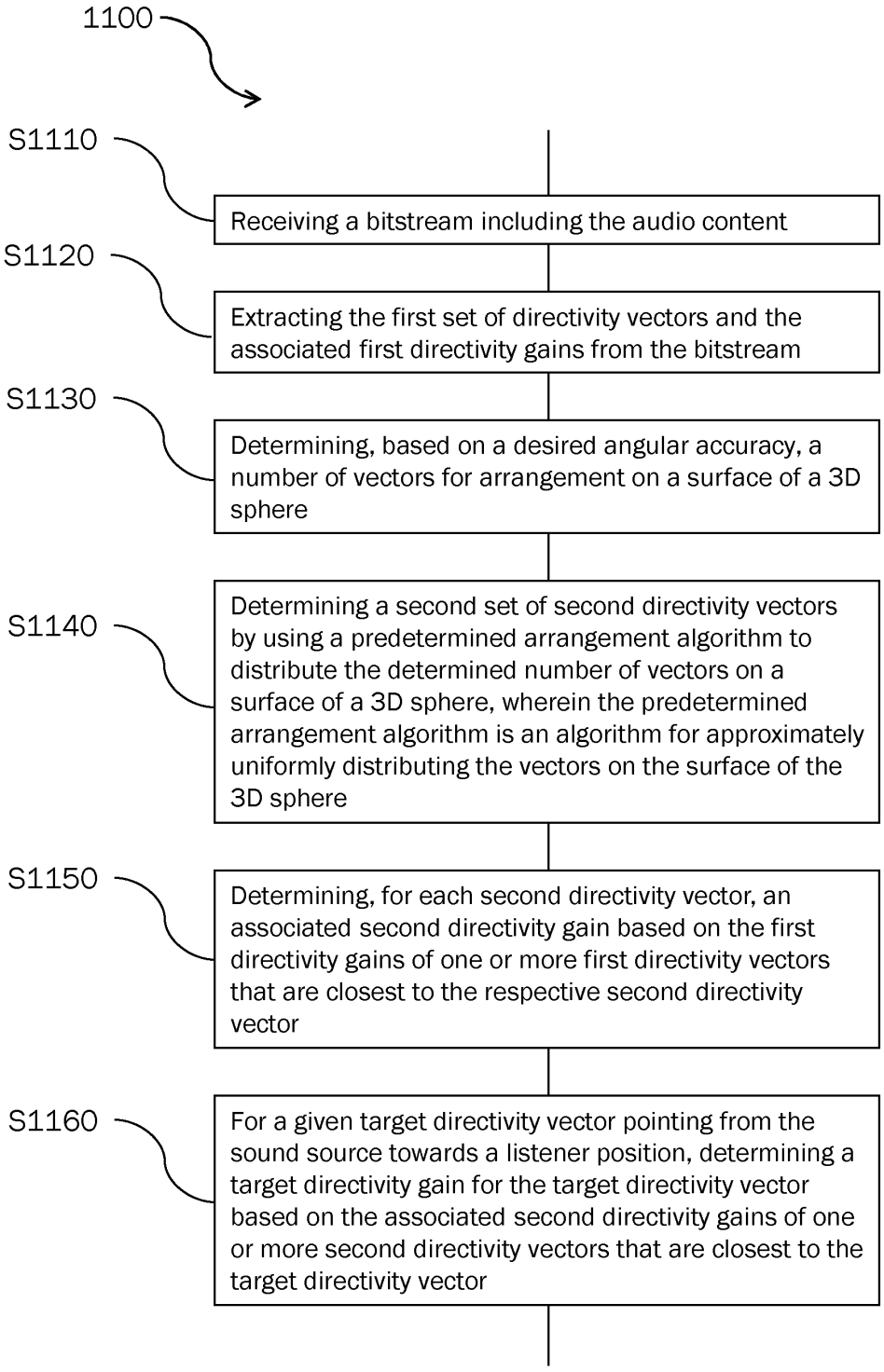

1100
S1110
Receiving a bitstream including the audio content
S1120
Extracting the first set of directivity vectors and the associated first directivity gains from the bitstream
S1130
Determining, based on a desired angular accuracy, a number of vectors for arrangement on a surface of a 3D sphere
S1140
Determining a second set of second directivity vectors by using a predetermined arrangement algorithm to distribute the determined number of vectors on a surface of a 3D sphere, wherein the predetermined arrangement algorithm is an algorithm for approximately uniformly distributing the vectors on the surface of the 3D sphere
S1150
Determining, for each second directivity vector, an associated second directivity gain based on the first directivity gains of one or more first directivity vectors that are closest to the respective second directivity vector
S1160
For a given target directivity vector pointing from the sound source towards a listener position, determining a target directivity gain for the target directivity vector based on the associated second directivity gains of one or more second directivity vectors that are closest to the target directivity vector

Fig. 11

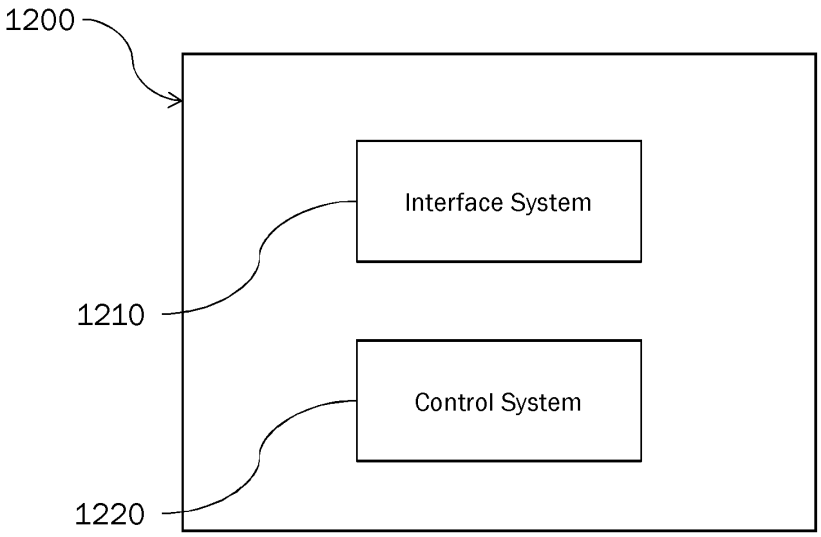

1200
Interface System
1210
Control System
1220

Fig. 12

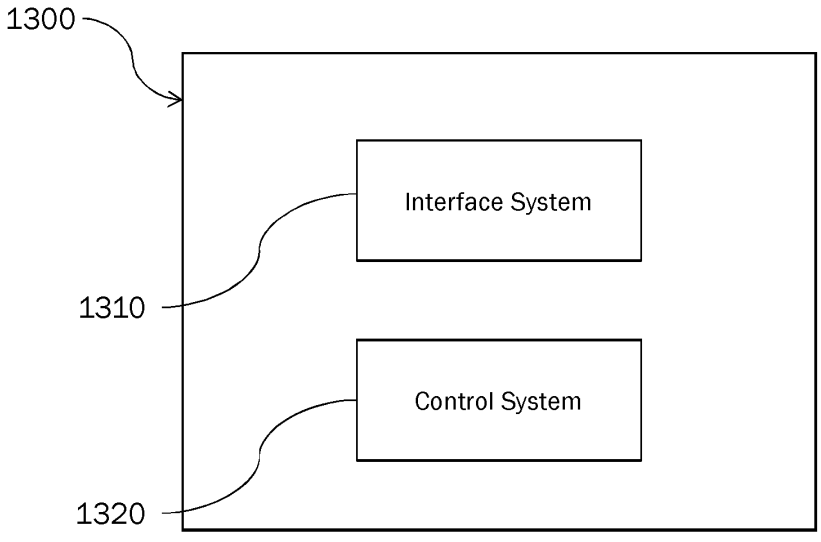

1300
Interface System
1310
Control System
1320

Fig. 13