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SATO et al.(10) **Pub. No.: US 2022/0368307 A1**(43) **Pub. Date: Nov. 17, 2022**(54) **ACOUSTIC WAVE DEVICE, FILTER, AND MULTIPLEXER**(52) **U.S. CL.**CPC *H03H 9/13* (2013.01); *H03H 9/17* (2013.01); *H03H 9/703* (2013.01)(71) Applicant: **TAIYO YUDEN CO., LTD.**, Tokyo (JP)(72) Inventors: **Koichi SATO**, Tokyo (JP); **Shinji YAMAMOTO**, Tokyo (JP); **Toshio NISHIZAWA**, Tokyo (JP); **Ryohei KOMIYAMA**, Tokyo (JP)

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ABSTRACT(73) Assignee: **TAIYO YUDEN CO., LTD.**, Tokyo (JP)(21) Appl. No.: **17/724,346**(22) Filed: **Apr. 19, 2022**(30) **Foreign Application Priority Data**

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An acoustic wave device includes a piezoelectric layer, a pair of comb-shaped electrodes disposed on a first surface of the piezoelectric layer, each of the pair of comb-shaped electrodes including electrode fingers that excite an acoustic wave, a support substrate disposed at a second surface side of the piezoelectric layer, and having protruding portions and/or recessed portions on a first surface, which is closer to the piezoelectric layer, of the support substrate, each of the protruding portions and/or the recessed portions having a shape in which each of left and right side surfaces has linear slopes inclined at different angles with respect to the first surface of the piezoelectric layer in a cross-sectional view, and a second insulating layer located between the piezoelectric layer and the support substrate and disposed on the third surface, on which the protruding portions and/or the recessed portions are formed, of the support substrate.

