Sept. 18, 1951 W. B. HARPMAN 2,568,068

MAGNETIZED GROUNDING ELECTRODE

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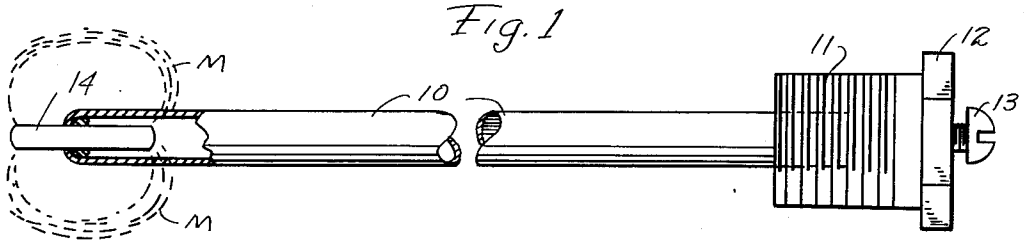
Fig. 1



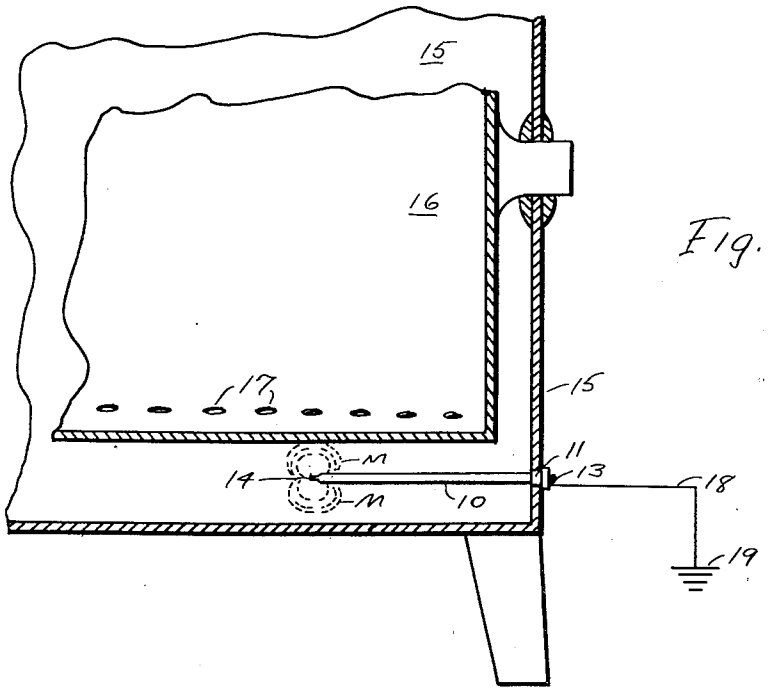


Fig. 2.

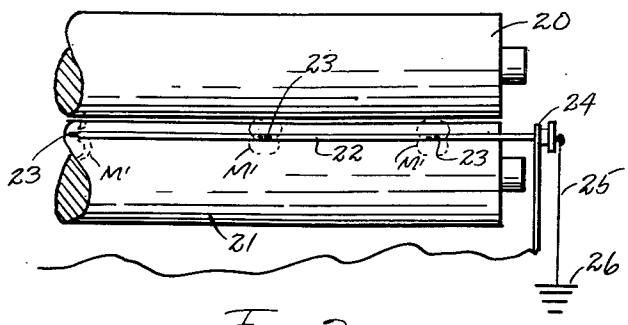


Fig. 3

Webster B. Harpman

INVENTOR.

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MAGNETIZED GROUNDING ELECTRODE

Webster B. Harpman, Youngstown, Ohio

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6 Claims. (Cl. 175—264)

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This invention relates to grounding electrodes and more particularly to grounding electrodes having permanent magnets incorporated therein for creating magnetic fields in the area of the grounding electrode.

The principal object of the invention is the provision of a grounding electrode adapted for use in grounding static electric currents generated in dry cleaning washers, dryers and the like.

A further object of the invention is the provision of a grounding electrode having a magnetic field and adapted for use in grounding static electric currents when placed in proximity to elements generating such currents.

A still further object of the invention is the provision of a grounding electrode of a simple, inexpensive construction for efficiently grounding static electricity in various moving objects.

It is known in the art that many and various attempts have heretofore been made to effectively ground static currents arising as a result of or in conjunction with various industrial processes and including the formation or processing of sheet materials, the treatment of various materials in rotating or agitating vessels and in the cleaning or treating of garments in solvents of a dielectric nature.

It is also known that the means for establishing ground paths for static electric currents as generated by such apparatus has heretofore been relatively expensive in initial construction, installation and maintenance and sometimes incapable of achieving their desired result.

The present invention relates to a simple and inexpensive grounding electrode incorporating a permanent magnet establishing a magnetic field around and about the electrode enabling the same to efficiently provide a ground path for static electric current whereby the same will be efficiently drained from the device, apparatus or process concerned to the ground.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a side elevation with parts broken away and parts in cross section illustrating the magnetic grounding electrode.

Figure 2 is a side view of a portion of the dry cleaning washer showing the grounding electrode installed therein, dotted lines indicating the magnetic field thereabout.

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Figure 3 is a symbolic view of a pair of rolls in a rotary printing press illustrating the application of the magnetic grounding electrode thereto, dotted lines indicating the magnetic field therein.

By referring to the drawings and Figure 1 in particular it will be seen that a grounding electrode has been disclosed which comprises an elongated metal object, preferably tubular in shape, and is indicated by the numeral 10 and formed of a material forming a good electrical conductor. For this purpose, a copper tube provided with a silver coating has been found to be highly efficient. One end of the electrode 10 is mechanically and electrically secured to a threaded plug 11 which in turn is provided with a plurality of annularly spaced, flat facets 12 and a connection screw 13. The other end of the electrode is inwardly flanged and is provided with a section of a permanent magnet material 14 such as "Alnico," a portion of which preferably extends beyond the electrode 10. The permanent magnet material 14 is mounted in the end of the electrode 10 in a liquid-tight manner as by soldering the same therein. The magnet material 14 is magnetized so that the line of flow of magnetic current is from one end of the magnet material 14 to the other, as shown by the dotted lines in Figure 1 of the drawings and as characteristic of a permanent magnet. If desired, additional permanent magnet material 14 may be positioned intermediate the ends of the electrode 10 by securing the same in the electrode 10 in spaced relation to one another.

The grounding electrode in use is illustrated in Figure 2 of the drawings wherein a casing 15 of a dry cleaning washer is illustrated and wherein the rotatable basket 16 is positioned for the reception of garments to be cleaned. The rotatable basket 16 is provided with a plurality of perforations 17 as known in the art and an access door enclosure (not shown).

The grounding electrode 10 is illustrated in position in the area between the exterior of the basket 16 and the interior of the housing 15 with the threaded plug 11 being secured in a drilled and tapped opening in the housing 15 so that the connection screw 13 is on the exterior of the housing while the electrode 10 is on the interior thereof and spaced with respect to both the basket 16 and the housing 15. An electrical conductor 18 is connected to the electrode by means of the connection screw 13 and run to a ground 19. Dotted lines in Figure 2 indicate the magnetic current flow lines from the section of permanent magnetic material 14 in the grounding electrode 10. These dotted lines are generally indicated by the letter M.

It will thus be seen that static currents generated in the dry cleaning washer and within the housing 15 in the solvent normally used

therein as upon the rotation of the basket 16 with garments therein will be in the area of the magnetic field M of the magnet material 14 and that such static currents as are generated will be directed and/or deflected by the magnetic current lines of flow M to the magnet and the electrode 10 thereby enabling the electrode 10 to form an effective ground path or collecting agency for the electro-static currents. The electrode 10 is formed of an excellent electrical conductor and when connected with a good ground through the electrical conductor 18 provides an efficient ground by reason of its relative lack of resistance as compared with the housing 15 of the washer itself or the mechanical apparatus in connection therewith. The grounding electrode therefore operates to continually drain away static currents as the same are generated to the end that the clothes in the washer do not build up static charges and do not therefore attract soil particles freed by the solvent. This freedom of electro-static attraction on the part of the garments eliminates graying as known in the dry cleaning industry and which is recognized as comprising a re-deposition of the soil removed from the garments by the solvent action of the washer.

Many and various other applications of the magnetic grounding electrode will occur to those skilled in the art and among such will be the application of the magnetic grounding electrode to rotary printing presses. Such an application is illustrated symbolically in Figure 3 of the drawings and by referring thereto it will be seen that a pair of opposed rolls are illustrated and indicated by the numerals 20 and 21. A grounding electrode 22 of the modified nature is illustrated in proximity to the rolls 20 and 21 and comprises a rod or a tube having a plurality of permanent magnets 23 positioned at intervals therealong so that the magnetic fields from each of the magnets, as indicated by the letters M', lie in contact with or proximity to the rolls 20 and/or any film or sheet material processed thereon. The grounding electrode is provided with a mounting bracket 24 and an electrical conductor 25 connects the electrode 22 with a good ground 26.

This particular application of the invention represents a solution of a problem for which various static grounding systems have been proposed, among them the use of grounding electrodes including radioactive material emitting alpha and beta radiation to form paths for the static currents generated by the apparatus. Such grounding electrodes have proved harmful to personnel and they are quite expensive in manufacture and maintenance.

In the preferred form of the invention, as illustrated in Figures 1 and 2 of the drawings, the tubular body of the electrode is formed of copper with a silver plating thereover, the silver plating forming a contaminating agent with respect to the solvent in the dry cleaning washer whereby extremely minute quantities of silver salts are released into the solvent to facilitate the grounding action of the said electrode with respect to electrostatic currents generated in the washer.

The magnetic grounding electrode shown herein is also useful in application to calendering machines as used in the processing of various sheet and film-like materials including synthetic rubbers and cellulose tissue products and the like.

It will thus be seen that a magnetized grounding electrode has been disclosed which meets the several objects of the invention.

Having thus described my invention, what I claim is:

1. A magnetic grounding electrode comprising a hollow section of conducting material having at least one permanent magnet positioned partially therein and protruding partially therefrom, the poles of the magnet being spaced with respect to said conducting material, the magnetic field of which directs and deflects electrostatic currents to the said section of conducting material, and connection means for grounding the said section of conducting material to a suitable ground.

2. A grounding electrode comprising a tubular section of electrical conducting material having one end thereof inwardly flanged, a permanent magnet positioned in said inwardly flanged end thereof so that one pole of the magnet lies beyond the end of the tubular material and the other lies within the area of the end of the tubular material, and connecting means on the said grounding electrode establishing electrical connection with a ground.

3. The grounding electrode as set forth in claim 2 wherein the tubular material is coated with a secondary electrical conductor characterized by its ability to form an oxide or salt useful as a contaminating agent in a body of dry cleaning fluid.

4. A grounding electrode comprising a rod having a hollow end, a permanent magnet positioned in said end so that one pole of the magnet lies beyond the rod and the other pole lies within the hollow end of the rod, and connection means on the said grounding electrode establishing electrical connection with a ground.

5. A grounding electrode comprising a rod of non-conducting material having a permanent magnet positioned in one end thereof so that one pole of the magnet lies beyond the rod and the other pole lies within the area of the end of the rod, the said rod having a coating of an electrical conducting material thereover, and connection means on the said grounding electrode establishing electrical connection with a ground.

6. A grounding electrode comprising a tubular section of electrical conducting material having a permanent magnet positioned in one end thereof so that one pole of the magnet lies beyond the end of the tubular material and the other lies within the area of the end of the tubular material and spaced with respect thereto, and a threaded plug secured to the other end of the said grounding electrode and providing means for mounting the same in a drilled and tapped opening, electrical connection means on the outermost end of the said plug to facilitate connection of the grounding electrode to a ground.

WEBSTER B. HARPMAN.

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