United States Patent

[11] **3,551,743**

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[54] **STATIC ELIMINATOR**
4 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **317/2,** 250/49.5
[51] **Int. Cl.** **H05x 3/04**
[50] **Field of Search** ..... 317/2, 2.1, 2.3, 3, 4, 2; 226/94; 250/49.5—60, 49.5—61, 49.5—62

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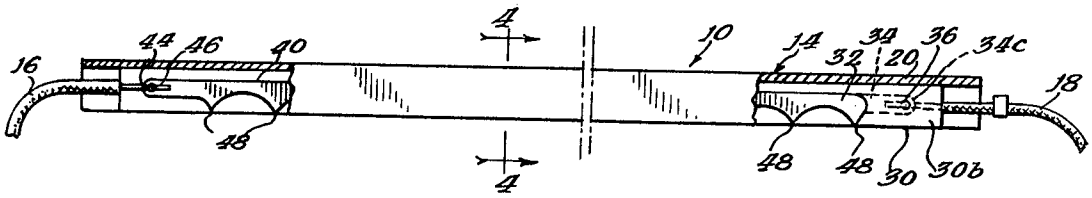
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ABSTRACT: A generator-type static electricity neutralizer, preferably for use in business machines wherein webs of material, such as paper, are fed therethrough characterized in that the several emitter points of the neutralizer have a smooth shape which terminates in a sharp point, thereby eliminating undesired secondary emitting points.



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FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

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STATIC ELIMINATOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a generator-type static electricity eliminator structure.

2. Description of the Prior Art

The prior art of the type of structure disclosed and claimed herein is amply represented by the Schutz U.S. Pat. No. 3,283,209, owned by the assignee of this invention and the prior art cited therein, including the following U.S. Pat. Nos. 940,431, to Chapman; 2,392,808, to Chapman; 3,137,806, to Schweriner; 3,162,787, to Hanscom; 3,174,748. to Roberts.

Generally speaking, the prior art construction includes pointlike discharge elements in conductive contact with an element which is connected to a source of high voltage and negligible current. The discharge elements may be within a casing having a connection to ground. The prior art further teaches that a charge of high voltage and low amperage may be used to send current through the discharge elements to create an atmosphere of free ions which neutralize the charge of static electricity in webs or strips of material fed past the discharge elements.

While the prior art structures have been satisfactory for performing the function of neutralizing static electricity, they have possessed the shortcomings of being relatively expensive, and being so constructed as to be possessed of several areas of possible secondary emittance. In particular, in many of the prior art references the discharge element or emitter point is joined to the conductive element at a juncture resulting in a relatively sharp corner. Such corners or square edges result in areas of secondary emittance. Also the discharge point itself may have relatively square ends, resulting in more areas of secondary emittance.

Furthermore, in many known static eliminator structures the discharge point is surrounded with a ground conductor by placing the point in the center of a hole cut into the surface of a tube. In assembly, it has been found extremely difficult to center the point with sufficient accuracy so that the field will be concentrated towards the nearest ground path. This distorts field pattern and also requires that voltage be lowered to avoid shorting out on a shorter than planned path.

Finally, many of the structures shown in the prior art are relatively large for the desired area in which they are intended to be used.

Thus, a need has arisen to provide an improved static eliminator of the generator type which is extremely compact, for use in office business machinery, is inexpensive to produce and is extremely efficient in that all areas of secondary emittance are eliminated.

SUMMARY OF THE INVENTION

This invention is directed, in brief, to the provision of an improved static eliminator of the generator type wherein the emitter points thereof are so constructed and arranged so as to eliminate any areas of secondary emittance. The best mode currently contemplated for carrying out the invention is the provision of a thin metallic member, preferably copper, clad with gold, having one edge serrated with smooth, generally semicircular cutout areas forming a continuous edge of smoothly formed teeth. The metallic member is secured to a thin, elongate insulated backing member on the other side of which a thin, elongate metallic ground member is secured. The assembly may be positioned within an insulating casing of limited dimension.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view, partially broken away in a section, of the static eliminator assembly of this invention;

FIG. 2 is a side elevational view of the static eliminator bar subassembly;

FIG. 3 is a side elevational view taken from the opposite side of FIG. 2;

FIG. 4 is a sectional view taken generally along the lines 4–4 of FIG. 1, and;

FIG. 5 is a fragmentary enlarged sectional view of a modified form of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The static eliminator assembly **10** of this invention includes a static bar **12** which preferably is mounted within an insulating housing **14** and has an electric lead **16** and a ground lead **18** secured thereto. The static eliminator **10** is intended for use in neutralizing static electricity, such as may be produced by running webs of paper through business machines at high rates of speed. The insulating housing **14** is generally rectangular in cross section and includes spaced, generally parallel sidewalls **20***a* and **20***b* and top **20***c* spanning the distance therebetween, forming a generally U-shaped structure having a hollow interior **22** and an open end **24** between the free ends of the sides **20***a* and **20***b*. A static bar receiving notch **26** is formed in the interior of the top **20***c* and the sidewalls **20***a* and **20***b* have mutually inwardly facing opposed ribs **28***a* and **28***b*.

The bar **12** includes a thin, elongate base **30** of suitable insulating material, preferably plastic, such as a phenolic or fiber glass. On face **30***b* there is mounted by suitable means, such as an adhesive or the like, a thin, flat, elongate metallic emitter element **32**, preferably made of copper having a thin coating of gold. On face **30***a* of base **30** there is also secured by suitable means, such as adhesive, a thin, elongate metallic ground element **34** which also is preferably formed copper or the like.

The ground member **34** has two generally linear parallel sides **34***a* and **34***b* which terminate in semicircular rounded ends **34***c* and **34***d*. An opening **36** is formed through the base **30** and through the end **34***c* of ground element **34** for connecting ground wire **18** to ground element **34** by suitable means, such as soldering.

Emitter element **32** has a straight side **40** and opposite round ends **42** and **44**. Rounded end **44** has an opening **46** therethrough which also extends through the insulating bar **30**, this opening being on the end opposite of the opening **36** which extends through end **34***c* of ground element **34**. Opening **46** is for the reception of a portion of lead wire **16** which is secured to the emitter bar **32** by means such as soldering or the like.

The edge of the emitter element **32** opposite straight edge **40** is provided with a plurality of sharp emitter points **48**. The space between each of the emitter points **48** is a smooth semicircular arc **50**.

By way of example only, and not by way of limitation, the following are representative dimensions of one embodiment, it being understood that such dimensions will differ with respect to the intended use and installation of the static eliminator. By way of example, in one such embodiment the dimension between the holes **46** and **36** is 15¾inches, with the height of the insulating base **30** from top to bottom being five-eighths inch and the height of the ground element being one-quarter inch. The arcs **50** are formed on a one-half inch radius so that the several points **48** are 1 inch apart. In the same example, the point **48** seen at the right of FIG. 2 is 1 inch from the centerline of opening **36** and the point **48** at the other end is 1 inch from the centerline of pole **46**.

In the modified embodiment shown in FIG. 5, the area of the emitter element **32** adjacent point **48** has one flat face **48***a* which may lie adjacent the insulating base **30**, and an undercut inner face **48***b* so that the point **48** is sharply pointed in two planes.

As can be seen from FIG. 4, the bar **12** may be mounted within the insulating cover **14** with the top of the assembly snugly received in the notch **26** in the interior of cover **14** so that the inwardly directed ribs **28***a* and **28***b* abut the opposite faces of the bar **32** thereby positioning the discharge points **48** at the open end **24** of the housing **14** and generally medially spaced between the sides **20***a* and **20***b* thereof.

In operation, it is intended that the static eliminator of this assembly may be used in business machinery of the type through which webs or strips of paper or similar sheet material is fed at high speeds, such as a machine sold by the assignee of this invention and referred to as a "Uarco 1747 Burster." As the web of paper is fed through the machine, static electricity is created. Electrical current of low amperage, but of approximately 5,000 volts or any other suitable voltage is applied to line **16**, creating free ions adjacent the points **48** to neutralize static electricity created by the moving web of paper. Because there are no sharp or square corners other than the discharge points **48** themselves, there will be almost no stray emittage. The device may be manufactured to great accuracy in that the two openings **36** and **46** are used as registration points for the elements **32** and **34** and the top and bottom of the insulator base **30** may be easily sheared to obtain close dimensional accuracy. The preferred embodiment is very compact in that the overall thickness of the assembly including the housing is only three-eighths inch and the dimension from top to bottom of the assembly including the insulating housing is three-quarters inch. The bar assembly, itself, is only five-eighths inch from top to bottom, and 16¾ inches in length, although the length can be varied depending upon the width of the path of paper feed across which it is intended that this assembly is to span.

The manufacture and assembly of this structure is extremely simple in that the strips **32** and **34** to opposite faces of the base **30**, and with merely two soldering operations at opposite ends of the base to connect the electrical and ground leads thereto.

The insertion of the bar assembly **12** within the insulating housing **14** may be by a simple frictional force fit. Thus, this invention provides an improved static eliminator assembly of the generator type which is easily and economically manufactured and assembled, and is compact and highly efficient in operation.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, as some modifications may be obvious to those skilled in the art.

We claim:

1. A static eliminator comprising: an elongate base of insulating material; a conductive discharge element on said base, said conductive element having an edge and having means for connection to a source of electrical energy, a conductive ground element on said base with means for connection to ground; said discharge element having a plurality of discharge points spaced from the edge along the length of the edge thereof; each discharge point being joined to said conductive element by a substantially smooth, generally arcuate surface; and a generally U-shaped insulating housing having an open end and having surfaces on the interior thereof for embracing and holding the eliminator with the discharge points facing out of the open end of the housing.

2. A static eliminator comprising: a thin elongate base of insulating material having two opposite faces; a thin conductive ground element on one face of the base with means for connection to ground; a thin conductive discharge element on the opposite face of the base having an edge and having means for connection to a source of electrical energy, the conductive discharge element having a plurality of recesses in the edge forming a plurality of discharge points therealong; and a generally U-shaped insulating housing having an open end and having surfaces of the interior thereof for embracing and holding the eliminator with the discharge points facing out of the open end of the housing.

3. A thin static eliminator comprising: a thin elongate base of insulating material having two opposite faces; a thin conductive ground element on one face of the base with means for connection to ground; and a thin conductive discharge element on the opposite face of the base having an edge and including means for connection to a source of electrical energy, a plurality of recesses in the edge forming a plurality of discharge points therealong, the opposite ends of the conductive discharge element and the juncture of the discharge points therewith being smoothly rounded.

4. A static eliminator comprising: a thin elongate base of insulating material having two opposite faces; a thin conductive ground element on one face of the base with means for connection to ground; a thin conductive discharge element on the opposite face of the base having an edge and including means for connection to a source of electrical energy and a plurality of recesses in the edge forming a plurality of discharge points therealong, said ground and conductive elements being laterally offset relative to each other; and lead wire openings formed in opposite ends of the insulating base and through the conductive element at one end and the ground element at the other end.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,551,743 Dated December 29, 1970

Inventor(s) Donald H. Koepke and Lewis F. Jennings

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Page 1 of the patent, in the designation of the Assignee, "Varco Incorporated" should be --Uarco Incorporated--.

Signed and sealed this 27th day of April 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents