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R. E. DE COLA ET AL

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SONIC WAVE GENERATOR

Filed July 5, 1957

2 Sheets-Sheet 1

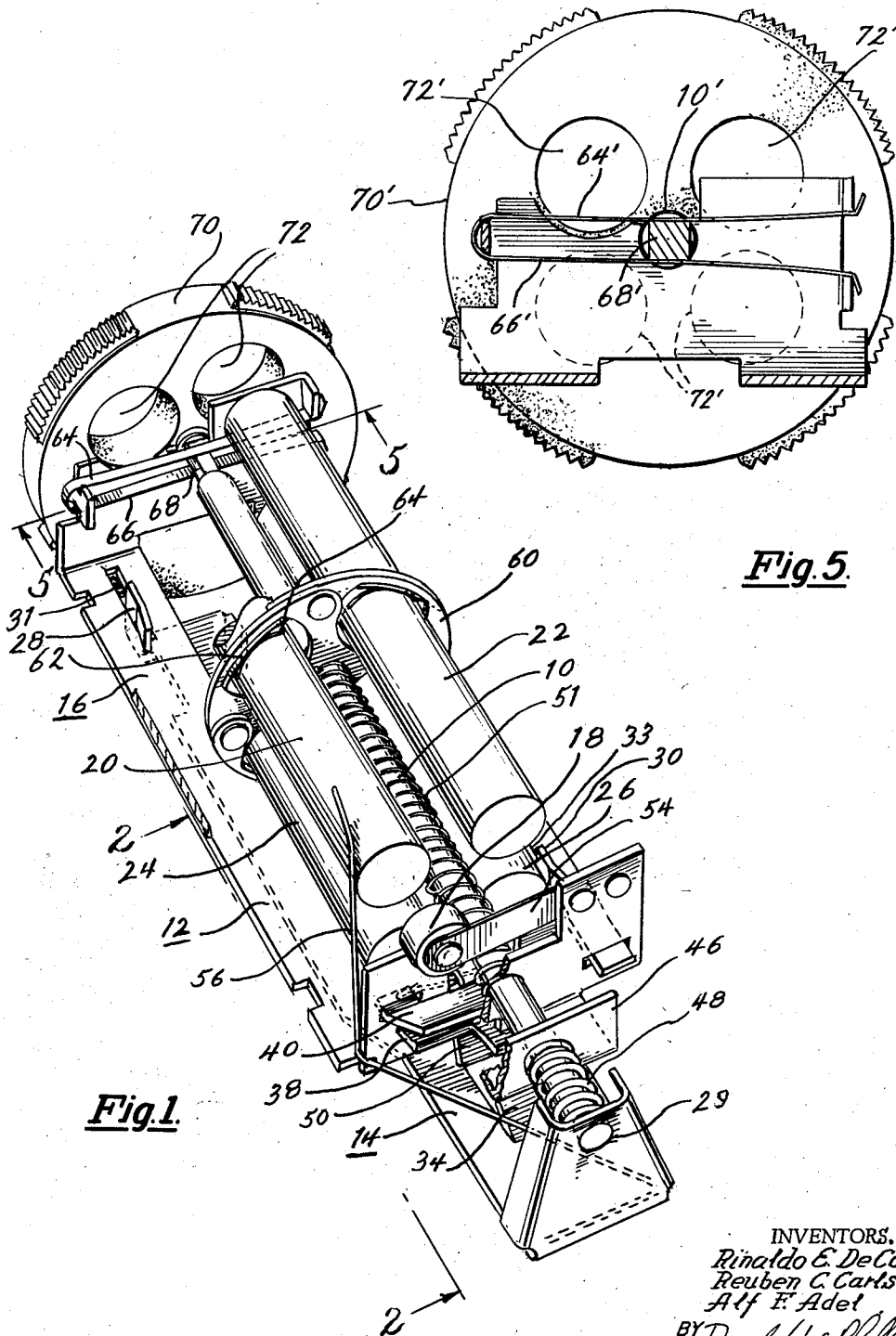


Fig. 5.

Fig. 1.

INVENTORS,
Rinaldo E. DeCola
Reuben C. Carlson
Alf E. Adet
BY *Donald W. Phillion*
ATTORNEY

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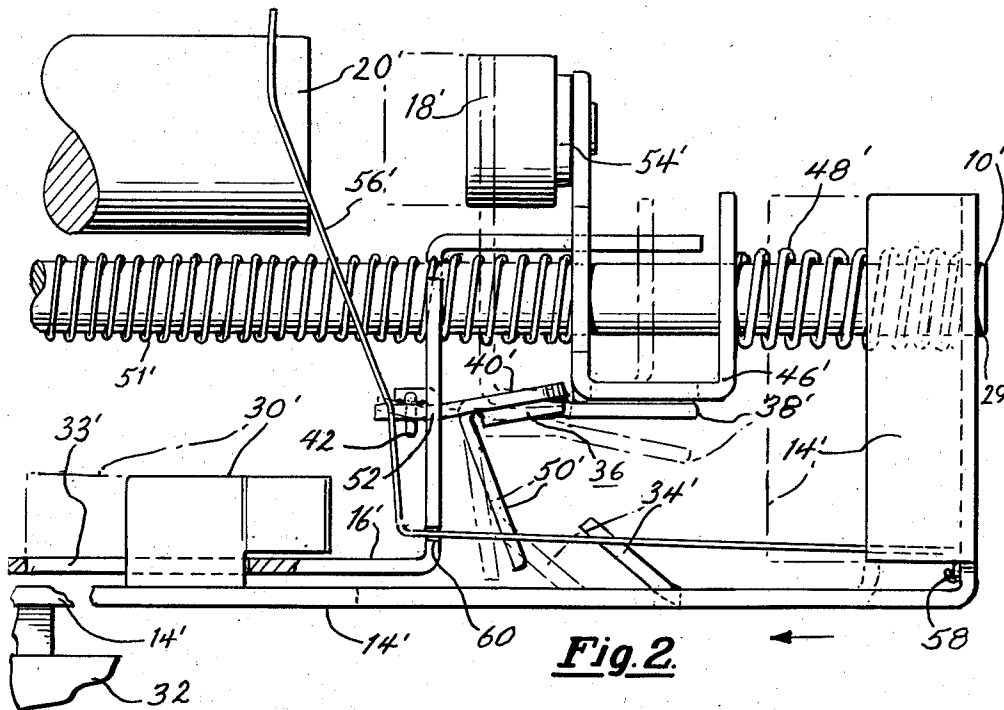


Fig. 2.

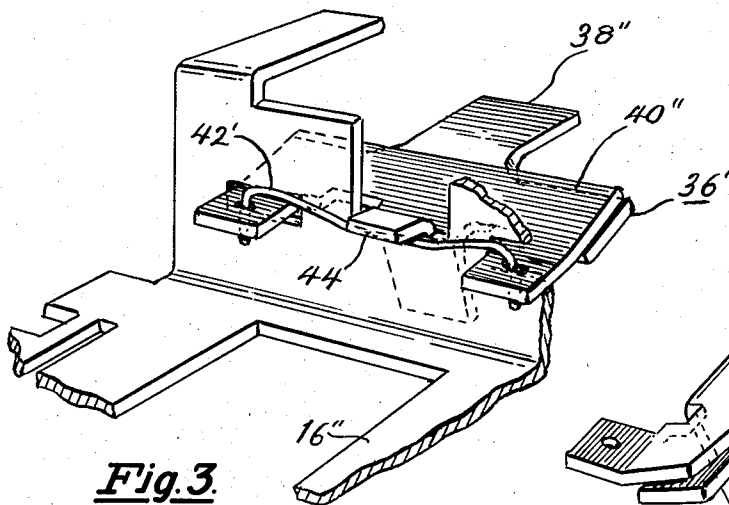


Fig. 3.

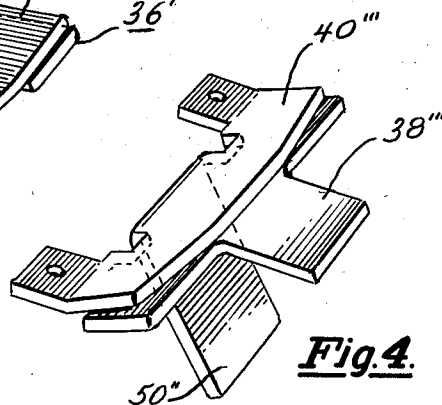


Fig. 4.

INVENTORS.
Rinaldo E. De Cola
Reuben C. Carlson
Alf F. Adel
BY *Donald W. Phillion*
ATTORNEY

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SONIC WAVE GENERATOR

Rinaldo E. De Cola, Parkridge, Reuben C. Carlson, River Grove, and Alf F. Adel, Chicago, Ill., assignors to Admiral Corporation, Chicago, Ill., a corporation of Delaware

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4 Claims. (Cl. 116—137)

This invention relates, generally, to sonic wave generating devices, and more particularly to sonic wave generating devices utilizing a plurality of sonic wave generating rods and a single hammer means which can be employed to strike selectively any of said rods.

Sonic waves can be employed for a number of purposes, including those of control. As examples, garage doors can be opened or closed by apparatus constructed to respond to sonic waves, or the controls of a television receiver can be adjusted from a remote point through the use of sonic waves and apparatus constructed to respond to said sonic waves. Some of these prior art sonic wave generating devices employ more than one sonic wave generating bar. However, these devices employ a separate hammer means for each bar. Such an arrangement is costly and complex. It would mark a definite improvement in the art to provide a sonic wave generator capable of generating a plurality of sonic waves, but employing only a single hammer means.

An object of the invention is to provide a sonic wave generator which utilizes a plurality of sonic wave producing bars, each of which can be energized selectively by a common hammer means.

Another object of the invention is an inexpensive multi-frequency sonic wave generator.

A third object of the invention is a multifrequency sonic wave generator employing but a single hammer means.

A further object of the invention is the improvement of sonic wave generators, generally.

In accordance with the invention, there is provided a supporting structure, a shaft rotatably mounted upon said supporting structure, and means for providing a plurality of discrete angular positions for said shaft. A plurality of sonic wave generating rods are mounted upon said shaft parallel with the axis of said shaft and equidistant from said shaft. Successive ones of said plurality of rods are spaced apart angular distances equal to the angular distances between successive ones of said discrete angular positions of said shaft so that as the shaft is rotated successive ones of the rods will assume a particular angular position. Hammer means is provided to strike the rod which has been rotated to said particular angular position.

In accordance with a subcombination of the invention, the means which determines the discrete angular position of the shaft comprises two spring elements which are mounted so as to apply pressure on opposite sides of said shaft, which passes therebetween. The portion of the shaft between the two spring elements has a cross-sectional shape which will cooperate with said spring elements to provide the desired number of discrete angular positions. For example, if four angular positions are desired, the cross-sectional shape of the shaft can be square; if six positions are desired, the cross-sectional shape can be hexagonal.

In accordance with another subcombination of the in-

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vention, the supporting structure comprises a first section and a second section slidably engaged with each other along a line of motion parallel to the axis of said shaft. One end of said shaft is supported in said first section and the other end is slidably supported in said second section. The said hammer means is mounted on a bracket, which in turn is slidably mounted on said shaft. As the two sections are slid together, the bracket is forced towards said rods through spring means. An escape mechanism mounted in said first section is constructed to block the path of said bracket and thus build up a static force in said spring means. When the two sections are slid together far enough a tab positioned on said second section will actuate said escape mechanism, thus releasing said bracket and permitting said hammer to strike a rod.

The above-mentioned, and other objects and features of the invention will be more fully understood from the following detailed description thereof, when read in conjunction with the drawings, in which:

Fig. 1 is a perspective view of the invention with parts thereof broken away;

Fig. 2 is a plan view of the structure of Fig. 1, taken along the line 2—2.

Fig. 3 is a detailed perspective view of the escape mechanism associated with the hammer means;

Fig. 4 is another detailed perspective view of a portion of the said escape mechanism; and

Fig. 5 is a plan view of the structure of Fig. 1, taken along the line 5—5.

Referring now to Fig. 1, the rotatable shaft 10 is mounted upon the frame 12, which consists of two sections 14 and 16, which are so constructed that the section 14 can slide in towards the section 16 along a line of motion parallel with the axis of the shaft 10. The function of such sliding action is to cause the hammer 18 to strike the end of one of the sonic wave generating bars 20, 22, 24, or 26. By referring to the structure of Figs. 2, 3, and 4, as well as the structure of Fig. 1, the sliding action can be more fully understood. Elements of Figs. 2, 3, 4, and 5, which correspond to elements of Fig. 1, are identified by the same reference character (although primed in varying degrees in different figures). In Fig. 2, element 14' can be seen to have an aperture 29' therein, in which the shaft 10' is rotatably supported. In Fig. 1 the other end of the frame section 14 can be seen to be slidably secured to the frame section 16 by means of tabs, such as tab 28, which extend through long slots such as slot 31 in the element 16. Since these long slots are aligned parallel with the axis of the shaft 10, the tabs such as tab 28 can move back and forth therein, as the framing section 14 is moved back and forth. Another tab 30 and a slot 33, which perform a function similar to the function of the tab 28 and the slot 31, are also shown in Fig. 1.

Referring now to the structure of Fig. 2, as the section 14' of the supporting structure is moved to the left by means of the button 32, which is fastened securely to said section 14', the tab 34', which is also secured to the structure 14', will come into contact with the escape mechanism 36, which consists of an element 38', an element 40' welded to the element 38' at the point of contact as shown in Fig. 2, and a wire spring 42. The wire spring 42 is more clearly shown in the structure of Fig. 3, wherein it is identified by the primed reference character 42'. From Fig. 3 it can be seen that the ends of the spring 42' fit into apertures provided therefore in the element 40'', and the center portion of the spring 42' fits under the tab 44, which is a part of the framing section 16''. Thus, the escape mechanism 36, shown in Fig. 2, is normally held in the position shown in solid lines. In this position the hammer support bracket

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46', which moves freely along the axis of the shaft 10', will be stopped by the element 40' as the framing section 14' is moved to the left. The helical spring 43' will be compressed so as to produce a static force upon said hammer support 46'. As the framing structure 14' is moved further to the left the tab 34' will come into contact with the tab 50' which is a bent-out portion of the element 40'. Since the escape mechanism 36 is pivoted at the point 52, which is where the escape mechanism passes through the framing structure 16', the element 40' will be forced downward by the action of the tab 34' upon the tab 50', thus releasing the hammer support 46' which will be impelled to the left in Fig. 2 by the force of the compressed spring 48'. It is to be noted that the hammer 18' is secured to the support bracket 46' by means of a flat ribbon-type spring 54'. Now the support bracket 46' will be impelled to the left until it abuts against the framing structure 16'. Due to the inertia of the hammer 18' and the flexibility of the spring 54' the hammer will continue moving to impinge on the end of the sonic wave producing rod 20', which will respond thereto to produce a sonic wave.

The spring wire 56 (in Fig. 1) performs the function of damping the sonic wave generating bars. One end of the spring 56 is secured to the framing structure 14 near portion identified by the reference character 58 (shown in Fig. 2). The spring wire 56 is also supported in a slot 60 (Fig. 2) located in the framing section 16'. When the framing structure 14' is in its at-rest position (i. e. in its rightmost position in Fig. 2) the wire spring 56' will be in physical contact with the rod 20'. As the framing section 14' is moved to the left, the spring wire 56' will be forced away from the rod 20'. This can be seen clearly from the structure of Fig. 1. Once the hammer 18' has struck the rod 20', however, and the framing section 14' has been allowed to resume its normal at-rest position by the action of the spring 51', the spring wire 56' again comes into contact with the rod 20' to damp its oscillations.

In Figs. 3 and 4 there are shown detailed perspective views of the escape mechanism to facilitate a clearer understanding thereof. In the structure shown in Fig. 3, it can be seen how the spring 42' is secured at its ends in the tab-like extensions of the element 40' which protrude through slots provided therefore in the supporting section 16' and how the middle portion of the spring 42' is positioned, under stress, under the tab 44, which is a part of the section 16'. Thus, due to action of the wire spring 42', the element 38' is forced in an upward direction so that it rests against the bracket 46 (see Fig. 1).

The structure shown in Fig. 4 more clearly shows the construction of the elements 38''' and 40'''.

Returning again to the structure of Fig. 1, the four sonic wave generating bars 20, 22, 24, and 26 are each mounted at their axial midpoints in the mounting structure 60. Such mounting is effected by spring wires, such as, for example, the spring wire 62, which fits into a slot, such as, for example, the slot 64 formed in the rod 20. A similar spring wire and slot exist on the other side of the rod 20.

The shaft 10 has four discrete angular positions spaced so that each of the rods 20, 22, 24 and 26 can be positioned selectively in front of the hammer 18. These four discrete angular positions are determined by the two flat, ribbon-shaped springs 64 and 66, and the cross-sectional shape of the portion 68 of the shaft 10, where it passes between said flat springs 64 and 66. It will be observed that the aforementioned cross-sectional shape is square. The flat springs 64 and 66 press against this portion of the shaft 10 so that said shaft will have four discrete positions. Thus, each of the four rods 20, 22, 24, and 26 can be successively positioned in front of the hammer 18. Obviously, if the cross-sectional shape of the portion of the shaft under discussion is hexagonal, the shaft will have six discrete positions.

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In Fig. 5 there is shown in detail the flat, ribbon-shaped springs 64' and 66' and the rectangularly shaped cross-section portion 68' of the shaft 10'.

The shaft 10 is mounted securely in the center of the control disc 70 so that said control disc can be employed to position selectively any of the four rods 20, 22, 24, or 26 in front of the hammer 18. Apertures 72 are provided in the control disc 70 to permit free egress of the generated sonic waves.

It is to be noted that the form of the invention herein shown and described is but a preferred embodiment of the same and that various changes can be made in the design thereof without departing from the spirit or scope of the invention.

We claim:

1. A supporting structure, a shaft rotatably mounted upon said supporting structure, shaft positioning means operatively associated with said supporting structure and said shaft to provide a plurality of discrete angular positions for said shaft, a plurality of sonic wave generating rods mounted upon said shaft parallel with the axis of said shaft and equidistant from said shaft, successive ones of said plurality of rods being positioned from the preceding rod angular distances which are equal, respectively, to the angular distances between successive ones of said discrete angular positions of said shaft so that each successive rod will assume the same angular position with respect to the supporting structure as the preceding rod as the shaft is rotated through its various discrete positions, single hammer means operatively disposed relative to the particular rod in juxtaposition thereto, and means operable to strike said hammer means against said particular rod.

2. A supporting structure, a shaft rotatably mounted upon said supporting structure and having a plurality of discrete angular positions, a plurality of sonic wave generating bars, means for supporting said plurality of bars upon said shaft parallel with the axis of said shaft and spaced equidistant from said shaft, said bars further being spaced so that each of said bars will successively occupy the same preselected angular position as the shaft is rotated through its plurality of discrete angular positions, single hammer means mounted on said supporting structure for striking a bar when said bar is in said preselected angular position, and means operable for causing said hammer means to strike said bar in said preselected angular position.

3. In a sonic wave generator for generating a plurality of predetermined frequency signals, a supporting structure, a shaft rotatably mounted upon said supporting structure, a mounting structure affixed to said shaft, a plurality of sonic wave generating rods, each of said rods responsive to an energizing blow to vibrate at one frequency thereby generating one of said signals, said rods mounted on said mounting structure substantially parallel to and equidistant from the axis of said shaft and each other, shaft positioning means on said supporting structure for positioning said shaft in predetermined discrete angular positions which are spaced apart an angular distance equal to the angular distance between any two rods of said plurality of rods with respect to said shaft, single hammer means mounted in juxtaposition to a selected one of said rods for providing an energizing blow thereto, and control means on said shaft for rotating said shaft and said mounting structure to variably select one of said rods for juxtaposition with said single hammer means.

4. Structure in accordance with claim 3 in which said supporting structure comprises a first section and a second section slidably engaged with each other along a line of motion parallel to the axis of said shaft, one end of said shaft being mounted in said first section and the other end of said shaft being mounted in said second section, and in which said single hammer means include bracket means slidably supported upon said shaft, a hammer mounted upon said bracket means, a helical spring slid-

ably mounted around said shaft between said bracket means and said second section, said helical spring responsive to a sliding together of said first and second sections to exert a force against said bracket means tending to cause said bracket means to move towards said sonic wave generating rods, escape mechanism means pivotally mounted on said first section to block the path of motion of said bracket means, and trigger means secured to said second section to actuate said escape mechanism means to release said bracket means when said first and second

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sections are slid together a predetermined distance thereby striking said hammer against the juxtapositioned rod.

References Cited in the file of this patent

UNITED STATES PATENTS

1,912,418	Vehling et al. -----	June 6, 1933
1,930,029	Alden -----	Oct. 10, 1933
2,728,902	White -----	Dec. 27, 1955
2,821,954	Adler -----	Feb. 4, 1958
2,821,956	Wold -----	Feb. 4, 1958