July 19, 1927. 1,636,328

L. B. SAUER

CONDENSER

Filed May 23, 1924

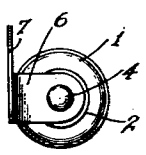

Fig. 3.

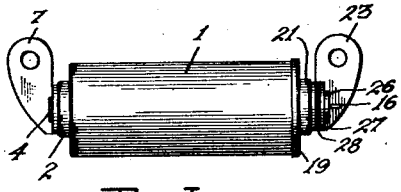

Fig. 1.

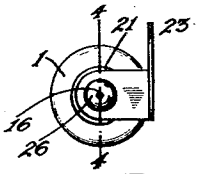

Fig. 2.

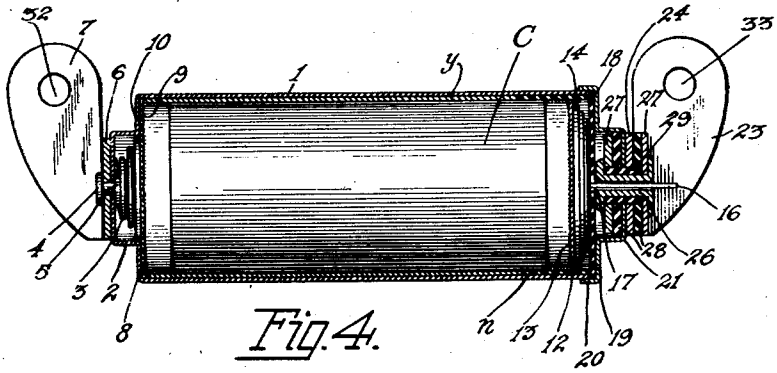

Fig. 4.

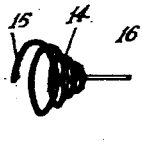

Fig. 5.

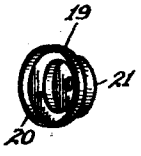

Fig. 6.

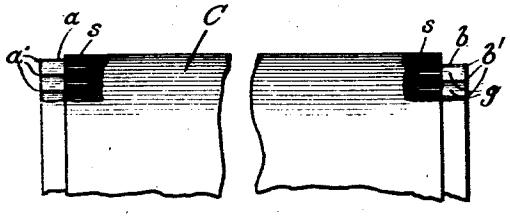

Fig. 7.

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UNITED STATES PATENT OFFICE.

LOUIS B. SAUER, OF WESTERN SPRINGS, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CONDENSER.

Application filed May 23, 1924. Serial No. 715,279.

My invention relates to condensers such as those used in ignition circuits or the like and an object of my invention is the production of a condenser which is simple in construction, inexpensive to manufacture and efficient in its operation.

A feature of my invention is the manner in which I arrange the conducting elements of my condenser so that the same are insulated from each other and extend out beyond the insulation material or dielectric, which separates said conducting elements from each other, to form terminals.

Another feature of my invention is the provision of terminal disks which have serrations or teeth integrally formed therewith for engaging the conducting elements of my condenser; and also the provision of spring means for effecting contactual engagement of said terminal disks with the conducting elements.

Still another feature of my invention is the provision of a receptacle for receiving and enclosing my condenser, and which receptacle is provided with means for retaining the spring means in operative engagement with the disk terminals of my invention.

A further feature of my invention is the manner in which I insulate one of the disk terminals and the spring means operatively associated therewith from the enclosing receptacle of my condenser; and also the provision of means for permitting an external conductor to be connected to said spring means.

The above features, as well as others, will be more clearly pointed out in the ensuing specification, and for a clearer understanding of the same reference may be had to the accompanying drawings in which:

Fig. 1 is a plan view of the condenser of my invention;

Fig. 2 is a right end view of Fig. 1;

Fig. 3 is a left end view of Fig. 1;

Fig. 4 is a view of the condenser of my invention, on an enlarged scale, showing a portion thereof in section along the line 4—4 of Fig. 2;

Fig. 5 is a plan view of one of the spring means for retaining the terminal disk of my invention in contactual engagement with one of the conducting elements of my condenser;

Fig. 6 is a view of the cover cap for the enclosing casing or receptacle of my invention; and

Fig. 7 is a partial plan view, on an enlarged scale, of the condenser of my invention showing a portion thereof in section to illustrate the arrangement of the conducting elements and insulating element or dielectric of my condenser.

Referring now in detail to the condenser of my invention as illustrated in the drawings, my condenser comprises conducting elements *a* and *b* made of tin foil or the like and are insulated from each other by two layers of suitable insulation material *s*, such as rice paper or the like, said layers forming a suitable dielectric. In forming the condenser of my invention I wind together a predetermined number of turns of conducting elements *a* and *b* to form the plates of my condenser, and between the conducting elements are wound turns of the insulation material *s* to obtain a desired capacity effect. The conducting element *a* is fed from one source, and the conducting element *b* is fed from another source, said sources being positioned so that the conducting elements *a* and *b* overlap each other in the central portion of the condenser. The insulation material *s* is wound into the condenser C between the conducting elements *a* and *b* from two different sources, said sources being positioned so that one turn of insulation *s* is wound upon the other turn of insulation *s* and in direct alignment therewith, thus it will be seen that there will be two turns or layers of the insulation material *s* between each turn of the conducting element *a* and each turn of the conducting element *b*. The conducting elements *a* and *b* are of such a width and overlap each other at a point so that a portion *a'* of the conducting element *a* extends beyond one edge of the turns of the insulation material *s*, and a portion *b'* of the conducting element *b* extends beyond the other edge of the turns of the insulation material *s*. Due to the overlapping of the conducting elements *a* and *b*, a gap *g* will be provided between each turn of the conducting element *a*, and also between each turn of the conducting element *b*, the gaps *g* giving a slight amount of flexibility to the ends of the condenser for purposes to be pointed out later. After a predetermined number of turns of the con-

ducting elements *a* and *b*, and turns of the dielectric *s* are wound to form the condenser C, a layer of heavier insulation material *y* is wound around the outer layer of the dielectric *s*. A layer of insulation *n* is also wound around the condenser C and extends beyond the end of the said condenser C and abuts against the end of insulation *y*.

A receptacle or enclosing casing 1 is provided which is of a size to receive the condenser C. In one end of the receptacle 1 is provided a cup-shaped portion 2 integrally formed therewith, in which cup-shaped portion 2 is secured a coil spring 3 by means of a rivet 4, said rivet 4 having its head 5 engaging one end of the coil spring 3 and its other end extending through aligned openings in the cup portion 2 and the arm 6 of the mounting bracket 7 and then spun over to prevent its removal. A disk like terminal plate 8 is provided which has a plurality of serrations or teeth 9 integrally formed therewith, said plate 8 being of a size to fit into the receptacle 1 and abut against the circumferential shoulder 10 and also to engage the coil spring 3. When the condenser C is inserted into the receptacle 1, the protruding edges *a'* of the conducting element *a* will come into contactual engagement with the serrated face of the terminal plate 8, the insulation layers *y* and *n* wound around the condenser C insulating the condenser from the receptacle 1.

A disk like terminal plate 12, identical in construction as the terminal plate 8, is provided and adapted to fit into the receptacle 1 so that the same comes in contactual engagement with the protruding edges *b'* of the conducting element *b* (it being assumed for the sake of explanation that the condenser C is inserted into the receptacle 1 in such a manner that the protruding edges *a'* of the conducting element *a* engage the terminal plate 8), said terminal plate 12 being of a size to fit within the protruding edge of the insulation layer *n* so that said layer *n* will insulate said terminal plate 12 from the said receptacle 1. The integrally formed serrations or teeth 13 of the terminal plate 12 will engage the protruding edges *b'* of the conducting element *b*. A coil spring 14 is provided which has its one end 15 engaging the terminal plate 12 and its other end 16 straightened out and extending through a suitable opening 17 in an insulation member 18 which fits into the receptacle 1 and engages the open end of the said receptacle 1. The said member 18 is also adjacent the smallest turn of the coil spring 14. An enclosing cap 19 is provided, which has a circumferential flange 20 integrally formed therewith, and is of a size to fit over the open end of the receptacle 1, said cap 19 being provided with a cup-shaped portion 21 integrally formed therewith. A mounting bracket 23, having an arm 24 integrally formed therewith, is secured to the cap 19 by a tubular rivet 26 which extends through suitably aligned openings in the metal washers 27, insulation members 28, and arm 24 of the bracket 23, said insulation members 28 insulating the metal washers 27 from the cap 19 and arm 24 of bracket 23, while an insulation bushing 29 insulates the rivet 26 from the cap 19 and said arm 24. The bracket 23, metal washers 27, insulation members 28 and cap 19 are secured together by the rivet 26 to form a single mountable unit.

When the mountable unit is in the position shown in Fig. 4, the straight terminal end 16 of the coil spring 14 will extend and protrude through the central opening in the tubular rivet 26, while the inner end of the rivet 26 and a portion of the cap 19 will engage the insulation member 18, which member 18 in turn will press against the coil spring 14 and will also engage the open end of the receptacle 1, and when the said unit is in the position as shown in Fig. 4 solder is applied where the receptacle 1 and circumferential flange 20 meet whereby the said unit is secured on the receptacle 1 against displacement. The end 16 of the coil spring 14 protrudes through the tubular rivet 26 and is adapted to receive an external conductor to connect the same in circuit with one plate of my condenser through the terminal plate 12. It will be seen that the terminal plate 12 and coil spring 14 are completely insulated from the enclosing receptacle 1 and mounting bracket 23, thereby preventing the liability of shunting the condenser C.

When the condenser C is inserted into the receptacle 1 and the cap 19 is secured on said receptacle as described above and as shown in Fig. 4, the terminal plates 8 and 12 will engage the protruding portions *a'* and *b'* of the conducting elements *a* and *b* respectively. The condenser C is of such a length that when the same is inserted into the receptacle 1, the terminal plates 8 and 12 engage the protruding portions *a'* and *b'* of the conducting elements *a* and *b* respectively, and due to the pressure exerted upon the said terminal plates the extending edges *a'* and *b'* of said conducting elements being very pliable will turn over and will be mashed up against the ends of the condenser C thereby forming a substantially solid terminal or face into which are embedded the serrations or teeth 9 and 13 of the terminal plates 8 and 12 respectively, and due to the flexibility of the ends of the condenser C allowed by the gaps *g* a substantially smooth terminal face is effected. The coil springs 3 and 14 are compressed due to the length of the condenser C and the ends of the said condenser abutting against the ter-

minal plates 8 and 12, and it will be at once apparent that the serrations or teeth of the terminal plates 8 and 12 will be pressed into the contactual engagement with the substantially solid terminal faces formed by the protruding portions a' and b' of the conducting elements a and b respectively, and the biting of the serrations or teeth into the said solid faces will insure contactual engagement of the terminal plates 8 and 12 with the plates of my condenser and will also tend to prevent rotary movement of the condenser C within the receptacle 1.

From the foregoing description it will be seen that one plate of my condenser is conductively connected in circuit with the mounting bracket 7, which may be grounded while the other plate of my condenser is conductively connected in circuit with the coil spring 14 which is adapted to receive an external conductor to complete the circuit through my condenser.

The brackets 7 and 23 are provided with suitable openings 32 and 33 for receiving bolts or screws for mounting my condenser in position for use.

Having described and illustrated a preferred embodiment of my invention it is to be understood that I do not wish to be limited to the exact structure as shown and described, as modifications and changes will readily suggest themselves, but that I intend to cover all that which may come within the spirit and scope of the appended claims.

Having described my invention what I claim as new and desire to secure by United States Letters Patent is:

1. A device of the class described including a pair of conducting elements overlapping each other, a dielectric for insulating said conducting elements from each other, said conducting elements extending beyond the edges of said dielectric, and individual disk terminal means for each of said conducting elements, each of said disk terminal means adapted to engage the extending edge of the particular conducting element associated with the said disk terminal means, and yielding means for maintaining said disk terminals in engagement with their respective conducting elements.

2. A device of the class described including a pair of conducting elements overlapping each other and wound into a coil, layers of insulation wound into said coil between said conducting elements to insulate said conducting elements from each other, a portion of each of said conducting elements extending beyond the edges of said layers of insulation, and terminal plates provided with integrally formed teeth for engaging and making contact with said extending portions, and means for retaining said terminal plates in contactual engagement with said extending portions.

3. A device of the class described including a pair of conducting elements wound into a coil, layers of insulation wound into said coil between said conducting elements to insulate said conducting elements from each other, a portion of each of said conducting elements protruding out between the said layers of insulation, a receptacle for receiving said coil, terminal plates supported in said receptacle, spring means for pressing said terminal plates into contactual engagement with said protruding portions of said conducting elements, and means on said terminal plates for preventing rotation of said terminal plates relative to the ends of said conducting elements.

4. A device of the class described including conducting elements wound into layers to form a coil, layers of insulation wound between said conducting elements, a portion of one of said conducting elements protruding out between said layers of insulation at one end of said coil, and a portion of the other of said conducting elements protruding out between said layers of insulation at the other end of said coil, a receptacle for receiving said coil, terminals for each end of said receptacle for engaging the protruding portions of said conducting elements, spring means in said receptacle for maintaining contactual engagement of said terminals and said protruding portions, and means on said terminals for preventing movement of said terminals relative to said coil.

5. A device of the class described including conducting elements wound into layers to form a coil, layers of insulation wound between said conducting elements, a portion of one of said conducting elements protruding out between said layers of insulation at one end of said coil, and a portion of the other of said conducting elements protruding out between said layers of insulation at the other end of said coil, a receptacle for receiving said coil, terminal disks, having a plurality of teeth integrally formed therewith, supported in each end of said receptacle, spring means supported in said one end and a cap having a spring means secured thereto engaging the other end of said receptacle, said spring means adapted to engage said terminal disks to press and maintain the teeth of said disks in the protruding end portions of said conducting elements, and a mounting bracket secured to said receptacle and in conductive connection with one of said terminal disks, and a second mounting bracket secured to said cap and insulated from said other of said terminal disks.

6. A device of the class described including conducting elements wound into layers

to form a coil, layers of insulation wound between said conducting elements, a portion of one of said conducting elements protruding out between said layers of insulation at one end of said coil, and a portion of the other of said conducting elements protruding out between said layers of insulation at the other end of said coil, a receptacle for receiving said coil, metal disks, having teeth integrally formed therewith, one of said disks supported in the closed end of said receptacle, a mounting bracket and a coil spring conductively associated and secured to said one end of said receptacle, said coil spring adapted to engage said metal disk and to exert pressure upon the same to embed said teeth in the protruding portion of one of said conducting elements, a cap engaging the open end of said receptacle and a coil spring secured thereto engaging the other of said disks resting in the open end of said receptacle to cause the teeth of said other disk to engage the protruding end of the other of said conducting elements, and a mounting bracket secured to said cap but insulated from said other disk.

7. A device of the class described including conducting elements wound into layers to form a coil, layers of insulation wound between said conducting elements, a portion of one of said conducting elements protruding out between said layers of insulation at one end of said coil, and a portion of the other of said conducting elements protruding out between said layers of insulation at the other end of said coil, a receptacle for receiving said coil, a metal disk, having teeth integrally formed therewith, supported in the closed end of said receptacle, a mounting bracket and a coil spring conductively associated and secured to said one end of said receptacle, said coil spring adapted to engage said metal disk and to exert pressure upon the same to embed said teeth in the protruding portion of one of said conducting elements, a cover cap for fitting over the open end of said receptacle, a mounting bracket, means for securing said second mounting bracket to said cover cap, means for insulating said means from said bracket and said cover cap, a metal disk, having teeth integrally formed therewith, supported in said receptacle but insulated therefrom, a coil spring supported in said receptacle and adapted to engage said second metal disk to embed the teeth thereof in the protruding portion of the other of said conducting elements, and a terminal integrally formed with said coil spring extending through said first means and adapted to receive an external conductor.

8. A condenser of the character described including a pair of conducting elements, a dielectric for insulating said conducting elements from each other, a portion of one of said conducting elements protruding beyond one edge of the said dielectric, while a portion of the other of said conducting elements protrudes beyond the other edge of said dielectric, a receptacle for receiving said conducting elements and said dielectric, a terminal supported in one end of said receptacle and spring pressed into contactual engagement with one of said protruding portions of said conducting element, another terminal supported in the other end of said receptacle and spring pressed into engagement with the other protruding portion of said conducting elements, said spring pressed terminals forming the protruding portions of the said conducting elements of the respective ends into substantially solid flat faces.

9. A condenser of the class described including a pair of conducting elements wound to form a coil, a dielectric for separating said conducting elements, an enclosing casing for enclosing said conducting elements and said dielectric, a spring pressed terminal supported in one end of said casing for making contact with one of said conducting elements, a spring pressed terminal supported in the other end of said casing for making contact with the other of said conducting elements, said spring pressed terminals provided with means for preventing turning of said terminals relative to said coil.

10. A condenser of the class described including a pair of conducting elements, a dielectric for separating said conducting elements, an enclosing casing for enclosing said conducting elements and said dielectric, a spring pressed terminal supported in one end of said casing for making contact with one of said conducting elements, a spring pressed terminal supported in the other end of said casing for making contact with the other of said conducting elements, and means integrally formed with said terminals for insuring positive contact between said terminals and said conducting elements and also to prevent rotary movement of said conducting elements and dielectric within said casing.

11. A device of the class described including a condenser comprising a pair of conducting elements wound to form a coil, a dielectric for separating said conducting elements, an enclosing casing for receiving said condenser, a terminal supported in each end of said casing, spring means in each end of said casing and associated with the terminal thereat, said condenser adapted to compress said spring means whereby said spring means force said terminals into constant contactual engagement with said conducting elements, said terminals provided with means for preventing turning of said terminals relative to said coil.

12. A device of the class described including a condenser, comprising a pair of conducting elements, layers of insulation for

separating said conducting elements, an enclosing casing for enclosing said condenser, a serrated terminal supported in each end of said casing, individual spring means conductively and operatively associated with each of said serrated terminals, said condenser adapted to compress said spring means so that the serrations of one of said terminals are embedded in one of said conducting elements, and the serrations of the other of said terminals are embedded in the other of said conducting elements.

13. A device of the class described including a condenser comprising a pair of conducting elements, layers of insulation for separating said conducting elements, an enclosing casing for enclosing said condenser, a serrated terminal supported in each end of said casing, individual spring means conductively and operatively associated with each of said serrated terminals, said condenser adapted to compress said spring means so that the serrations of one of said terminals are embedded in one of said conducting elements, and the serrations of the other of said terminals are embedded in the other of said conducting elements, and means on each of said spring means for permitting conductive connection with said spring means.

14. A device of the class described including a condenser comprising a pair of conducting elements wound in layers to form a coil, layers of insulation for separating said conducting elements, an enclosing casing for said condenser coil, a mounting bracket conductively secured to one end of said casing, a metal plate supported in each end of said casing, one of said metal plates adapted to engage one of said conducting elements while the other of said metal plates is adapted to engage the other of said conducting elements, a cover cap for enclosing the open end of said casing, a mounting bracket, means for securing said bracket to said cover cap to form a single unit, spring means secured to the closed end of said casing and said cover cap each of said springs being associated with one of said metal plates for maintaining contactual engagement of said metal plates and said conducting elements, and a member integrally formed with one of said spring means and adapted to extend through said first means to receive an external conductor.

15. A device of the class described including a condenser comprising a pair of conducting elements, layers of insulation for separating said conducting elements, an enclosing casing for said condenser, a metal plate supported in each end of said casing, one of said metal plates adapted to engage one of said conducting elements while the other of said metal plates is adapted to engage the other of said conducting elements, a cover cap for enclosing the open end of said casing, a mounting bracket, means for securing said bracket to said cover cap to form a single unit, individual spring means associated with each of said metal plates secured respectively in the closed end of said casing and said cover cap for maintaining contactual engagement of said metal plates and said conducting elements, a member integrally formed with one of said spring means and adapted to extend through said first means to receive an external conductor, and a mounting bracket conductively secured to the closed end of said casing and connected with the other of said spring means for receiving an external conductor.

16. A device of the class described including a pair of conducting elements wound into layers to form a coil, layers of insulation wound between said conducting elements, a portion of one of said conducting elements protruding out between the layers of said insulation at one end of said coil, and a portion of the other of said conducting elements protruding out between the layers of said insulation at the other end of said coil, a casing for receiving said coil, a disk terminal supported in each end of said casing, a coil spring secured to each end of said casing contacting said disk terminals, said springs being compressed to force said disk terminals into engagement with the protruding convolutions of said conducting elements to cause said protruding convolutions to be swaged to form a terminal whereby a terminal is provided for each end of said coil to be engaged by the spring pressed terminal associated therewith.

17. A device of the character described made up of layers of conducting and insulating members in the form of a coil, said members being wound so that the edges of the convolutions of one of the conducting members extend beyond one end of said insulating members, a receptacle for said coil, a disk terminal engaging an end of one of said conducting members, yielding means secured to said receptacle engaging said terminal to force the same into engagement with said end of said one of said conducting members for yieldingly making contact with said end of said one of said conducting members.

18. A device of the character described made up of layers of conducting and insulating members to form a coil, said members being wound so that the edges of the convolutions of one of the conducting members extend beyond one end of said insulating members and the edges of the convolutions of the other of said conducting members extend beyond the opposite end of said insulating member, a receptacle for said coil, disk terminals supported in said receptacle engaging the respective ends of said

conducting members, yielding means secured in said receptacle engaging said terminals to force said terminals into engagement with the respective ends of said conducting members for yieldingly making contact with said ends of said conducting members.

19. A device of the character described made up of layers of conducting and insulating members to form a coil, said members being wound so that the edges of the convolutions of one of the conducting members extend beyond one end of said insulating members and the edges of the convolutions of the other of said conducting members extend beyond the opposite end of said insulating member, a receptacle for said coil, disk terminals supported in said receptacle and engaging the respective edges of convolutions of said conducting members, springs secured in said receptacle engaging said terminals to force said terminals into engagement with the respective edges of convolutions of said conducting members for yieldingly making contact with said respective edges of convolutions of said conducting members.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 21st day of May, 1924.

LOUIS B. SAUER.