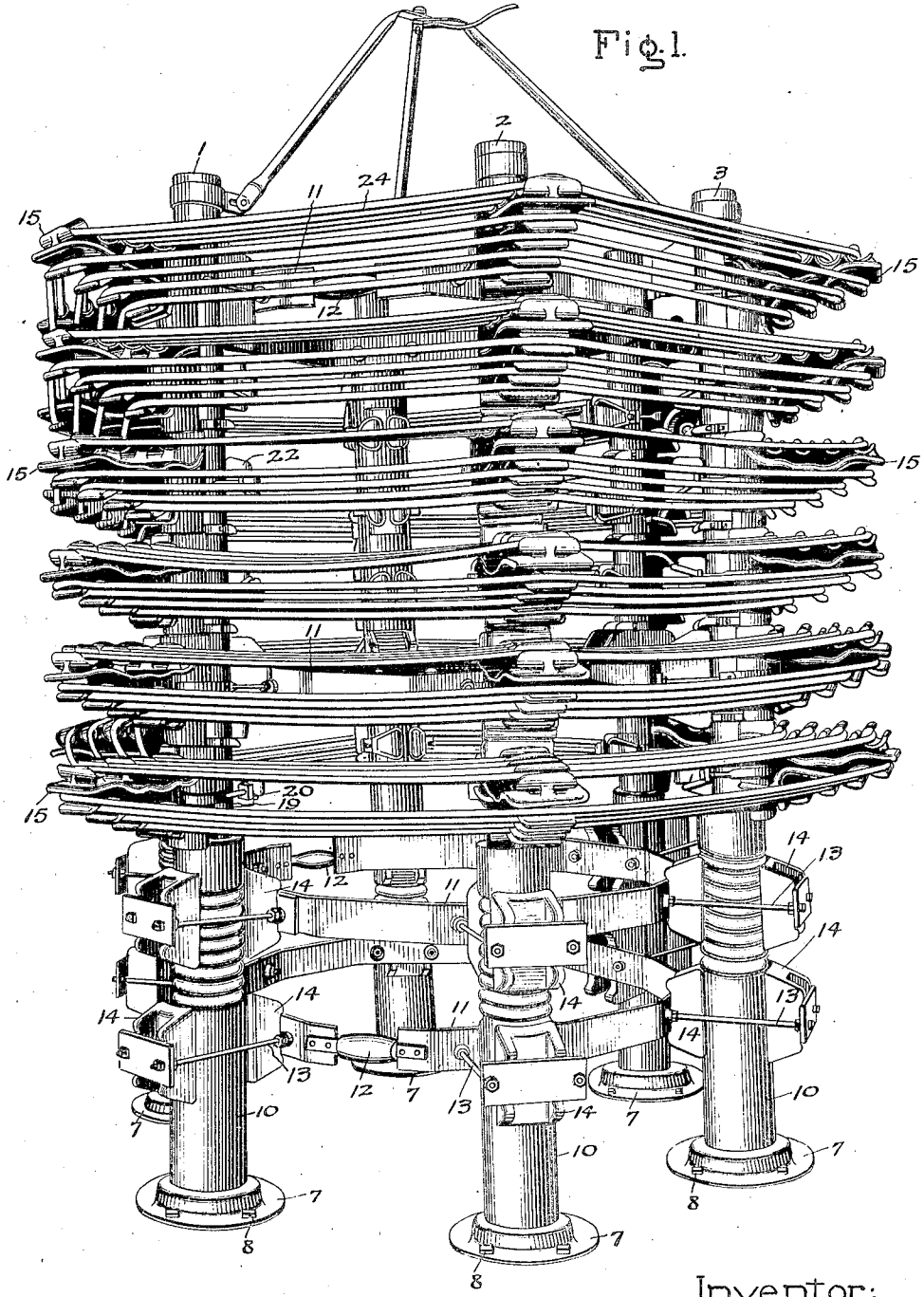
Dec. 13, 1927. 1,652,938

E. M. HEWLETT

INDUCTANCE COIL

Filed Sept. 18, 1923 3 Sheets-Sheet 1

Fig. 1.



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INDUCTANCE COIL

Filed Sept. 18, 1923 3 Sheets-Sheet 2

Fig. 2.

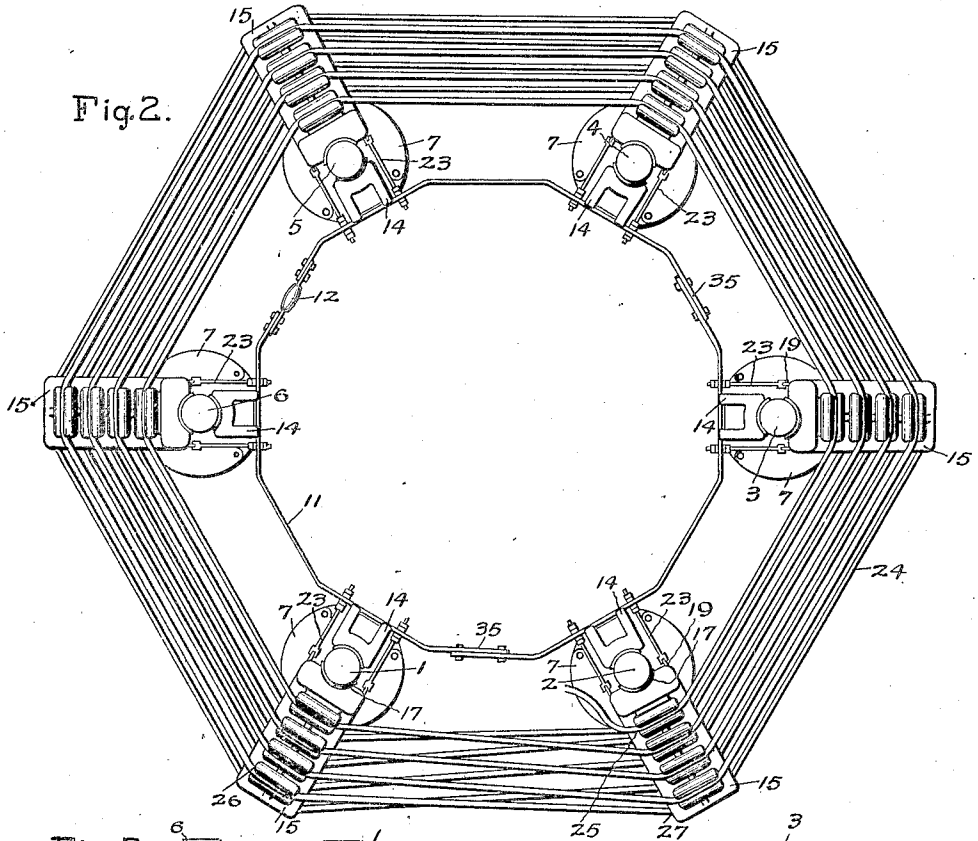


Fig. 3.

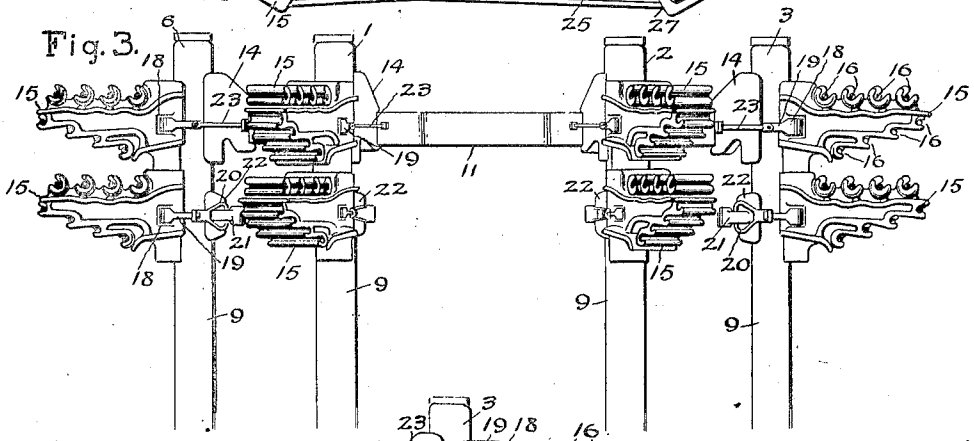
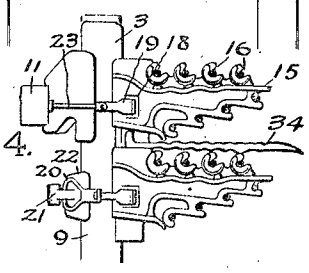


Fig. 4.



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Filed Sept. 18, 1923 3 Sheets-Sheet 3

Fig. 5.

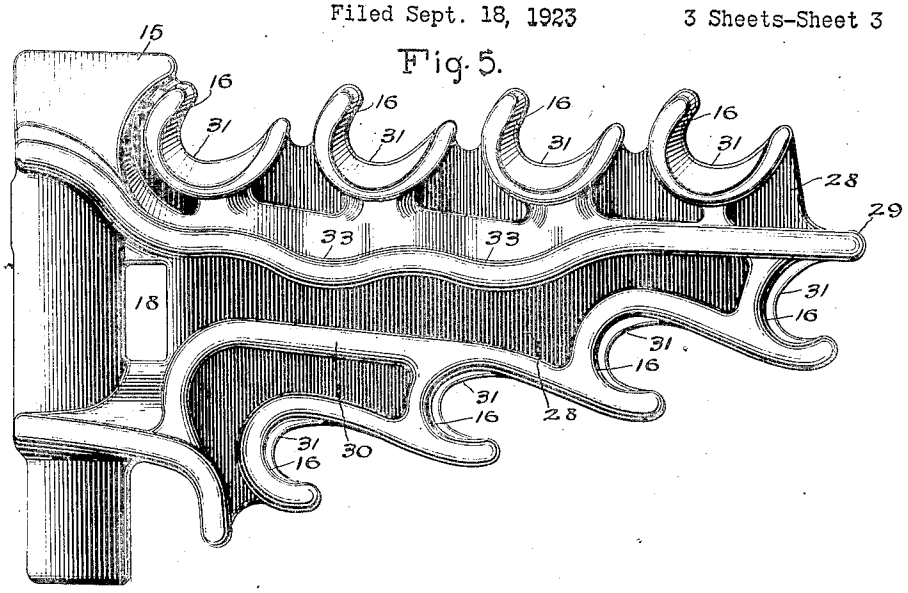
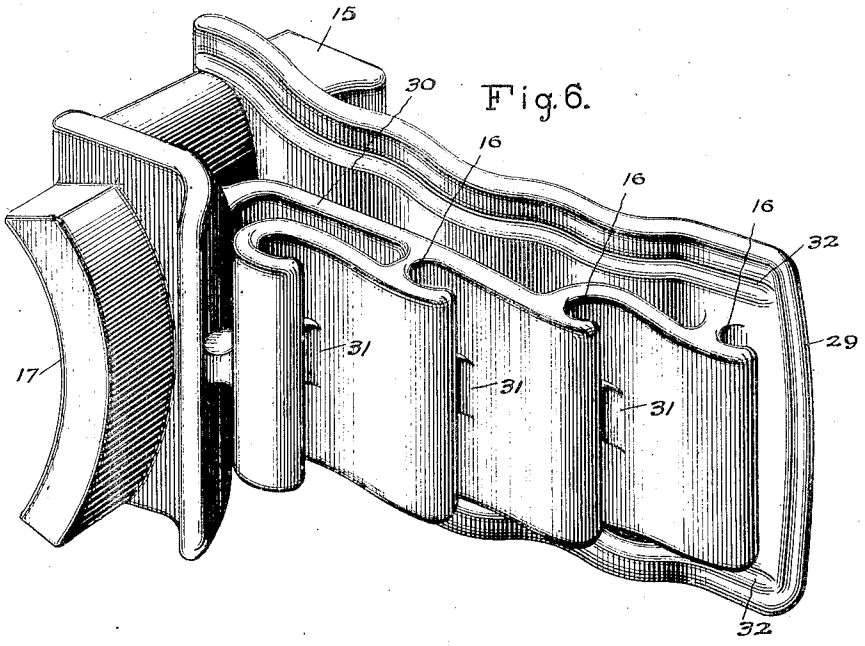


Fig. 6.



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Patented Dec. 13, 1927. 1,652,938

UNITED STATES PATENT OFFICE.

EDWARD M. HEWLETT, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

INDUCTANCE COIL.

Application filed September 18, 1923. Serial No. 663,509.

My present invention relates to the construction of inductances, and more particularly to inductances which are especially adapted for use in radio signaling systems of high power.

One of the objects of my invention is to provide a simple and reliable construction for an inductance coil which is adapted for use with large currents and high voltages. Another object of my invention is to provide a coil construction which will be adapted for use without any protective housing in situations where the coil is exposed to the elements. Still another object of my invention is to provide an efficient means for spacing and insulating from one another the separate turns of the coil.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof will best be understood by reference to the following description taken in connection with the accompanying drawing in which Fig. 1 is a perspective of a coil constructed in accordance with my invention; Fig. 2 is a plan view thereof; Fig. 3 is an elevation of a portion of a coil illustrating certain of the structural features thereof; Fig. 4 is a detail showing a modification in the construction of the coil; and Figs. 5 and 6 are perspectives, taken at different angles, of the spacing and insulating devices.

As shown in the drawings, the coil is built up around six supporting posts 1 to 6 of insulating material uniformly spaced around the circumference of a circle. The lower ends of these posts are provided with bases 7 which may be secured to any suitable foundation by means of bolts 8. These posts may comprise porcelain tubes 9 the lower ends of which are surrounded by cylindrical porcelain insulators 10. The posts are held in their desired parallel position by means of metal bands 11 each of which is provided with an insulating joint 12, in order that these bands shall not form short circuited secondary windings, for the coil. The two lower bands 11 are secured to the posts by means of clamping rods 13 and spacing members 14 of insulating material. The clamping rods 13 are provided with insulating bushings for insulating them from the bands 11 and thus preventing the formation of a closed circuit in which induced currents may flow. In the construction of the coil support metal parts are used only where necessary to obtain the desired strength as the use of metal parts in the coil support tends to increase the losses of the coil.

The coil which I have illustrated is of the multi-layer type, each layer consisting of four turns. The turns of the coil are all supported upon insulators 15 and are all held in spaced relation to one another. The insulators 15 are of substantially triangular shape having conductor holders in which retaining grooves 16 are formed secured to two sides thereof. The third side of each insulator 15 is provided with a groove 17 for receiving the porcelain tubes 9. Each insulator is also provided with an opening 18 for receiving a clamping band 19. Each end of the clamping band 19 is attached to a yoke 20, which surrounds a projection 21 on the spacing block 22. The clamping bands are thereby made discontinuous so that they do not form closed circuits in which induced currents may flow. The upper bands 11 are secured to the posts 1 to 6 by means of the rods 23 which are secured to the ends of clamping bands 19.

In winding the conductor 24 upon the supporting structure, the conductor is first wound upon the inner groove of the top series of insulators starting at point 25 and then progressively outward until the last groove of the top series is reached at 26. The conductor is then carried down to the outer groove on the lower side of the next insulator at 27 and wound progressively inward until the last groove on the lower side of the top series of insulators is reached. The conductor is then carried down to the inner top groove of the next insulator of the second series and progressively outward as on the top series, and so on until the end of the coil is reached at the inner groove on the lower side of one of the insulators of the lowest series.

When the coil is wound in this way it will be noted that the maximum potential developed in the coil during operation between the two outer turns of adjacent layers carried by any insulator will be the potential developed in a single turn of the conductor

while the maximum potential developed between the two inner turns of adjacent layers carried by any insulator will be the potential developed in eight turns. By making the insulators of triangular form the spacing between the two inner turns carried by each insulator is made enough greater than the spacing between the two outer turns to take care of the greater potential developed between the two inner turns. The distributed capacity of the coil is also reduced by this expedient. Similarly the spacing between the outer turns on the lower side of one series of insulators and the top of the next or adjacent series below is made greater than the spacing between the inner turns to take care of the increased potential.

It will also be observed that the conductor retaining grooves on the lower side of the insulators are in staggered relation to the grooves on the upper side so that the turns of the conductor retained on the lower side of the insulators are not directly below the turns retained on the upper side of the insulators. This expedient increases the spacing between turns and also reduces the tendency to the formation of partial short circuits of the turns which might be caused by the formation of icicles between turns due to water dripping from one turn down onto an adjacent turn directly below it.

In the construction of the insulators 15, three important conditions are taken into consideration; first, a large creepage surface over the insulator is desirable between the different conductors; second, a portion of this creepage surface should be so arranged that it will at all times remain substantially dry; third, means should be provided for preventing the formation of large streams of water which will flow over the insulator and between adjacent turns of the conductor.

The first of these conditions is provided by supporting the conductor holders in which the upper grooves 16 are formed on a central rib 28, which is of less thickness than the length of the grooves, and also by the provision of a barrier 29, which is interposed between the two sets of grooves, and which in turn is wider than the length of these grooves. A substantially horizontal rib 30 also provides a secondary barrier between the inner grooves of the top and bottom series. Each of the grooves is also provided with a central projection 31 so arranged that the conductor will be in contact only with this central projection and will not be in contact with the grooves throughout their whole length.

The second condition is taken care of by reason of the fact that the under portion of the upper set of conductor holders is not directly exposed to the elements and the under side of the barrier 29 is not directly exposed. Grooves 32 are also preferably provided on the lower side of the barrier 29, which prevent water from creeping along the lower side of the barrier to the central rib 28. The barrier 29 is provided with depressions 33, which serve to collect water falling on the surface of the insulator and cause it to be broken up into separate streams. The possibility of water forming in one large stream and running off the surface of the insulator and forming a short circuit between conductors is thereby prevented. The depressions are so located that the water dropping from the edge of the barrier will not fall directly upon the conductors resting in the lower series of grooves.

If desired, additional protection may be furnished by means of a barrier 34, as shown in Fig. 4, which is interposed between superimposed insulators. This barrier is provided with a plurality of transverse grooves in order to subdivide as much as possible the stream of water which may flow over the insulators.

For convenience in shipment the bands 11 instead of being formed from one continuous strip of metal may be formed in sections, which are bolted together at points 35, as indicated in Fig. 2.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. An insulator having a set of conductor retaining grooves formed thereon and arranged in a substantially horizontal plane, and a second set of grooves formed thereon and arranged in a plane which intersects the plane of the first set.

2. An insulator of substantially triangular form having a plurality of conductor retaining grooves formed on two sides thereon and the third side thereof being adapted to be readily attached to a support.

3. An insulator of substantially triangular form having a plurality of conductor retaining grooves formed on two sides thereof, the third side of which is formed to partially embrace a support.

4. An insulator of substantially triangular form having a plurality of conductor retaining grooves formed on two sides thereof and the grooves in one side being individually out of vertical alignment with corresponding grooves in the other side.

5. An inductance coil made up of a plurality of layers each layer comprising a plurality of turns, said turns being all held out of contact with one another by a plurality of insulators each of which supports at least one turn of two layers.

6. An inductance coil made up of a plurality of layers, each layer comprising a plurality of turns, said turns being all held out of contact with one another by a plurality of horizontally mounted insulators,

each of which supports at least one turn of two layers.

7. An inductance coil made up of a plurality of layers each layer comprising a plurality of turns, said turns being all held out of contact with one another by a plurality of insulators each of which support two layers, the oppositely disposed turns of each pair of adjacent layers thus supported being spaced at different distances from one another than any other pair.

8. An inductance coil made up of a plurality of layers, each layer comprising a plurality of turns, said turns being all held out of contact with one another by a plurality of insulators which support each layer in such a way that the pair of turns in adjacent layers between which the highest potential difference is developed during operation is separated by a greater distance than the other pairs of turns.

9. A multi-layer inductance coil comprising a plurality of circumferentially arranged posts, each of which has secured thereto a plurality of spaced supporting insulators, each of which insulators serves to support and hold in spaced relation the turns of two layers of the coil.

10. An inductance coil comprising a plurality of circumferentially arranged posts each of which has secured thereto a plurality of supporting insulators of substantially triangular form having conductor retaining grooves formed on two sides thereof.

11. An inductance coil comprising a plurality of circumferentially arranged posts each of which has secured thereto a plurality of supporting insulators of substantially triangular form having conductor retaining grooves formed on two sides thereof one of which lies in a substantially horizontal plane.

12. An inductance coil comprising a plurality of circumferentially arranged posts each of which has secured thereto a plurality of supporting insulators of substantially triangular form having conductor retaining grooves formed on two sides thereof, said grooves serving to retain the individual turns of the coil in spaced relation to one another.

13. An inductance coil comprising a plurality of circumferentially arranged posts each of which has secured thereto a plurality of supporting insulators of substantially triangular form having conductor retaining grooves formed on two sides thereof, said grooves serving to retain the individual turns of the coil in spaced relation to one another, and the turns of the coil being so arranged that adjacent turns between which the highest potential difference is developed during operation are separated by a greater distance than other adjacent turns.

14. An insulator of substantially triangular form having a plurality of conductor retaining grooves formed on two sides thereof, the third side thereof being adapted to be readily attached to a support, and having a barrier interposed between the grooves on the two sides.

15. An insulator having a set of conductor retaining grooves formed thereon and arranged in a substantially horizontal plane, a second set of grooves formed thereon and arranged in a plane intersecting the plane of the first set and a barrier interposed between the two sets of grooves.

16. An insulator of substantially triangular form having a plurality of conductor retaining grooves formed on two sides thereof, the third side thereof being adapted to be readily attached to a support, and having a barrier interposed between the grooves on the two sides, said barrier being of greater width than the length of the grooves.

17. An insulator having a set of conductor retaining grooves formed thereon and arranged in a substantially horizontal plane, a second set of grooves formed thereon and arranged in a plane intersecting the plane of the first set, and a barrier interposed between the two sets of grooves, said barrier being of greater width than the length of the grooves.

18. An insulator comprising a central rib, a plurality of conductor holders having conductor retaining grooves secured to opposite edges of said rib and a barrier extending from opposite sides of said rib and interposed between the conductor holders which are secured to the opposite edges.

19. An insulator comprising a central rib and a plurality of conductor holders having conductor retaining grooves secured to opposite edges of said rib, said conductor holders being of materially greater length than the thickness of the rib.

20. An insulator comprising a central rib, a plurality of conductor holders having conductor retaining grooves secured to opposite edges of said rib, said conductor holders being of materially greater length than the thickness of the rib, and a barrier extending from opposite sides of said rib and interposed between the conductor holders which are secured to the opposite edges.

21. An insulator comprising a central rib, a plurality of conductor holders having conductor retaining grooves secured to opposite edges of said rib, said conductor holders being of materially greater length than the thickness of the rib, and a barrier extending from opposite sides of said rib and interposed between the conductor holders which are secured to the opposite edges, said barrier being of greater width than the length of the conductor holders.

In witness whereof, I have hereunto set my hand this 17th day of September 1923.

EDWARD M. HEWLETT.