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(54) **NEAR-FIELD VECTOR SIGNAL ENHANCEMENT**

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(57) **ABSTRACT**

Near-field sensing of wave signals, for example for application in headsets and earsets, is accomplished by placing two or more spaced-apart microphones along a line generally between the headset and the user's mouth. The signals produced at the output of the microphones will disagree in amplitude and time delay for the desired signal—the wearer's voice—but will disagree in a different manner for the ambient noises. Utilization of this difference enables recognizing, and subsequently ignoring, the noise portion of the signals and passing a clean voice signal. A first approach involves a complex vector difference equation applied in the frequency domain that creates a noise-reduced result. A second approach creates an attenuation value that is proportional to the complex vector difference, and applies this attenuation value to the original signal in order to effect a reduction of the noise. The two approaches can be applied separately or combined.
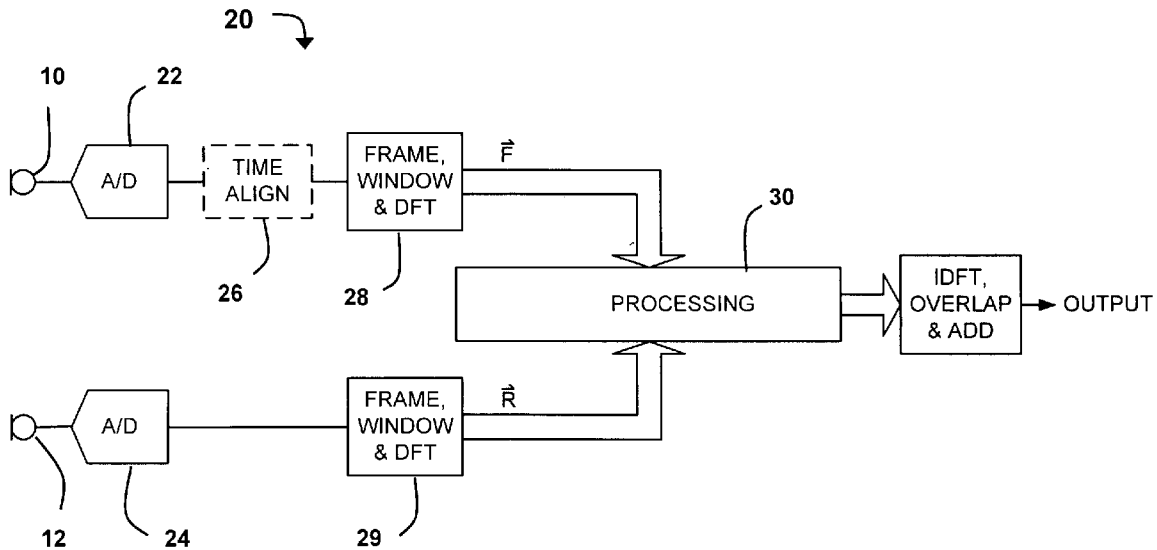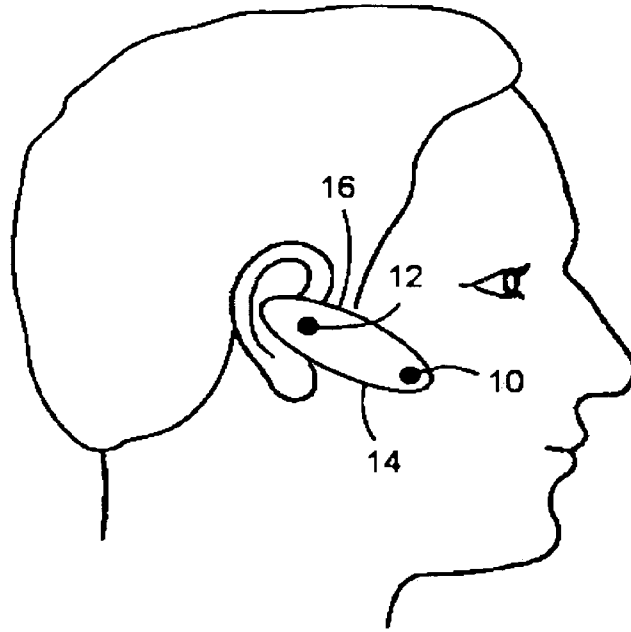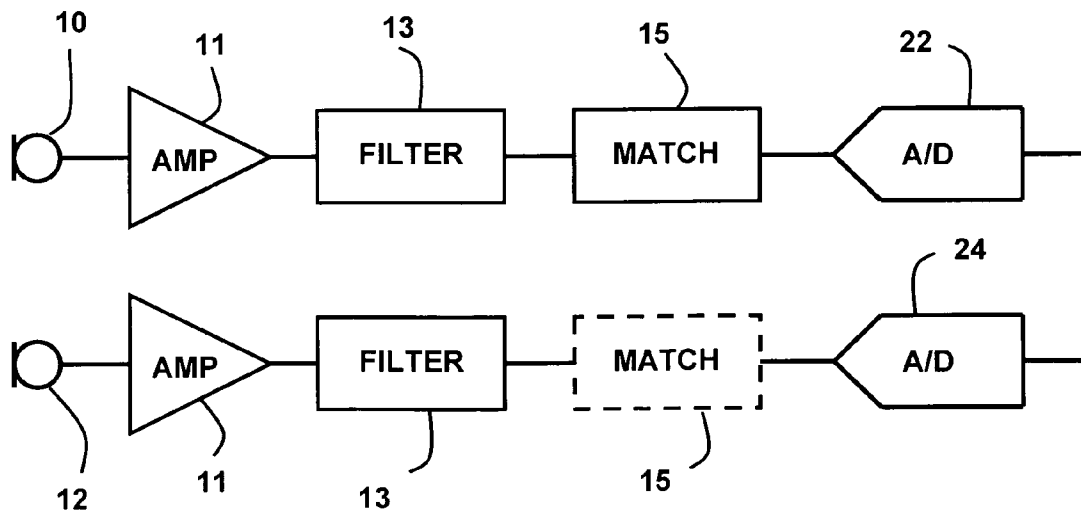
FIG. 1

FIG. 1A

FIG. 2

FIG. 3

OUTPUT

$$(1 - X^{-1}) \cdot \vec{F} - (1 - X) \cdot \vec{R}$$

$$X = \sqrt{\frac{Re\vec{F}^2 + Im\vec{F}^2}{Im\vec{R}^2 + Re\vec{R}^2}}$$

1μ

1ϰ

FIG. 4

DOCKET ALARM
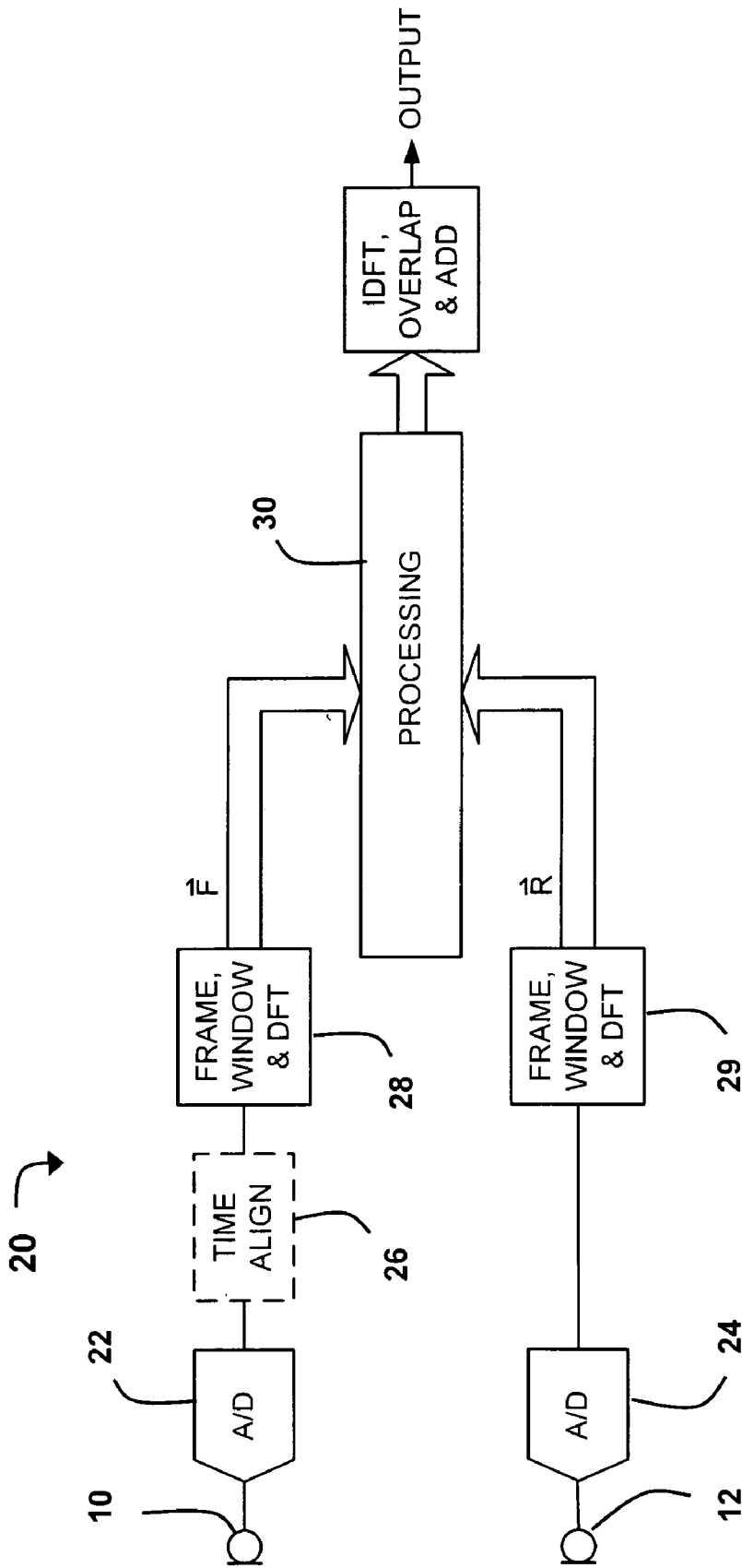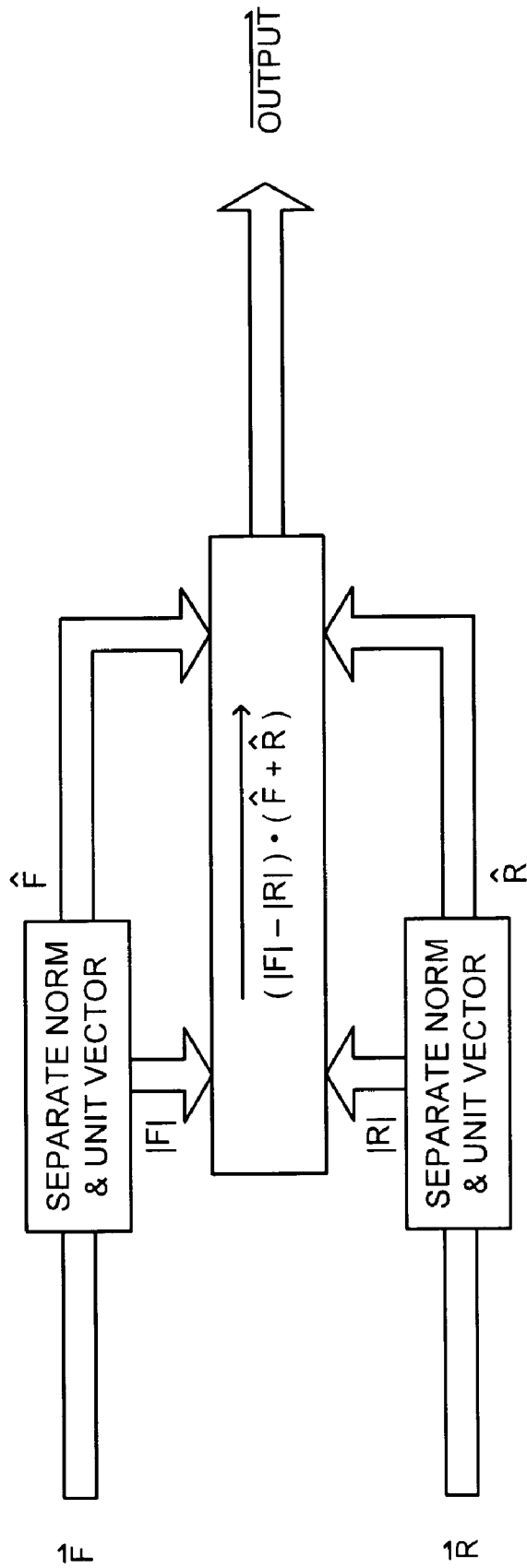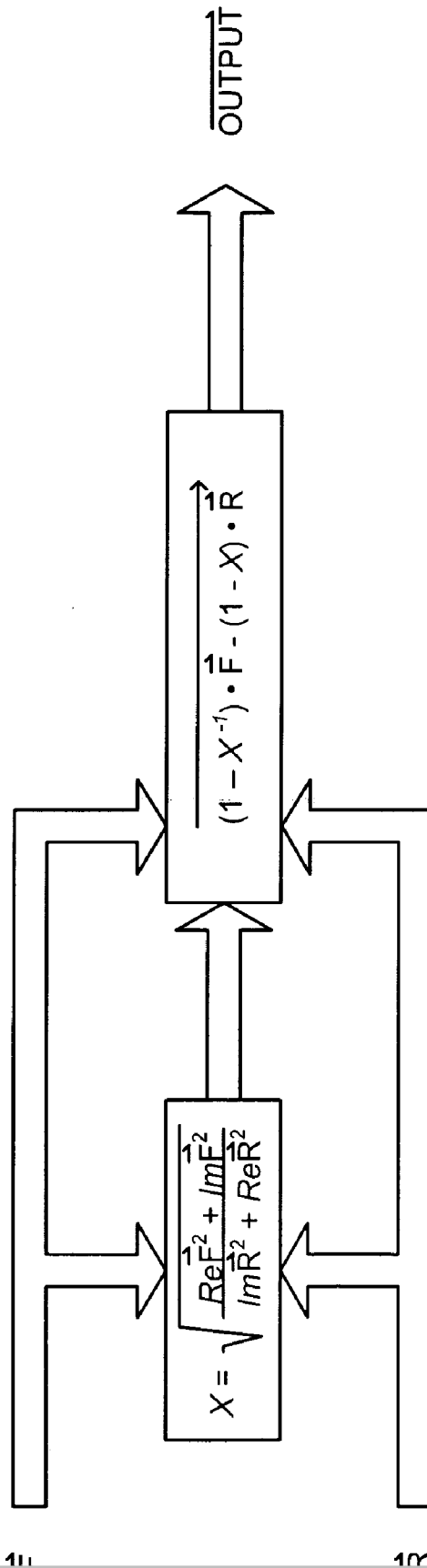
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