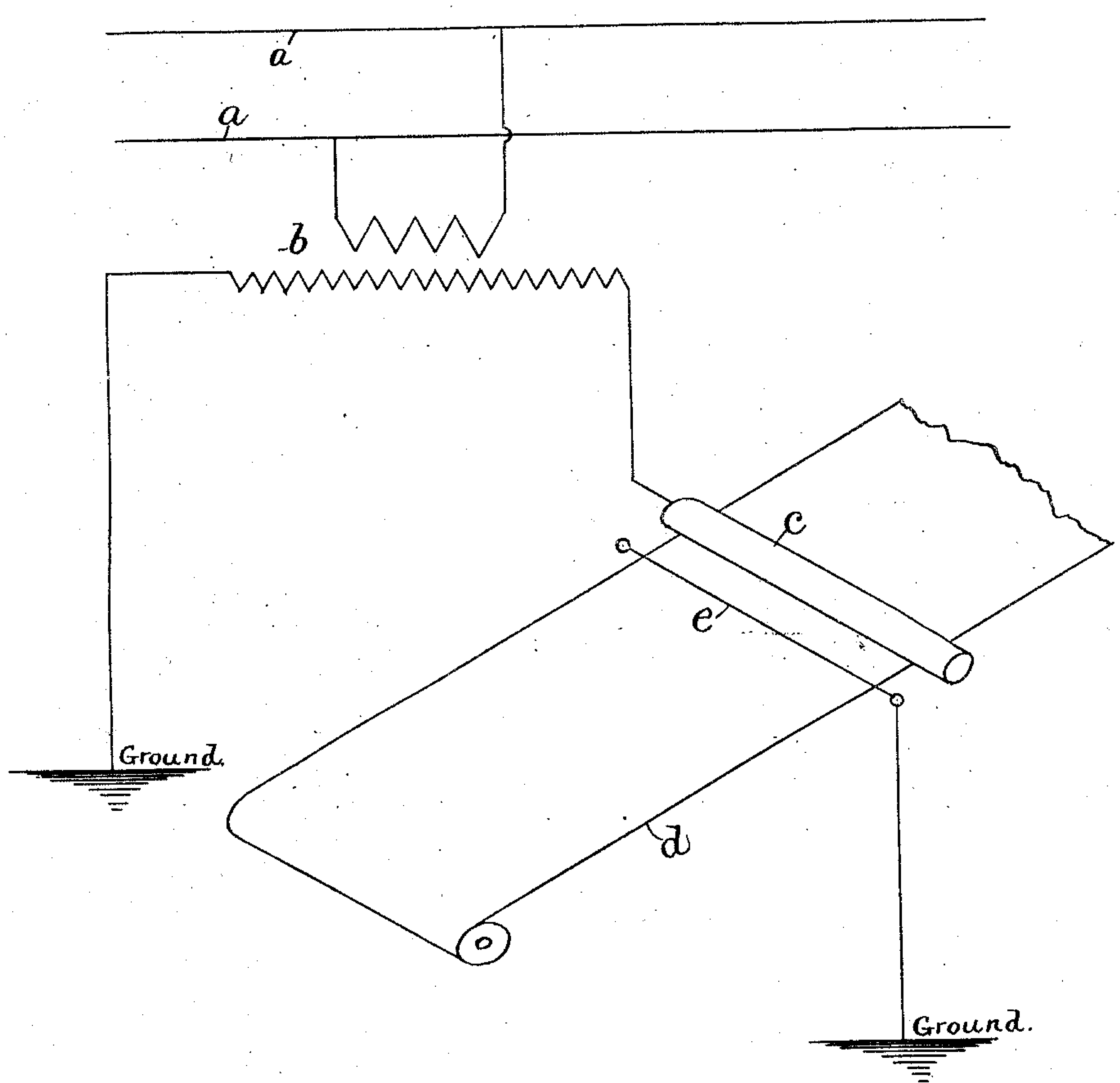
W. H. CHAPMAN.

METHOD OF REMOVING STATIC ELECTRICITY.

APPLICATION FILED JAN. 23, 1908.

983,536. Patented Feb. 7, 1911.



Witnesses:
Charles A. Johnston
Eleanor W. Dennis.

Inventor:
William H. Chapman
by S. W. Bates
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM H. CHAPMAN, OF PORTLAND, MAINE.

METHOD OF REMOVING STATIC ELECTRICITY.

983,536. Specification of Letters Patent. Patented Feb. 7, 1911.

Application filed January 23, 1908. Serial No. 412,231.

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, county of Cumberland, State of Maine, have invented certain new and useful Improvements in Methods for Removing Static Electricity, of which the following is a specification.

My present invention has for its object the removal of static electrical charges from any material where the presence of such charges is objectionable, as in the drawing and spinning frames in textile manufactories and it is an improved method of performing the process which is set forth in my United States Patent No. 777,598 dated Dec. 13, 1904. In that patent I showed a wire or other exposed conductor of small surfaces placed adjacent to the material and charged with an alternating potential by direct connection with a transformer or other source of alternating currents. This arrangement is in many cases impracticable because the parts of the machine are too crowded to admit of space to place the charged wire and keep it sufficiently separated from other metallic masses to avoid sparking across and its presence is also objectionable in many cases because as in spinning frames the operatives must frequently splice threads and would get their fingers in contact with the conductor, thus subjecting them to the spark that comes from such a charged conductor when touched.

My present invention consists in placing the material within an alternating electrostatic field and placing a conductor of small surface, like a fine steel wire also within the alternating electrostatic field and preferably in proximity to the material. The electrostatic field is obtained by placing an insulated conductor of considerable surface at any convenient point near the material to be treated and connecting it with a source of high voltage alternating electricity. This conductor, being designed merely to act by induction and establish an electrostatic field, it may be entirely enveloped in a very heavy insulating covering without detracting in the least from its efficiency in performing its function as inductor. The fine wire acted upon by induction from the inductor discharges first one kind of electricity and then the opposite kind into the air around it, and yet it is always in a neutral condition as compared with persons and things around it and will not emit sparks when touched and I have found that the wire under these conditions is just as efficient in carrying out the process as though it were directly charged by conducting connection with the transformer, the opposing charges drawn into the air from it by the influence of the conductor become free to neutralize the material.

At the instant the inductor is positive it causes the wire to discharge negative into the air, forming for an instant an air condenser in which a zone of air around the wire is one plate and the inductor is the other plate, separated by an insulating layer of air. At the next instant when the alternating charge on the inductor has dropped to zero this bound electric charge is set free and if we assume the material to have a positive charge the tendency to escape to the material and to neutralize it is much greater than is the tendency to escape to earth by reason of the fact that the tendency to discharge between two bodies is proportional to the square of the voltage between the two. But on the other hand when the inductor becomes negative it causes a discharge of positive from the wire into the surrounding air which when liberated has more tendency to escape to earth than it has to go to the positive material. Thus the sum of cycles becomes a constant series of neutralizing impulses. In placing the small conductor with relation to the material acted upon, I find that both must be within the electrostatic field with a body of unobstructed air between them, that is, any solid body inserted between the fine conductor and the material acted on forms a screen and interferes with the effective operation of the process.

I illustrate my invention by means of the accompanying drawing in which—

a represents an alternating circuit which may be an ordinary commercial lighting circuit and *b* is a transformer by which the current is raised to a high voltage as for instance 10,000 volts, which I have found to be effective. The transformer is connected with a conductor *c* of relatively large surface such as a metal tube bar or plate. The surface of the conductor is so formed as to prevent discharge of electric ions into the air, that is, it must be free from projecting points or small surfaces. It may be thoroughly insulated from all surrounding objects and it may be inclosed or covered with insulating material to make it safe or unobjectionable to persons coming in contact with it.

The material to be treated may be any material charged with static electricity such as paper, yarn, roving, etc. I have here represented a web of paper *d* passing adjacent to the conductor *e*. The alternating charge applied to the conductor *c* creates an alternating electrostatic field which extends from a considerable distance around it in all directions, its extent depending on the size of the conductor and the tension of the charge. Within this electrostatic field the material is placed or made to pass and also within the field is located a conductor of relatively small surfaces as a fine wire *e* connected with the ground or with a body of large static capacity. The wire is placed preferably adjacent to the material to be acted upon but it is more or less effective if placed anywhere within the electrostatic field provided there is no screen or obstruction interposed between the wire and the material, in which case the effect is destroyed. The conductor *e* may be of any size or shape and may extend over any size of surface as for instance it can be placed on the floor or above the same and thoroughly insulated and the wires can then be placed at any desired points about the machine so as to act on the material. By this method the fine wire which must be naked and cannot be insulated is rendered safe and free from sparking either from contact with persons or parts of the machines.

In practice I find it convenient to attach the fine wire to the insulating envelop of the inductor practically making it a part of the same structure so that they can be handled and located as one part.

I claim:—

1. The herein described method of removing static electricity from a body consisting of charging an insulated conductor of relatively large area the surfaces of said conductor being insulated with an alternating charge of high voltage, placing the body to be treated within the electrostatic field thus produced and placing a conductor of relatively small area within said field and connecting the same with earth, said small conductor being separated from said body by an unobstructed air space.

2. The herein described method of removing static electricity from a body consisting of charging an insulated conductor of relatively large area the surfaces of said conductor being insulated with an alternating charge of high voltage, placing the body to be treated within the electrostatic field thus produced and placing a conductor of relatively small area within said field and adjacent to said body and connecting the same with the earth.

In witness whereof I have hereunto set my hand this 2d day of January, 1908.

WILLIAM H. CHAPMAN.

Witnesses:

S. W. Bates,

Eleanor W. Dennis.