

[54] **ULTRASONIC SHEET FEEDER, LOW-PROFILE ULTRASONIC MOTOR, AND METHOD OF DRIVING THE SAME**

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## [57] ABSTRACT

An ultrasonic sheet feeder includes a convex shell, piezoelectric ceramic elements, a base, a roller, and a driving power source. The convex shell has a protruding middle portion. Each piezoelectric ceramic element has one end in contact with a corresponding one of the two ends of the convex shell. The base serves to fix the other end of each of the piezoelectric ceramic elements. The roller is arranged to oppose the protruding middle portion of the convex shell so as to urge a paper sheet against the convex shell when the paper sheet is loaded. The coefficient of friction of a contact portion of the roller with respect to the paper sheet is smaller than that of a contact portion of the convex shell with respect to the paper sheet. The driving power source applies AC voltages having a phase difference to the two piezoelectric ceramic elements. A low-profile ultrasonic motor used for the ultrasonic sheet feeder and methods of driving the motor and the sheet feeder are also disclosed.

18 Claims, 12 Drawing Sheets

