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W. D. KENDALL ET AL

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ELECTROTHERAPEUTIC TREATMENT HEAD

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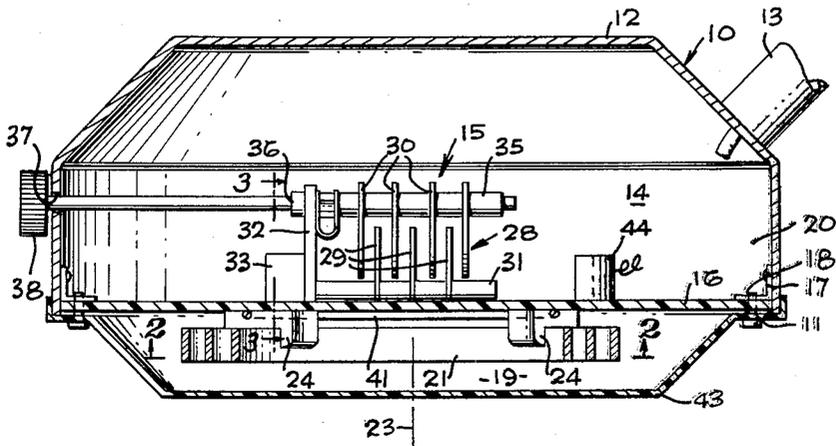


Fig. 1

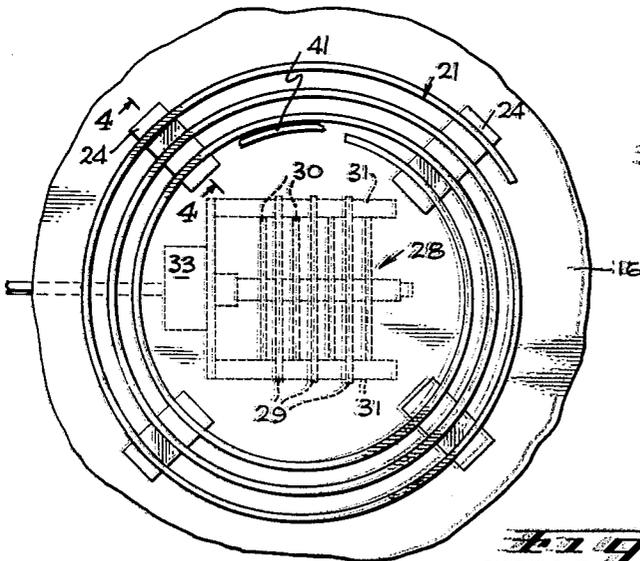


Fig. 2

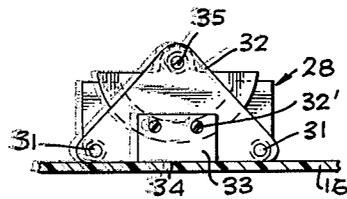


Fig. 3

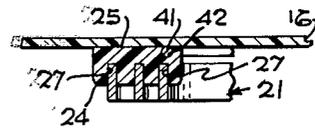


Fig. 4

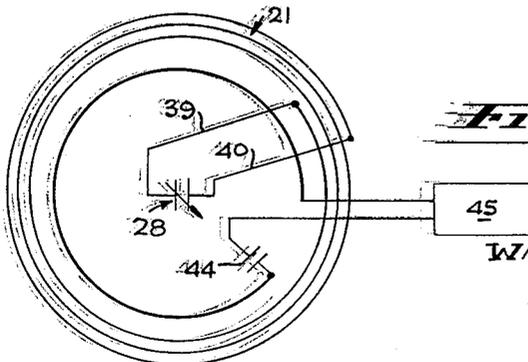


Fig. 5

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ELECTROTHERAPEUTIC TREATMENT HEAD
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 2 Claims. (Cl. 128—404)

This invention relates generally to electrotherapeutic apparatus, and more particularly has to do with treatment head construction facilitating voltage increase and matching of head impedance to that of the patient undergoing treatment.

It is a major object of the invention to provide a treatment head having novel and advantageous construction, affording a high degree of utility. Basically, the head comprises a metallic shell having a front opening, together with an assembly in the shell including a non-metallic partition extending transversely within the casing and forming therewith compartments at the front and rear of the partition. A multiple loop secondary coil is carried in the front compartment by the partition, the latter also carrying a variable capacitor in the rear compartment so as not to interfere with high frequency electromagnetic pulse transmission from the secondary coil to the patient. The primary coil is carried by the partition generally between the capacitor and the secondary coil, and finally a non-metallic cover for the shell closes the front opening thereof.

The aforementioned construction facilitates reception of the assembly of elements as a unit through the front opening of the shell when the cover is removed, variations of the capacitor being provided for by inserting a rotary shaft transversely through the shell wall for connection to the rotor element of the capacitor. The coupling between the capacitor and secondary coil may then be adjusted to match impedance with the patient being treated, since the capacitor and secondary coil are interconnected.

Other objects and advantages include the provision of a plastic partition carrying plastic support lugs received at the front and rear sides thereof to receive and mount the turns of the secondary and primary coils respectively, the partition also mounting another capacitor connected in series with the primary coil.

These and other objects and advantages of the invention, as well as the details of an illustrative embodiment, will be more fully understood from the following detailed description of the drawing, in which:

FIGURE 1 is an elevation taken in section through the electrotherapeutic head;

FIGURE 2 is a section taken on lines 2—2 of FIGURE 1;

FIGURE 3 is a section taken on lines 3—3 of FIGURE 1;

FIGURE 4 is a section taken on line 4—4 of FIGURE 2; and

FIGURE 5 is a circuit diagram showing the interconnection and intercoupling of the electrical components.

In the drawings the head is shown in the form of a generally cylindrically metallic shell 10 having a front opening 11 and a closed rear wall 12 supported by a rod or similar member 13. Received through the opening 11 and into the shell interior 14 is an assembly 15 that includes a partition 16 which is made of plastic such as Lucite or an equivalent material. The partition extends transversely and is peripherally removably connected to the shell as by interior bracket 17 and fasteners 18. The partition and shell together form front and rear interior compartments 19 and 20, as shown.

A metallic loop secondary coil 21 extends generally transversely within the front compartment 19 and spirals

about the forwardly extending central axis 23. Coil 21 is supported by means such as the plastic lugs 24 circularly spaced about the axis 23 and suitably bonded at 25 to the partition front face. Lugs 24 are recessed inwardly from the front sides thereof and at the locations 27 shown in FIGURE 4 to receive and mount the secondary coil turns.

A variable capacitor 28 is carried by the partition 16 to lie within the rear compartment 20. The capacitor includes forward and rearwardly extending parallel stator and rotor plates 29 and 30 respectively, the former being mounted on parallel legs 31 projecting transversely from end panel 32. The latter is connected by fasteners 32' to a plastic block 33 bonded at 34 to the rear face of partition 16. The capacitor rotor plates are mounted to a single post 35 journaled by end panel 32 for rotation. A rotary shaft is inwardly connected to the post 35 at 36, and projects transversely through an opening 37 in the shell to a control knob 38, whereby the rotor may be easily turned to vary the coupling between the capacitor and the secondary coil. As shown in FIGURE 5, suitable leads 39 and 40 interconnect the terminals of the capacitor and secondary coil.

A primary coil or loop is shown at 41 as being carried by the plastic support lugs 24, which are recessed at their rear faces to receive the single loop. Typically, the loop is inserted in the lug recesses 42 prior to bonding of the lugs to the front face of the partition 16. Accordingly, the primary is firmly located in position and along with the secondary coil is everywhere spaced from the ferrous metallic shell which shields the coils against rearward and transverse transmission of electromagnetic radiation. At the same time, the coils are mounted by structure which is non-metallic and offers no constraint or impedance to such radiation.

Finally, a non-metallic and typically plastic cover plate 43 is removably mounted to the shell rim. The cover offers no obstruction to transmission of electromagnetic radiation through the front opening 11 of the shell, which accordingly remains "open" to such transmission. At the same time, plate 43 protects the patient from contact with the high voltage components within the shell interior.

FIGURE 5 shows a fixed capacitor 44 connected in series with the primary coil 41 and with a high voltage pulse source 45 functioning to provide a train of interrupted pulses transmitted to the primary coil. The frequency of such pulses is typically 27.12 megacycles, and they are transmitted at regular intervals as for example .001 to .025 second. The capacitor 44 prevents D.C. application to the primary and is shown in FIGURE 1 as being mounted by the partition 16.

We claim:

1. An improved electrotherapeutic head, comprising a metallic shell having a front opening, means including a dielectric partition received through said front opening and carried by the shell to extend transversely therein and to form therewith separate compartments at the front and rear of said partition, a metallic multiple loop secondary coil extending generally transversely and spaced forwardly of the rear compartment and spiraling about a forwardly extending axis, a high voltage capacitor having exposed plates in the rear compartment, the capacitor and secondary coil having interconnected terminals, a low voltage primary coil extending generally transversely and spaced forwardly of the rear compartment and curving about said axis, the partition being solid and dielectrically shielding both coils from the capacitor, said means forming recesses to receive the coils, the coils having supported connection to said means, the capacitor being mounted at the rear side of the partition and extending within an axial cylinder passing through the primary coil turn, and non-metallic cover for said shell.

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2. A head as defined in claim 1 in which said means includes a series of circularly spaced dielectric lugs having said recesses to receive the turns of said coils and attached to said partition, said lugs and partition comprising hardened synthetic resins, the lugs protruding from and being bonded to the forward face of the partition, the recesses to receive the secondary coil being sunk in the forward sides of the lugs and the recesses to receive the primary coil being sunk in the rear sides of the lugs.

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RICHARD A. GAUDET, *Primary Examiner.*