

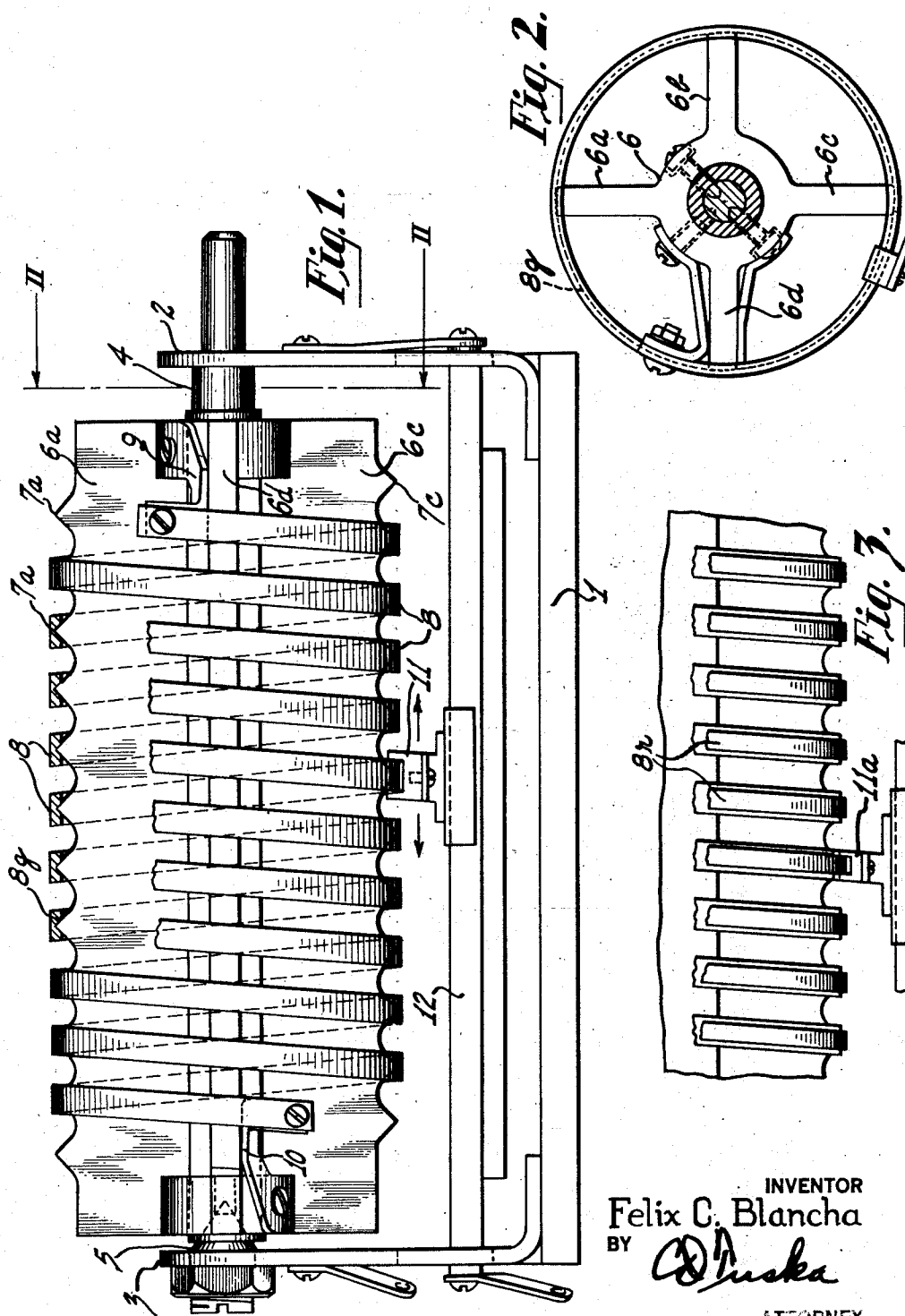
Jan. 31, 1950

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2,496,034

INDUCTOR

Filed Jan. 5, 1946



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UNITED STATES PATENT OFFICE

2,496,034

INDUCTOR

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Application January 5, 1946, Serial No. 639,463

3 Claims. (Cl. 171-242)

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This invention relates to inductors and particularly to improvements in variable inductance devices for use in the frequency determining circuits of radio transmitters, industrial oscillators and analogous (i. e. high and ultra high frequency) apparatus.

The usual inductor designed for use in high frequency circuits comprises a ceramic coil form and a space-wound ribbon-like conductor mounted on the form with one edge of the conductor, or one of its major faces, embedded in, or presented to, the ceramic. In such inductors there is a considerable volume of ceramic material in the space between adjacent turns of the coil and this ceramic material is subjected to a more or less intensive electric field when the coil is energized. The presence of the ceramic material in the field between adjacent turns of the coil results in loss of power by absorption and, because of the short "leakage path," between the turns, limits the permissible voltage per turn. The permissible voltage is further limited in prior variable inductors by the use of trolley-wheel and similar taps which partly encircle the conductor and extend into the space between the coil turns, thus reducing the arc-over distance between the said turns.

Accordingly, the principal object of the present invention is to minimize the foregoing and other less apparent objections to present day inductors and to provide an inductor of improved electrical efficiency.

Another and related object is to provide an improved space-wound coil, and insulating form therefor, having a long "leakage path" between the turns of the coil, and one characterized by the absence of power absorbing material between the said turns.

The invention will be described in connection with the accompanying drawing, wherein

Fig. 1 is a side elevational view, partly in section, of a continuously variable inductor constructed in accordance with the principle of the invention; Fig. 2 is a sectional view taken on the line II-II of Fig. 1 and Fig. 3 is a fragmentary elevational view showing an alternative form of conductor and variable tap, within the invention.

In the drawing, wherein like reference characters designate the same or corresponding parts in all views, 1 designates an insulating chassis base having upstanding front and rear metal panels or brackets 2 and 3, respectively, within which a pair of oppositely located stub-shafts 4 and 5 are journaled for rotation. These shafts 4 and 5 support a coil form which, as shown more

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clearly in Fig. 2, comprises an insulating core or body portion 6 and a plurality (in this case, four) of outwardly extending, preferably integral, ceramic fins or ribs 6a, 6b, 6c, 6d which extend along the full length of the core and define an imaginary cylinder whose axis is the center of the core. It will be observed upon inspection of Fig. 1 that each of the ribs 6a, 6b, etc. is provided, in accordance with the invention, with a riser which terminates in a beveled edge 7a (7b etc.), and that the edge of each rib is off-set longitudinally with respect to the edge on the adjacent rib in such a way that the edges on all of the ribs lie in the locus of a helix whose axis is the center of the core portion 6 of the coil form. These helically arranged beveled edged risers 7a, 7b etc. serve as a support for a space-wound coil 8 whose opposite ends are connected, as by means of straps 9 and 10, to the grounded stub shafts 4 and 5, respectively. The coil 8 comprises a ribbon-like conductor, such as copper or silver-plated copper, and is provided in accordance with the invention with a groove 8g which extends along the center of the inner surface of the conductor so that it may be seated, as with a force fit, upon the beveled ends 7a, 7b etc. of the risers 6a, 6b, etc. It will be observed that, when the coil 8 is mounted in the manner above described with only the grooved center portion 8g of the conductor 8 in contact with the coil form there is no insulating material, other than air, in the space immediately between adjacent turns of the conductor and that the "leakage space" between adjacent turns of the coil is increased (by substantially the width of the conductor) without any increase in the actual spacing of the said turns. This results in a large reduction in the power lost by absorption in the insulating material and in a very substantial decrease in the distributed capacitance of the assembly, and permits the use of higher voltages, per turn, without incurring any losses due to leakage.

In the embodiment of the invention shown in Figs. 1 and 2 the helix 8 comprises a flat, relatively thin strip of metal which, aside from the mounting groove 8g on its inner surface, is similar to the ribbon-like conductors heretofore employed in variable inductors. In this case the variable tap or trolley for varying the effective length (and hence the effective inductance) of the coil may be of the conventional design shown in Fig. 1. That is to say, the tap may comprise a V-shape conductor 11 (or a trolley-wheel, not shown) which is mounted for slideable movement

along a monorail 12 beneath (or above) the helix and in contact with the ribbon 8. In this case it is of course necessary that the edges of the ribbon 8 be received within the U (or within the groove of the trolley) so that rotation of the coil about its axis will produce the desired longitudinal movement of the tap 11 on its track 12.

Although the conventional form of conductor and slideable tap described above is satisfactory for many applications it is subject to one real disadvantage when the coil is operated at very high voltages. That is to say, the presence of the upstanding arms of the U in the space between the turns of the coil reduces the effective distance between the said turns and increases the possibility of an arc-over between the terminals of the U and the next adjacent coil turns. Accordingly, referring now to Fig. 3, in order to utilize fully the advantages afforded by the point-mounted coil of the invention it is preferable to provide the conductor 8 with a central protuberance or rib 8r, throughout its length, and to limit the overall width of the sliding contact (which is here designated 11a) to the width of the conductor. In this case, as clearly shown in Fig. 3, the distance between the arms of the groove (or U) in the contact 11a corresponds substantially to the width of the rib 8r which is received therein. It should be noted that the resulting decrease in the possibility of establishing an arc between the tap and the adjacent turns of the coil is achieved without any decrease in the current carrying capacity of the coil and without impairing the ability of the tap to follow the turns of the coil.

It will now be apparent that the present invention provides an improved space-wound inductor of improved electrical efficiency and one characterized by the absence of power absorbing conductive and dielectric materials in the space between the coil turns.

What is claimed is:

1. The combination with a rotatably mounted helical inductor comprising a space wound conductor, of a tap of a width no greater than that of said conductor mounted for movement in reg-

ister with said conductor along a line parallel to the axis of rotation of said coil, said space-wound conductor comprising a ribbon-like member having a central rib on the surface thereof which is presented to said movable tap, and said tap comprising a U-shape member within which said central rib is received.

2. An inductor comprising a coil form including a core having a plurality of circumferentially spaced longitudinally extending insulating ribs thereon, each of said ribs having a plurality of longitudinally spaced beveled edges thereon with the beveled edges of each rib in the locus of a helix whose axis is the center of said core, and a space-wound ribbon-like conductor having a central complementary-shaped groove within which said beveled edges of said ribs are received along the path of said helix.

3. In combination, a coil comprising a spaced-wound ribbon-like conductor having a longitudinally extending centrally located groove on its inner surface, and a coil form comprising a plurality of insulating ribs each terminating in an edge having a contour corresponding substantially to that of said groove, said edges of said insulating ribs being received within the said groove of said ribbon-like conductor.

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