Feb. 26, 1952 G. F. LANDGRAF 2,587,173

ELECTRODE FOR ELECTROSTATIC FILTERS

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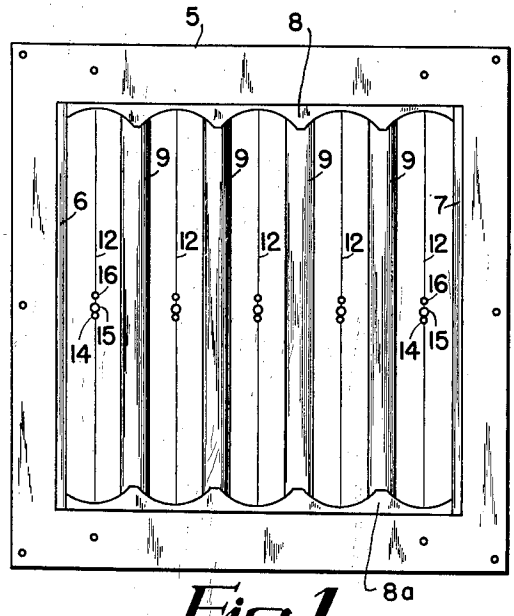


Fig.1

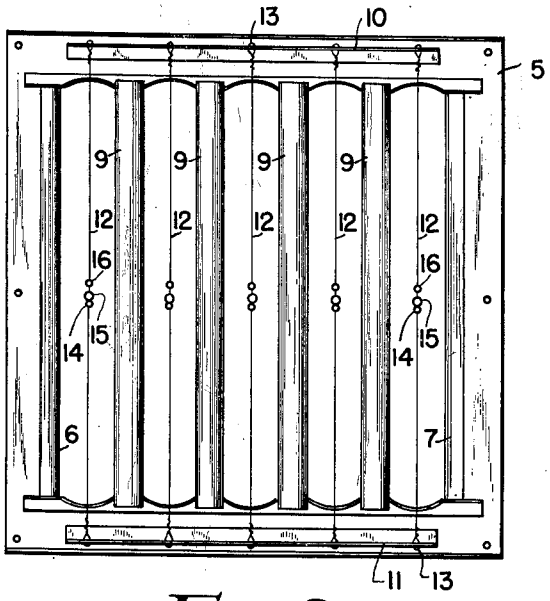


Fig.2

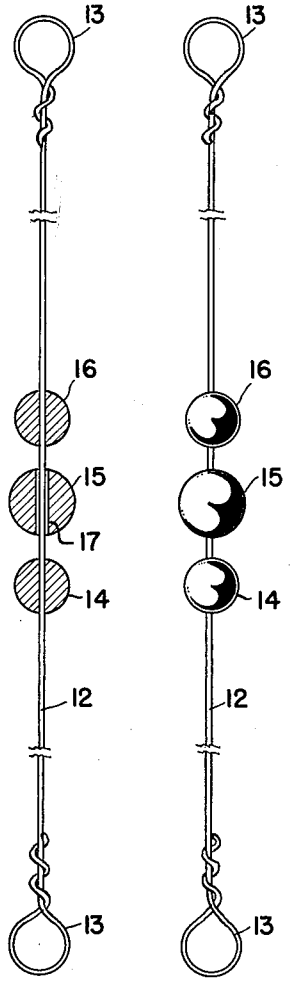


Fig.4

Fig.3

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ELECTRODE FOR ELECTROSTATIC FILTERS

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5 Claims. (Cl. 183—7)

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This application relates to improvements in electrodes for electrostatic filters and particularly to electrodes in electrostatic filters for cleaning air in buildings or homes, which filters employ a thin wire as one of the electrodes for ionizing particles in the air prior to collecting the particles on charged plates. Electrostatic air filters generally comprise two sections or units, first an ionizing unit and second a collecting unit. The ionizing unit comprises a plurality of wires spaced parallel to each other and across the air inlet passage of the filter. The wires are charged at a high potential. Oppositely charged members are spaced between the wires. These members may be extensions of some of the collecting plates of the collecting unit or separately mounted tubes. The collecting unit comprises a series of parallel plates spaced from each other with opposite charges on adjacent plates. Air enters the intake of the filter and first passes through the ionizing unit where particles carried in the air are ionized. The air then passes through the collecting unit and the ionized particles are collected by oppositely charged plates of the collecting unit.

Such electrostatic air filters "howl" in dry weather and at a pitch which is very annoying to occupants of a house or building. It has been found that the howl is caused by vibration of the ionizing wires of the air filter and various attempts have been made to remedy this defect but without success. For example, it has been proposed to rigidly support the ionizing wires at their center points in addition to their ends. This did not prevent the howl; in fact it made the howl worse because each half length of the wire vibrated and thus the pitch of the howl was raised an octave. The rigid supports also created a dead space in the ionizing unit past which air could flow without being ionized.

As will appear hereinafter, I have invented an ionizing wire electrode having means thereon to reduce the lateral vibration of the wire and thereby reduce, if not completely eliminate, the objectionable hum or howl above referred to. My electrode comprises a wire which is similar to ionizing wires heretofore used but which has in addition at least two beads which are threaded onto the wire and held in position adjacent the central portion of the wire when it is mounted in operative position in an air filter. One bead is firmly secured to the wire so that it cannot move relative to the wire. A second bead has a hole extending through it and through which the wire passes. The diameter of this hole is larger

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than the diameter of the ionizing wire so that the bead can move laterally on the wire. When the wire is mounted in the filter, the loosely threaded bead rests on and is supported by the bead which has been firmly secured to the wire.

If the wire vibrates laterally during operation of the filter, it will carry with it the bead which is firmly held to the wire but not the loose bead, unless the amplitude of the vibration is greater than the difference between the diameter of the hole in the bead and the diameter of the wire. Upon vibration of the wire, therefore, a sliding friction will be developed between the contacting surfaces of the two beads. I have found that this friction will absorb the energy of vibration of the wire and thereby damp out the vibration and reduce the tendency of the air filter to howl.

In the accompanying drawings, I have illustrated a present preferred embodiment of my invention, in which—

Figure 1 is a front elevation of an ionizing unit of an electrostatic air filter;

Figure 2 is a rear view of the ionizing unit shown in Figure 1;

Figure 3 is an elevation view of an ionizing wire embodying my invention; and

Figure 4 is a central vertical section through the ionizing wire shown in Figure 3.

Figure 1 shows an ionizing unit of an electrostatic filter having electrodes which embody my invention mounted therein. The ionizing unit is more fully described in my copending application Serial No. 138,355 filed January 13, 1950. The unit comprises a rectangular frame 5 having a rectangular opening therein with side flanges 6 and 7 extending inwardlly from the sides of the rectangular opening. A top flange 8 and a bottom flange 8a extend inwardly from the top and bottom edges of the opening and support tubes 9 which act as one set of electrodes in the ionizing unit. Brackets 10 and 11 are mounted on insulators (not shown) extending from the rear side of the rectangular frame 5 and support ionizing wires 12 which constitute the other set of electrodes in the unit.

Figures 3 and 4 show my electrode on a scale larger than the scale used in Figures 1 and 2. The electrode comprises a suitable length of very fine wire of the type heretofore used in electrostatic filters. The wire has loops 13 at each end to facilitate its mounting in the filter. It can be secured, for example, to the brackets 10 and 11 shown in Figure 2. The wire also has beads 14, 15 and 16 adjacent its central portion, the beads being made of lead or other heavy material. Al-

so, as shown in Figure 4 the beads 14 and 16 are secured to the wire 12. This may be done by pressing the beads onto the wire or by affixing them to the wire by a suitable glue or adhesive or by holder. The bead 15 has a centrally positioned hole 17 which extends through the bead and through which the wire 12 is threaded. The diameter of the hole 17 is considerably greater than the diameter of the wire 12 so that the bead is very loosely threaded onto the wire.

As shown in Figures 1 and 2 the wires are mounted in the electrostatic air filter so that they extend vertically. When they are thus mounted, the bead 15 rests on either the bead 14 or the bead 16 depending upon how the wire has been placed in the filter, two beads 14 and 16 being provided on each wire on either side of the bead 15 so that either end of the wire can be fastened to the top supporting bracket 13.

I have found that ionizing wires that are constructed as described just above will not vibrate laterally sufficiently to create "howl" when they are in use in an electrostatic air filter. The vibration is damped by reason of frictional engagement of the bead 15 with either the bead 14 or 16 whichever happens to be supporting the bead when the wire is installed in the filter. When a wire 12 begins to vibrate it carries with it the bead 14 but not the bead 15 since the diameter of the hole 17 in the bead 15 is considerably larger than the diameter of the wire. This develops friction between the adjacent surfaces of the bead 14 (or 16) and the bead 15. This friction absorbs the energy of vibration of the wire and thereby damps the vibration sufficiently to prevent the electrostatic air filter from "howling."

While I have described a present preferred embodiment of my invention, it is to be understood that it may be otherwise embodied within the scope of the following claims.

I claim:

1. An electrode for electrostatic filters comprising a wire adapted to be supported at its ends in the filter and two beads on the wire, one bead being secured to the wire adjacent the central portion of the wire, the other bead being loosely mounted on the wire and supported by the first mentioned bead when the wire is in position in the filter.

2. An electrode for electrostatic filters comprising a wire adapted to be supported at its ends in the filter and two beads on the wire, one bead being secured to the wire adjacent the central portion of the wire, the other bead having a hole extending through the bead, said hole having a diameter larger than the diameter of the wire, said second bead being supported in position on the wire by said first bead when the wire is in position in the filter.

3. An electrode for electrostatic filters comprising a wire adapted to be supported at its ends in the filter and three beads on the wire, two of said beads being seecured to the wire adjacent its central portion, but spaced from each other, the third bead being loosely mounted on the wire between said first two beads, whereby said third bead is supported on the wire by one of said beads which are secured to the wire when the wire is in operative position in the filter.

4. In an electrostatic filter having an ionizing wire, means for damping lateral vibration of the wire, said means comprising a bead secured to the wire adjacent its central portion, and a second bead loosely mounted on the wire and adapted to be supported by said first bead when the wire is mounted in operative position in the filter.

5. In an electrostatic filter having an ionizing wire, means for damping lateral vibration of the wire, said means comprising a bead secured to the wire adjacent its central portion, and a second bead having a hole therethrough, the ionizing wire being threaded through said hole, the diameter of the hole being larger than the diameter of the wire whereby said second bead is supported on the wire by said first bead when the wire is mounted in operative position in the filter.

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REFERENCES CITED

The following references are of record in the file of this patent:

FOREIGN PATENTS

Number	Country	Date
379,749	Germany	Aug. 30, 1923
403,995	Germany	Oct. 10, 1924