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Invention Title: Low Noise Magnetron and Crossed-field Amplifier by Azimuthally Varying Axial Magnetic FieldInventor(s): Ronald M Gilgenbach, Yue-Ying Lau, Vasile B NeculaesU.S. Filing/Issue Date: 4/17/03Patent or Application Serial No.: 10/417,655Grant/Contract Number(s): F49620-00-1-0088, F49620-02-1-0089, F49620-99-1-0297

Foreign Applications filed/intended in (countries): _____

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UOM 0290 PUS
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4/17/03 10/4/7655

utility 2512
appas filedLOW-NOISE, CROSSED-FIELD DEVICES SUCH AS A MICROWAVE
MAGNETRON, MICROWAVE OVEN UTILIZING SAME AND
METHOD OF CONVERTING A NOISY MAGNETRON
TO A LOW-NOISE MAGNETRON5 STATEMENT REGARDING FEDERALLY SPONSORED
RESEARCH OR DEVELOPMENT

This invention was made with Government support under Grant Nos. F49620-99-1-0297 and F49620-00-1-0088, awarded by the AFOSR. The Government has certain rights in the invention.

10 BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to low-noise, crossed-field devices such as microwave magnetrons, microwave ovens utilizing same, crossed-field amplifiers and methods of converting noisy magnetrons to low-noise magnetrons.

15 2. Background Art

The noise generation mechanisms of linear electron beam devices are well known. Generally, fluctuations of cathode electron emission excite space charge waves, which propagate along the electron beam. Calculations and computations of noise figures in linear devices agree with experiments. Methods
20 of noise suppression in linear tubes are at a very advanced stage. On the other hand, noise generation mechanisms in cross-field devices are not presently understood and predictive computational calculations do not exist. Methods of noise suppression in crossed-field devices have not previously been practically realized.

Existing magnetrons and crossed-field amplifiers use an azimuthally-
25 symmetric, axial magnetic field, shown in Figures 1a and 1b. In a standard microwave oven magnetron such as the magnetron, generally indicated at 70, of