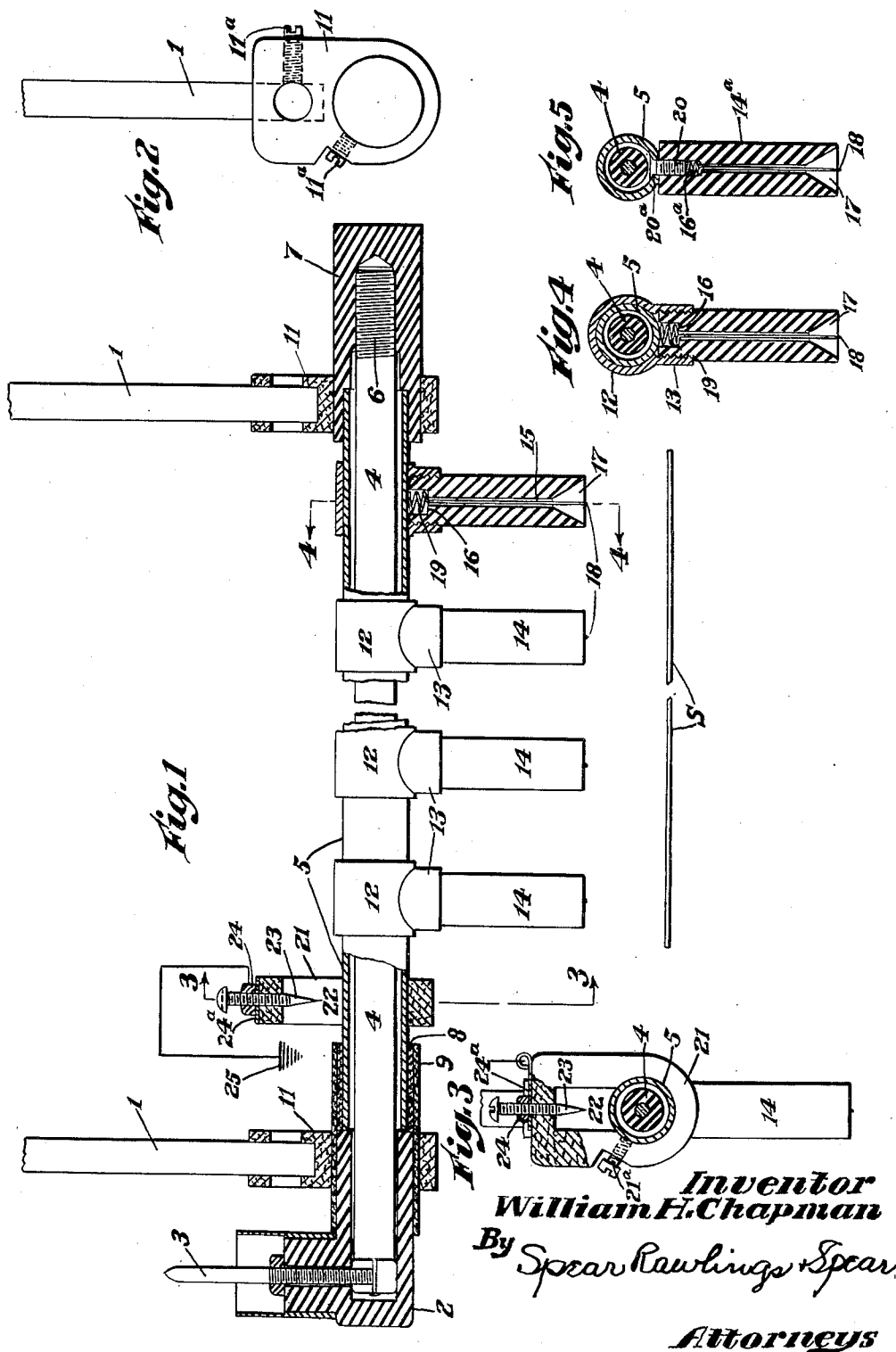


June 22, 1937.

W. H. CHAPMAN
NEUTRALIZING APPARATUS

2,084,968

Filed March 3, 1937



Inventor
William H. Chapman
By Spear Rawlings & Spear
Attorneys

UNITED STATES PATENT OFFICE

2,084,968

NEUTRALIZING APPARATUS

William H. Chapman, Portland, Maine, assignor
to Chapman Electric Neutralizer Company,
Portland, Maine, a corporation of Maine

Application March 3, 1937, Serial No. 128,837

10 Claims. (Cl. 175—264)

My present invention relates to methods and apparatus to control static electricity generated in the process of manufacture or in the printing of paper, textile fabrics, and the like.

5 The presence of static electricity has presented very real problems with the practical solution of which I have been for many years actively interested and as a result have developed and patented methods and apparatus for neutralizing static electric charges.

10 In the type of apparatus with which my present invention is concerned, a plurality of discharge points as required by the width of material to be treated are capacitatively connected to a source of high tension alternating current, all of which discharge points are provided with a grounded conductor near them. In such apparatus, the active discharge points effect an ionized atmosphere by which the static charges of the material under treatment are neutralized. As the discharge points are capacitatively connected to the source of alternating current, if there were no ground in operative proximity thereto, the static charge would collect and prevent the production of ions of the opposite polarity rendering the apparatus ineffective until the accumulated charge was allowed to escape.

20 The grounded conductor is, therefore, of real importance and attention is invited to certain of my patents in which different grounding means are shown. In my Letters Patent Nos. 1,653,599 and 1,841,323 I have shown the use of apparatus which includes an insulated conductor with which a plurality of discharge points are capacitatively coupled and which are held in desired relation to the conductor and to the grounded metallic tube. In my Letters Patent No. 1,787,188 I have shown a ground rod positioned parallel to and in working proximity to all the discharge points. Attention is also invited to my Letters Patent No. 1,782,712 relating to the control of the static electric charges, as, for example, by reversing the polarity of the initial charge of the material in anticipation of the influence of a mechanical factor which would impart a new charge of the same polarity as the original charge whereby neutralization at some point remote from the place available for the control apparatus is possible by varying the angular position of the ground bar in relation to the discharge points.

50 My present invention relates to an improved apparatus by which the static electricity may be effectively controlled. Included in the advantages of my invention are its simplicity and adaptability by the elimination of the rod type

of ground conductor or the means holding each of said discharge points in working proximity to their grounded conductor so that my novel neutralizing apparatus may be installed readily and grounded where desired. For example, certain types of printing presses make necessary the use of fingers, carrying the discharge points of sufficient length to reach past certain parts which prevent the location of a ground rod in proximity to their ends and necessitate the performance of the grounding function at some selected and accessible point.

5 In my invention, I utilize a metal tube containing the insulated cable, which tube carries a plurality of discharge points in contact therewith. The entire tube is served by a single ground discharge point located in proximity to the tube or by a single ground point in contact with the sleeve and in proximity to a grounded conductor or the discharge point and the grounded conductor may be located where desired away from the discharge tube so that the grounding of my apparatus may be effected where convenient and desired. Preferably, the ground discharge point is adjustable relative to the tube or the grounded conductor to effect a complete neutralization or reversal of the polarity of the static electric charge.

10 In the accompanying drawing, I have illustrated preferred embodiments of my invention of which drawing:

15 Fig. 1 is an elevation partly broken away of a neutralizing apparatus in accordance with my invention.

Fig. 2 is an end view of Fig. 1.

20 Fig. 3 is a partly sectioned view of Fig. 1 along the lines 3—3.

Fig. 4 is a similar view of Fig. 1 along the lines 4—4, and

Fig. 5 is a similar view showing a modified form.

40 I have indicated at 1 supporting rods or arms which are connected to the machine (not shown) which for purposes of discussion may be considered as a press for printing the sheets.

45 I have indicated at 2 a terminal bushing of a moulded insulation, which bushing is provided with a terminal pin 3 comprising one part of a bayonet type socket for connection to a source of high tension alternating current. The bushing 2 is formed to receive one end of the heavily insulated cable 4 in contact with the terminal pin 3, the cable 4 being carried within the steel tube 5.

55 The other end of the cable 4 is threaded as at 6 to enter the threaded hard rubber head 7. The head 7 is formed to receive one end of the steel

tube 5 while the fibre sleeve 3 on the tube 5 and the fibre sleeve 9 overlying the bushing 2 and the sleeve 3 support its other end.

Fibre clamps 11 are utilized to support the assembled apparatus on the steel rods 1 which clamps may be locked in position by the set screws 11a.

I have shown a plurality of metal sleeves 12 loosely mounted on the tube 5. Each of the sleeves 12 is formed with an internally threaded hub 13 adapted to receive a rubber finger 14 formed with an axial bore 15 having an enlarged recess 16 at its upper end and being outwardly flared at its lower end as at 17.

I provide in each one of the bores 15 of the fingers 14 metal discharge points 18 which include a spring head 19 which the enlarged recess 16 is adapted to receive and hold in contact with the metal tube 5. As shown in the drawing, the discharge points 18 protrude slightly from the rubber fingers 14.

In Fig. 5 I have shown a modified form of steel tube which is slotted longitudinally to receive screws 20 adapted to enter the interiorly threaded recess 16a of the rubber fingers 14a and to contact the spring head 19 of the discharge points 18. Thus, the rubber fingers 14 and 14a may be tightened or loosened to permit their desired disposition on the tube 5 relative to the moving sheets. The screws 20 are provided with flattened surfaces 20a adapted to fit the slot in the tube so that the screws 20 are held against turning.

At 21 I have shown a fibre member formed with an aperture 22 shaped to fit the tube 5 and to space from the tube 5 the steel grounding point 23 which is threaded through the check nut 24 and the fibre member 21 between which is positioned the metal clip connection 24a to a ground indicated at 25.

While this form of ground connection is preferred for many uses, it will be appreciated that it is but illustrative of the required function of the grounds. As the metallic points 18 are capacitatively coupled to the source of alternating current, a ground of this type is essential and services the entire metal tube 5 and accordingly each of the several discharge points 18.

It will be appreciated that if the metal tube 5 were directly grounded, it would be impossible to neutralize the static electric charge of the sheet S while if no ground were available, the static charge would accumulate on the active discharge points 18 and prevent the production of ions of opposite polarity. By adjustment of the point 23 relative to the tube 5 in accordance with the requirements of each situation, I am able to provide an air gap across which a "glow" or "corona" discharge takes place thus effecting desired results. Thus, with the point 23 a certain distance from the tube 5, the material S will be perfectly neutralized, while with the point 23 closer to the surfaces of the tube 5, the polarity of the charge of the sheet S may be reversed to a limited degree whereby small subsequent charges will be completely neutralized.

In my invention, it is immaterial where the air gap is located. As described, it may be between the steel tube 5 and the point 23. It may be between a point carried by the tube 5 and a ground member or the gap may be in the ground at a distance from the tube 5.

In accordance with my invention, the neutralization of the static electric charges of a moving sheet may be accurately controlled by my

device which is not only simple in construction, but is also very readily installed even in those machines where the obstruction of certain parts has constituted a seriously troublesome factor.

What I therefore claim and desire to secure by Letters Patent is:

1. In apparatus for controlling the static electricity of a moving sheet, an insulated conductor for connection with a source of high tension alternating current, a metallic member capacitatively connected to said conductor, a plurality of discharge points carried by said member, and means to ground said member, and said means including an air gap.

2. In apparatus for controlling the static electricity of a moving sheet, an insulated conductor for connection with a source of high tension alternating current, a metallic member capacitatively connected to said conductor, a plurality of discharge points carried by said member, said means to ground said member, said means including an air gap, and means for varying the width of said gap.

3. In apparatus for controlling the static electricity of a moving sheet, an insulated conductor for connection with a source of high tension alternating current, a metallic member capacitatively connected to said conductor, a plurality of discharge points slidably carried by said member, means to ground said member, said means including an air gap, and means for varying the width of said gap.

4. In apparatus for controlling the static electricity of a moving sheet, an insulated conductor for connection with a source of high tension alternating current, a metallic member capacitatively connected to said conductor, a plurality of discharge points loosely mounted on said member, and means to lock said discharge points in desired position on said member, means to ground said member, said means including an air gap, and means for varying the width of said gap.

5. In apparatus for controlling the static electricity of a moving sheet, an insulated conductor for connection with a source of high tension alternating current, a plurality of interconnected discharge points capacitatively connected to said conductor, and ground means connected to all of said discharge points, said means including an air gap.

6. In apparatus for controlling the static electricity of a moving sheet, an insulated conductor for connection with a source of high tension alternating current, a plurality of interconnected discharge points capacitatively connected to said conductor, and ground means connected to all of said discharge points, said means including a ground discharge point and a member normally spaced therefrom effecting an air gap, and means for varying the width of said gap.

7. In apparatus for controlling the static electricity of a moving sheet, an insulated conductor for connection with a source of high tension alternating current, a metallic member capacitatively coupled to said conductor, a plurality of discharge points connected to said member and a ground, said ground including a ground discharge point and a non-conductive support on said member to hold said ground discharge point in desired relation to said member.

8. In apparatus for controlling the static electricity of a moving sheet, an insulated conductor for connection with a source of high tension alternating current, a metallic member capacitatively coupled to said conductor, a plurality of dis-

charge points connected to said member, a ground, a non-conductive support on said member, a ground discharge point connected to said ground and mounted in air gap relation to said member in said support for adjustment relative to said member.

9. In apparatus for controlling the static electricity of a moving sheet, an insulated conductor for connection with a source of high tension alternating current, a metallic tube capacitatively connected to said conductor, a plurality of sleeves loosely carried by said tube, each of said sleeves including a hub, a finger for each sleeve having an aperture extending therethrough, a discharge point for each finger adapted to be carried by said finger within said aperture, each of said fingers and said hubs having interengaging threaded portions effective to permit said finger to be threaded in said hub to bear against said tube to hold said sleeve in desired position, and said discharge point being formed to be held by said finger against said tube, and a ground, said ground including an adjustable ground discharge point spaced from said tube to ground the single

polarity charge collected by all of said discharge points.

10. In apparatus for controlling the static electricity of a moving sheet, an insulated conductor for connection with a source of high tension alternating current, a metallic tube capacitatively connected to said conductor, said tube having a longitudinal slot, a plurality of fingers, a plurality of screw members carried by said tube in said slot, each of said fingers having an aperture extending therethrough, a discharge point for each finger adapted to be carried by said finger within said aperture, each of said fingers being threaded for engagement with one of said screws to permit said finger to be threaded to bear against said tube to hold said finger in desired position, and each of said discharge points being formed to be held by said finger in contact with said screw, and a ground, said ground including an adjustable ground discharge point spaced from said tube to ground the single polarity charge collected by all of said discharge points.

WILLIAM H. CHAPMAN.