

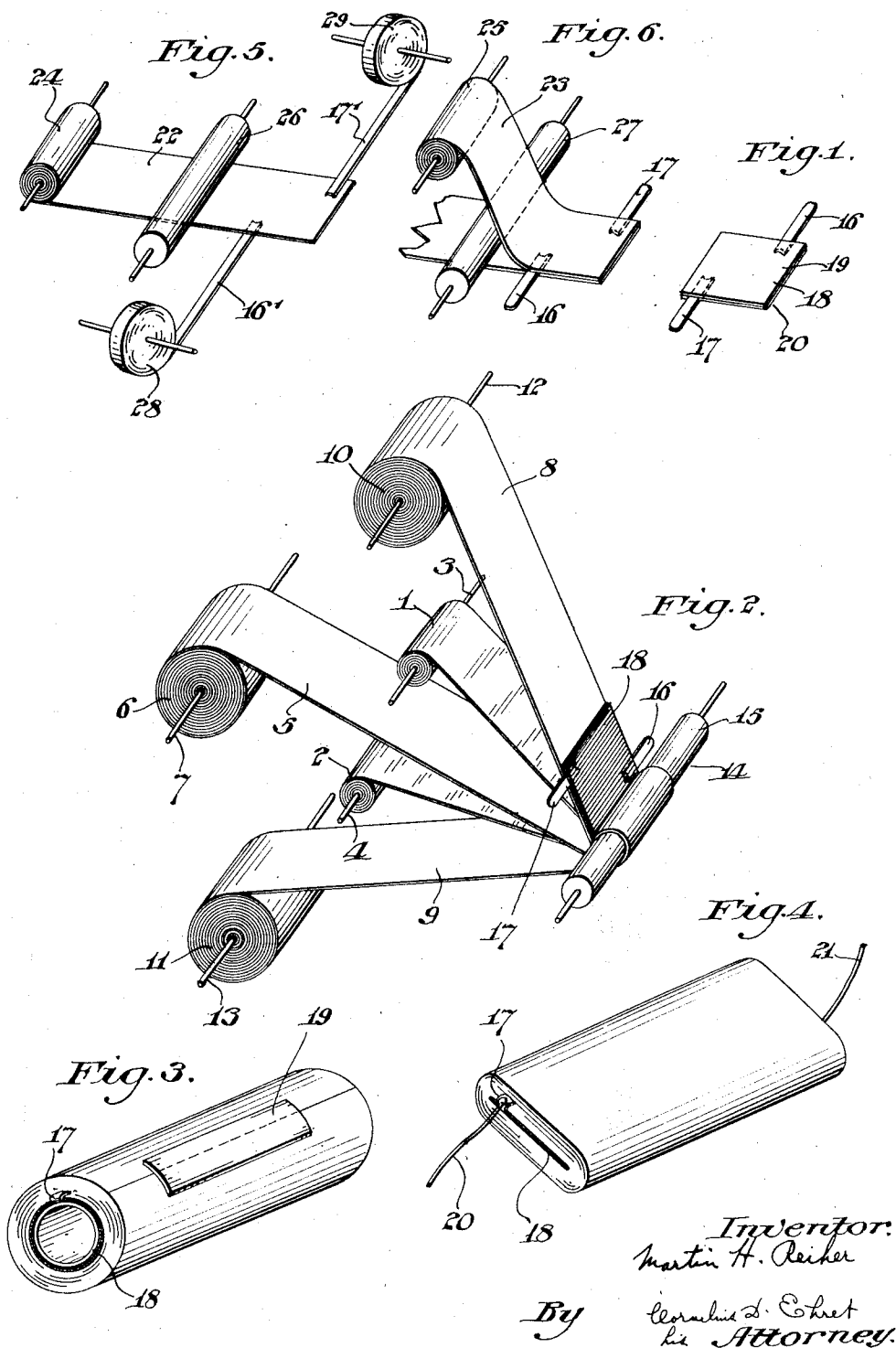
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ELECTRIC CONDENSER

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ELECTRIC CONDENSER

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My invention relates to electric condensers of the paper-foil type used in filter and bypass circuits of radio receiving apparatus, for example, and more particularly to connection of the condenser foil to leads or conductors extending therefrom exteriorly of the condenser.

Hithertofores strips of metal foil interposed between and separated by strips of paper or the like have been wound to form condensers, and during the winding operation conductive strips, as of foil ribbon, were removed by an operator from a supply thereof, wiped over an adhesive coated surface and placed between the paper strips in contact with the foil strips, the adhesive coated sides of the ribbon engaging paper. It often occurred that the connectors were wrinkled, twisted or otherwise bent resulting in weak spots in the condensers responsible for their subsequent break-down in service.

In accordance with my invention the terminal strips of a condenser are all secured to a card of suitable flexible insulating material, specifically between two pieces of paper adhesively secured to each other. During the winding of a condenser the terminal card is wound into the condenser, the operator folding the free ends of the foil strips into engagement with the condenser foil. The necessity of handling delicate, adhesive-coated foil ribbon is avoided with the result that the terminal strips within the condenser are flat. Condenser breakdown from deformed terminal strips has been reduced to practically negligible value by the use of terminal cards. In addition, the total time of the winding operation has been substantially reduced.

Further in accordance with my invention, the condenser terminal cards are preferably formed by effecting a relatively adhesive condition of two paper strips, for example, by moistening gum-coated strips which are subsequently brought into engagement with one

another, and prior to their engagement interposing therebetween a suitable number of narrow metal foil strips, preferably cut from rolls of foil ribbon, leaving suitable length of the strips projecting outwardly from the paper strips; after engagement of the coated strips, by a cutting operation, the completed terminal card is severed and becomes a distinct unit.

My invention further resides in methods and structure hereinafter described and claimed.

For an understanding of my invention reference is to be had to the accompanying drawings, in which:

Fig. 1 discloses in perspective a condenser terminal card.

Fig. 2 diagrammatically represents condenser winding apparatus, with the terminal card of Fig. 1 in position.

Fig. 3 shows in perspective the completely wound and partially finished condenser.

Fig. 4 in perspective illustrates the condenser of Fig. 3 subsequent to a flattening operation and with leads connected to the terminal strips.

Figs. 5 and 6 represent diagrammatically and in perspective successive steps of a method of producing the terminal card of Fig. 1.

Referring to Fig. 2 the rolls 1, 2, of metal foil, as tin foil, lead foil, copper foil ribbon or the like, are supported by rods or shafts 3, 4, respectively, the foil strips therefrom extending on opposite sides of a strip 5 of one or more layers of paper or other flexible insulating material herein generically termed paper, removable from a roll 6 thereof supported by rod or shaft 7. Similar strips of paper 8 and 9 are removable from rolls 10 and 11 supported respectively upon rods 12, 13 or equivalent.

The operator usually begins the winding operation by securing the ends of the paper strips in any suitable manner to the mandrel or form 15 and winding several layers of

paper thereon. Narrow elongated strips of foil ribbon were removed from a loose supply thereof, and after being wiped over a sponge or other adhesive-coated surface, were brought into engagement with the paper upon the forms with substantial length thereof extending from the paper.

Thereafter the ends of the foil rolls 1 and 2 were inserted between the paper strips in the position indicated in Fig. 2, and after the winding operation had proceeded to some extent, the operator stopped the mandrel and reversely bent the free ends of the strips of foil ribbon into engagement with the condenser foil strips.

Investigation of condenser breakdowns revealed that in many instances the failure was due to connecting strips or terminals that had been bent or twisted during winding of the condenser. The nature of the terminal strips made it difficult for an operator always to make their reversely bent portions lie flat against the condenser foil, and the sharp corners of their ends caught by the paper upon resumption of winding fractured or weakened the paper, destroying or lessening its dielectric properties. This latent defect could be discovered only upon breakdown of the condenser in service or on the test bench at which time it could not be rectified. The scrapping of the defective condensers represented a loss of condenser materials and of the labor producing the condensers.

Referring to Fig. 1, the condenser terminal strips 16, 17 are mounted upon a card structure 18 of suitable insulating material, as paper, preferably substantially corresponding in length to the circumference of the mandrel. In the specific form shown the foil strips 16, 17 are secured between two pieces 19, 20 of gummed paper for greater ruggedness.

Again referring to Fig. 2, at any desired stage of the winding operation but preferably before insertion of foil from rolls 1 and 2, the mandrel is stopped and the terminal card 18 positioned upon the upper surface of one of the condenser strips, preferably the paper strip 8, with the terminals 16, 17 extending transversely thereof. As indicated the width of the terminal card corresponds substantially to that of the paper strips.

Thereafter the portions of the terminal strips 16, 17 extending beyond the terminal card are bent over the edges of paper strips and tucked inwardly into engagement with the foil strips 1 and 2, the operator, if necessary or desirable, rotating the mandrel 15 to bring the strips to position facilitating the operation.

As the terminal card 18 holds the strips 16, 17 in proper relation with sufficient length extending beyond the paper strips 8 and 5 to insure good connection with the narrow foil strips 1 and 2 respectively, and as the pro-

jecting ends of the strips which are engaged by the operator are dry, there is no difficulty in effecting flat face to face engagement of the foil strips 1, 2 and the terminal strips 16, 17. The paper of the terminal card is sufficiently stiff to retain its shape during handling yet flexible enough to permit winding of the card into the condenser. The prolific causes of condenser breakdown incident to the prior art method of manufacture are thus not only avoided, but it is actually more simple to produce my condenser as the separate handling and individual positioning of condenser terminal strips are avoided.

After tucking in of the connectors 16, 17, the condenser is wound to attain the desired capacity, the foil strips 1, 2, cut, and the winding preferably continued for a short time utilizing only the paper strips 5, 8 and 9. The ends of the paper strips 5, 8, 9 are held by a tab or sticker 19 to prevent unrolling of the wound condenser. The condenser at the conclusion of the winding operation is slipped from the mandrel 15 for subsequent operations forming no part of the present invention. For example, the wound condenser, Fig. 3, is pressed or flattened to assume the appearance of a flattened roll, Fig. 4. Conductors 21, 21 are soldered to the exposed portions of the terminal strips 16, 17.

I prefer to make the terminal cards by feeding strips 22, 23, Figs. 5 and 6, from rolls 24, 25, the strips passing into engagement with the adhesive-applying or moistening rolls 26, 27, respectively. The ends of the narrow strips 16', 17' of foil ribbon removed from rolls 28, 29 thereof are pressed into engagement with the adhesive surface of strip 22, for example. The ribbons are thereafter cut to form the conductor terminal strips 16, 17 leaving sufficient length projecting beyond the strip 22 to insure substantial area of contact therebetween and the condenser foil. Preferably subsequent to the ribbon cutting operation, strip 22 is fed into engagement with strip 23, the adhesive side of the latter engaging the upper face of strip 22 and of the terminal strips 16, 17. Thereafter the composite strip with the connectors securely held thereto is cut to suitable length to form the terminal card assembly of Fig. 1.

The width of the terminal card, and the number and free length of the terminal strips, etc. are determined by the dimensions, number of plates, etc. of the condenser with which it is to be associated.

While I prefer to use a terminal card of the construction disclosed and made as above described, it will be understood that it may be otherwise produced and may vary in construction without departing from the spirit of my invention.

What I claim is:

1. A condenser comprising a roll of alter-

nate layers of paper and foil, and a terminal card wound into said roll comprising terminal strips held between flexible insulating material and reversely bent into engagement
5 with said foil during winding of the condenser.

2. A rolled condenser comprising a roll of alternate layers of paper and foil, and a terminal card unit wound in said condenser
10 and comprising two strips of paper adhesively secured to each other and securing at least one terminal strip therebetween, said terminal strip projecting from said paper strips externally of the condenser and re-entering
15 the condenser for engagement with said foil.

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