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SONIC SENDER

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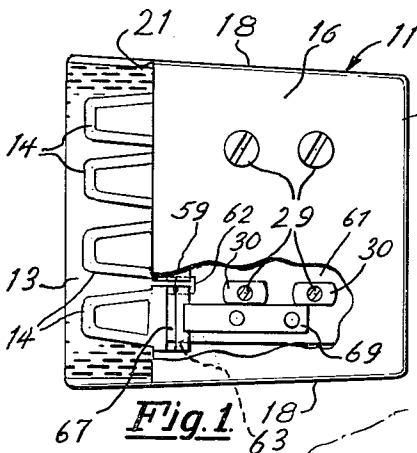


**Fig. 1.**

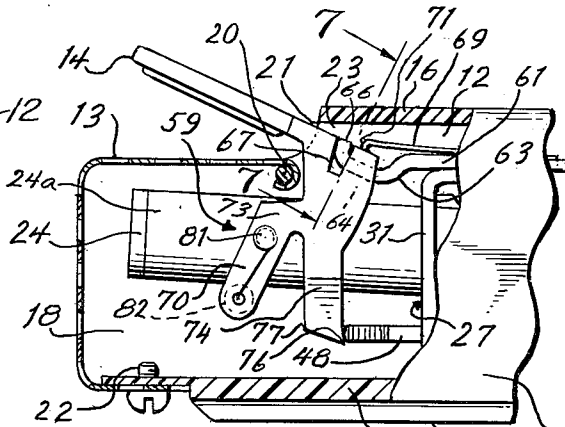


**Fig. 2.**

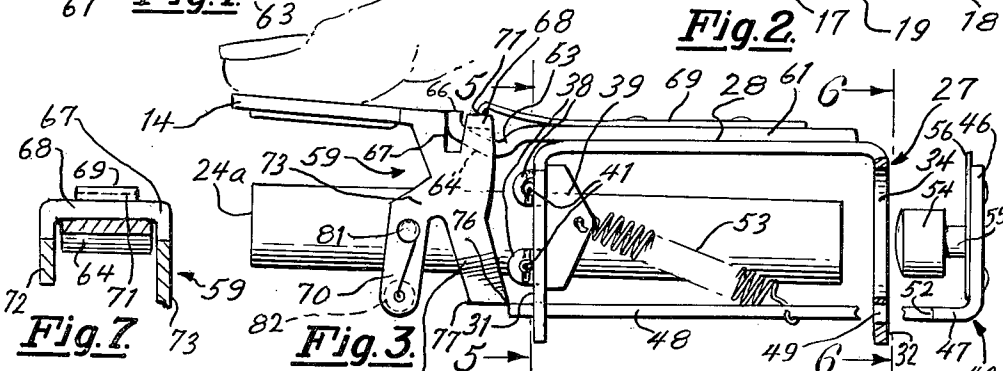


**Fig. 3.**

**Fig. 4.**

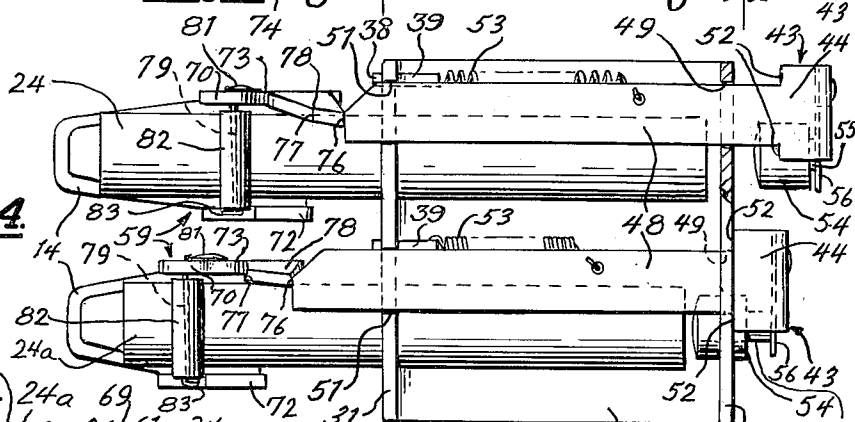


**Fig. 5.**

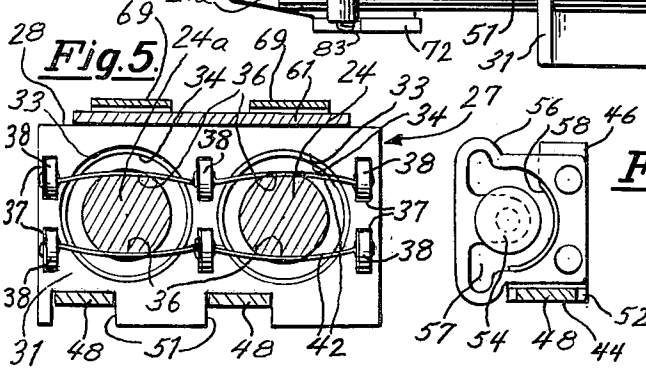


**Fig. 6.**

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## SONIC SENDER

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1 Claim. (Cl. 116—137)

This invention relates to sonic apparatus, and in particular to apparatus for generating a plurality of ultrasonic signals, each of which is selectable by manually actuating a selected operating member.

More specifically, the invention relates to a portable manual control apparatus for actuating controls on a stationary domestic appliance, the appliance being provided with suitable receiving apparatus, the operation of which is responsive to ultrasonic signals produced by operation of the manual control apparatus and relay means to initiate operation of or change the function of the domestic appliance.

Although apparatuses for producing inaudible sound are known to the prior art, the apparatuses were intricate, and consequently expensive of manufacture.

By the present invention an ultrasonic sending apparatus is provided which is simple, easy of manufacture, and less expensive than corresponding apparatuses of the prior art.

Additional advantages of the invention will be apparent from the following description, when considered in conjunction with the accompanying drawings, in which:

Fig. 1 is a top plan view of the invention, a portion of the cover being broken away;

Fig. 2 is a fragmentary side elevational of the same, drawn to an enlarged scale;

Fig. 3 is a side elevational view of the invention, the cover thereof having been removed;

Fig. 4 is a bottom plan view of the mechanism shown in Fig. 3;

Fig. 5 is a vertical section taken on line 5—5 of Fig. 3;

Fig. 6 is a vertical section taken on line 6—6 of Fig. 3; and

Fig. 7 is also a vertical section taken on line 7—7 of Fig. 2.

Throughout the foregoing views, the reference character 11 is used to denote an ultrasonic sender unit in its entirety. Externally, it includes a casing 12, a grille 13 partly covering an open end of the casing, and a plurality of triggers, levers or sound selectors 14, extending over the grille from the interior of the casing. The casing is a one-part, rigid structure preferably of some suitable plastic material such as Bakelite. Transversely thereof, the casing 12 is rectangular and therefore includes a top wall 16, a bottom wall 17, and side walls 18. The bottom wall 17 is also formed with skids or ribs 19 which may be engageable with a table top or other horizontal support surface. Although the side walls extend to the left, Fig. 2, slightly beyond the bottom wall 17, they are of reduced height from shoulder portions thereof 21 at the left edge of the wall 16, the top wall being considerably shorter than the bottom wall 17. From a point in the proximity of the shoulders 21 the grille 13 extends horizontally, between the walls 18, thence vertically and backward under the edge of the base wall to which the grille is rigidly secured by any convenient

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means, such as screws 22. The grille 13 is preferably rigid as provided by foraminous sheet metal. An opening 23 is therefore provided between the shoulders 21, the free edge of the top wall 16, at the left thereof and the grille 13. At this opening the grille 13 is also anchored to a tie rod 20 extending transversely between the side walls.

A plurality of vibratory members 24, 24a, etc., are included in the unit 12. Preferably, they are associated with each other in pairs, each pair being independently supported from the casing 12 by means of the structure which will later be indicated. Each of the vibratory members 24, 24a, etc. is preferably a metallic cylindrical member. Satisfactory vibratory members are formed from round aluminum bar stock, the diameter of all the members then being  $\frac{3}{8}$ " and their lengths varying from  $2\frac{3}{8}$ " to  $2\frac{3}{4}$ ". Each of the vibratory members of the unit 11 had a length differing from the remaining vibratory members of the unit in order that each member may vibrate at a different frequency.

Support for a pair of the vibratory members 24 and 24a includes a frame or carrier 27, Figs. 3 and 4. It is formed of sheet metal and has a central portion 28, of rectangular formation, fixed to the top wall 16 by screws 29 and also spaced slightly from the top wall by spacers 30, Fig. 1. From opposed ends of the central portion front and rear flanges 31 and 32 extend downward. The front and rear flanges 31 and 32 are formed with pairs of clearance apertures 33 and 34, Fig. 5, coaxial with each other. The front apertures 33 are sufficiently large to provide a clearance space for the rods 24 and 24a of approximately  $\frac{1}{16}$ " or  $\frac{3}{32}$ " when the vibratory members are supported substantially concentric of the apertures 33.

The vibratory members 24 and 24a are supported at points thereon intermediate their ends from the front flange 31. For this to be carried out, opposite sides of the members 24 and 24a, midway of their ends, are each formed with narrow slots 36, Fig. 5. On either side of the respective apertures 33 the flange 31 is formed with a pair of spaced-apart, rectangular apertures 37 through which a pair of ears 38 of a U-shaped anchor member 39 extend. On the outside of the flange 31 the ears 38 are each formed with a small bore 41 large enough to receive a wire 42, one of which passes through those ears 38 upwardly of the vibratory members 24 and 24a, while a second wire 42 passes through those ears 38 which are downwardly of the members 24 and 24a. The wires 42 are of fine gauge resilient steel piano wire of about .012" diameter. Both of the wires 42 are received in the slots 36 and are deflected away from each other, within their elastic limit, by the members 24 and 24a, which are thus pinched between the wires. The consequent slight bowing of the wires 42 away from each other has a tendency to bias the vibratory members to points centrally of the apertures 33. Additionally, a suitable adhesive may be applied to the wires, at the ears 38, to resist any tendency of the wires to be displaced longitudinally. Thus resiliently supported from the carrier 27, the vibratory members are otherwise freely supported spaced from the rear flange 32.

The vibratory members 24 and 24a are vibrated by striking them on their ends adjacent the apertures 34. This is carried out by a striker mechanism 43, one of which is associated with each of the members 24, 24a, etc. Each striker mechanism is formed from sheet metal and includes a striker or head portion 44 of L-shaped formation, having an upright section 46 and a base section 47, from which a slider section 48 of reduced width, continues. Each of the slider sections 48 is slidably journaled in an aperture or bearing 49, in the rear flange 32 and received for sliding movement in a notch 51 in the front

flange 31. By the difference in width between the slider section 48 and head 44, shoulders 52 are provided on the base section 47. The striker mechanism is biased toward the left or toward the vibratory member by a spring 53. The spring has one end anchored to the anchor member 39, thereby drawing the wires 42 against the front flange 31, and the other end anchored to the slider section 48 to both normally bias the slider into seated relation to the notch 51, owing to the obliquity of force exerted by the spring on the slider, and to bias the shoulders 52 into engagement with the rear flange 32. In this position a striker 54, associated with the upright section 46, is substantially co-axial with the aperture 34, yet spaced slightly from one end of the vibratory member 24a. Even though the respective spaces between the members 24 and 24a and flange 32 vary, the normal spacing between the strikers 54 and vibratory members is uniform. This feature is effected by supporting each of the strikers 54 from a leaf striker spring 56 by a neck 55, each neck differing in length. Each of the springs 56, in turn, is fixed to the upright section 46. The striker spring 56 is apertured as indicated at 57, Fig. 6, to increase its yieldability. And the upright section 46 is cut away at 58 to provide clearance for movement of the striker 54 axially thereof, against the resistance of the striker spring. When the striker mechanism 43 is forcibly moved to the right, against resistance of the motive spring 53, and then released, the spring returns the slider to its normal position with a snap. In this operation inertia is acquired by the striker which is adequate to carry said striker beyond its normal position so that it engages the vibratory member 24 with impact, thereby generating vibrations in said member which are above the audible range and which are emitted through the grille 13. Owing to the uniform normal spacing between the vibratory members and strikers, occasioned by the necks 55, the length of the return stroke of all the strikers 54 is uniform, resulting in uniformity of impact of the strikers with the vibratory members 24 and 24a. After striking the member 24 the striker is returned to its normal position by the striker spring 56.

By moving one of the triggers 14 from its normal position, Fig. 2, to a depressed position thereof, Fig. 3, the striker mechanism 43 is moved away from its normal position. This is achieved by the medium of a trigger bracket or plate 61 carried on the top of the central section 28. The trigger bracket 61 may also be of sheet metal, the formation of which is rectangular. At the left, it extends over the vibratory members 24 and 24a where it is divided by a slot 62 to provide a pair of tongues 63, each of which is formed with an offset or stirrup 64, in oblique relation to the central section 28, and a toe portion 66.

Each of the triggers 14 is formed with a transverse slot 67, Fig. 3, into which one of the toes 66 extends. Between its inner edge and the slot 67 the trigger is provided with a saddle portion 68 of width adapted to be accommodated by the stirrup 64, and into abutting engagement with which the saddle is biased by a leaf spring 69 fixed to the top of the trigger bracket 61, the spring being preferably formed with a downward bent end 71 engaging with the top of the saddle. Since the stirrup 64 is oblique relative to the top of frame 26, the trigger 14 is normally retained in oblique relationship to the top wall 16 of the casing 12, as illustrated best in Fig. 2.

The saddle 68 is retained against displacement transversely of the stirrup 64 by a flange 72, Fig. 4, extending downward from one side of the saddle and a trigger arm 73 extending downward from the opposite side of the saddle. The trigger arm 73 is bifurcated at the lower end to provide a dampening arm 70 and a contactor arm 74 having a toe portion 76. Normally, the toe portion may be spaced slightly from the left end of the slider section

48 and at this time extends to a level below that of the slider section. When, however, the trigger 14 is depressed, the toe portion 76 moves to the right into pressure engagement with the end of the slider 48, against the force of the spring 53. The course of the toe portion 76, being arcuate, extends to a point above the slider. Therefore, it will be apparent that as the toe portion reaches the level of the top of the slider 48, as the trigger 14 is depressed, the slider will be released from the arm 74, whereupon said slider is returned to its normal position by the spring 53. During the return motion of the slider 48, the contactor arm 74 may also be returning to its normal position involving downward pressure exerted thereby on the top of the slider tending to unseat it from its position at the top of notch 51. This may take place freely due to the resiliency of the motive spring, thereby providing binding resistance of the parts to return to their normal positions. Also, during its return motion, the slider 48 may be unseated by a heel portion 77 of the contactor arm without detriment to the backward motion of the slider for operation of the vibratory member 24. As the slider is depressed it is, of course, swung slightly about its bearing 49 in the rear flange 32.

If desired, the contactor arm 74 may be bent laterally slightly to extend under the member 24, as indicated at 78 in Fig. 4, in order that triggering force of the contactor arm 74 may be applied more centrally thereof of the end of the slider 48.

Dampening means, in connection with the trigger mechanism, is provided for cooperation with the vibratory member 24 on the return stroke of the trigger 14. The dampening means includes a resilient arm 79 extending laterally of the dampening arm 70. Preferably the resilient arm 79 is provided by a length of music wire passing transversely of the lower end of the dampening arm 70 on the outside of which the wire extends upward and is twisted around a rivet 81 as anchorage for the wire. On the opposite side of the dampening arm 70, the arm 79 bears a cushioning element or sleeve 82, confined between the arm 70 and a laterally-bent end section 83 of the arm 79. The cushioning element 82 is preferably formed of some yieldable material, such as rubber or other flexible plastic. The element 82 extends under the vibratory member 24, with which it normally has pressure engagement at a point thereon remote from its point of suspension. As the trigger 14 is depressed, however, the sleeve 82 is carried out of engagement with the member 24. This enables the vibratory member to be operated by the striker 54, involving an operation which takes place before the trigger 14 and sleeve 82 are returned to their normal positions by the spring 69. Return of the yieldable element 82 to cooperative engagement with the vibrating member 24 has been found to dampen the vibrations of the member.

Having thus described my invention in an embodiment thereof, I am aware that numerous and extensive departures may be made therefrom without departing from the spirit of the invention as defined in the appended claim.

I claim:

A striking mechanism for striking a sonic transmitter comprising, a manually held casing having a front end and a rear end, a base mounted in said casing, a movable carrier slidably mounted on said base for longitudinal movement relative to said casing, a striker resiliently mounted in juxtaposition to said rear end and operatively associated with said carrier for actuation thereby, a finger actuable trigger pivotally mounted on said base near said front end of said casing to present a finger-engaging portion which automatically directs the manually held casing in a desired frontal direction, said finger-engaging portion being located in a position on said casing such that comfortable and secure manual retention of said casing is obtained during operation thereof, said trigger

having an arm engageable with said carrier to translate manual pivotal actuation of said trigger to longitudinal movement of said carrier, and a spring mounted between said base and said carrier for biasing said carrier toward said front end and against said arm, said arm engageable with said carrier to move said carrier in response to manual actuation of said trigger through a predetermined distance towards said rear end until said arm disengages from said carrier to release said striker.

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