United States Patent [19]

Suzuki et al.

[11] Patent Number: 5,449,419

[45] Date of Patent: Sep. 12, 1995

[54] **FE BASED SOFT MAGNETIC ALLOY, MAGNETIC MATERIALS CONTAINING SAME, AND MAGNETIC APPARATUS USING THE MAGNETIC MATERIALS**

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[73] Assignees: **Alps Electric Co., Ltd.**, Tokyo; **Tsuyoshi Masumoto**, Sendai, both of Japan

[21] Appl. No.: **201,135**

[22] Filed: **Feb. 24, 1994**

Related U.S. Application Data

[63] Continuation of Ser. No. 690,201, Apr. 23, 1991, abandoned.

[30] **Foreign Application Priority Data**

Apr. 24, 1990	[JP]	Japan	2-108308
Aug. 31, 1990	[JP]	Japan	2-230135
Sep. 7, 1990	[JP]	Japan	2-237752
Sep. 7, 1990	[JP]	Japan	2-237753
Sep. 7, 1990	[JP]	Japan	2-237754
Sep. 7, 1990	[JP]	Japan	2-237755
Sep. 7, 1990	[JP]	Japan	2-237757
Sep. 7, 1990	[JP]	Japan	2-237758
Sep. 13, 1990	[JP]	Japan	2-243589
Sep. 13, 1990	[JP]	Japan	2-243590
Nov. 27, 1990	[JP]	Japan	2-324518
Nov. 27, 1990	[JP]	Japan	2-324519

[51] **Int. Cl.^{6}** **H01F 1/147**

[52] **U.S. Cl.** **148/306**; 148/310; 148/311; 148/305; 420/121; 420/125; 75/244

[58] **Field of Search** 148/305, 306, 310, 311; 420/121, 125; 75/244

[56] **References Cited**

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Attorney, Agent, or Firm—Guy W. Shoup; Patrick T. Bever

[57] **ABSTRACT**

An Fe-based soft magnetic alloy having a high saturated magnetic flux density and having a composition represented by formula (I) below:

$$(Fe_{1-a}Q_a)_b B_x T_y T'_z \qquad (I)$$

wherein Q represents at least one element selected from the group consisting of Co and Ni; T represents at least one element selected from the group consisting of Ti, Zr, Hf, V, Nb, Ta, Mo and W, with Zr and/or Hf being always included; T' represents at least one element selected from the group consisting of Cu, Ag, Au, Ni, Pd and Pt; a, b, x, y and z are real numbers satisfying relationships below:

$0 \leqq a \leqq 0.05$ atomic %,
$0 < b \leqq 93$ atomic %,
$0.5 \leqq x \leqq 16$ atomic %,
$4 \leqq y \leqq 10$ atomic %,
$0 \leqq z \leqq 4.5$ atomic %

provided that when $0 < z \leqq 4.5$ atomic %, Q represents Co and $0 < b \leqq 92$ atomic %; and when $z=0$, $0.5 \leqq x \leqq 8$ atomic % and $4 \leqq y \leqq 9$ atomic %. Also disclosed are soft magnetic materials such as thin films, ribbons, and powder magnetic transducers such as low frequency transformers and magnetic heads using the material. Finally, processes and apparatuses for producing ribbons formed from the alloy are disclosed.
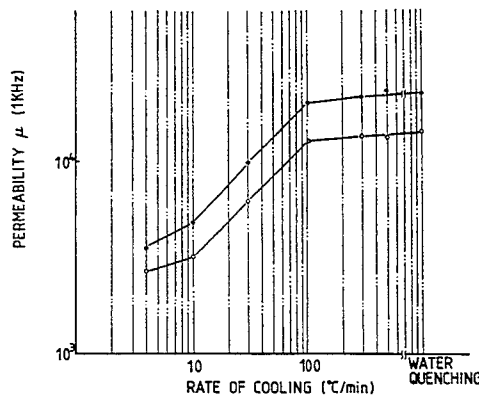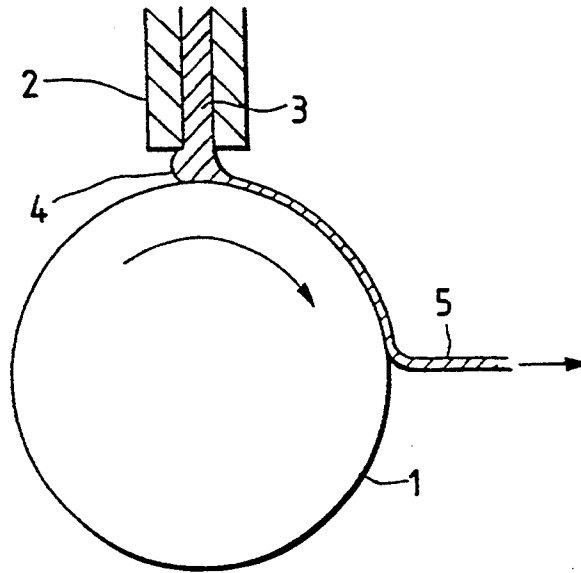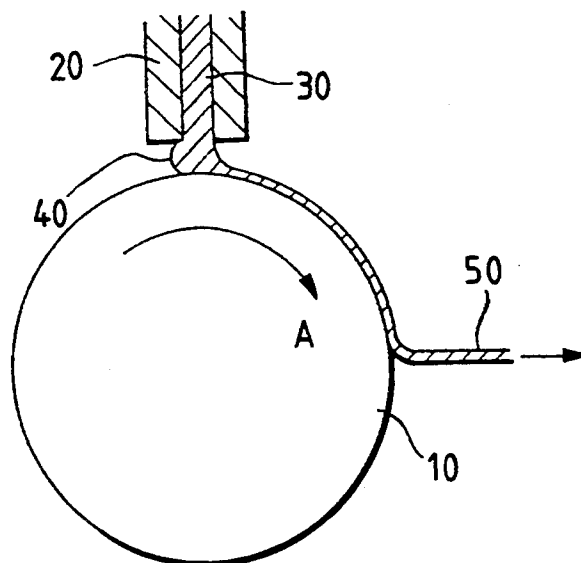
4 Claims, 19 Drawing Sheets
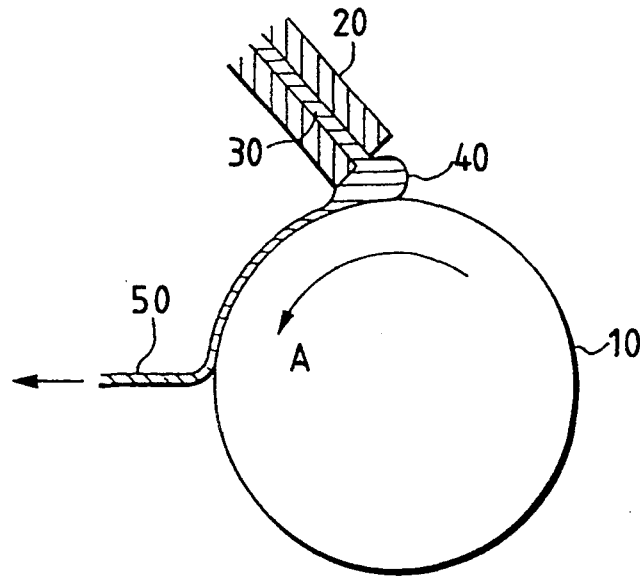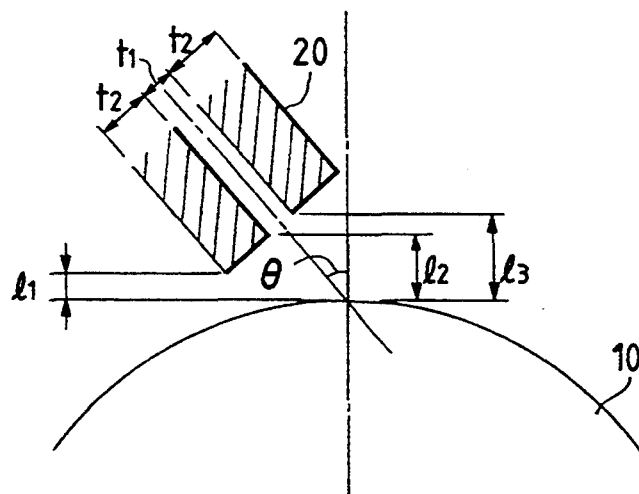

• Fe₈₈Cu₁B₃Zr₈
○ Fe₉₁Zr₇B₂

FIG. 1
PRIOR ART

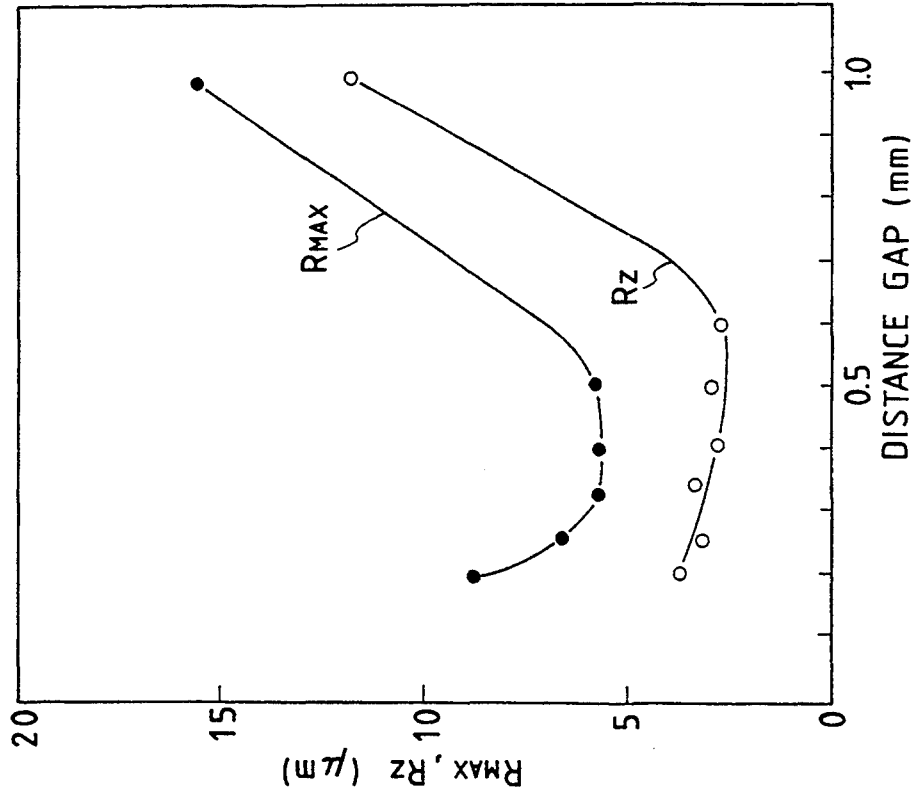*FIG. 2*
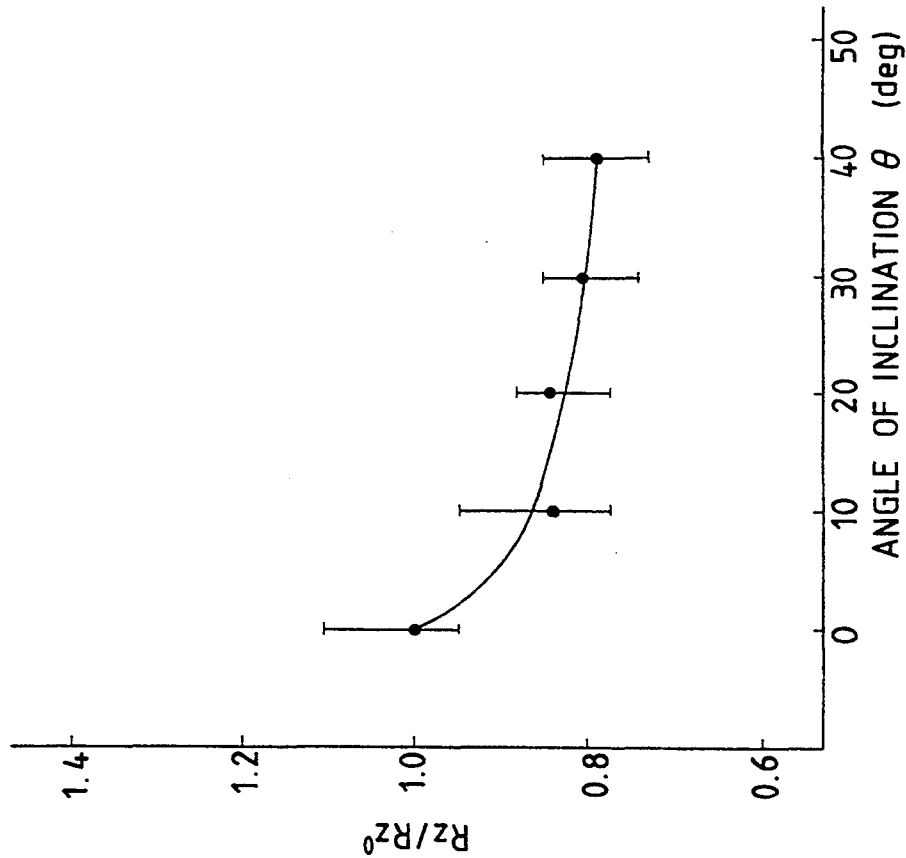
FIG. 3

FIG. 4

FIG. 6

FIG. 5

FIG. 7

DOCKET ALARM
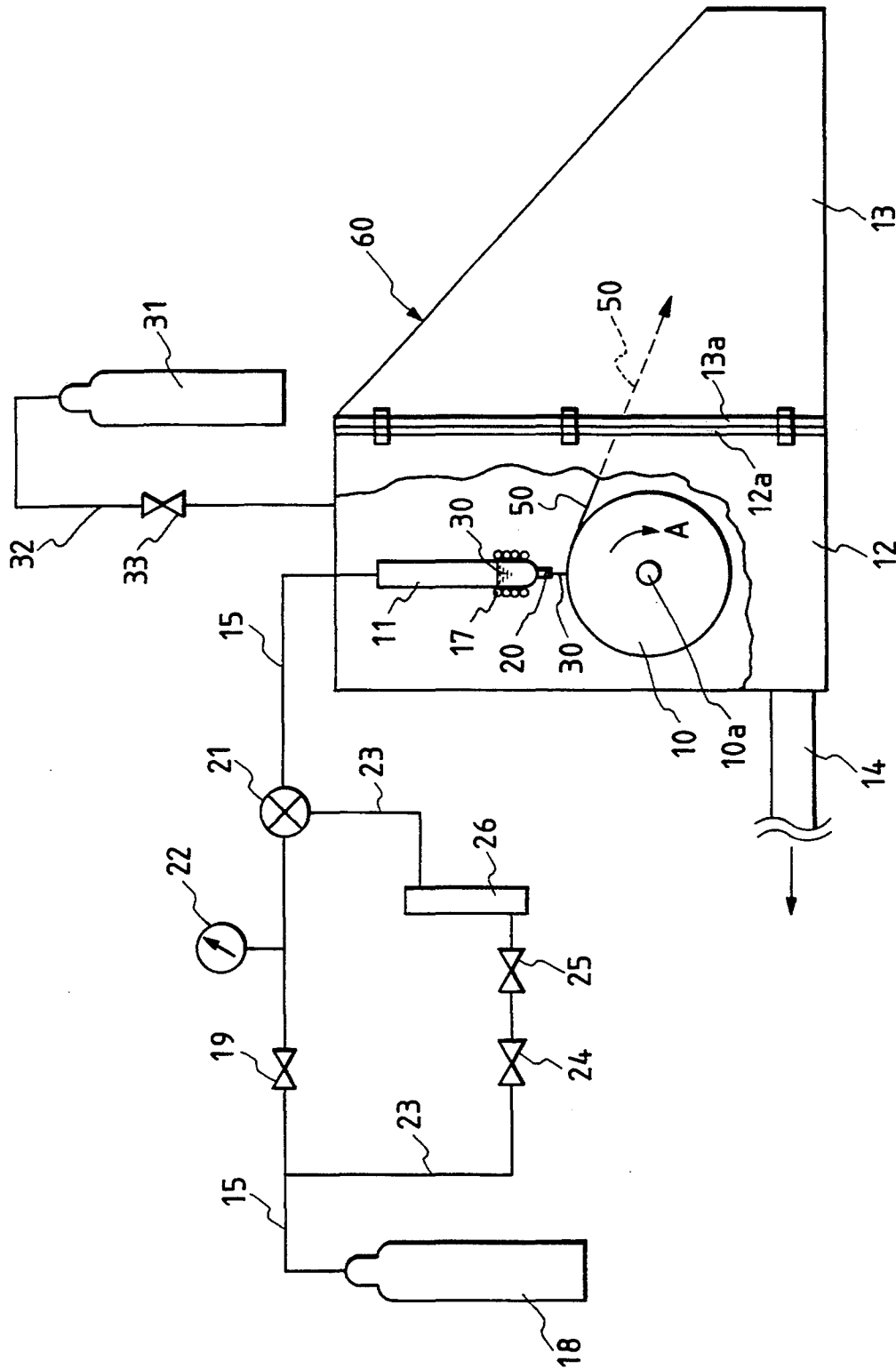
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