

PATENT SPECIFICATION

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(54) BUZZER

(71) We, KABUSHIKI KAISHA SEIKOSHA, a Japanese company of 5, 2-chome, Kyobashi, Chuo-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a buzzer whose sound can be adjusted.

In a conventional buzzer a vibrator is mounted within a case and is vibrated by electromagnetic driving means which includes a yoke and a coil wound about the yoke. In the conventional buzzer, the vibrator is arranged to produce an impact noise by striking against the case or by striking against a sound-producing membrane disposed within the case.

In such a conventional buzzer, the quality of the sound produced is considerably influenced by the clearance between the vibrator on the one hand, and the case or the sound-producing membrane on the other hand. Therefore, in such a conventional buzzer, any manufacturing error in the said clearance produces a direct effect on the sound produced resulting in an alteration of the sound produced and a high rate of rejects.

According to the present invention, there is provided a buzzer comprising a case within which is mounted a vibrator having a movable magnetic portion, a screw which is threaded into the case and which is arranged to be periodically struck by the vibrator during vibration thereof to produce a buzzing sound, the screw being aligned with the movable magnetic portion and being movable towards and away from the vibrator to adjust the buzzing sound, and electromagnetic driving means, cooperable with said movable magnetic portion, for effecting the said vibration of the vibrator, the electromagnetic driving means comprising a coil

wound about a yoke.

The vibrator may be an elongated sheet metal member which is fixed at one end thereof and which is provided at its opposite end with a magnet which constitutes the movable magnetic portion.

The case preferably has a hole there-through to render the buzzing sound more audible.

The present invention is illustrated, merely by way of example, in the accompanying drawing, in which:—

Figure 1 is a perspective view of a buzzer according to the present invention,

Figure 2 is a sectional view taken on the line II-II of Figure 1,

Figure 3 is an exploded perspective view of the buzzer of Figures 1 and 2, partially broken away, and

Figure 4 shows a driving circuit of the buzzer.

Terms such as "upper", "lower", "front" and "rear", as used in the description below are to be understood to refer to directions as seen in the accompanying drawing.

Referring now to the drawing, a base plate 1, of magnetic material, is stamped to provide integral projections which constitute an upstanding yoke 2 and an upstanding vibrator support 3. A pick-up and driving coil 4 is mounted about the yoke 2. An elongated sheet metal vibrator 5 is provided at one end portion thereof with a magnet 6, the vibrator 5 being provided with a square hole 5a at its opposite end portion. The vibrator support 3 is provided with a projection 3a which fits into the hole 5a, thereby fixedly supporting the said opposite end portion of the vibrator 5. A printed circuit board 7 is provided on its front surface with a transistor Tr and with a resistance R, the transistor Tr and the resistance R being component parts of a driving circuit. The printed circuit board 7 is provided, on its rear surface, with a printed circuit pattern

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(not shown in the drawing) which connects terminals (not shown) to the said component parts. Leads 8, 9 are connected to the said terminals of the printed circuit board 7 to supply power thereto.

5 At the lower end portion of the printed circuit board 7, two projections 10 are formed. The two projections 10 fit into holes 11 provided in the base plate 1. (Only one of the holes 11 can be seen in Figure 3 since the other of them is disposed behind the vibrator support 3). The printed circuit board 7 is also fixed to the upper surface of the base plate 1 by adhesive (not shown).
10 The transistor Tr and the resistance R are located between the yoke 2 and the vibrator support 3, so using the space effectively. A case 12 of synthetic resin is connected to the base plate 1 by adhesive, the vibrator 5 with its magnet 6 being mounted within the case 12.

15 Through the case 12 there is provided a threaded hole 13 into which there is threaded a screw 14 which is aligned with the magnet 6. The screw 14 is arranged to be periodically struck by the movable end portion of the vibrator 5, which carries the magnet 6, during the vibration of the vibrator 5, to produce a buzzing sound. The screw 14 thus acts as an abutment member which can be moved in the case 12 in directions towards and away from the vibrator 5 to adjust the buzzing sound. Thus the movable end portion of the vibrator 5 which carries the magnet 6 is disposed adjacent to and facing the screw 14, leaving a small adjustable clearance "a". A hole 15 is formed through the case 12 to render the buzzing sound more audible.

20 Figure 4 shows an electromagnetic driving circuit which is cooperable with the magnet 6 so as to effect vibration of the vibrator 5. The circuit comprises the transistor Tr, the resistance R, a pick-up portion 4a of the coil 4 and a driving portion 4b of the coil 4

which are connected by means of the printed circuit to a power source E and to a switch S. The coil 4 is disposed on the opposite side of the vibrator 5 to the screw 14 and is aligned with the latter.

55 Upon closing the switch S, the vibrator 5 periodically strikes the screw 14 with its free end portion producing a buzzing sound. The buzzing sound can be adjusted to a desired level by screwing the screw 14 inwardly or outwardly to adjust the size of the clearance "a".

WHAT WE CLAIM IS:—

1. A buzzer comprising a case within which is mounted a vibrator having a movable magnetic portion, a screw which is threaded into the case and which is arranged to be periodically struck by the vibrator during vibration thereof to produce a buzzing sound, the screw being aligned with the movable magnetic portion and being movable towards and away from the vibrator to adjust the buzzing sound, and electromagnetic driving means, cooperable with said movable magnetic portion, for effecting the said vibration of the vibrator, the electromagnetic driving means comprising a coil wound about a yoke.

2. A buzzer as claimed in claim 1 in which the vibrator is an elongated sheet metal member which is fixed at one end thereof and which is provided at its opposite end with a magnet which constitutes the movable magnetic portion.

3. A buzzer as claimed in claim 1 or 2 in which the case has a hole therethrough to render the buzzing sound more audible.

4. A buzzer substantially as hereinbefore described with reference to and as shown in the accompanying drawing.

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(not shown in the drawing) which connects terminals (not shown) to the said component parts. Leads 8, 9 are connected to the said terminals of the printed circuit board 7 to supply power thereto.

At the lower end portion of the printed circuit board 7, two projections 10 are formed. The two projections 10 fit into holes 11 provided in the base plate 1. (Only one of the holes 11 can be seen in Figure 3 since the other of them is disposed behind the vibrator support 3). The printed circuit board 7 is also fixed to the upper surface of the base plate 1 by adhesive (not shown). The transistor Tr and the resistance R are located between the yoke 2 and the vibrator support 3, so using the space effectively. A case 12 of synthetic resin is connected to the base plate 1 by adhesive, the vibrator 5 with its magnet 6 being mounted within the case 12.

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Figure 4 shows an electromagnetic driving circuit which is cooperable with the magnet 6 so as to effect vibration of the vibrator 5. The circuit comprises the transistor Tr, the resistance R, a pick-up portion 4a of the coil 4 and a driving portion 4b of the coil 4

which are connected by means of the printed circuit to a power source E and to a switch S. The coil 4 is disposed on the opposite side of the vibrator 5 to the screw 14 and is aligned with the latter.

Upon closing the switch S, the vibrator 5 periodically strikes the screw 14 with its free end portion producing a buzzing sound. The buzzing sound can be adjusted to a desired level by screwing the screw 14 inwardly or outwardly to adjust the size of the clearance "a".

WHAT WE CLAIM IS:—

1. A buzzer comprising a case within which is mounted a vibrator having a movable magnetic portion, a screw which is threaded into the case and which is arranged to be periodically struck by the vibrator during vibration thereof to produce a buzzing sound, the screw being aligned with the movable magnetic portion and being movable towards and away from the vibrator to adjust the buzzing sound, and electromagnetic driving means, cooperable with said movable magnetic portion, for effecting the said vibration of the vibrator, the electromagnetic driving means comprising a coil wound about a yoke.

2. A buzzer as claimed in claim 1 in which the vibrator is an elongated sheet metal member which is fixed at one end thereof and which is provided at its opposite end with a magnet which constitutes the movable magnetic portion.

3. A buzzer as claimed in claim 1 or 2 in which the case has a hole therethrough to render the buzzing sound more audible.

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