Apr. 24, 1923. 1,452,939

C. SPARKS ET AL

COIL

Filed Jan. 9, 1920 2 Sheets-Sheet 1

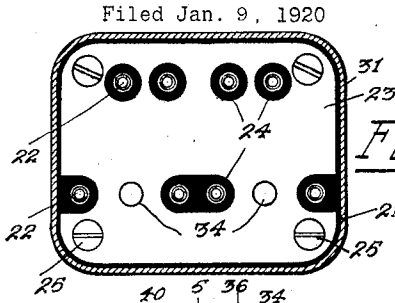


Fig. 2.

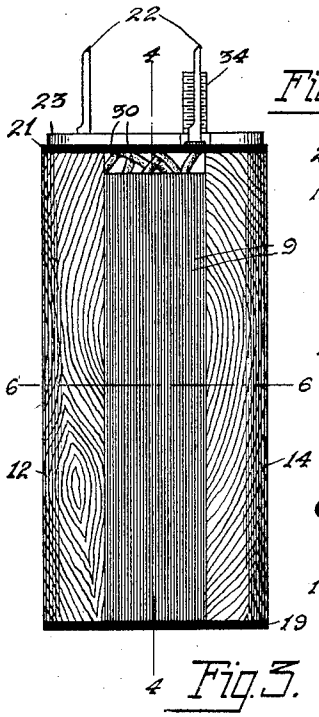


Fig. 3.

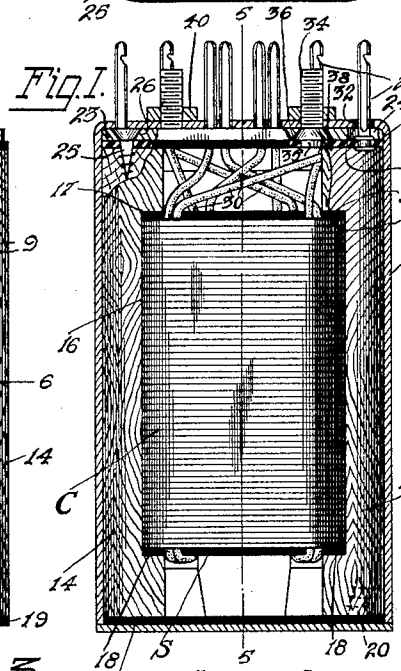


Fig. 1.

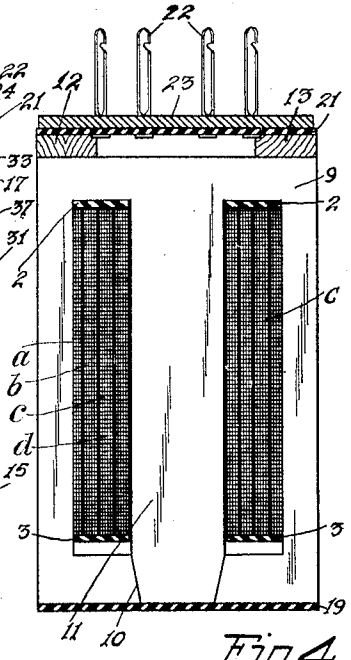


Fig. 4.

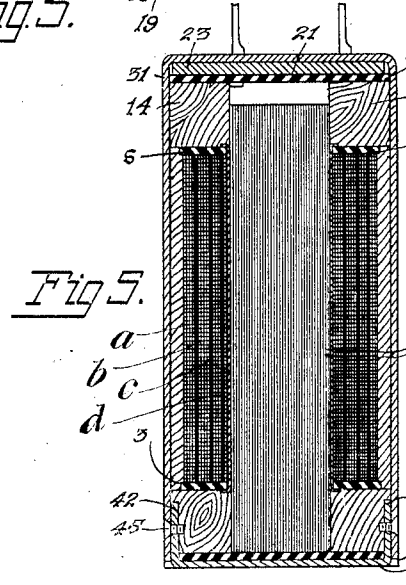


Fig. 5.

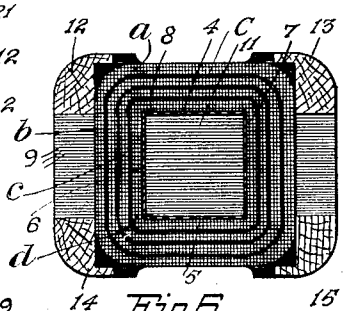


Fig. 6.

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C. SPARKS ET AL

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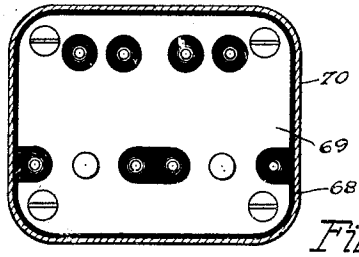


Fig. 8.

Fig. 7

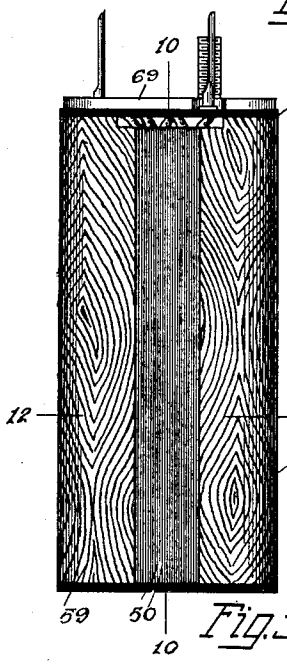
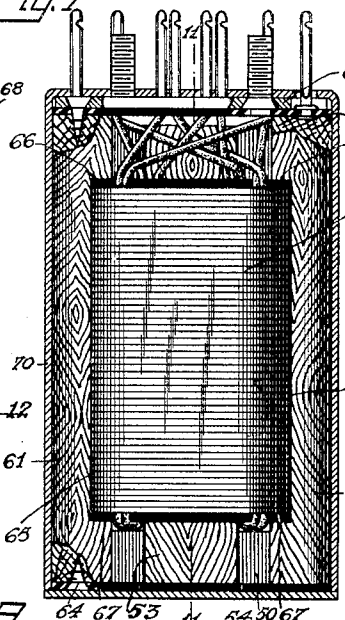


Fig. 9.



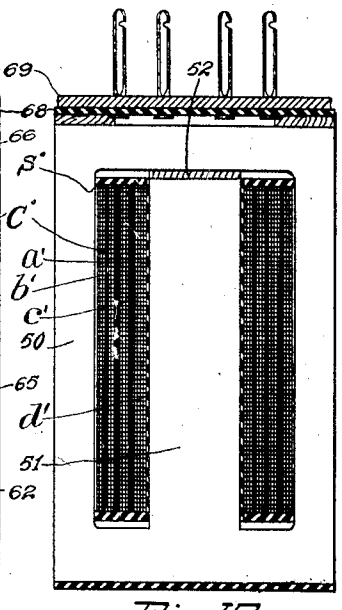


Fig. 10.

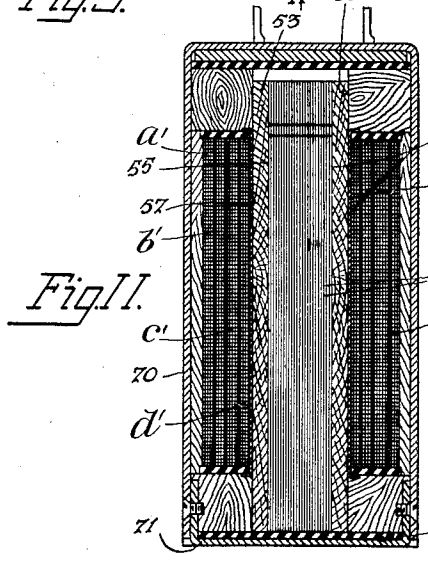


Fig. 11.

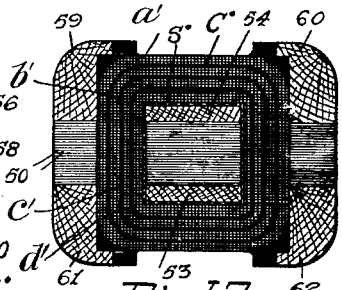


Fig. 12.

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Patented Apr. 24, 1923. 1,452,939

UNITED STATES PATENT OFFICE.

CHARLES SPARKS, OF OAK PARK, AND WILLIAM G. SHULL, OF CHICAGO, ILLINOIS, ASSIGNORS TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

COIL.

Application filed January 9, 1920. Serial No. 350,816.

To all whom it may concern:

Be it known that we, CHARLES SPARKS and WILLIAM G. SHULL, citizens of the United States of America, residing in Oak Park and Chicago, respectively, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Coils, of which the following is a specification.

Our invention relates to repeating coils or transformers for use in electrical circuits, and an object of our invention is to produce an improved device of the class described which will embody desirable features and advantages, all in a simple, efficient and economical manner, and to this object and such other objects as may appear, our invention consists in the novel details of construction, parts and combination of parts to be hereinafter more fully described and more particularly pointed out in the ensuing specification and the appended claims.

A feature of our invention is the method of supporting the coil of the transformer upon the core of the transformer and to securely hold the said winding upon the core of the transformer against movement. This method of construction provides a transformer of compact construction and one which takes up a minimum amount of space when mounted.

A further feature of our invention is the method of constructing the repeater so that when mounting the same in a telephone switchboard, no special mounting means is necessary as the coil of our invention may be mounted upon the relay rack of the board upon relay mountings, as is well understood in the art. The above features as described, as well as others, will be more fully hereinafter described in the following specification and in the appended claims.

For a more complete understanding of our invention, reference is to be had to the accompanying drawings, in which like reference characters in the several views denote like parts, and in which—

Fig. 1 is a front elevation of one form of repeating coil, with the enclosing casing in section;

Fig. 2 is a plan view of Fig. 1, with the enclosing casing or cover in section;

Fig. 3 is a left side elevation of Fig. 1, with the enclosing casing removed;

Fig. 4 is a sectional view along the line 4—4 of Fig. 3;

Fig. 5 is a sectional view along the line 5—5 of Fig. 1;

Fig. 6 is a sectional view along the line 6—6 of Fig. 3;

Fig. 7 is a front elevation of another form of repeating coil, showing the enclosing casing in section;

Fig. 8 is a plan view of Fig. 6 with the enclosing casing or cover in section;

Fig. 9 is a left side elevation of Fig. 7 with the enclosing casing removed;

Fig. 10 is a sectional view along the line 10—10 of Fig. 9;

Fig. 11 is a sectional view along the line 11—11 of Fig. 7;

Fig. 12 is a sectional view along the line 12—12 of Fig. 9.

Referring now more in detail to our invention as illustrated and referring more particularly to Figs. 1 to 6, inclusive, the repeating coil as illustrated in the said figures is of the ring-through type, for uses and purposes as are well understood in the art. The repeating coil as illustrated comprises a coil C built up of a plurality of windings *a*, *b*, *c* and *d* wound upon the spool S.

The spool S comprises spool heads 2 and 3, made of any suitable insulation material such as bakelite. The heads 2 and 3 have suitable openings of a size to receive the insulation strips 4 and 5 and the thin metal strips 6 and 7. The metal strips 6 and 7, when in place in the respective heads 2 and 3, protrude slightly, and these protruding ends are turned over to hold the heads in place, and insulation strips 4 and 5, in association with strips 6 and 7, when in place form a central opening 8. The coil C and spool S, as a whole, are carried by a core which is made of what might be called S-shaped laminations 9. The laminations 9 are split at 10 so that they may be inserted into the central opening 8 of the spool S.

To clamp the laminations 9 against move-

ment and to also hold the coil S as a whole upon the core portion 11 of the 8-shaped laminations 9, I provide posts 12, 13, 14 and 15, which are provided with recessed portions 16 which form shoulders 17 and 18 upon each of the posts 12, 13, 14 and 15. The posts 12, 13, 14 and 15 are secured to a bottom plate 19 of suitable insulation material, such as bakelite, by means of wood screws 20, which pass through suitable openings in the plate 19 and screw into the ends of the posts 12, 13, 14 and 15. The posts 12, 13, 14 and 15, when secured to plate 19 as just described and the coil C in the position just described, the head 3 of the spool of the coil C rests upon the respective shoulders 18 formed by the recesses in the posts 12, 13, 14 and 15, and the head 2 of the spool S of the coil C rests against the shoulders 17 of recesses 16 of the posts 12, 13, 14 and 15. A terminal plate 21 of suitable insulation material is provided, upon which terminals 22 are mounted and secured thereto in any suitable manner, the said plate 21 resting against the top of the posts 12, 13, 14 and 15. A clamping plate 23 is provided which is placed on top of the terminal plate 21 and is provided with suitable openings 24 through which the terminals 22 extend. The clamping plate 23 is secured to the posts 12, 13, 14 and 15 by means of wood screws 25, which screws pass through suitable openings 26 in the plate 23 and openings in the plate 21 and screw into the posts 12, 13, 14 and 15, thus clamping the terminal plate 21 between the clamping plate 23 and the tops of posts 12, 13, 14 and 15. The posts 12, 13, 14 and 15, when secured to the plates 21 and 23 as just described, secure the coil C in place upon the core portion 11 of the 8-shaped laminations 9 against movement in an up and down direction upon the said core portion 11, and the said laminations 9 are at the same time clamped between the posts 12 and 13, and 14 and 15.

The terminals 30 of the windings of the coil C are connected to the terminals 22 in any suitable manner, as by means of soldering. An enclosing casing or shell 31 is provided which is slipped over the repeating coil as a whole, the bottom of which is provided with suitable openings 32 of a size to receive sleeves 33 of insulation through which the terminals 22 are to pass, the said sleeves 33 insulating the terminals 22 from the casing 31. The terminals 22 form terminals for the coil windings and permit external connections with the said coil windings. Bolts 34 for securing the repeating coil as a whole to the casing are provided, the said bolts 34 being provided with square portions 35 which set into square orifices 36 in the terminal plate 21. The head or conical portions 37 of the bolts 34 set in countersunk openings 38 in the bottom face of the plate 23, and when the clamping plate 23 is secured by means of the screws 25, the said bolts 34 are held in place by means of the conical portion 37 entering the countersunk openings 38 and are held against rotation due to the square portion 35 setting into the square openings 36 in the terminal plate 21. Nuts 40 are provided and have screw-threaded engagement with the bolts 34, thus securing the transformer as a whole to the shell 31. A cover or cap 41 for covering the opening in the shell 31 is provided and has ears 42 and 43 struck up at right angles from the cover 41, the said ears 42 and 43 being diametrically opposite each other. The cover 41, when in place, rests against the bottom edge 44 of the shell 31 and the ears 42 and 43 project up into the shell 31 for a short distance. Screws 45 are provided which pass through suitable openings in the shell 31 and have screw-threaded engagement with suitable tapped openings in the ears 42 and 43, holding the said cover 41 in place upon the shell 31.

Referring now to Figs. 7 to 12, inclusive, we illustrate another form of repeating coil known in the art as a non-ring-through repeating coil, whose functions are well understood in the art. Referring now in detail to the repeating coil as illustrated, it comprises a coil C′ made up of a plurality of windings suitably separated and wound upon the spool S′. The spool S′ upon which the windings *a′*, *b′*, *c′* and *d′* are wound is constructed similar to the spool described in connection with Figs. 1 to 6, and a description of spool S′ is not thought necessary. The windings and the spool S′ as a whole are carried by a core which is built up of a plurality of laminations 50, rectangular in shape and provided with a core portion 51 which extends upward and upon which the coil C′ as a whole is supported. A space 52 between the top of the core portion 51 and the inner edge of the top portion of the laminations 50 permits the laminations 50 to be slipped in the central opening of the spool S′. To hold the coil C′ upon the core portion 51, we provide shims 53 and 54, which are forced in between the faces 55 and 56 of the laminations 50 and the inner faces 57 and 58 of the central opening of the spool S′ to hold the coil C′ against movement. Posts 59, 60, 61 and 62 are provided and are secured to a mounting plate 63 by means of wood screws 64, the said posts being provided with recessed portions 65, and the said spool S′ rests in these recesses. The heads of the spool S′ engage the shoulders 66 and 67 formed upon the posts 59, 60, 61 and 62 by the recesses 65 when the posts are in place to prevent the coil C′ from moving up and down upon the core portion 51, as described in connection with the repeating coil as shown in Figs. 1 to 6. A terminal plate 68 and clamping plate

69 are secured to the posts 59, 60, 61 and 62 in a manner similarly described in connection with the preceding figures, and the method of securing the coil as a whole and of securing the cover plate 71 to the shell 70 is also similar to that described in connection with Figs. 1 to 6, and a further description is not thought necessary.

While we have described a certain form of our invention, it is to be understood that changes and modifications will readily suggest themselves, and we do not wish to be limited to the exact structures as shown, but aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

What we claim as new and desire to secure by United States Letters Patent, is:

1. In a repeating device, a rectangular coil comprising a plurality of windings, a laminated core upon which said coil is supported, mounting plates, two sets of posts positioned between said mounting plates and secured thereto, the said posts securing the coil upon the said core against movement, the said core being adapted to extend between the two sets of two posts to clamp and maintain said core in position against displacement.

2. In a repeating device, a rectangular coil comprising a plurality of windings, a core built up of a plurality of laminations upon which said coil is mounted, mounting plates, four posts positioned between said mounting plates and secured thereto, the said posts clamping said laminations in position and also securing said coil upon said core against movement.

3. In a repeating device, a core built up of a plurality of laminations, a coil having a plurality of windings mounted upon said core, mounting plates, four posts positioned between said mounting plates and secured thereto, said plurality of laminations being compactly clamped between and held in position by said posts, the said posts also positioning said coil upon said core between said mounting plates and securing the said coil upon said core against movement.

4. In a repeating device, a core built up of a plurality of laminations, a coil mounted upon said core and having a plurality of windings, mounting plates, four posts positioned between said mounting plates and secured thereto, said posts securing said coil upon the said core against displacement and serving as clamping means for clamping said laminations between the two sets of two posts to maintain said laminations in position.

5. In a repeating device, a core built up of a plurality of laminations, a spool for said core provided with a plurality of windings, mounting plates, four posts positioned between said plates and secured thereto, recesses in said posts forming shoulders, the said shoulders engaging the heads of said spool when the same is in position to prevent movement of said coil, said posts serving as clamping means for said plurality of laminations.

6. In a repeating device, a core comprising a plurality of laminations, a spool for said core provided with a plurality of windings, mounting plates, four posts positioned between said plates and secured thereto, recesses in said posts forming shoulders, which shoulders engage the heads of said spool when the said coil is in position to prevent movement of said coil, said posts also clamping the laminations of said core between said posts to prevent movement.

7. A device of the character described including a spool supporting a plurality of windings, a core comprising a plurality of laminations for said spool, a pair of end plates, posts positioned between said end plates and to which the same are attached, and cut-away portions for said posts adapted to receive the heads of said spool to secure the same in position, the said laminations being adapted to extend between the two sets of two posts and being clamped and maintained in position by said two sets of posts.

8. A device of the character described including a spool provided with a winding, a laminated core for said spool, a pair of end plates, positioning means extending between said end plates to which said end plates are secured, and recesses in said positioning means adapted to receive the heads of said spool to maintain the same in position, said positioning means also being adapted to clamp said laminated core in position against movement.

9. A device of the character described including a spool provided with a winding, a laminated core for said spool, a pair of end plates, positioning means extending between said end plates to which the same are secured, recesses in said positioning means adapted to receive the heads of said spool to maintain the same in position, said positioning means also being adapted to clamp said core in position, and a terminal plate secured to said positioning means provided with electrical terminals.

10. A device of the character described including a spool provided with a winding, a core comprising a plurality of laminations, each lamination having two oblong openings opposite each other, the portion between said openings extending through the central opening in said spool, a pair of end plates, positioning means extending between said end plates to which said end plates are secured, recesses in said positioning means adapted to receive the heads of said spool to maintain the same in position, a terminal plate secured to said positioning

means provided with electrical terminals, and a mounting plate secured to said positioning means provided with means for mounting the device as a unit.

11. A device of the character described including a spool provided with a winding, a laminated core for said spool, a pair of end plates, positioning means extending between said end plates to which said end plates are secured, recesses in said positioning means adapted to receive the heads of said spool to maintain the same in position, said positioning means clamping said laminated core in position against displacement, a terminal plate secured to said positioning means provided with electrical terminals, a mounting plate secured to said positioning means provided with means for mounting the device as a unit, and a cover cap adapted to fit over said device to protect the same.

12. A device of the character described including a coil having a plurality of windings, a core comprising a plurality of laminations, each lamination having two oblong openings opposite each other, said windings occupying said openings, a plate to which said coil is secured, electrical terminals and screw-threaded members extending from said plate, and a mounting strip provided with an orifice, said screw-threaded members extending through said orifice to secure the device as a unit to the mounting strip.

13. A device of the character described including a coil having a plurality of windings, a core comprising a plurality of laminations, each lamination having two oblong openings opposite each other, said winding occupying said openings, a plate to which said coil is secured, electrical terminals and screw-threaded members extending from said plate, and a mounting strip provided with an orifice, said screw-threaded members adapted to pass through said orifice to secure the device as a unit to the mounting strip, said electrical terminals adapted to extend through bushed openings in said mounting strip.

14. An inductorium of the character described including a spool provided with a plurality of windings and having a rectangular core of magnetic material, composed of a plurality of laminations, each lamination having two oblong openings opposite each other, the portion between said openings extending through the opening in said spool, a pair of rectangular plates, four posts connecting said plates together, and recessed portions cut in said posts adapted to receive the heads of said spool to maintain said coil in position, the said rectangular core for said coil being adapted to extend between the two sets of two posts to maintain said core in position.

15. In a device of the character described including a spool having a plurality of windings, a core comprising a plurality of laminations, rectangular shaped openings in said laminations occupied by said windings, the center portion of said laminations extending through the central orifice of said spool, a pair of end plates, two sets of two posts positioned between said end plates and to which said end plates are secured, means formed on said post which engage said spool to maintain the same in position on said core, said posts also forming clamping means for said laminations when said end plates are secured to said two sets of two posts.

16. In a device of the character described comprising a spool having a plurality of windings, a core comprising a plurality of laminations upon which said spool is supported a pair of end plates, two sets of two posts positioned between said end plates to secure said spool in position on said core and clamp said laminations, one of said end plates being secured to said two sets of two posts, a plurality of terminals secured to said other end plate, which plate rests upon the other ends of said posts, a clamping plate secured to said other end of said posts to clamp said terminal plate between said other ends of said posts and said clamping plate, and screw-threaded members extending through said clamping plates to form securing means for said device as a unit.

17. In a device of the character described including a coil having a plurality of windings, a core comprising a plurality of laminations upon which said coil is supported, an end plate and a terminal plate, two sets of two posts positioned between said end plate and said terminal plate, one end of said posts being secured to said end plate, a clamping plate secured to the other end of said posts to clamp said terminal plate between said other ends of said posts and the clamping plate, said posts positioning said coil on said core and clamping said laminations, square orifices in said terminal plate, screw-threaded members provided with square heads which rest in said square orifices to prevent rotation of said members, the threaded portions of said members extending through said clamping plate to form securing means for said device.

18. In a device of the character described including a coil having a plurality of windings, a core comprising a plurality of laminations upon which said coil is supported an end plate and a terminal plate, two sets of two posts positioned between said end plate and said terminal plate, one end of said posts being secured to said end plate, a clamping plate secured to the other end of said posts to clamp said terminal plate between said other ends of said posts and the clamping plate, said posts when thus secured positioning said coil on said core and

clamping said laminations, square orifices in said terminal plate, countersunk orifices in said clamping plate in alignment with said square orifices in said terminal plate, screw-threaded members forming securing means for said device provided with square heads which rest in said square orifices and countersunk shaped portions which rest in said countersunk orifices in said clamping plate, said clamping plate when in position holding said threaded members in position against longitudinal movement through the medium of said countersunk orifice in said plate and countersunk portion of said threaded member, and said square orifices in said terminal plate and said square heads of said threaded members preventing rotation of said threaded members in said countersunk orifices in said clamping plate.

Signed by us at Chicago, in the county of Cook and State of Illinois, this 7th day of January, 1920.

CHARLES SPARKS.
WILLIAM G. SHULL.