W. H. CHAPMAN.

PROCESS AND APPARATUS FOR NEUTRALIZING STATIC ELECTRICITY.

APPLICATION FILED APR. 2, 1906.

**940,430.** Patented Nov. 16, 1909.

*Fig. 1.*

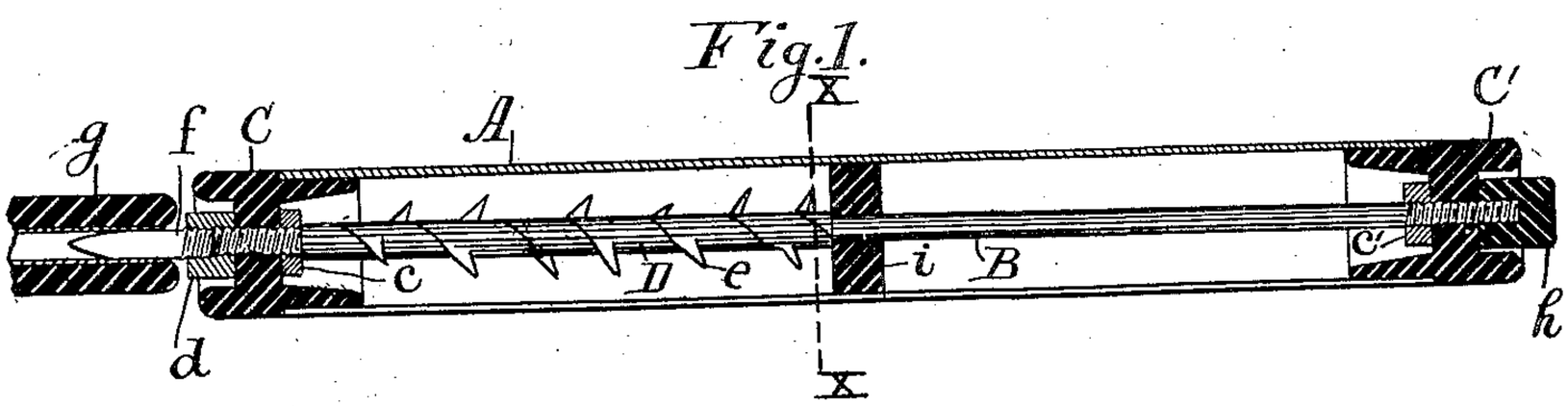



*Fig. 3.*

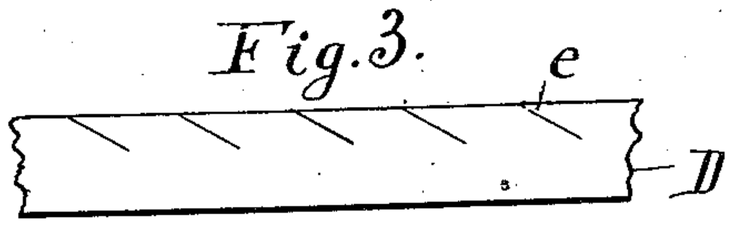



*Fig. 2.*

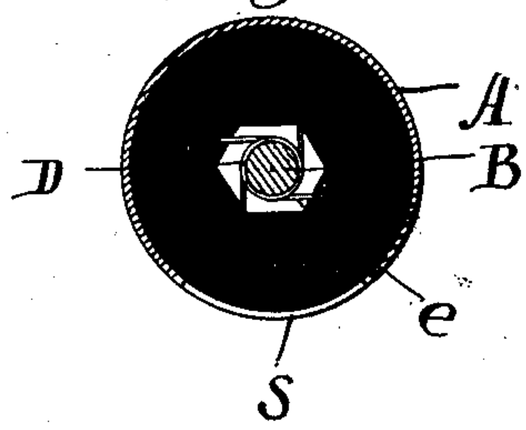
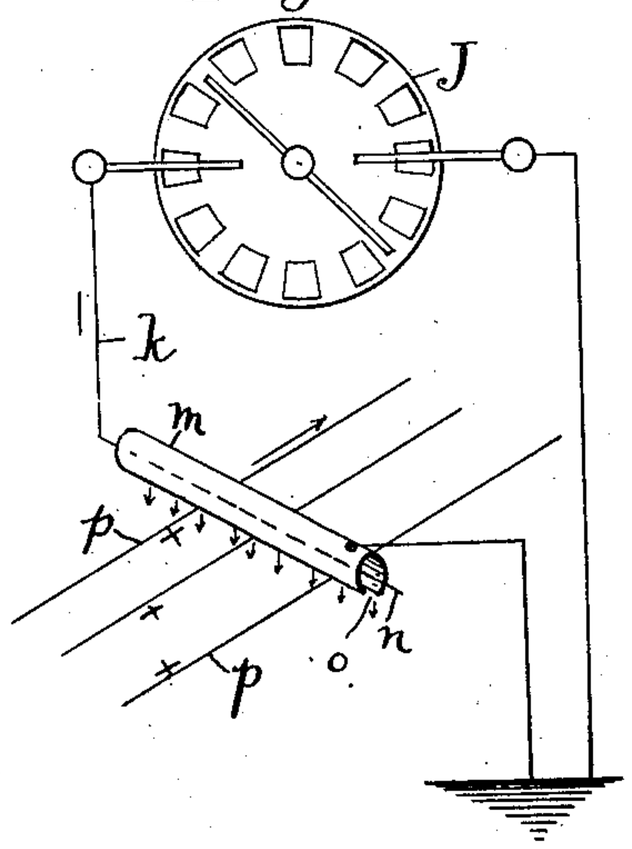



*Fig. 4.*

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# UNITED STATES PATENT OFFICE.

WILLIAM H. CHAPMAN, OF PORTLAND, MAINE, ASSIGNOR TO CHAPMAN ELECTRIC NEUTRALIZER COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

## PROCESS AND APPARATUS FOR NEUTRALIZING STATIC ELECTRICITY.

940,430. Specification of Letters Patent. Patented Nov. 16, 1909.

Application filed April 2, 1906. Serial No. 309,352.

*To all whom it may concern:*

Be it known that I, WILLIAM H. CHAPMAN, a citizen of the United States of America, and a resident of Portland, Maine, have invented certain new and useful Improvements in Processes and Apparatus for Neutralizing Static Electricity, of which the following is a specification.

My invention relates to a process and apparatus for neutralizing static electricity in moving material and it is particularly directed to certain improvements in the process shown in my Patent No. 777,598 dated Dec. 13, 1904 and the apparatus used for carrying out that process.

In this process I have made use of an alternating electric charge of high voltage applied to a wire or other conductor containing small points and supported in close proximity to the moving paper or other like material.

The process herein set forth is a modification of the process set forth in my application No. 292,388 filed Dec. 18, 1905.

In using my process for the treatment of textile yarns and other forms of textile materials I have found that in many cases it was not practicable to locate the wire or other conductor near enough to the work so that the ions sent off by the discharge from the conductor would reach the material to be treated.

The object of my present invention is to so modify the process and the apparatus that the ions discharged from the conductor will travel a considerable distance, taking effect as far away as 18 inches in some cases and enabling me to locate my conductor at a convenient point about textile machinery of various kinds which is as a rule so crowded with parts that there is little room for such devices as this. I accomplish this object by using a direct charge of high voltage on the conductor, modifying the effect to prevent overcharging of the material by partially surrounding the conductor with a conducting envelop or slotted tube connected to earth. A free or open space is left in the envelop of varying width according to the distance the ions have to travel and I have found from experience that with a conductor in a slotted tube and charged with a high tension direct charge, there is a certain fixed width of slot which may be used for different distances through which sufficient electricity will pass to neutralize the electricity of the goods without overcharging them as would be the case if the conductor was open or unclosed.

Another object of my invention is to find a conductor with sufficiently fine points or surfaces which can be cheaply made and strong and substantial for practical use in mills &c. as I have found that a single wire when the radiation took place from its sides oxidized rapidly under the action of the ozone produced. This object of my invention I carry out by the use of a substantial metal rod preferably steel or iron having a tubular covering with fine points or projections formed preferably of a thin strip of copper with angular cuts in its edge and wound spirally into the form of a tube with angular and pointed projections.

I illustrate the several features of my invention by means of the accompanying drawing in which:

Figure 1 is a central longitudinal section showing my conductor as I prefer to make it, Fig. 2 is an enlarged cross section through the same, taken on the line *x x* of Fig. 1. Fig. 3 is a detail of the copper strip before winding and Fig. 4 is a diagram illustrating the application of my process to moving yarn.

Considering Fig. 4, J represents a Wimshurst machine or other source of high tension direct current electricity connected by a wire *k* to an insulated conductor *n* passing through a tube *m* of brass or other conducting material connected to earth with a longitudinal slot *o* in the under side of the tube. Strands of yarn *p* are represented as passing along under the tube *m* and the ions discharged from the conductor by the high tension charge are represented as passing from the conductor through the slot *o* onto the yarn as it passes by. It is understood that the electricity supplied to the wire *n* is of opposite polarity to that generated in the yarn in its process of manufacture, the electricity being generally generated in the yarn and other textile material by passing through rolls where it becomes compressed. The ions discharged by the conductor neutralize the electricity of the yarn and the yarn is prevented from getting an overcharge by the presence of the metal partially surrounding the conductor. The slot *o* is of a certain width according to the distance of

the yarn from the conductor, so that it allows just the right quantity to pass to neutralize the yarn without giving it an overcharge. The reason the width of the slot limits the charge which goes to the material is as follows: The ions are given off in all directions from the conductor and striking directly on the inner surface of the conductor the charge which they contain is conducted to earth. Those which are given off in the direction of the slot will be diverted and conducted away by the tube when there is no charge of opposite electricity in the material to attract them. When however there is a charge in the material of opposite polarity to the ions given off by the conductor, the latter are drawn or attracted through the slot by a force stronger than that by which they are attracted to the tube. Thus while the charge is in the material the ions will be drawn through the slot to neutralize the electricity of the material but as soon as the latter becomes neutral the attraction of the tube takes effect and diverts the ions to the tube and the charge is delivered on to earth. It is evident that the farther away the material is from the conductor the larger the slot will have to be and the more ions it will be necessary to release to do the same work. If the slot is too wide there will be an escape of ions through the slot when the material is in a neutral condition and consequently it will receive an overcharge of the same kind of electricity as that given off by the conductor. For this reason as already stated, there is generally a certain standard width of slot which is effective at a given distance. I find from experience that the width of the slot does not have to be regulated with absolute accuracy as a slight over or under charge is not injurious to the yarn or other textile material. The practical form of conductor which I use for this class of work is shown in Figs. 1, 2 and 3.

For supporting the insulated conductor I make use of a tube preferably of brass, laterally perforated with holes or when the direct current and long distance process is used with a longitudinal slot regulated in width according to the distance the ions have to travel. As here shown, I use a brass tube having a slot *s* in its underside and having an insulated bushing C in one end and C′ in the other. Each of these bushings is centrally recessed on each side and each has a central hole through which passes the conducting rod B screw-threaded at each end. At the bushing C′ the rod projects through and has screwed on its end an insulated cap *h* for the purpose of protecting the operator from getting a shock or spark and a check nut *c′* is located on the rod just inside of the bushing. At the opposite end of the tube the rod projects through the bushing C in like manner, with a check nut *c* on the inside and a holding nut *d* on the outside and a stud *f* screwed into the nut *d* from the outside and having its inner end in contact with the end of rod B. The socket *g* fits over the stud and connects with a suitable conducting cord or cable not here shown, through which the high tension charge is conveyed to the conductor. The discharging or radiating points are provided by means of a tubular covering or envelop which is slipped over the rod B and which is provided with numerous projecting points or fine surfaces. As here shown, I form this tubular covering by means of a strip of thin copper D in the edge of which is cut a series of angular cuts. The strip is wound spirally about a form to form a tube and is slipped on in sections over the rod B, the pointed portions *e* projecting outward from the body of the strip to form radiating points which will be unaffected by the action of the ozone. In the center of the tube is shown an insulating guide *i* for supporting the rod. This form of conductor can be made up in lengths to suit the job, the tube D can be put on in short sections if desired and the slot cut according to the distance of the work from the conductor. When the alternating charge is to be used as in the treatment of paper when the conductor can be placed near the work, the tube will be perforated instead of slotted.

I claim:—

1. The herein described apparatus for removing static electricity which consists of a tube of conducting material connected to earth and having a longitudinal slot therein, a longitudinally disposed insulated conductor within said tube and means for supplying a high voltage charge to said conductor.

2. The herein described conductor for neutralizing static electricity which consists of a tube having one or more openings through the sides thereof, an insulating bushing at each end, a metal rod extending through said tube and said bushings and a tubular covering for said rod having projecting points for discharging high voltage electricity.

3. The herein described conductor for use in neutralizing static electricity which consists of a laterally perforated tube having extending longitudinally through it an insulated conductor composed of a metal rod having a tubular covering provided with projecting points for discharging high voltage electricity.

4. The herein described conductor for use in neutralizing static electricity which consists of a laterally perforated tube having a longitudinally disposed insulated metal rod therein, said rod having a tubular covering composed of a spirally wound strip of thin metal having sections cut and bent outward forming projecting points and edges from which the high voltage electricity discharges.

5. The herein described conductor for use in neutralizing static electricity which consists of a laterally perforated tube having a longitudinally disposed insulated metal rod therein, said rod having a tubular covering composed of a spirally wound strip of thin metal having angular slits in its edge forming pointed sections which are bent outward to form discharging points and edges.

6. The herein described conductor to be used for removing static electricity which consists of a perforated tube connected to earth, an insulated bushing in each end, a screw threaded metal rod extending centrally through said tube and said bushings, a nut on said rod on the inside and the outside of each bushing, one of said external nuts being of insulating material, a screw threaded stud screwed into the other external nut and abutting against the end of said rod, and a tubular covering for said rod having fine projecting points or surfaces.

7. The herein described conductor for discharging or radiating high voltage electricity consisting of a metal rod having a tubular covering composed of a spirally wound strip of thin metal having angular slits in its edge forming pointed sections which are bent outward to form discharging points or edges.

Signed at Portland, Maine this 24th day of March 1906.

WILLIAM H. CHAPMAN.

Witnesses:

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