R. SAN MARTIN.

VARIABLE MERCURY CONDENSER.

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1,108,793.

Patented Aug. 25, 1914.

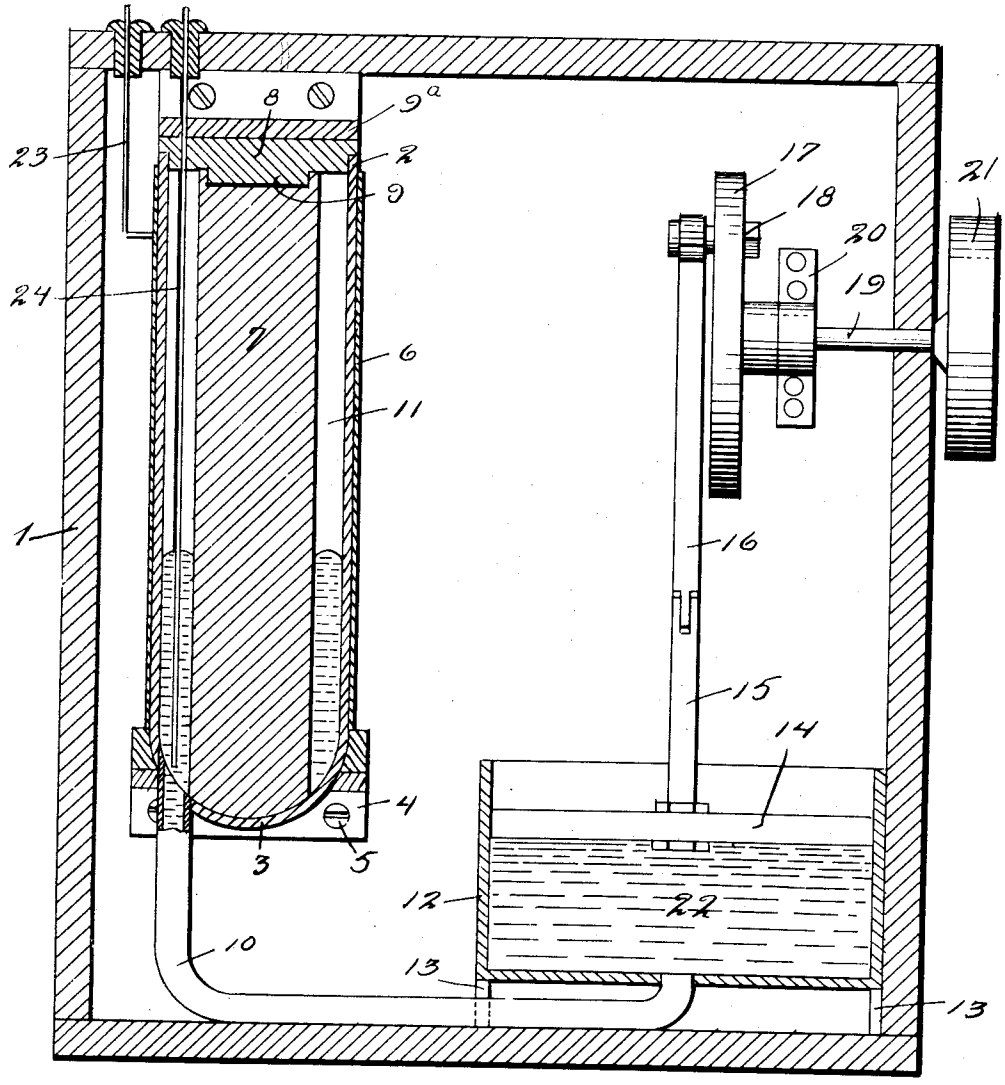


Fig. 1.

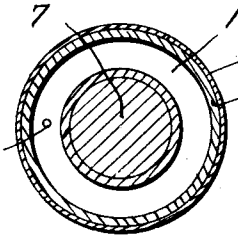


Fig. 2.

Witnesses

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RENÉ SAN MARTIN, OF HABANA, CUBA, ASSIGNOR OF ONE-HALF TO JORGE ABALLI, OF HABANA, CUBA.

VARIABLE MERCURY-CONDENSER.

1,108,793. Specification of Letters Patent. Patented Aug. 25, 1914.

Application filed January 9, 1913. Serial No. 741,055.

To all whom it may concern:

Be it known that I, RENÉ SAN MARTIN, a citizen of the Republic of Cuba, residing at Habana, in the Province of Habana and Republic of Cuba, have invented certain new and useful Improvements in Variable Mercury-Condensers, of which the following is a specification.

This invention comprehends certain new and useful improvements in electrical condensers and relates more particularly to a condenser having an internal liquid conductor, for use with high potential electric currents, such as are used in connection with the various forms of telephony and in all those circuits where a variable condenser is needed.

One of the objects of the invention is to provide a condenser of this type, which shall be of very simple construction, compact in form, having a capacity which may be varied all degrees between zero and the full capacity of the apparatus, and having little or no liability of breakage of the dielectric, due to the high potential strains.

It is well known that the ordinary type of Leyden jar condensers now in common use take up a great deal of room; are subject to brush discharges or short circuits of high resistance between the inner and outer coatings; and that their inner coatings are subject to a strong chemical action, owing to the constituents of the air being decomposed and the ions of the composition attacking the said coatings to such a degree that it is next to impossible to keep them intact. My invention is designed to overcome these objections as well as similar objections common to other commercial types of condensers and I accomplish my object by the apparatus to be hereinafter described.

Referring to the accompanying drawings, Figure 1 is a vertical sectional view, partly in elevation, of my improved condenser and the casing therefor, and, Fig. 2 is a horizontal sectional view through the condenser proper.

Referring in detail to the drawings by numerals, 1 designates a casing here shown as rectangular in cross section but which may be made of any desired shape, as well as any desired material. A cylindrical tube 2 open at its top, having a spheroidical bottom 3, and formed of any dielectric material, such as glass, hard rubber, mica, etc., is supported vertically within the casing 1, by means of the bracket 4, said bracket being secured to one wall of the casing, by means of the fasteners 5. The exterior of the tube 2 is covered for the major portion of its length with a suitable metallic coating 6, forming the exterior conductor of the condenser. Within the tube 2 a solid cylinder 7 of a somewhat smaller diameter than said tube, and formed of any suitable dielectric material, is positioned. A disk 8 secured to a bracket 9^a, said bracket being fastened to the wall of the casing 1, may be used, if desired, to steady the tube 2 and solid cylinder 7. This disk fits loosely within the top of the tube 2 and is formed with a central projection 9, which fits within a circular recess formed in the top of the cylinder 7. It is to be understood that this method of steadying the tube and cylinder is purely optional and may be varied or dispensed with entirely, without affecting in any way the value of the condenser.

A connecting pipe or tube 10 communicates at one end with the annular chamber 11 formed between the cylinder 7 and the interior wall of the tube 2 and communicates at its other end with the bottom of a cylindrical container 12. The container is supported upon suitable legs 13 and has its upper end open, as clearly shown in Fig. 1. A piston 14 is slidably movable within said container, and carries with it a piston rod 15, which is pivotally connected at its outer end to a pitman 16. The upper end of the pitman is eccentrically connected to the disk 17 by means of the pin or fastener 18. This disk is rotatable with a shaft 19, said shaft projecting through a bearing 20 and one wall of the casing 1 and being provided upon its outer end with a handwheel 21. A liquid conductor 22, preferably mercury, is placed within the container 12 and may be made to flow in any suitable amount into the chamber 11, by actuating the piston 14. The condenser formed by the metallic coating 6, the dielectric tube 2, and the liquid conductor in the chamber formed within said tube by the cylinder 7, will change its electric capacity in direct proportion with the amount of mercury let into the said chamber.

23 and 24 are leads to the exterior and interior conductors, respectively.

The mercury presents a continuous layer

with a mirror surface in direct contact with the dielectric of the condenser, thus avoiding the injurious space which exists between any two solids in contact, and which, in the case of a condenser, causes the potential accumulated in the dielectric to tend to puncture it and cause a short circuit. This intimate contact of the mercury with the dielectric, produces a condenser of a relatively large capacity, since the capacity of a condenser is inversely proportional to the thickness of the dielectric. In my condenser the thickness of the dielectric is reduced by the actual contact between this dielectric and the mercury to the real thickness of the material of which the tube 2 is formed. This feature of my invention I consider of extreme importance.

The surface of the mercury within the annular chamber 11 forms a convex meniscus, having no angles, edges, etc., and consequently there is no tendency to brush discharges which, however considered, means a loss in efficiency. As the mercury is a very dense liquid, having a specific gravity of 13.5, any insulating liquid will float on its surface and will not have any effect on the raising or lowering of the level of the mercury; this insulating liquid would do away with any chance of loss through the only vulnerable spot, the meniscus, which disappears under said insulating liquid.

In the foregoing description and accompanying drawing I have referred to and illustrated only a single unit, but it is to be understood that as many of the tubes 2 and cylinders 7 as are necessary may be used, in order to obtain a known electric capacity. It is to be understood that I do not wish to be limited to the exact construction and design of my apparatus as herein shown, but may make such changes as will fall within the scope and spirit of the invention.

Having thus described my invention, what I claim is:—

1. A condenser comprising a tubular dielectric open at its upper end and having a spheroidical bottom, means for supporting said tube in a vertical position, a metallic coating surrounding the exterior of said tube, a solid cylindrical member positioned within said tube and forming between its exterior and the interior of the tube an annular chamber, a container, a pipe connecting the bottom of said container with the bottom of said chamber, a fluid conductor, and means whereby the same may be forced from said container into said chamber.

2. The combination with a casing, of a condenser comprising a tubular dielectric open at one end and closed at the other end, a bracket secured to said casing for supporting the dielectric, a solid cylindrical dielectric positioned within said tube and forming therein an annular chamber, the top of said last mentioned dielectric being annularly recessed, a second bracket secured to said casing, a disk carried upon said bracket and projecting into the tube and the annular recess formed in said solid cylindrical dielectric, a container, a piston slidably movable within said container, means for actuating said piston, said means comprising a rotatable shaft, a disk fixed to said shaft, and a pitman centrally connected to said disk and to the piston; a pipe connecting the bottom of said container with the bottom of the annular chamber, a conducting fluid adapted to be forced from said container into said chamber, and a conducting coating surrounding said dielectric tube.

3. The combination with a casing, of a condenser including a tubular glass container open at its upper end, a bracket secured to the casing for supporting the container, a solid cylindrical dielectric positioned within said tube and forming therein an annular chamber, a conducting fluid within the container, means for varying the height of said fluid, a metallic coating surrounding the container, a lead connected to the metallic coating and a second lead engaging the conducting fluid.

In testimony whereof I affix my signature in presence of two witnesses.

RENÉ SAN MARTIN.

Witnesses:
CAYETANO SOCARRAS,
BRUNLIO C. GONZALEZ.