

# (19) United States

# (12) Patent Application Publication (10) Pub. No.: US 2023/0232161 A1 SATOH et al.

(43) **Pub. Date:** 

Jul. 20, 2023

### (54) VIBRATION DEVICE

(71) Applicant: TDK CORPORATION, Tokyo (JP)

Inventors: Akira SATOH, Tokyo (JP); Kaoru (72)

KIJIMA, Tokyo (JP)

Assignee: TDK CORPORATION, Tokyo (JP)

Appl. No.: 18/079,346

(22)Filed: Dec. 12, 2022

(30)Foreign Application Priority Data

Jan. 17, 2022 (JP) ...... 2022-004948

### **Publication Classification**

(51) Int. Cl. H04R 17/00 H10N 30/87 (2006.01)(2006.01) H10N 30/88 (2006.01)H04R 1/02 (2006.01)

(52) U.S. Cl.

CPC ...... H04R 17/00 (2013.01); H01L 41/053 (2013.01); H01L 41/0475 (2013.01);

H04R 1/025 (2013.01)

#### (57) **ABSTRACT**

A vibration device includes: a piezoelectric unit including a piezoelectric element; and a housing made of metal that holds the piezoelectric unit. The housing includes a bottom surface portion to which the piezoelectric unit is fixed, and side surface portions that stand at an edge portion of the bottom surface portion to surround the piezoelectric unit. The side surface portions are continuous with the bottom surface portion, and are inclined to open outward from the edge portion with respect to the bottom surface portion.

