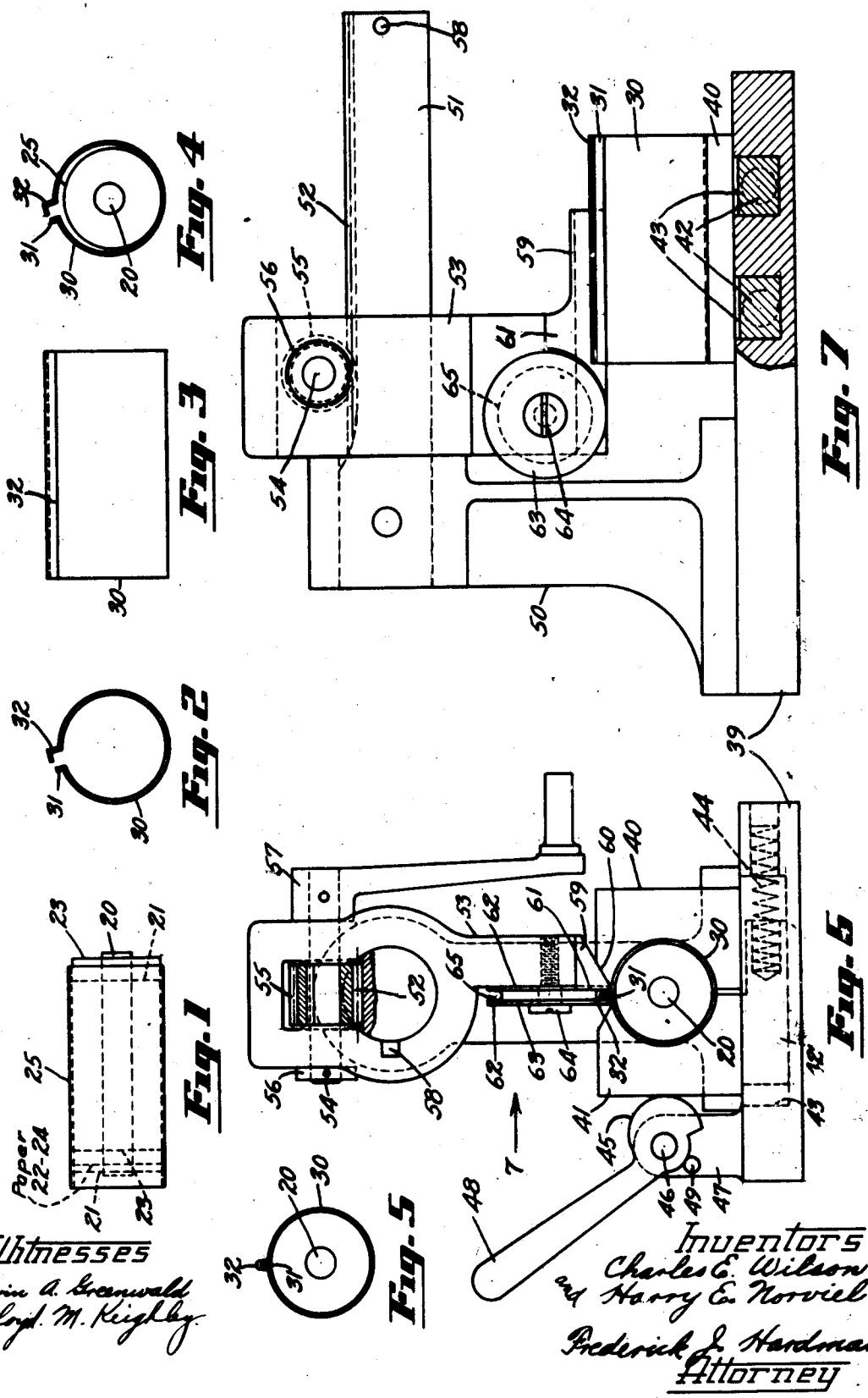
Sept. 14, 1926. 1,599,859

C. E. WILSON ET AL

CONDENSER

Filed July 24, 1922 3 Sheets-Sheet 1



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C. E. WILSON ET AL

CONDENSER

Filed July 24, 1922 3 Sheets-Sheet 2

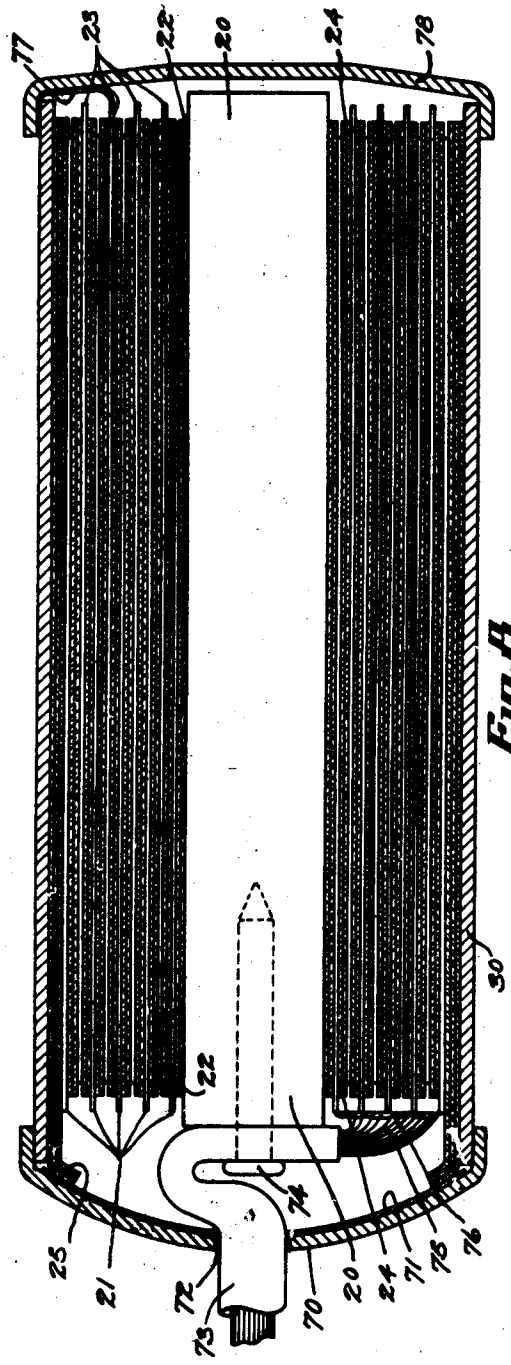


Fig. 8

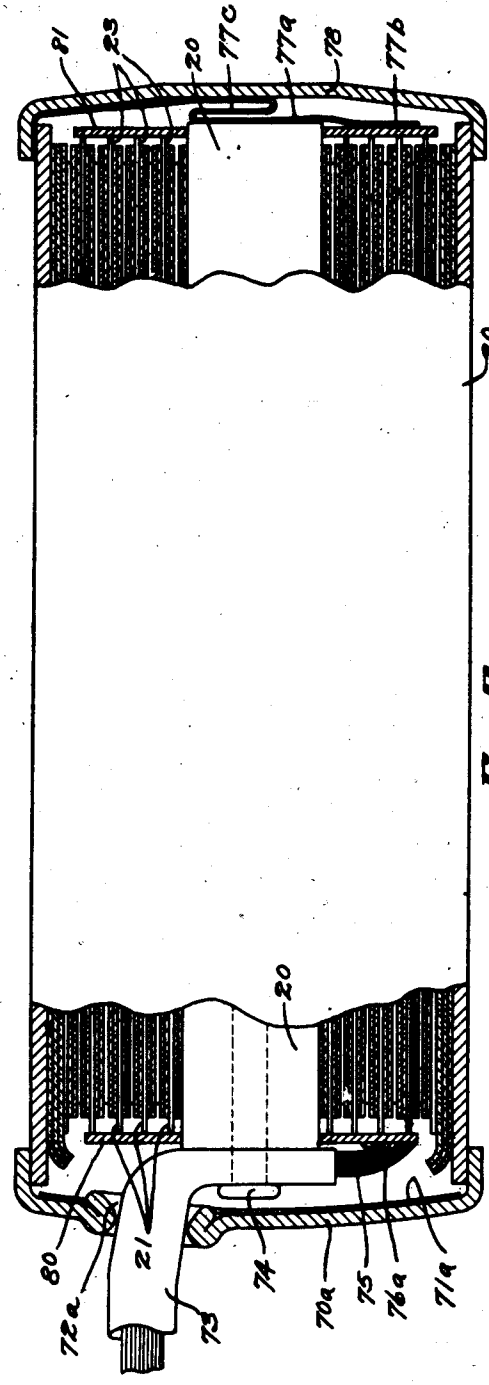


Fig. 9

Witnesses
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CONDENSER

Filed July 24, 1922 3 Sheets-Sheet 3

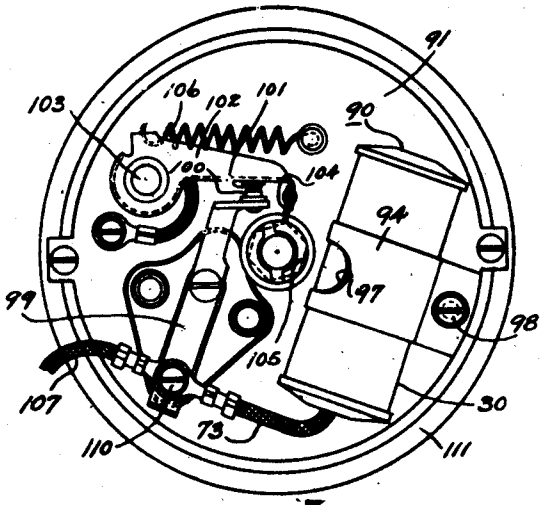


Fig. 10

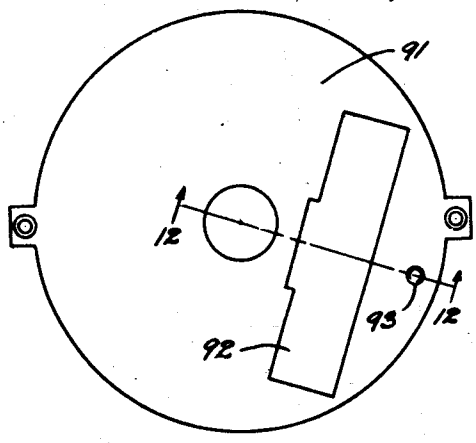


Fig. 11

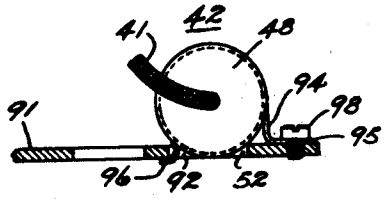


Fig. 12

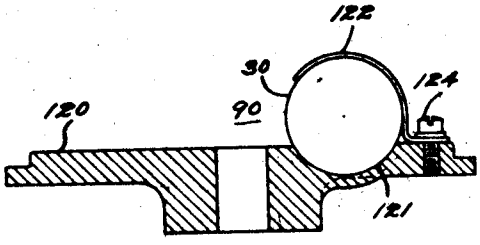


Fig. 14

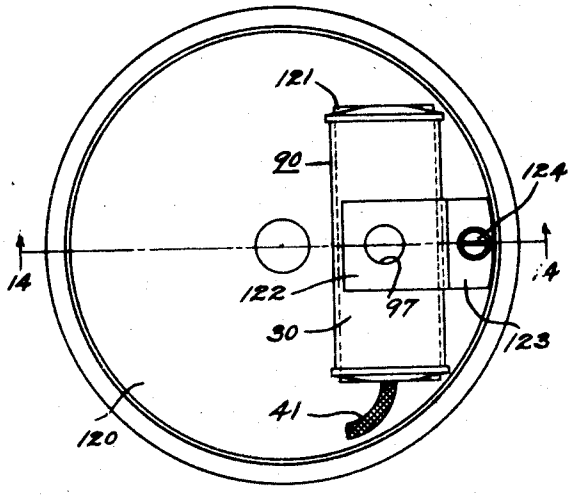


Fig. 13

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UNITED STATES PATENT OFFICE.

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CONDENSER.

Application filed July 24, 1922. Serial No. 576,933.

This invention relates to the manufacture of condensers especially for ignition apparatus and other types of electric apparatus wherein the use of a relatively small and compact condenser of the required capacity is desirable.

It is among the objects of this invention to provide containers, terminal connecting devices, and container mounting devices for condensers of the type described in the copending application of F. C. Kroeger and H. E. Norviel, Serial No. 578,513, filed July 29, 1922. In said application is described a condenser comprising alternate layers of foil and paper insulation wrapped in compact form about a wooden core. The process and apparatus for winding said condenser material onto the core is particularly described and claimed in said application, and the present invention deals with the manufacture of the condenser following the winding operation. But it is to be understood that the present invention is not limited to condensers which have been wound in accordance with the copending application referred to.

Other and further objects of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

Fig. 1 is a side view of a bare condenser which has been wound in accordance with the copending application of Kroeger and Norviel;

Fig. 2 is an end view of the condenser can;

Fig. 3 is a side view thereof;

Fig. 4 is an end of the can with the condenser inserted;

Fig. 5 is an end of the condenser with the can crimped on;

Fig. 6 is a front view of the condenser can crimping machine;

Fig. 7 is a side view looking in the direction of the arrow 7 of Fig. 6;

Fig. 8 is a sectional view of a condenser, the scale being much enlarged;

Fig. 9 is a side view, partly in section, of a modified form of condenser;

Fig. 10 is a plan of an ignition timer showing a completed condenser mounted thereon;

Fig. 11 is a plan of the timer breaker lever plate shown in Fig. 10;

Fig. 12 is a sectional view taken on the line 12—12 of Fig. 11, and an end view of the condenser shown in Fig. 8;

Fig. 13 is a plan of a modified form of ignition timer housing showing the completed condenser mounted thereupon, and

Fig. 14 is a sectional view on the line 14—14 of Fig. 13.

Referring to Figs. 1 and 8, the first steps in the manufacture of a condenser to which the present invention may be applied, are to rotate a wooden core 20 while wrapping thereon two metal foil strips 21 and 23 separated by layers of paper insulation 22 and 24. The foil is preferably .0005 inch thick, and each layer of paper insulation comprises two or more superimposed strips of paper, each .0005 inch thick. To wind the material practically free from wrinkles and in compact form upon the core, the material is wound on under pressure applied by a roller pressing directly against the condenser material wound about the core.

When the desired number of turns of this material has been wound on, the condenser material is severed from that which has been wound on, one of the foil strips being severed closer to the condenser than the other material so that the liability of short circuit will be minimized. Several turns of wrapping paper 25, preferably .001 inch thick are applied and the loose end is pasted down. As shown in Fig. 8, the left margin of foil 21 extends, preferably $\frac{1}{32}$ to $\frac{1}{16}$ inch beyond the left margin of the paper layers. and the right margin of foil 23 extends the same distance beyond the right margin of the paper layers.

The next step is to assemble around the condenser a metal tube or can which shall serve as part of the condenser casing. This tube is formed from a piece of sheet material 30 bent into the form shown in Figs. 2 and 3. The end margins are formed with flanges 31 and 32 respectively prior to forming a seam. The condenser is assembled within the unseamed can 30 as shown in Fig. 4 and both together are clamped between suitable jaws 40 and 41 mounted on the base 39 of a crimping machine (see Fig. 6). Jaw 40 is stationary while the jaw 41 is movable with respect to jaw 40. Jaw 41 is provided for this purpose with depend-

ing guides 42 slidable along grooves 43 provided in base 39. Springs 44 tend to separate the jaws, and a clamping lever 45, pivotally mounted at 46 upon a lug 47, moves the jaw 41 toward jaw 40 to clamp the can 30 firmly about the condenser material as shown in Fig. 6. The flange 31 is located against the flange 32 which overhangs flange 31. To release the jaw 41, the handle 48 of lever 45 is moved clockwise. A stop 49 limits this movement.

Bracket 50 mounted on base 39 carries a rod 51 provided with a rack gear 52. A carriage 53 is slidable along the rod 51 and carries a shaft 54 to which is fastened a gear 55, a collar 56 and a crank 57. A stop 58 limits the movement of carriage 53.

Carriage 53 supports a pilot 59 having a bevelled surface 60 bearing against the block 40, and with a surface 61 in alignment with the inside edge of the right flange 62 (see Fig. 6) of the crimping wheel 63 which is secured to carriage 53 by means of screw 64. The groove 65 between flanges 62 of wheel 63 will span three thicknesses of can material. The pilot surface 61 supports one side of the flange 32, and by turning the crank 57, the carriage 53 will move forward and cause the crimping wheel to roll the flange 32 of can 30 around the flange 31 as shown in Fig. 5.

The condenser is removed from the crimping machine and the seam in can 30 is soldered.

A quantity of condensers thus provided with the can 30 are impregnated at one time with wax by the usual process of evacuation and forcing wax under externally applied pressure to the evacuated voids of the condenser. During the impregnation with wax, the condenser tends to swell, but cannot swell appreciably on account of the can 30 which resists change in diameter. Therefore a large part of unnecessary wax will be squeezed out of the condenser and its capacity will be somewhat greater than if there had been no binding can to restrain swelling of the condenser. This is one advantage of placing the binding can around the condenser before impregnation.

If the condensers were impregnated with wax before applying the binding can, they might not all swell out equally and hence it would be impossible to use identical strips of binding can material to encase a quantity of condensers after impregnating. But crimping the can in place before the wax is applied permits the use of can material of the same size for all condensers of a given diameter since the process of winding described in the Kroeger and Norviel application referred to provides for winding condensers to a uniform outside diameter.

Referring to Fig. 8, the can end cover 70 is formed preferably from sheet metal and is provided with a nonconducting lining 71. An aperture 72 is provided in both members 70 and 71 to permit introducing an insulated flexible terminal wire 73. Before applying the end cover 70 to the cam 30, the terminal 73 is attached to the wooden core 20 by means of a small nail 74 and the bared end 75 of the conductor 73 is attached to the foil strip 21 by means of solder indicated at 76. The end cover 70 is then secured in the position shown in Fig. 8 by means of soldering.

During the winding operation, a strip metal conductor or jumper 77 is inserted in contact with the foil strip 23, and this jumper 77 is soldered to the can 30 while soldering the end cover 78 thereto. It is apparent that one foil of the condenser is attached to an insulated terminal wire and the other foil is grounded to the condenser can.

The form of condenser shown in Fig. 8 was described in our copending application Serial No. 429,271, of which the present application is a continuation in part.

A modified form of the invention is shown in Fig. 9. Instead of attaching the flexible insulated conductor and the metallic jumper strip directly to the foil, these parts are attached through intermediate tinned copper washers. The washers 80 and 81, coated with tin on both sides, are placed in position on the core 20 and are pressed adjacent the margins of foils 21 and 23 respectively. A soldering iron is applied to the exposed faces of these washers to sweat them onto the margins of the foils. After this is done, the soldering iron may be used to draw a few points of solder across the washers and onto the foil at the edges of the washers. Bismuth solder without flux is preferable. The bared end 75 of the terminal 73 is soldered as indicated at 76^a to the washer 80, after which the end cover 70^a is soldered in the position shown in Fig. 9. Cover 70^a is provided with a nonconducting lining 71^a, and these members are provided with an aperture 72^a located to one side of the core 20. This arrangement permits attachment of the terminal 73 to the core 20 without the double bend in this terminal which is present in the construction shown in Fig. 8. Instead of the jumper being attached to the foil during the winding operation, as in Fig. 8, the jumper 77^a is soldered at 77^b to the washer 81 and is provided with a double loop 77^c intermediate its ends, and the other end is soldered to the can 30 during the operation of soldering the cover 78 thereto. By providing the double loop 77^c, there is less liability of the jumper 77^a being jarred loose from its connections.

While in Fig. 9, the margins of the foil strips which extend beyond the margins of the paper insulation have been shown in posi-

tions created by the winding operation, it is to be understood that during the assembling of the condenser these projecting foil margins will be crushed down so as to form practically a continuous mass of foil material at each end of the core. Therefore, when the tinned copper washers are sweated to these foil margins, there will be formed, in effect, a metallic button at each end of the core, each button being directly in electrical contact with each convolution of a condenser foil. In this manner the communication between the condenser terminals and the condenser foil will be substantially a direct one.

The mounting of the condenser, which will now be designated as a whole by numeral 90, upon a timer for ignition apparatus is shown in Fig. 10. The timer includes a supporting plate 91 which is provided with an oblong aperture 92 and a tapped hole 93. A clip 94 is provided with an apertured portion 95 and a hooked portion 96. This clip 94 is attached to the can 30 by means of soldering, solder being placed around the edges of a hole 97 provided in the clip. The condenser is mounted upon the plate 91 by causing the hook portion 96 to engage under the plate 91 while a portion of can 30 projects into the oblong aperture 92. A screw 98 passes through the apertured portion 95 and engages the tapped hole 93 to secure the condenser in position upon the timer plate 91.

The engagement of the hook 96 with the plate 91 assists in maintaining the condenser upon the plate by preventing turning the condenser about the screw 98 to cause it to be loosened.

The timer plate 91 carries an insulated contact bracket 99 carrying a contact 100 which cooperates with a contact 101 carried by breaker lever 102 which is mounted upon a stud 103 grounded upon the plate 91. The breaker lever 102 carries a fiber block 104 which cooperates with the timer cam 105. A spring 106 tends to maintain the block 104 in engagement with the cam 105, or the contact 101 in engagement with the contact 100. The insulated contact 100 is provided with a conductor 107 attached to the contact bracket 99 by means of a screw 110 which also attaches the condenser terminal 73 to the bracket 99. It is therefore apparent that the condenser 90 is connected in parallel with contacts 100, 101 of the timer. A single screw 98 secures the condenser in position and provides a grounded connection, and the timer terminal attaching screw 110 also attaches the insulated terminal of the condenser.

It is apparent that the condenser 90 is adaptable for use in ignition apparatus of the usual type wherein a cam controls a breaker lever to separate a pair of timer contacts. Generally the breaker lever and contacts can be located substantially on one side of a diametrical line passing through the cam center, thus providing condenser space on the other side of this line. By employing the manufacturing processes described herein, a condenser of the required capacity can be made sufficiently compact to fit into this somewhat limited space. Therefore when a cover, not shown, (usually the distributor head) is placed in position over a timer cup 111, to which the plate 91 is attached, all of the timer parts including the condenser will be enclosed.

A different method of condenser mounting is shown in Figs. 13 and 14. The timer plate 120 may be constructed in ways other than by punching from flat material. One of these other ways may be by die casting. The timer plate 120 is provided with a cylindrical recess 121 which is shaped to conform with the cylindrical surface of the casing 30. A clip 122 is attached to the can 30 by soldering around the edges of the clip and the edges of a hole 97 provided in the clip. The clip is provided with an apertured portion 123 through which projects a screw 124 having threaded engagement with the plate 120. One screw therefore attaches the condenser to the plate 120 and the engagement of a portion of the condenser with a recess in the plate prevents the condenser from turning about the screw 124 to loosen the same and to cause the condenser to be accidentally disconnected from the plate 120.

From the foregoing description it is apparent there has been provided a condenser which is very simple and compact in construction and which may readily be removed, for replacement or repair, from a timing device or other apparatus with which the condenser may be associated.

While the forms of mechanism herein shown and described constitute preferred forms of embodiments of the invention, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What we claim is as follows:—

1. In a condenser, the combination with a single core member; of a plurality of insulated condenser foils wound about said core; a terminal conductor metallically joined to the coiled side margin of one of said foils; and means for mechanically anchoring said conductor to one end of said core, whereby a pull upon said conductor is resisted by the mechanical anchoring rather than the electrical connection.

2. In a condenser, the combination with a core; of a plurality of insulated foil sheets wound about said core; a cylindrical casing enclosing the core and condenser foils; a terminal conductor passing through an opening in one end of the casing and metallically joined to the coiled side margin of one of

the foils; and means for mechanically anchoring said conductor to one end of said core, whereby a pull upon said conductor is resisted by the mechanical anchoring rather than the electrical connection.

3. In a condenser, the combination with a cylindrical, non-conducting core; of a plurality of insulated foil sheets wound about said core; a cylindrical casing enclosing the core and condenser foils; an insulated stranded wire terminal conductor passing through an opening in one end of the casing and electrically connected to a margin of one of the foils; and a pointed member passing through the conductor and extending into the non-conducting core for anchoring the conductor to the core.

4. The steps in the method of making a condenser which comprise winding about a core strips of metal foil separated by strip insulation to form a cylindrical body, placing about the cylindrical body a sheet metal strip adapted to form a cylindrical casing, in clamping said strip in its position surrounding said body to cause it to conform to the exterior of the body, and then securing the ends of the metal strip together while the clamping pressure is maintained.

5. The steps in the method of making a condenser which comprise winding about a core strips of metal foil separated by strip insulation, placing about the core foil body a sheet metal strip adapted to form a casing for the foil body, in clamping the strip in its position surrounding the body to cause the strip to conform to the exterior of the body, and then securing the ends of the metal strip together while the clamping pressure is maintained.

In testimony whereof we hereto affix our signatures.

CHARLES L. WILSON.
HARRY E. NOTVIEL.