

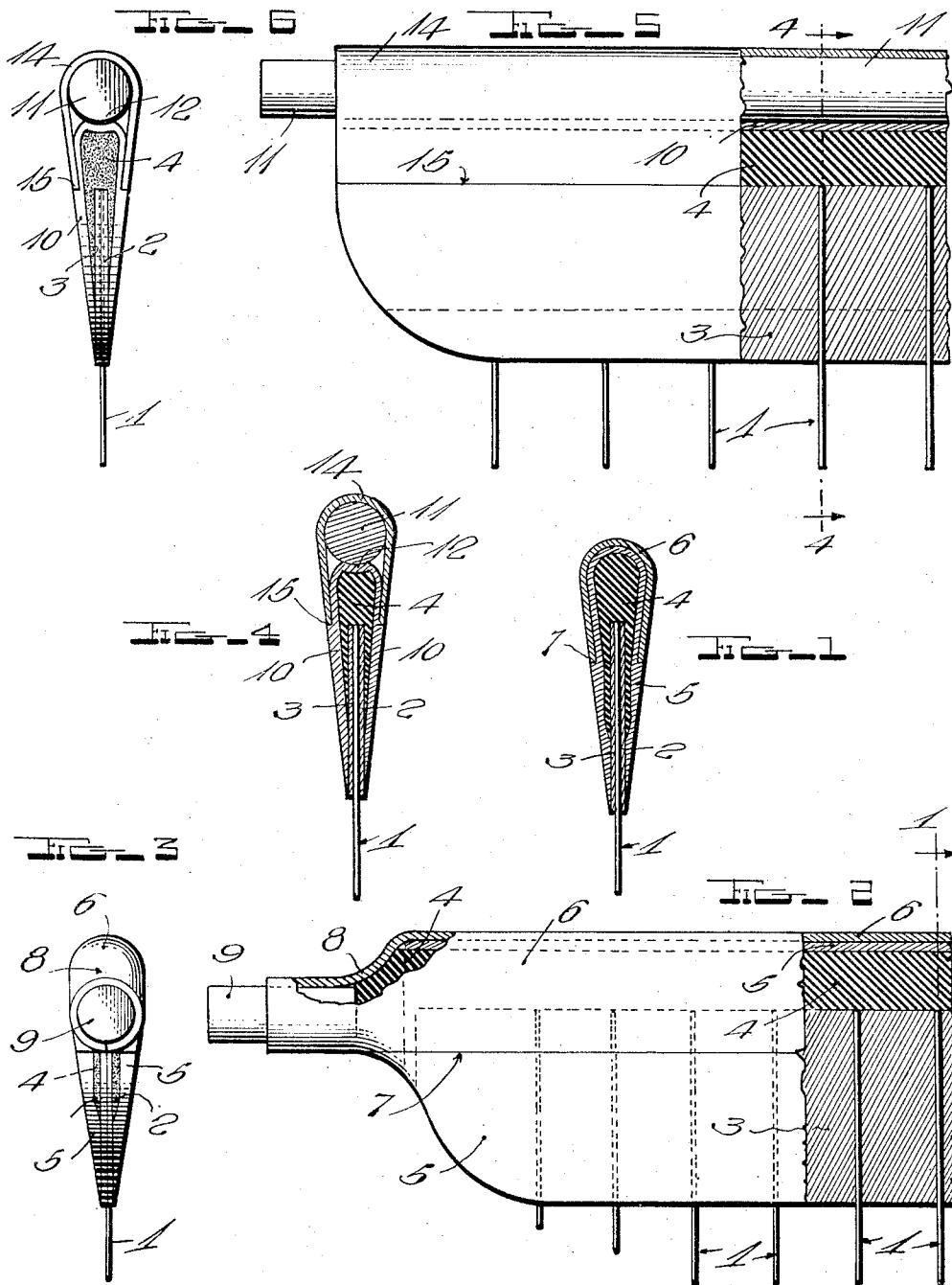
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ELECTRIC DISCHARGE ELECTRODE

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ELECTRIC DISCHARGE ELECTRODE

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12 Claims. (Cl. 230—69)

My invention relates broadly to electric discharge electrodes and more particularly to an improved construction of electric discharge electrodes.

One of the objects of my invention is to provide a construction of emitting electrode including a charge collecting portion and a charge emitting portion with a predetermined resistance disposed between the charge collecting portion and the charge emitting portion with insulation means interposed within the electrode for preventing internal failure of the electrode at high potentials.

Another object of my invention is to provide a construction of discharge electrode in which one portion thereof serves as a target while another portion thereof serves as a multipoint emitter and wherein the electrodes are assembled in cascade with coating electrodes by which the multipoint emitters of one electrode discharge with respect to the target portion of an adjacent electrode and wherein the target portion and/or a portion of the electrode intermediate the emitters and the target portion are formed from semi-conductive material for predetermining the potential drop between the target portion and the multipoint emitters.

Still another object of my invention is to provide a construction of multipoint emitter which may be fabricated inexpensively on a quantity basis and supported within a metallic substantially channel shaped member providing both a target and a carrier for the structure of the electrode.

A further object of my invention is to provide a construction of multipoint emitter discharge electrode having a supporting bus associated therewith and a target of semi-conductive material extending around the supporting bus and forming a resistive path to the emitters with insulation means interposed between the emitters and internal portions of the electrode for confining the distribution of current in predetermined paths from the bus to the emitters.

Other and further objects of my invention reside in the construction of high potential multipoint emitter set forth more fully in the specification hereinafter following by reference to the accompanying drawing, in which:

Figure 1 is a cross sectional view taken through one form of discharge electrode of my invention, taken on line 1—1 of Fig. 2; Fig. 2 is an elevational view of a fragmentary portion of the discharge electrode illustrated in Fig. 1, partially broken away and illustrated in cross section; Fig.

3 is an end elevational view of the discharge electrode illustrated in Figs. 1 and 2; Fig. 4 is a cross sectional view taken through a modified form of discharge electrode embodying my invention, the view being taken on section line 4—4 of Fig. 5; Fig. 5 is an elevational view of a portion of the discharge electrode of my invention shown in Fig. 4, partially broken away and illustrated in cross section; and Fig. 6 is an end elevational view of the discharge electrode illustrated in Figs. 4 and 5.

In several designs of fans and devices for moving masses of air or fluid, such as represented in my copending application Serial No. 254,724, filed concurrently herewith for Electric discharge system, it is advantageous that the leading edge of each stream-lined discharge electrode serve as a target for preceding discharges and that the tapered edge in which the emitting points are supported be so arranged that the emitters therein function with respect to the target of the next succeeding bank of electrodes. The discharge electrodes set forth herein function in this manner and are capable of use either in staggered arrangement of banks or in the flat type of target fan. The discharge electrodes of my invention are capable of being fabricated inexpensively on a quantity basis and arranged in a fan assembly for efficient operation. In one form of discharge electrode of my invention, a sheet metal strip of substantially channel shape is rolled around the fabricated assembly and serves as both a mechanical support and a bus. The conduction of current occurs from the sheet metal through a resistive layer to an assembly of semi-conducting strips which support the emitting points. Insulation is interposed around the embedded ends of the emitters for insulatingly separating the embedded ends of the emitters from the bus, thereby confining the conductive path from the bus to the emitters through the resistive or semi-conducting layer of material in the electrode.

In a modified form of my invention, I provide a bus which extends longitudinally of the discharge electrode and which is surrounded by a resistive layer which forms a mechanical and electrical connection with a resistive layer on the opposite side of the bus which serves as a support for semi-conducting strips constituting carriers for the emitting points. A mass of insulation is provided between the embedded ends of the emitting points and the semi-conductive layer for preventing internal failure of the electrode

by eliminating discharge directly between the bus and the embedded ends of the emitters.

My invention will be more fully understood by detailed reference to the drawing wherein reference character 1 designates the emitting points in the form of fine wires which are carried in uniformly spaced positions between semi-conducting strips 2 and 3. The strips 2 and 3 may be fabricated from tape impregnated with conductive material. I employ a variety of kinds of tapes such as fiber glass, or tapes of organic character such as cotton, silk, satin, celanese or rayon impregnated with semi-conducting material such as plastics into which carbon black has been incorporated. The rear ends of the emitter wires 1 are substantially encased by means of insulation material such as empire cloth or other high quality insulation as indicated at 4. The insulation material 4 extends substantially midway of the width of the tapes 2 and 3 and is shaped to conform with the contour of the electrode when fabrication is completed. The impregnated tapes 2 and 3 are wholly enclosed by the semi-conductive layer of resistive material indicated at 5. The resistive material 5 is formed in stream-lined contour and extends around the insulation material 4. Metallic bus 6 surrounds the semi-conductive layer 5. The metallic bus 6 is formed from sheet metal and is substantially channel shaped, open at one side to receive the fabricated electrode. The metallic bus 6 substantially unites with the resistive material 5 along longitudinally extending juncture 7. The ends of the metallic bus 6 are reduced in section as indicated at 8, forming a substantially tubular end support into which the metallic peg-like member 9 extends. In associating the discharge electrodes in a fan assembly, the members 9 fit into spaced socket-like receptacles in the frame structure. The stream-lined contour of the discharge electrode is imparted to the electrode by placing the assembled parts in a press and subjecting the assembly to high pressure while baking the electrode in a high temperature oven over a considerable period of time. The electrodes are allowed to cool while being maintained in the press and when removed, retain their stream-lined shape while possessing high dielectric strength against internal failure.

In the form of my invention illustrated in Figs. 4, 5 and 6, the impregnated tapes 2 and 3, with the emitting points 1 carried therebetween, are surrounded by the mass of insulation 4 which is in turn surrounded by the semi-conductive impregnated tape material 10. The semi-conductive material 10 bears against one side of metallic bus 11 as represented at 12, forming an electrical connection therewith. The bus 11 is surrounded by the semi-conductive layer of material 14 which may be impregnated tape pressed to conform with the stream-lined contour of the electrode and uniting with the semi-conductive layer of material 10 along the longitudinally extending juncture 15.

An electrical connection is thus established between bus 11 through semi-conductive material 14 to semi-conductive material 10 to the semi-conductive tapes 2 and 3 and thence to the emitting wires or points 1.

Wherever I have referred to the impregnated tape it will be understood that the tape is subjected to a treatment of a plastic containing carbon black, graphite, resonoid, or other fine particles of a conducting character or else the tape may have had applied to it colloidal graphite

or other conducting material in thin adhering layers. The stream-lining is applied to the structure of Figs. 4, 5 and 6 by placing the fabricated electrode in a press and subjecting the parts to pressure while baking the electrode in an oven at high temperature over a considerable period of time. It will be seen that the mass of insulation 4 substantially separates the rear ends of the emitting wires 1 from the bus 11 limiting the conducting path from bus 11 through semi-conductive material 14, semi-conductive material 10 and semi-conductive strips 2 and 3 to the emitting wires or points 1. The insulation 4 insures against internal failure of the electrodes.

The semi-conductive properties of the material 5 and 10 and tapes 2 and 3 in both forms of my invention control the distribution of current from the bus or target to the emitting points and serve as ballast resistors in the manner set forth more fully in my copending application Serial No. 179,619, filed December 13, 1937, for Method and apparatus for electrically generating pressures. Arcing or sparking at the emitting points is thus prevented and mass movement of air or fluid accompanying the discharge thus obtains. The metallic bus 6 and the semi-conductive layer 14 receive the applied potential and serve as targets, where desired, for an electric discharge separately produced and directed at the electrode, at the same time the potential is conducted to the discharge points through the ballast resistance of the electrode. The applied potential may be altered slightly when the bus 6 or layer 14 is operative as a target in the field of an electric discharge, and the potential of the discharge points is likewise altered through the ballast resistance.

I have found the construction of electrodes set forth herein highly practical in manufacture, production and operation. However, I realize that various modifications in forms and construction of the electrodes of my invention may be made and no limitations upon my invention are intended other than those which may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A discharge electrode comprising in combination, a semi-conductive tape, a multiplicity of spaced emitting points carried by said tape, a metallic channel member, and semi-conductive means supporting said semi-conductive tape with respect to said channel member and providing a high resistive path for distribution of electric potential from said channel member to said tape and said points.

2. A discharge electrode comprising in combination, a semi-conductive tape, a multiplicity of spaced emitting points carried by said tape, a metallic channel member constituting a target electrode and means supporting said semi-conductive tape with respect to said channel member, said means comprising a high resistive path for distribution of electric potential from said target electrode to said emitting points.

3. A discharge electrode comprising a semi-conductive support, a multiplicity of emitting points mounted in said support, a target electrode, insulation means disposed between said target electrode and the rear ends of said emitting points, and a semi-conductive path through said support extending from said target to said emitting points.

4. A discharge electrode comprising a semi-conductive support, a multiplicity of emitting points mounted in said support, a target elec-

trode, insulation means disposed between said target electrode and the rear ends of said emitting points, and a semi-conductive path of impregnated tape extending between said target electrode and said emitting points.

5 5. A discharge electrode comprising a semi-conductive support, a multiplicity of emitting points mounted in said support, a target electrode, insulation means disposed between said target electrode and the rear ends of said emitting points, and a sheet-like member folded about said insulation means and establishing electrical connection at one end with said target electrode and at the other end with the semi-conductive support for the multiplicity of emitting points.

10 6. A discharge electrode comprising a longitudinally extending member of semi-conductive material, a multiplicity of spaced points mounted in said semi-conductive material, insulation means enveloping the rear ends of said points and extending over the sides of said longitudinally extending member, a layer of semi-conductive material extending over said insulation means and establishing electrical connection with said longitudinally extending member, and a metallic channel shaped member engaging said layer of semi-conductive material.

15 7. A discharge electrode comprising a longitudinally extending member of semi-conductive material, a multiplicity of spaced points mounted in said semi-conductive material, insulation means enveloping the rear ends of said points and extending over the sides of said longitudinally extending member, a layer of semi-conductive material extending over said insulation means and establishing electrical connection with said longitudinally extending member, a metallic channel shaped member engaging said layer of semi-conductive material, said channel shaped member being tapered at each end thereof, and pin supporting members extending into each of the tapered ends of said channel shaped member.

20 8. A discharge electrode comprising a longitudinally extending member of insulation material impregnated with a semi-conductive substance for rendering said member semi-conductive, a multiplicity of spaced points mounted in said semi-conductive material, insulation means enveloping the rear ends of said points and extending over the sides of said longitudinally extending member, a layer of semi-conductive material extending over said insulation means and establishing electrical connection with said longitudinally extending member, and a metallic

channel shaped member engaging said layer of semi-conductive material.

9. A discharge electrode comprising a semi-conductive support, a multiplicity of emitting points mounted in said support, a target electrode, insulation means disposed between said target electrode and the rear ends of said emitting points, and a sheet-like member formed of insulation material impregnated with semi-conductive material and folded about said insulation means and establishing electrical connection at one end with said target electrode and at the other end with the semi-conductive support for the multiplicity of emitting points.

10 10. A discharge electrode comprising a longitudinally extending support of semi-conductive material, a multiplicity of spaced emitting points mounted in said support, insulation means enveloping the rear ends of said emitting points, a layer of semi-conductive material enveloping said insulation means and establishing connection with said support adjacent the projection of the emitting points therefrom, and a target member enveloping the rear portion of said layer of semi-conductive material.

11. A discharge electrode comprising a longitudinally extending support of semi-conductive material, a multiplicity of spaced emitting points mounted in said support, insulation means enveloping the rear ends of said emitting points, a layer of semi-conductive material enveloping said insulation means and establishing connection with said support adjacent the projection of the emitting points therefrom, and a semi-conductive member secured over the rear edge of said layer of semi-conductive material for imparting charges collected thereon to the multiplicity of emitting points.

12. A discharge electrode comprising a longitudinally extending support of semi-conductive material, a multiplicity of spaced emitting points mounted in said support, insulation means enveloping the rear ends of said emitting points, a layer of semi-conductive material enveloping said insulation means and establishing connection with said support adjacent the projection of the emitting points therefrom, and a metallic member rolled into intimate contact with the rear edge of said layer of semi-conductive material and forming means for collecting charges and imparting the charges to said multiplicity of emitting points through a path established through said layer of semi-conductive material.

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