N° 5.

"Lighting Fixture incorporating Electrokinetic Precipitation and Loudspeaker Apparatus"

Docket No. 8319

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"Lighting Fixture Incorporating
Electrokinetic Precipitation and Loudspeaker Apparatus"

COMMENTS:

1) Invention relates to the combination of lighting fixture and electrogasdynamic apparatus for precipitation of smoke, pollen and dirt.

2) Invention relates to the combination of lighting fixture and electrogasdynamic loudspeaker.

This application is intended to cover lighting fixtures in general but, for sake of clarity, ceiling fixtures are specifically referred to. In the same way, the application may cover incandescent lighting although fluorescent lighting fixtures are referred to in the drawings.

This application, so far as the structure of the self-propelling electrostatic precipitator is concerned, relates to the applicant's U.S. Patent No. 2,949,550 and two co-pending applications, Docket Nos. 8318 and 8308. Precipitators may have two or three principal electrodes, any or all of which may be removable for cleaning or replacement.

Precipitation louvres are removable for cleaning or are disposable. Inexpensive paper or plastic plates are utilized. These plates are metallized or made electrically-conductive except for the handle.

This application also relates to the applicant's U.S. Patent No. 3,018,394 "Electrokinetic Transducer" insofar as the production of sound is concerned. Lighting fixtures serving also as loudspeakers would appear to be useful in large offices or factories for "wired music" or voice annunciation.

Four-tube fluorescent fixtures are indicated in the following drawing. The lamp base housing is slightly enlarged to provide for the electrokinetic elements. Air is drawn into the housing on one side (or at the bottom) and clean air vented out the opposite side.

This invention, therefore, features a combination (fluorescent tube) lighting fixture with base housing containing electrostatic precipitation apparatus with removable, washable or disposable collector plates.

The invention further features precipitation apparatus which can be electrokinetically modulated so as to serve as an electro-acoustic transducer or loudspeaker.

In general, it is the object of the invention to provide a lighting fixture, especially a ceiling fixture for use in offices or commercial or industrial applications, where it is desirable to provide smoke-free air and music or annunciator capability along with overhead lighting. An advantage results from the fact that both the precipitator and loudspeaker are operative only when the light is on.

Again, Mr. Kovelman, this is not an easy type of patent application for me to write. There is nothing technically basic about it. Its value as a patent seems (to me) to reside largely in its immediate commercial application as a combination unit. Undoubtedly there are many manufacturers of commercial fluorescent lighting fixtures who would be interested in manufacturing and marketing this combination device.

A patent application separate and distinct from my other patents would be helpful in defining the scope of a license.

Referring to the attached drawings:

Fig. 1 is a circuit diagram of the simplest form of a speaker-precipitator.

Fig. 2 is a similar circuit diagram producing a two-directional air-flow pattern.

Fig. 3 is a cross-section of a lighting fixture employing the circuit set forth in Fig. 1.

Fig. 4 is a cross-section of a similar lighting fixture using the circuit set forth in Fig. 2.

Fig. 5 is a perspective view of a typical commercial lighting fixture showing fluorescent lamps in a housing containing the precipitator-transducer elements and power supply.

Referring in detail to the attached drawings:

Fig. 1 shows louvres (1) which may or may not have adjustable angles, and which (preferably) have a streamlined, slightly curved form with rounded leading edge (as indicated). Ionizer wires (2), made of tungsten, stainless steel or the like, approximately .002" in diameter, are positioned midway between the leading edges of louvres (1), and slightly upstream therefrom, this distance being a function of the high voltage applied therebetween. Power supply (3) provides DC potential difference between electrodes (1) and (2). Resistor (4) acts as a current-limiting protective device and, at the same time, permits voltage variations of electrode (2) thru capacitor (5) from the secondary of modulation transformer (6). The input signal is applied to the primary of transformer (6).

The potential difference between electrodes (1) and (2) provides a steady flow of air as indicated by the arrows. Suspended particulate matter is precipitated on electrode (1). Variations in the potential between electrodes (1) and (2) generate sound waves which travel outward between the louvres of electrode (1) and outward in the same direction as the air flow.

Fig. 2 illustrates a circuit using a vacuum tube to modulate the signal input. This system consists of louvres (1) and (1a), ionizer wires (2) and (2a) and control grids (7) and (7a). High voltage is provided by power supply (3) with resistor (4) serving as a current limiting device. Modulation signal is provided to the grid of vacuum tube triode (8) and the varying plate potential supplied thru resistor (9) is conducted to control grids (7) and (7a). This circuit is shown in more detail in applicant's co-pending application Docket No. 3308.

Fig. 3 is a cross-section of a lighting fixture with precipitator-speaker installed in the housing thereof. Louvres (1) and electrodes (2) serve the same purpose as in the previous figures. Louvre (10) is located on the inlet side of the device and serves only to (physically) protect electrode (2) without being included in the electrical circuit. Fluorescent lamps (11, 11a, 11b and 11c) are shown attached to the precipitator housing (12). It is to be understood that louvres (1) can be removed for cleaning, or they may be made of a cheap plastic material, metallized for conductivity, which are disposable. To facilitate removing, fastening (13) and detachable hinge (14) permit the entire louvre-section to swing down and be disengaged.

Fig. 4 shows housing (15) with inlet openings (16, 16a and 16b) to permit the flow of air upward into the central chamber of housing (15). Air is propelled outward from highly-charged electrodes (2 and 2a) toward and thru electrically-grounded louvres (17 and 17a) upon which the smoke particles and dirt are precipitated. These louvres are removable for cleaning and/or replacement by disengaging hinges (14a and 14b) in a manner similar to that shown in Fig. 3.

Fig. 5 shows a standard commercial four-lamp fluorescent fixture with housing such as that described in Fig. 4 but with a closed compartment (18) at one end thereof to house power supply and modulation components.

The lighting fixture shown in Fig. 5 merely refers to a popular class of commercial fixtures and in no way is intended to limit the form or scope of the lighting fixtures described herein. It is apparent that the combination of precipitator-speaker and lighting fixture may apply as well to incandescent fixtures for ceiling, wall or even portable applications. While specific details have been referred to for the purpose of imparting a clear understanding of a combination lighting fixture, precipitator-loudspeaker, it is clear that many styles of fixtures may be resorted to without departing from the spirit of the invention as intended to be covered in the following claims.

I claim:

1) The combination in a lighting fixture of a light source and electrokinetic transducer-precipitator elements comprising sets of electrodes of different surface area, means for supplying different electrical potentials to said sets of electrodes and means to modulate said potentials.

2) A lighting fixture containing a light source in combination with electrokinetic apparatus for concurrently cleaning air and serving as a loudspeaker comprising electrodes of different surface area, means for supplying different electrical potentials to said electrodes, means to modulate said potentials and means for removing said electrodes for cleaning.

3) Apparatus according to claim 2 wherein said electrodes may be disposable and replacable.

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ADDENDUM:

Since patentability of a combination depends upon a new and "unexpected" result being achieved by the combination, attention should be given the following technical facts:

1) Photoelectric Effects:

Both the electrostatic precipitator and the electrokinetic loudspeaker (as set forth in the present patent application) depend upon ionization of air. The effectiveness is largely determined by the ionization threshhold of air and this value should be as low as possible. To facilitate ionization at the lowest possible voltage the electrodes are coated with emissive materials, many of which are photoelectric.

The presence, therefore, of an exciting radiation actually increases the emissivity of these coatings and improves the operation of the electrokinetic devices.

In short, both the visible and the near ultra-violet light from the lighting fixture improves the operation of the electrokinetic componets of the combination.

2) Reduction of Ozone:

A further advantage is gained, particularly when using fluorescent lamps, by the action of radiation in the region of 2500 to 2600 Angstroms in decomposing ozone.

This is especially useful in those instances where even a small amount (less than 3 parts per hundred million) of ozone may be objectionable.

In short, the radiation from fluorescent lamps, entering the precipitation chamber thru the air intake ports, serves also to eliminate even the small amount of ozone which may be generated.

It is to be pointed out, therefore, that the combination lighting fixture and electrokinetic precipitator and loudspeaker accomplishes a result which cannot be achieved by the components operating separately. For this reason, the combination appears to have the necessary qualifications for patentability.

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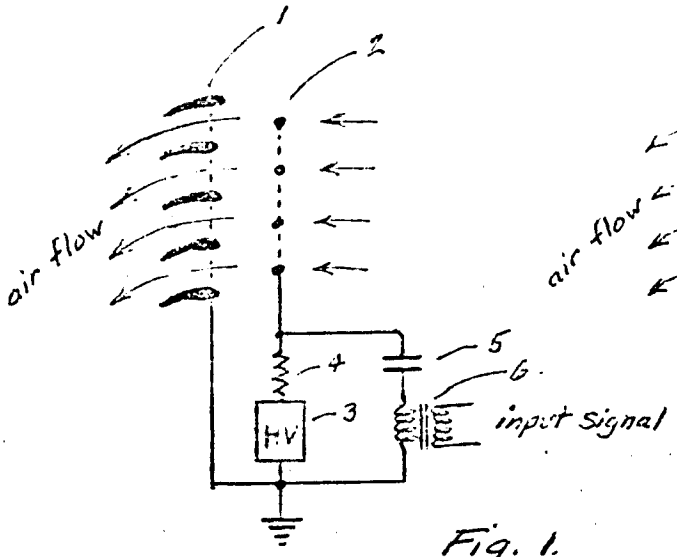

Fig. 1.

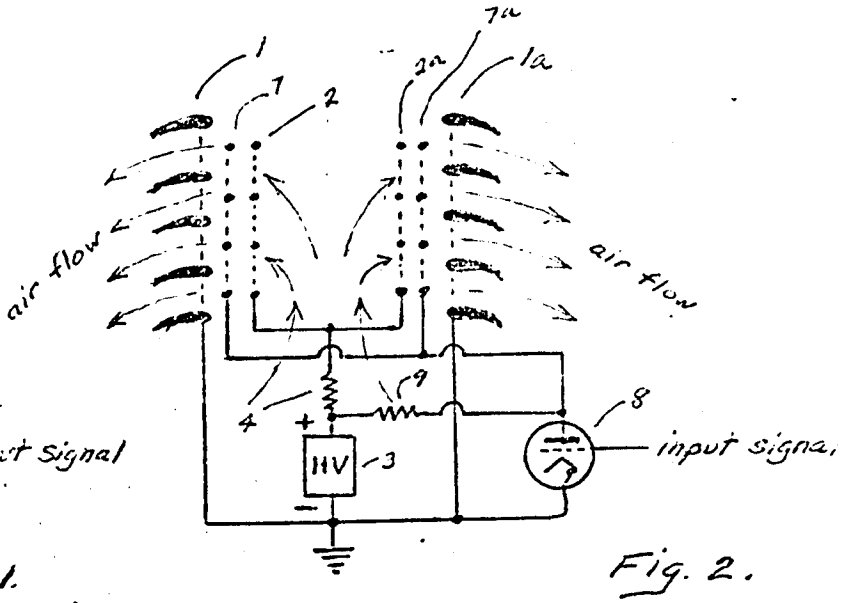

Fig. 2.

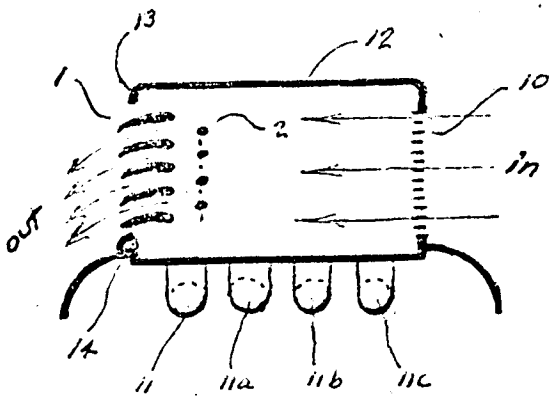

Fig 3.

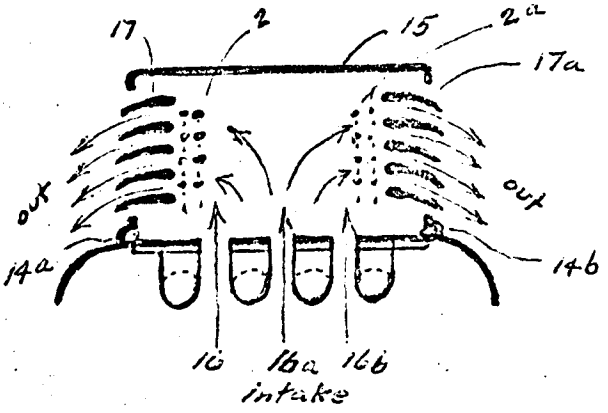

Fig 4.

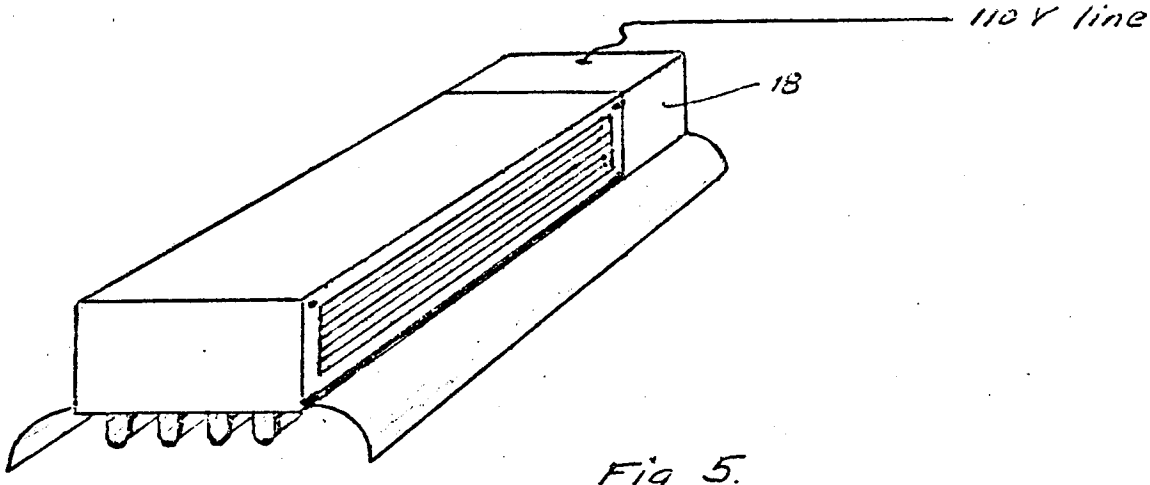

Fig 5.

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