June 10, 1958 F. DOSTAL 2,838,720

WATCH MOVEMENT DEMAGNETIZING APPARATUS

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FIG. 2

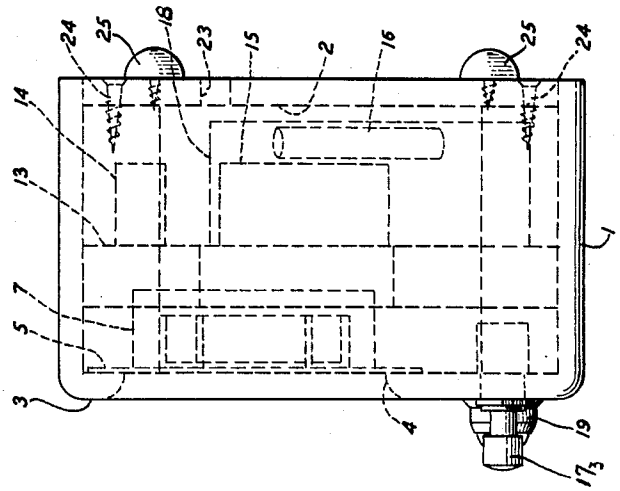

FIG. 1

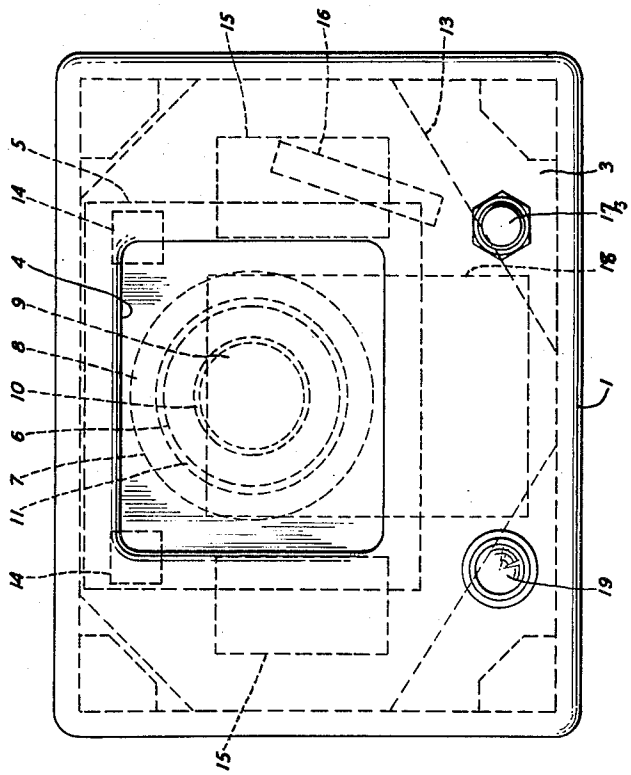

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FIG. 3

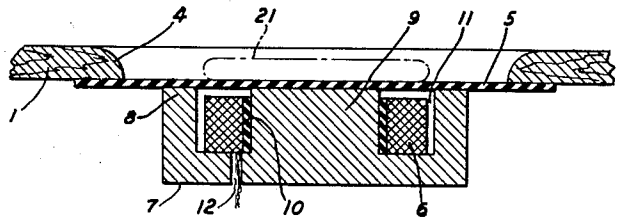
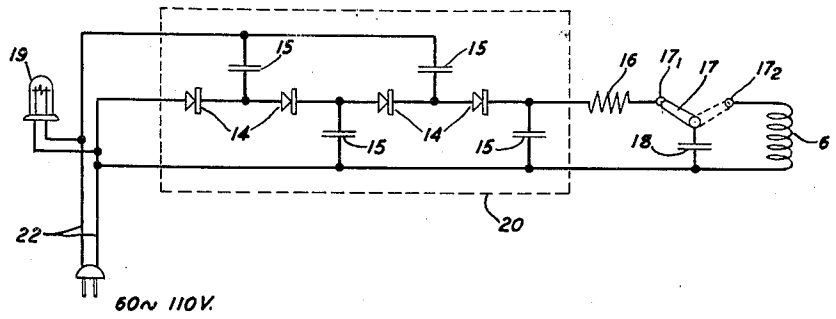


FIG. 4



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United States Patent Office

2,838,720

Patented June 10, 1958

2,838,720

WATCH MOVEMENT DEMAGNETIZING APPARATUS

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Application October 24, 1955, Serial No. 542,204

1 Claim. (Cl. 317—157.5)

The instant invention relates to an eliminator of magnetic effects in watch movements and parts thereof.

An object of the invention is to provide a demagnetizer for watch movements which is simple, quick and effective in operation and eliminates all uncertainty on the part of the user such as are presently involved with prior devices.

A further object is to provide a watch movement demagnetizer which appreciably reduces the time required for the demagnetization as compared to prior art devices.

A further object is to provide a watch movement demagnetizer which operates at a frequency which cannot damage any part of the watch tested, while operating at energies which are a large multiple of the prior art devices.

The foregoing, as well as other, objects as also the features and advantages of the invention will become apparent in the course of the following detailed description of an illustrative embodiment shown in the accompanying drawing, in which:

Figure 1 is a top view of an illustrative embodiment of the watch demagnetizer of our invention;

Figure 2 is a side elevation thereof;

Figure 3 is a section through the demagnetizing coil of our device; and

Figure 4 is a circuit schematic of our watch demagnetizer.

Referring to the drawing, the demagnetizer of my invention is housed in a rectangular container 1 open at its base, which may be closed by a fitted bottom 2. The top 3 of the container has a large opening 4 which is of such size as to be larger than the average watch, for example 3⅛" long and 2⅝" wide for a container 6½" long and 5" wide, which is closed by a dielectric sheet 5 affixed to the inner surface of the top and is for example of a glass-base Bakelite or other non-magnetic but mechanically rigid material. The opening 4 has aligned therewith a multi-turn coil 6 of enameled wire wound on a formed core 7 of magnetic material, such as compressed iron powder. As shown in Figure 3, the core 7 is cup-shaped having a rim 8 and a center post 9 integral with its base. The multi-turn coil 6 is wound on a cylinder 10, of cardboard for example, and is of such height that the coil height is somewhat less than the depth of the annular recess 11 between the rim 8 and the center post 9, and of an outer radius somewhat less than the inner radius of the rim. A small aperture 12 through the core base permits the ends of the wire of the coil to be drawn therethrough to make the required circuit connections. By way of example in one embodiment the core 7 is of outer diameter of 2⅜", ¾" in height, the center post 9 being 1" in diameter and the rim 9¼" wide, radially, with the free ends of the post and rim coplanar, the outer diameter of the coil is 1¾" and the depth of the recess 11 is ½".

The core 7 is supported in a panel 13 so as to project therefrom toward the sheet 5 closing the opening 4 with

the free face of the rim 8 and center post 9 closely adjacent thereto, the panel 13 in turn being supported in any well known manner from the container side walls. While in one embodiment of the demagnetizer the container 1, the bottom 2 and the panel 13 are of wood, any suitable non-magnetic material, such as various of the plastics, or metals, may be used. On its face opposite to that from which the core 7 projects, the panel 13 also supports the rectifier elements 14 and the capacitors 15 together with their connections, the electrical connections having been omitted in Figures 1 and 2 for simplicity of illustration, which are connected to constitute a voltage multiplier, specifically a quadrupler in this embodiment. Also supported on such face of panel 13 is the charging resistor 16 through which the capacitor 18 is charged. The spring-biased push button switch 17_3 is mounted in the top 3 at a convenient region thereof other than the opening 4. Similarly a pilot light 19, connected across the supply line, is mounted in top 3.

The wiring diagram of the demagnetizer of my invention is shown in Figure 4, with the elements in the dashed box 20 indicating a voltage quadrupler of any well-known prior type in which one output terminal is connected through the charging resistor 16, which prevents overloading the voltage quadrupler, to a fixed contact 17_1, engageable by switch 17, and normally engaging therewith, the other output terminal of the voltage quadrupler being connected to one side of capacitor 18 of which the other side is connected to the terminal on which switch 17 pivots. The ends of coil 6 are connected respectively to fixed contact 17_2 engageable by switch 17 but normally disengaged therefrom, and the side of capacitor 18 connected directly to the voltage quadrupler output. Switch 17 is biased by a spring so that normally the charging circuit 20, 16, 17_1, to capacitor 18 is closed, while on depressing button 17_3 against the spring biasing switch 17, such charging circuit is opened and the discharge circuit 17_2, 6, 18, is closed, discharging the capacitor 18 through coil 6. On releasing switch button 17_3, the switch 17 is immediately returned to terminal 17, under the influence of its spring to open the discharge circuit and close the charging circuit. On the passage of the current through coil 6, the oscillatory circuit comprising coil 6 and capacitor 18 will oscillate for a short interval, of perhaps $\frac{1}{20}$ second, at a frequency as determined by the constants of such circuit, which frequency is damped from its initial peak amplitude to a final minimum approaching zero. But with the core 7 cup-shaped as described, the center post 9 and the rim 8 will be the opposite poles of an electromagnet so formed, with the polarity of each rapidly reversing at the oscillating frequency. Thus when placing a watch, either face up or face down but preferably the latter as indicated by the dashed lines 21 in Figure 3, on the sheet 5 within the opening 4, the magnetic lines of flux passing through the watch movement from the center post 9 to the rim 8 in rapidly reversing directions and at a decaying intensity, will demagnetize the watch. The line supply connecting wires 22 are conveniently passed from the interior of the container through an aperture 23 in the bottom 2. The latter is affixed to the container, for example by screws 24, and has rubber casters 25 on its outer surface on which the assembled unit rests.

While the voltage multiplier 20 shown in Figure 4 is shown as a voltage quadrupler, and hence for a line voltage of 110–120 volts at 60 C. P. S., will result in a charging voltage of some 440 to 600 volts for the capacitor 18, it is obvious I do not limit myself to just this type of fourfold multiplication of the available line supply. I have furthermore determined that the frequency of the oscillatory circuit, coil 6 and capacitor 18, is not

critical although I prefer to have such frequency above 200 cycles per second to eliminate all danger of injury to parts of the watch movement. Winding the coil 6 with enameled copper wire of number 26 gauge and to the dimensions above given, and with capacitor 18 of some 4 μf., the frequency is some 500 C. P. S. and is most satisfactory. I have also found that a time interval of some five seconds between successive operations of the switch 17 is advisable to give the capacitor 18 ample opportunity to be recharged after a discharge.

It will be noted that the demagnetizing operation of a watch with the instant demagnetizer is simple in that, the demagnetizer having been connected to the supply line, the watch is placed, preferably with its face down as above stated, on the sheet 5 and the button 17_3 pressed and then released. Complete demagnetization is thus a matter of $\frac{1}{20}$ of a second or so, as compared to several seconds with prior art devices. The latter generally included a coil, energized by a key maintained in closed position from the electric line, and the watch approached axially to the coil and then withdrawn along the coil axis to a distance of a foot or more from the coil. The user of the prior art devices always feared that he might have not manually approached and withdrawn the watch truly along the axis of the coil, particularly in withdrawal was it difficult to avoid deviating from such axis, thereby subjecting the watch to the decreasing action of the oscillatory magnetic flux because of the greater distance from the coil. By contrast, with the demagnetizer of the invention the watch spatially remains in the same position throughout and the magnetic flux decreases as the transient oscillations decrease in amplitude, the watch being stationary and aligned substantially with the axis of core 7. With the instant demagnetizer, individual small parts of movements may be demagnetized by similarly placing them in roughly the center of sheet 5.

What I claim is:

A demagnetizing apparatus for watch movements and cased watches comprising a housing, a voltage multiplier adapted to be connected to an A. C. potential supply, a resistor connected to one output terminal of the multiplier, a capacitor connected at one side to the other output terminal of the multiplier, a cylindrical core of compressed powedered iron of high permeability integral with a cup of the same material having a cylindrical wall concentric with the core, a multi-turn coil about the core and substantially filling the cup space between the cylindrical cup wall and the core and having one end connected to that side of the capacitor connected to said multiplier output terminal, the multiplier, resistor, capacitor, core with integral cup and the coil being disposed within the housing, a switch operable from the exterior of the housing and supported in a wall of the housing and connected to the other side of the capacitor and normally connecting the resistor to the capacitor and operable to disconnect the resistor from the capacitor and connect the other end of the coil to the capacitor, the housing having an aperture aligned with the core with integral cup and the coil, and a supporting means of a material permeable to magnetic lines of force over the aperture, on which supporting means the watch movements and cased watches to be demagentized are positionable, the tops of the core, coil and the cup wall being coplanar and closely adjacent to the watch supporting means.

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