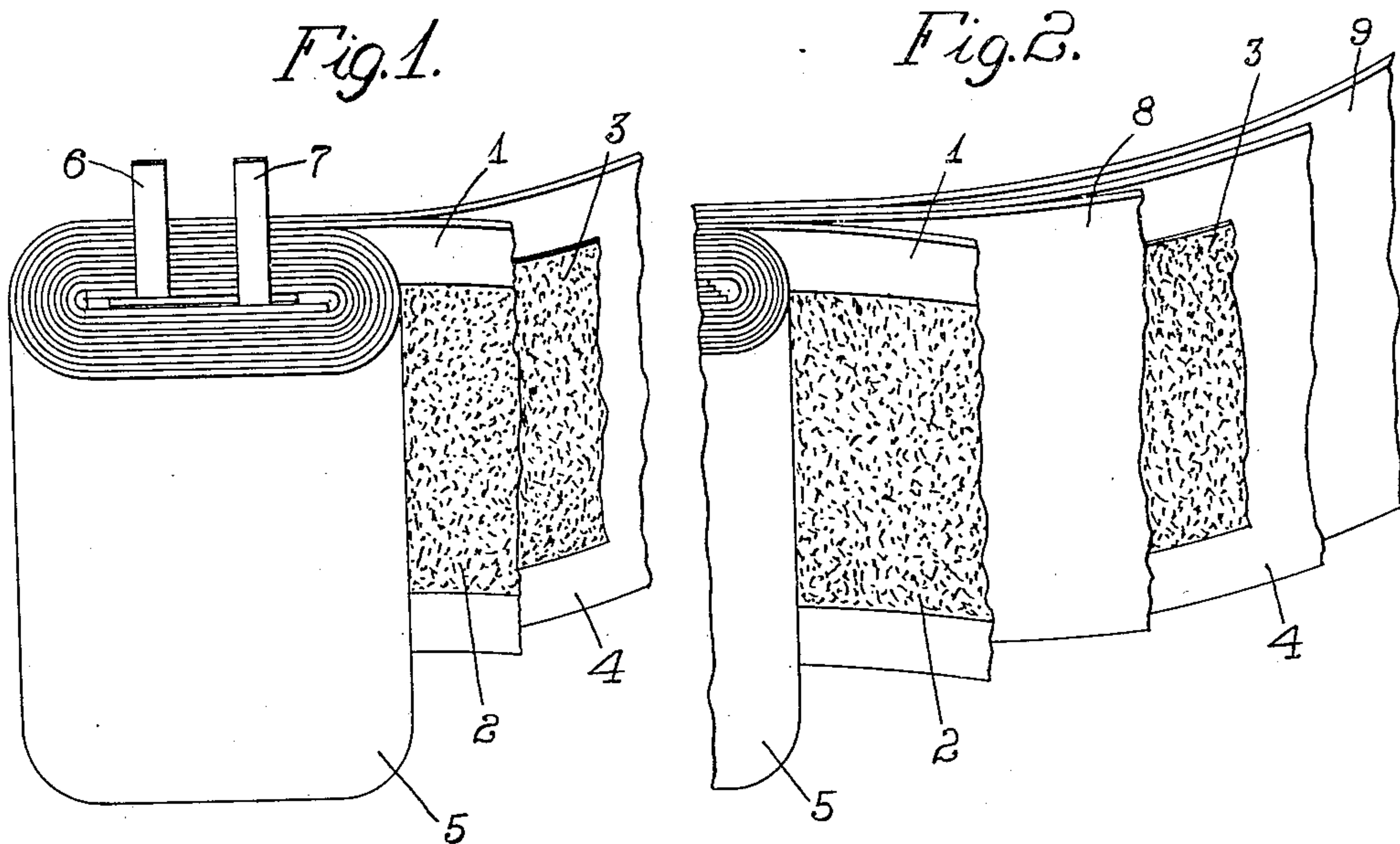


W. W. DEAN.  
ELECTRICAL CONDENSER.  
APPLICATION FILED JAN. 28, 1909.

965,992.

Patented Aug. 2, 1910.



Witnesses

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# UNITED STATES PATENT OFFICE.

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## ELECTRICAL CONDENSER.

965,992.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed January 28, 1909. Serial No. 474,772.

*To all whom it may concern:*

Be it known that I, WILLIAM W. DEAN, a citizen of the United States, residing at Elyria, in the county of Lorain and State of Ohio, have invented certain new and useful Improvements in Electrical Condensers, of which the following is a full, clear, and concise description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an electric condenser commonly used in connection with electrical apparatus, such as telephone exchanges, etc., in which it is desirable to store charges of electricity, as desired.

Heretofore in the art it has been customary to construct condensers of this class by assembling two metallic sheets or plates with interposed sheets or thicknesses of dielectric between them. It has been found convenient in the past to accomplish this result by using strips of tin foil to form the conducting surfaces and using strips of thin paper between the strips of tin foil to prevent their coming in contact, and winding the several strips together in the form of a roll, as a result of which a considerable amount of surface is available for retaining the electric charge.

In constructing condensers in the manner described, it has frequently happened in the past that particles of dirt or conducting matter would be wound in between the several layers of paper and tin foil in such a manner that the subsequent manipulation of the condenser in preparing it for use would cause the particles to puncture the dielectric between adjacent conducting surfaces and thus "short the condenser." It has been customary in the past to clear condensers of short circuits thus established by burning out the conducting path thus formed between the strips of tin foil by means of a bank of condensers which have been charged from a source of direct current or by applying the direct current to the terminals of the condenser to be cleared. In many cases this process fails to clear the condenser of the short-circuit owing to the fact that the conducting path between the layers of tin foil permits a sufficient current to flow to melt a considerable quantity of the foil before the conducting path is burned out, as a result of which the tin runs together through the opening formed in the dielectric and a perma-

nent short-circuit is the result, which cannot be burned out, and the condenser must be thrown away.

It is an object of this invention to improve the construction of electrical condensers in such a manner that a sufficient amount of metal is not available during the burning out process to permanently short-circuit the metallic conducting surfaces of the condenser. This I accomplish by using but one strip of tin foil and in combination with such strip, to constitute the second conducting strip of the condenser, a strip of thin paper to one side of which conducting material in finely divided condition is so applied that it forms a continuous conducting surface. The strip of tin foil and the coated strip of paper are wound together in the form of a roll in accordance with any of the well known ways for accomplishing this result, strips of thin paper being used to prevent either of such conducting surfaces coming in contact with the other conducting surface. After the rolls are formed, the condenser may be finished in any of the well known ways common in the art, which are not indicated in detail here since they form no part of this invention.

As a result of the improved construction described, the amount of metal which is subject to the heating action of burning out a short-circuit is greatly reduced and short-circuits that would otherwise permanently short-circuit the condenser and destroy the same by the burning out process, as described above, may be readily removed since the amount of metal melted in the process is very small comparatively and comes almost entirely from the strip of coated paper. The improvement resulting from this is of great value, especially in connection with telephone work, since in such work condensers are frequently mounted together in considerable number, and it is frequently necessary to burn out short-circuits in these condensers after they are placed in use, since the imperfections were not of a serious enough nature to give any indication of their presence at the time of testing the condensers at the factory. The possibility of clearing these condensers of short-circuits that may develop in this manner is a great advantage. Furthermore, condensers constructed in accordance with my invention are very much less liable to be short-cir-



cuted by the accidental puncturing of the dielectric by the accidental application of high voltage ringing current or accidental crossing of the conductors connected to the  
5 condensers with high voltage power circuits.

In constructing my improved condenser the strip coated with finely divided conducting material may be prepared and used in a number of ways, as, for instance, the strip  
10 may be coated on both sides, if desired, and one side may be placed directly in contact with the strip of tin foil, and thus serve to establish a more intimate relationship between the two conducting surfaces of the  
15 condenser, or, if desired, two strips of the coated paper may be employed and placed face to face to constitute, in effect, a single conducting surface.

It is to be understood that with any of the  
20 constructions described, additional strips of paper may be used between the conducting surfaces to furnish any desired dielectric strength.

The drawings illustrating my invention  
25 are as follows:

Figure 1 shows, in perspective, a roll formed by winding a single strip of coated paper, a strip of tin foil and a single strip of plain paper together in such a manner  
30 that the conducting surfaces are kept entirely separate from each other; Fig. 2 shows an arrangement similar to Fig. 1 in which an additional sheet of plain paper is used to afford further separation between  
35 the conducting surfaces.

Similar numerals refer to similar parts throughout the views.

As shown in Fig. 1 a strip of paper 1 is coated, as indicated at 2, with a conducting  
40 material in finely divided condition in such a manner that there is a portion of the strip along each edge that is not coated. The conducting material may consist in finely divided tin or any other suitable material  
45 that possesses high electrical conductivity and that may be reduced to finely divided condition. A strip of tin foil 3 of practically the width of the coating 2, and a strip of plain paper 4 are wound with the coated  
50 strip 1 into a roll 5, in such a manner that the strip of tin foil 3 has, on each side of it, a plain uncoated surface of paper, as a result of which the strips of paper 1 and 4 serve to prevent the strip of tin foil 3 coming in contact with the coating 2, either directly or as a result of the winding. Suitable terminals 6 and 7 are secured to the inner ends of the conducting surfaces 2 and 3 by means of which connections may be  
55 made to the terminals of the condenser when the same is finished for use.

The arrangement shown in Fig. 2 is similar to that shown in Fig. 1 with the difference that additional strips of paper 8 and  
65 9, are used on the two sides of the strip of

tin foil 3, as a result of which the conducting surfaces of the condenser are separated more thoroughly from each other, or, in other words, the electrical insulation between such surfaces is greater than with the  
70 arrangement shown in Fig. 1.

It is to be understood that the rolls formed in accordance with any of the arrangements described above may be subsequently treated in any of the well known  
75 ways, as, for instance, boiling in paraffin, pressing, placing in suitable cases, and the like by which the finished condenser is produced. These subsequent steps in the construction of the condenser, however, form  
80 no part of the present invention, which consists essentially in the construction and arrangement of the strips forming the condenser.

While I have shown my invention in the  
85 particular embodiment herein described, I do not, however, limit myself to this particular arrangement, but desire to claim any equivalent arrangement that will suggest itself to those skilled in the art.  
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What I claim is:

1. In an electrical condenser, the combination of a strip of paper coated on one side with finely divided conducting material, said strip of paper adapted to act as an insulator  
95 at low voltages, but adapted to be punctured at high voltages, said finely divided conducting material adapted to be dissipated at the puncture to isolate said puncture from the remaining finely divided conducting material and a strip of low resistance metallic foil all wound together in the form of a roll, the strip of paper being interposed between the layer of finely divided material and the foil and terminals connected one to  
100 the metallic foil and one to the finely divided conducting material.

2. In an electrical condenser, the combination of two conductors and an insulator, said insulator being puncturable at high voltages  
110 to permit a discharge of electricity between said conductors, one of said conductors composed of a relatively high resistance surface of finely divided conducting material, the finely divided conducting material in the vicinity of a puncture adapted to be dissipated by a high voltage discharge to isolate the puncture from the undissipated surface of said material, said second conductor consisting of a low resistance metallic surface,  
115 which is undisturbed by the discharge which punctures the said insulator and dissipates the finely divided conducting material and a plurality of strips of insulating paper, all wound together in the form of a roll, the  
120 insulator being between the conductors and a strip of paper on the outside of each conductor and terminals, one connected to each conductor.

3. In an electrical condenser, the combina- 130



tion of two conductors, and an insulator therebetween, the insulator being of a greater area than the conductors, said insulator being puncturable at high voltages, one  
5 of said conductors consisting of a strip of finely divided conducting material adapted to be dissipated by a high voltage discharge when the insulator is punctured, thereby to isolate the puncture from the remaining  
10 conducting material, the other of said conductors consisting of a strip of low resistance metallic foil, which is not disturbed by the said high voltage discharge, said strips being placed together with the edges of the  
15 strip of paper projecting beyond the edges of the foil and the whole wound together in the form of a roll and a terminal for each of said conductors.

4. In an electrical condenser the combination of a strip of paper coated on one side with finely divided conducting material, a strip of low resistance metallic foil, the finely divided conducting material adapted to be dissipated at temperatures at which the

foil is undisturbed, the two wound together 25 in the form of a roll with the paper between the metallic surfaces and terminals for each conductor.

5. In an electrical condenser the combination of a plurality of strips of paper, one of 30 which is coated on one side with finely divided conducting material, a strip of low resistance metallic foil, the finely divided conducting material adapted to be dissipated by electrical discharges, by which the metallic foil is undisturbed, said strips being 35 wound together in the form of a roll, a strip of paper being placed between the strips of conductors and a second upon the outside of the same and a terminal for each 40 conductor.

In witness whereof, I hereunto subscribe my name, this 21st day of January, 1909.

WILLIAM W. DEAN.

Witnesses:

A. D. T. LIBBY,  
W. B. MANSON.