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3,094,972

SOUND PRODUCING DEVICE

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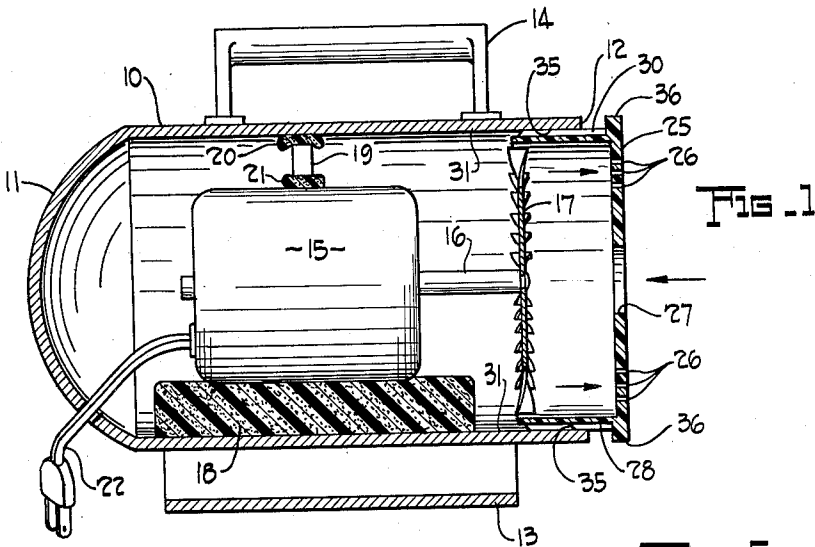


FIG. 1

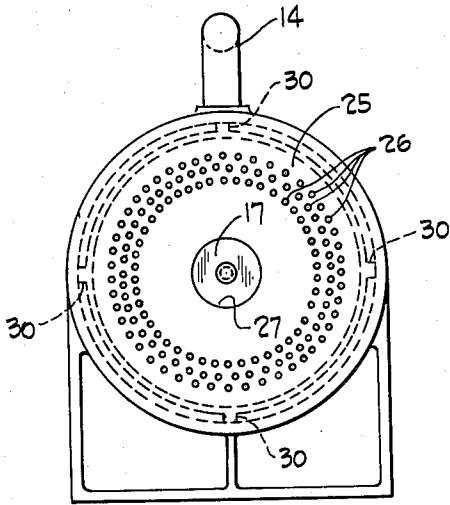


FIG. 2

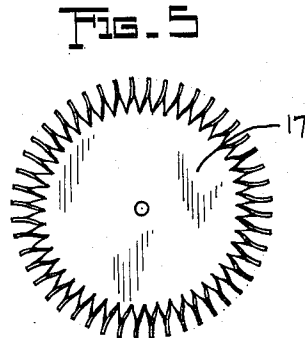


FIG. 3

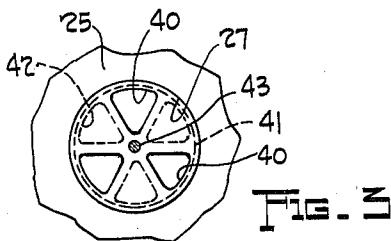


FIG. 4

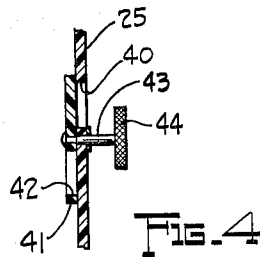


FIG. 5

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SOUND PRODUCING DEVICE
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This invention relates to devices for producing sound and more particularly to a device in which the character of the sound produced may be regulated.

Noises, especially the confused mixture of sounds arising from city traffic, the office or various nocturnal sounds such as the barking of dogs may be generally classified as disturbing sounds. While various means have been employed to minimize these sounds, these have usually been at the expense of fresh air or air circulation occasioned by closing doors and windows in effort to obliterate the sound. In my Patent 2,711,165 I have provided one means by which to mask such disturbing sounds substituting therefor or superimposing thereon a sound which is not disturbing, that is one which is not displeasing to the ear yet of a quality sufficient to exclude or mask extraneous noises which are harsh and irritating. The present invention is an improvement on the device described and claimed in my aforementioned patent.

This invention will be better understood by reference to the annexed drawings which are illustrative of one embodiment of my improved device, and wherein:

FIG. 1 is a cross-sectional view of one form of appliance embodying the principles of this invention.

FIG. 2 is a front elevation of the device shown in FIG. 1.

FIG. 3 is a fragmentary front view on a reduced scale of an alternative form of barrier.

FIG. 4 is a diametrical cross-sectional view of the barrier shown in FIG. 3 additionally showing means for adjusting the opening through the barrier.

FIG. 5 shows one form of impeller that can be employed in accordance herewith.

Briefly stated, this invention is in the provision of a sound producing device having a housing which is closed at one end and open at the other. A fan or other air impelling device is disposed within the housing for creating a flowing air stream. Disposed in the path of the air stream at the open end of said housing is a barrier having myriad openings peripherally disposed therethrough through which at least a portion of the air stream is directed and by means of which a major portion of the sound is created. Because the housing is otherwise substantially closed with the exception hereinafter noted, air inlet means are provided centrally of the barrier. In order to modulate or control the nature of the sound produced by the device, there may be provided two instrumentalities, the first of which is means for adjusting the distance between the barrier and the air stream producing device, which may be a fan or an air impeller, or the like, and secondly, the provision of air passages associated with the housing, the size of which may be varied in order to regulate the flow of air therethrough. These latter two means may be separately, or simultaneously adjustable as may be desired, and sound adjusting means may be provided to regulate the volume of air through the inlet centrally disposed in the barrier.

Referring now more particularly to FIG. 1, there is here provided housing 10 which in the preferred embodiment here shown may be formed of sheet metal in the form of a tube. Any geometric cross-section may, of course, be used; and instead of metal, plastic or any other substantially rigid material adapted for the purpose may be employed. One end of said housing 10 is closed as by cap 11, the opposite end 12 being open. The housing

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may be provided with a suitable base 13 and, optionally, a handle 14 for portability. Mounted within the housing is an electric motor 15 on the shaft 16 of which is conveniently mounted an air impeller or fan 17 adapted to create an air stream, preferably flowing outwardly in the direction of the arrows in the region of periphery of the blades. In order to minimize extraneous noises due to the electric motor it is convenient to mount the latter on a sponge rubber pad 18. Stop 19 having rubber pads 20 and 21 thereon may be used to retain the motor in said housing. Any suitable motor retaining means may be employed. A suitable electrical connection 22 is provided to operate the motor 15. A small fractional horsepower electric motor of the type used to operate automotive defroster fans, or light duty household fans may be used. While these don't ordinarily require cooling in excess of that available in the preferred embodiment shown in FIG. 1, cooling means, or vents may be employed in the housing 10, if desired.

The open end 12 of the housing 10 is closed with a barrier 25 which may be conveniently cast from a plastic material, or shaped from metal as desired. Barrier 25 is provided with myriad openings 26 peripherally disposed therein, through which the air stream generated by the impeller 17 passes. Although it is not necessary, barrier 25 may have a duplicate rotatable disc co-axially mounted therewith to control the area of the openings 26 from fully open to fully closed. The air which exits through the myriad openings 26, enters the device through the centrally disposed opening 27 which, as indicated above may include throttling means hereinafter more particularly described in connection with FIGS. 3 and 4. Barrier 25 is provided with a peripheral flange 28 which is adapted to be telescopically received by the housing 10 in the open end 12 thereof. While any suitable means for retaining the barrier 25 within the housing 10 may be employed, there is shown in FIGS. 1 and 2 a preferred means for such retention formed from a plurality of longitudinally extending ribs 30 attached to said peripheral flange and adapted to frictionally engage in inner surface 31 of the housing 10.

When the barrier 25 is in position, such as shown in FIG. 1, the peripheral flange 28, the ribs 30 and the inner surface 31 of the housing 10 coact to define air passages through which air may be passed either into or out of the system as the conditions of the system demand. For example, if the air intake 27 is insufficient to provide the total amount of air exhausted through ports 26 by the impeller 17, air will be drawn in through the air passages 35. This circumstance will create one sound characteristic. Alternatively, if the power applied to the air impeller 17 in conjunction with the air inlet 27 is such as to provide greater volume of air than can be exhausted by the openings 26, the excess air will be exhausted through the modulating passages 35. Radially extending flange 36 on barrier 25 coacts with the opening 12 of housing 10 to regulate the air flow through modulating passages 35 and thereby effect control on the sound generated by the device.

Axially movement of the baffle 25 in the simplified form shown in FIG. 1 may be effected simply by twisting the frictionally retained baffle and compressing, or tensioning the ports 10 and 25 to effect axial movement thereof. Obviously, more elaborate means for axial displacement of the barrier 25 may be employed, although this merely serves to increase the cost of the device without substantially affecting the operation thereof.

FIGS. 3 and 4 shows in fragmentary form one means of throttling the air flow through inlet 27. A device familiarly recognized as the same mechanism used in throttling air for admixture with gas in a conventional gas stove burner may be employed. This is composed of 3 open-

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ings which are segments of a circle 40 of substantially equilateral configuration disposed 120° apart, and a coacting rotatable plate 41 containing similar openings also disposed at 120° apart in said plate 41. The openings 42 may be brought into registry with the openings 40 by rotation of the plate 41 about the axis 43. Rotation of the plate 41 to adjust the registry of the openings 42 with the openings 40 in barrier 25 may be effected by any suitable means such as a knurled knob 44, the adjustment being in the range of from fully open to fully closed.

In operation, then, the apparatus of this invention may be used to mask or otherwise obliterate objectionable sounds. By moving the barrier 26 close to the impeller 17, a more shrill sound is produced which being caused by the movement of air relatively low power through peripheral openings 26 is nevertheless of a non-disturbing sound but of sufficient intensity to mask disturbing sounds. If the barrier 25 is moved away from the impeller 17, the modulating ports 35 are opened more fully, and the sound is considerably softened. Thus means have been provided for adjusting the nature of sound produced by air flowing through myriad openings to predetermined levels and pitch of a substantially non-disturbing type, which sound is effective to mask or substantially obliterate noises due to traffic, office, nocturnal sounds, etc. These devices may be used in the bedrooms of infants, and it has been found that sleep is less easily disturbed by extraneous noises with the device in operation than otherwise.

Other modes of applying the principle of this invention may be employed instead of those specifically set forth above, changes being made as regards the details herein disclosed provided the elements set forth in any of the following claims, or the equivalent of such be employed.

It is, therefore, particularly pointed out and distinctly claimed as the invention:

1. A low level, non-disturbing sound producing device comprising in combination a housing closed at one end and open at the other, means disposed within said housing for creating an air stream, barrier means adjustably disposed in the path of said air stream at the open end of said housing for axial movement with respect to said housing and having myriad openings peripherally disposed in said barrier through which at least a portion of said air stream is caused to pass, said barrier having air inlet means centrally disposed therein, and means coacting between said housing and said barrier for modulating the sound.

2. A sound producing device in accordance with claim 1 in which the barrier is telescopically disposed in the open end of said housing for axial movement.

3. A sound producing device in accordance with claim 1 in which the barrier is provided with a peripheral flange adapted to be telescopically received in said housing.

4. A sound producing device in accordance with claim 3 in which the peripheral flange is spaced from the housing and is provided with a plurality of housing engaging ribs disposed thereon, said ribs coacting with said hous-

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ing and said peripheral flange to define a plurality of air passages.

5. A sound producing device in accordance with claim 4 in which the means coacting between said housing and said barrier for modulating the sound comprises means for regulating the volume of air flowing through said air passages.

6. A sound producing device in accordance with claim 1 in which the air stream creating means is a multibladed air impeller.

7. A sound producing device in accordance with claim 1 in which the means coacting between said housing and said barrier for modulating the sound includes a plurality of air passages and means for regulating the volume of air flowing therethrough.

8. A sound producing device comprising in combination a tubular housing closed at one end and open at the other, an air impeller disposed within said housing for creating an air stream, a barrier plate adjustably disposed in the path of said air stream at the open end of said housing and having myriad holes peripherally disposed in said barrier through which at least a portion of said air stream is caused to pass, said barrier having an air intake centrally disposed therein, a peripheral flange extending from the periphery of said barrier and adapted to be telescopically received in said tubular housing, a plurality of longitudinally disposed ribs on the surface of said flange frictionally engaging the inner surface of said tubular housing and coacting therewith to define a plurality of air passages, and a peripheral shoulder radially extending with respect to said flange and coacting with said housing for regulating the volume of air flowing through said air passages.

9. A sound producing device comprising in combination a tubular housing closed at one end and open at the other, an air impeller disposed within said housing for creating an air stream, a barrier plate adjustably disposed in the path of said air stream at the open end of said housing and having myriad holes peripherally disposed in said barrier through which at least a portion of said air stream is caused to pass, said barrier having an air intake centrally disposed therein, means for regulating the volume of air flow through said air intake, a peripheral flange extending from the periphery of said barrier and adapted to be telescopically received in said tubular housing, a plurality of longitudinally disposed ribs on the surface of said flange frictionally engaging the inner surface of said tubular housing and coacting therewith to define a plurality of air passages, and a peripheral shoulder radially extending with respect to said flange and coacting with said housing for regulating the volume of air flowing through said air passages.

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