Aug. 4, 1925. 1,548,184

W. J. CAMERON

HOLDER AND CONTROL FOR PULP TESTERS

Filed April 11, 1923 2 Sheets-Sheet 1

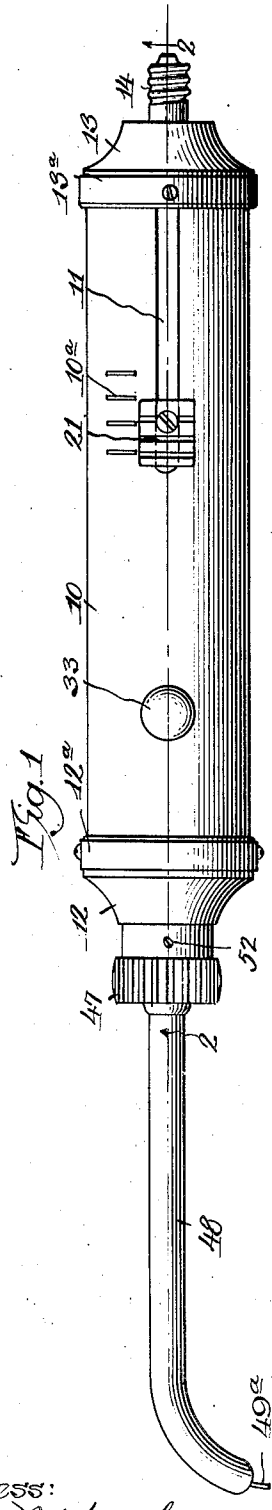


Fig. 1

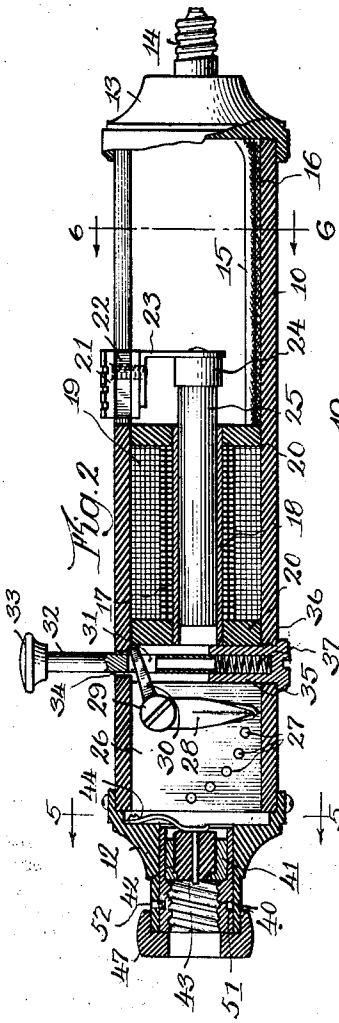


Fig. 2

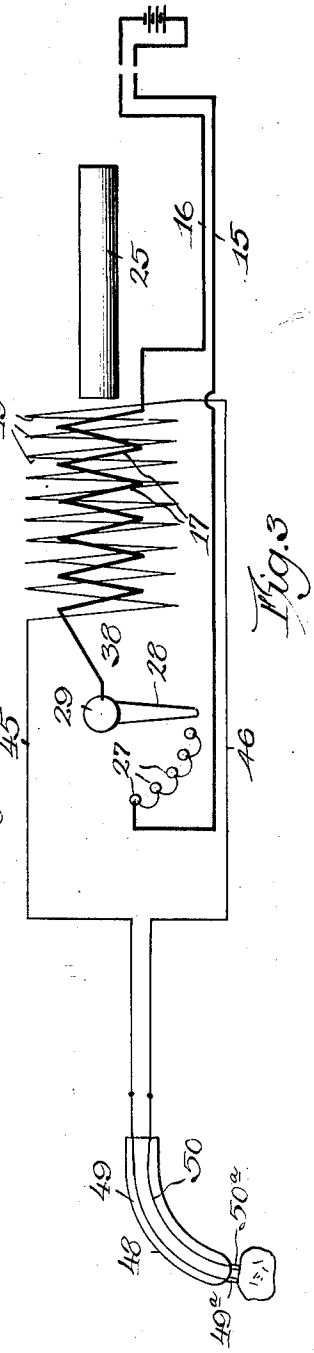


Fig. 3

Witness:
Chas. R. Kourse.

Inventor,
Will J. Cameron,
By Benjamin, Rochouse & Lindsey
Attys.

Aug. 4, 1925. 1,548,184

W. J. CAMERON

HOLDER AND CONTROL FOR PULP TESTERS

Filed April 11, 1923 2 Sheets-Sheet 2

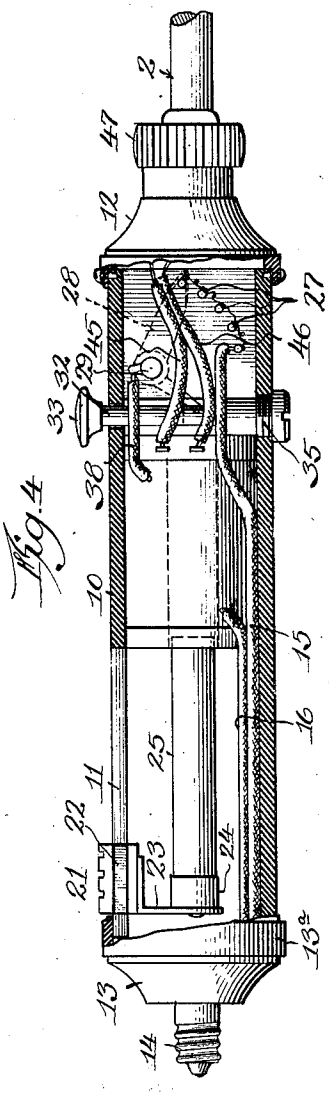


Fig. 4

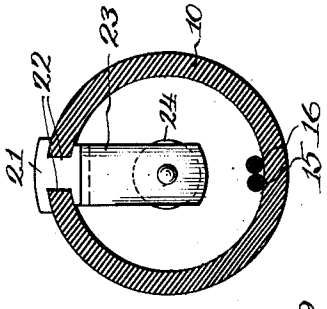


Fig. 6

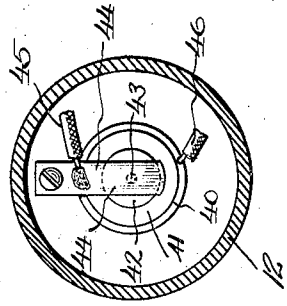


Fig. 5

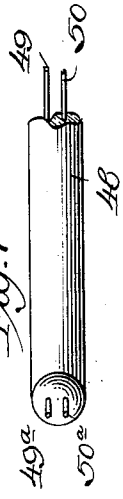


Fig. 7

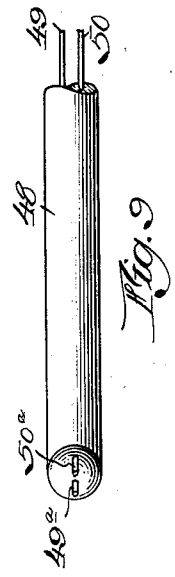


Fig. 9

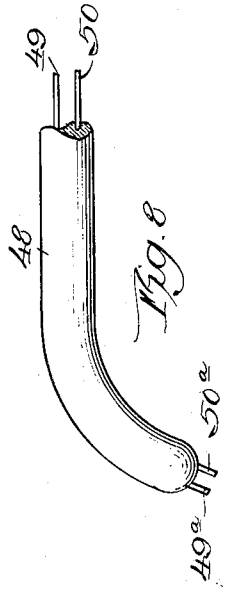


Fig. 8

Witness:
Chas. P. Kourse.

Inventor,
Will J. Cameron,
By Benjamin, Goodhouse & Lundy. Attys

Patented Aug. 4, 1925. 1,548,184

UNITED STATES PATENT OFFICE.

WILL J. CAMERON, OF CHICAGO, ILLINOIS.

HOLDER AND CONTROL FOR PULP TESTERS.

Application filed April 11, 1923. Serial No. 631,259.

To all whom it may concern:

Be it known that I, WILL J. CAMERON, a subject of the King of Great Britain, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in a Holder and Control for Pulp Testers, of which the following is a specification.

My present invention relates to a holder and means for controlling the current to a testing device for ascertaining the sensitiveness and vitality of teeth and the like.

In my prior application for dental pulp tester, now Patent No. 1,499,341 of July 1, 1924, I have disclosed a structure wherein a current is passed through a small tube of insulation by means of conductors that are spaced apart and which passes out of the end of the structure in the form of short terminals, which are brought into contact with the tooth or area under examination for obtaining a reflex action. In said application it is mentioned that the appliance is not ordinarily operated with the full service current but the current is passed through reducers or resistance devices that cut down the amount to what is required to cause a reflex action whereby the nature and condition of the tooth is ascertained. This reduction of current may be made by means of an ordinary resistance unit, or by means of a magnetic solenoid wherein the induced current is reduced in amperage. In this connection, the current will not be applied to the teeth of the patient continuously, but by rapid intermittent application thereof so that the shock is materially reduced and within control of the operator.

It is the object of my present invention to provide simple and compact means for accomplishing the above purposes so that the dental pulp tester disclosed in my aforesaid application for patent may be conveniently and dependably operated. In this connection, I have provided means whereby the pulp tester or other appliance mounted in the socket end of the structure may be rotated without disturbing the flow of current and without entangling the conductor wires leading to the structure from the service socket. A further object is to provide a switch which is normally open so that should the operator's fingers leave the switch plunger, the current will instantly be shut off. Also I have provided means whereby the amount of current utilized in testing the vitality of the teeth, may be regulated by the operator, and such regulation read upon a scale so that the amount of current used and degree of sensitiveness of the teeth may be thereby ascertained. Further objects will be apparent to others after an understanding of my invention is had, and I prefer to carry out my invention in the manner disclosed in the accompanying drawings.

In the drawings:

Fig. 1 is a longitudinal top plan of the unit showing a pulp tester mounted in the socket end thereof.

Fig. 2 is a central longitudinal section thereof on line 2—2, Fig. 1, with the pulp tester removed.

Fig. 3 is a schematic diagram of the electrical circuits.

Fig. 4 is a longitudinal view of the unit with the exterior casing partly broken away to disclose the structure upon the opposite side of the plane of the section shown in Fig. 2.

Fig. 5 is a vertical transverse section on line 5—5, Fig. 2.

Fig. 6 is a similar view on line 6—6, Fig. 2.

Figs. 7, 8 and 9 are fragmentary details of types of pulp testers.

The structure comprises a cylinder or tube 10, preferably of hard rubber, bakelite, or the like, that is provided with a longitudinal slot 11 in one side that extends to one end thereof, and the purpose whereof will hereinafter be more fully described. This tube or cylinder is closed at opposite ends by conical shaped heads or caps 12 and 13, respectively, that have annular portions 12^a and 13^a that fit over the ends of cylinder 10, and are secured by means of suitable screws or the like. The cap 13 is provided with a suitable electric plug connector 14 of the usual type, but of miniature size, and from the plug element lead the conductor wires 15 and 16 to the instrumentalities inside the tube.

Mounted approximately centrally within tube 10 is an induction coil comprising a primary winding 17 upon a suitable tube 18 and surrounded by a secondary winding 19. The ends of the solenoid are provided with the usual insulation disks 20 that engage tube 18 and fit within the outer cas-

ing 10. Mounted to reciprocate in slot 11, heretofore mentioned, is a slide piece or block 21 having longitudinal grooves 22 in its sides and an inverted L-shaped bracket 23 depending from its under surface. The lower end of the pendent arm of bracket 23 has a ferrule 24 secured to it in any suitable manner to receive the adjacent ends of a bundle of iron wires 25 that provide the core of the coil, and which are adapted to be moved in and out of tube 18 about which the coils are mounted upon the reciprocation of slide block 21 in slot 11. The conductor wire 16 leads from plug 14 to the adjacent end of primary winding 17 and the other conductor 15 leads to the points of a suitable intermittently operating switch which will now be described.

Mounted within casing 10 is an insulating plate 26 in which is mounted a plurality of metal terminals or switch points 27 arranged in an arc, and connected in series with conductor 15. A switch arm 28 is pivotally mounted by means of a screw 29 upon insulating plate 26, and is of bell-crank shape so that its lateral member 30 projects into a longitudinal slot 31 formed in a plunger or rod 32 that is mounted to reciprocate transverse to the axis of casing 10 so that by depressing said plunger by means of the finger rest 33 upon the outer extended end thereof, switch arm 28 is moved successively into and out of contact with terminals 27, causing an intermittent current to flow in the primary which induces an alternating current in the secondary. The plunger 32 passes through an aperture 34 in the wall of casing 10 and its axis is disposed transverse to the axis of said casing, while its lower end is mounted in the bore of a cylindrical plug 35 that is threaded and screwed into a threaded opening 36 diametrically opposite aperture 34. A spring 37 is mounted in the bore of the hollow plug behind the lower end of plunger 32 so as to yieldingly hold said plunger in a projected position, similar to that shown in Fig. 2 of the drawings. The arm 30 of the bell-crank after passing through slot 31 in the plunger extends beyond the latter so that its outer end will engage with the portion of the casing adjacent aperture 34 in the position shown in Fig. 2 so as to prevent the plunger being withdrawn from the casing. The switch arm 28 is connected by a conductor 38 with the primary winding of the coil in the manner shown in Figs. 3 and 4.

The adjacent end of casing 10 is closed by the conical shaped cap 12, similar to cap 13 at the opposite end of the casing and has mounted within its central bore a rotatable socket shell 40 to receive the plug end of the device that is usually inserted therein. The inner portion of the bore of shell 40 is smooth and unthreaded, and is slightly increased in diameter to accommodate a sleeve 41 within which is mounted a block of insulation 42, and centrally of this block is a small terminal rod 43 that projects at its opposite ends beyond the ends of said plug. A spring plate 44 is secured at one end to the inner portion of cap 12 and extends radially thereof so that its inner portion bears against the adjacent end of terminal conductor rod 43, as seen in Figs. 2 and 5. A conductor 45 leads from the secondary winding of the coil to spring plate 44 and is soldered or otherwise secured thereto. A conductor 46 leads from the opposite end of the secondary winding to the socket sleeve 40 so that the circuit is formed through the device that may be screwed into the socket. A knurled sleeve 47 having an annular side flange fits over the end of cap 12, and adjacent its inner periphery is connected to socket sleeve 40 so that by rotating the sleeve the socket and the device contained therein may be rotated to position the end of the latter in divers radial positions, and in order to retain the parts in assembly in cap 12, socket shell 40 is provided with an annular groove 51 and a threaded guide pin 52 is secured into the adjacent portion of the cap so that its inner end engages said groove.

The device for testing and ascertaining the vitality of the tooth under inspection comprises the structure, similar to that shown in Fig. 1, which consists of a glass or similar tube 48 through which conductor wires 49 and 50 lead from the plug end of said device. The plug is of the usual miniature lamp design, and the tube is elongated and its end bent laterally, as shown. The end portion of the tube is provided with terminals 49^a and 50^a that extend through the glass or other material of the tube so that they are exposed and may be placed in contact with the tooth under inspection. These terminals 49^a and 50^a may be arranged in the two positions, as shown in Figs. 1, 7, 8 and 9, for convenience in handling.

When the device is to be operated, the physician or dentist screws plug end 14 into the miniature socket having conductors in which a resistance device may be interposed, which conductors lead from the ordinary service socket and adjusts slide 21 carrying the iron wires or core 25 of the coil or solenoid. This adjustment varies the strength of the current for the test. The scale 10^a upon which the adjacent portion of casing 10 may be provided with indicia which indicates to the operator the relative strength of current in the secondary circuit, and the operator may then place terminals 49^a and 50^a upon the tooth and depress plunger 32 causing a rapid make and break in the primary circuit, and a correspondingly periodic alternating current at the ends of the terminals. This will cause slight shocks to the

patient, and the amount of reflex will be noted by the operator in making a diagnosis. When not in operation, it will be noted plunger 32 is at the limit of its projected outward movement, and switch arm 28 is out of engagement with contacts 27 so that no current is admitted under normal conditions to the testing instrument, thus avoiding any accidental shock to the patient.

From the foregoing description, taken in connection with the drawings, it will be apparent that besides producing a holder which permits of the rotation of the instrument mounted therein, I have also, by substituting an induction coil for the rheostats, made it possible to secure a very much reduced strength of operating current directly from the service current by a proper selection of the ratio of the windings of the primary and secondary coils.

What I claim is:

1. A device of the kind described comprising a casing, an induction coil therein the core of which is movable from the exterior of said casing, manually controlled means mounted within said casing for successively closing a plurality of contacts intermittently making and breaking the primary circuit of said coil, and a socket connected to the secondary circuit of said coil.

2. A control handle for an electrically operated instrument comprising a casing, an induction coil within said casing the secondary winding of which is in circuit with the instrument to be mounted in the handle and in the primary winding of which are interposed switch points in series, a switch arm co-operating with said points, and a plunger extending exteriorly of said casing and co-operating with said arm to cause it to sweep said points.

3. A control handle for an electrically operated instrument comprising a casing, an induction coil within said casing, the secondary winding of which is in circuit with the instrument to be mounted in the handle and in the primary winding of which are interposed switch points in series, a switch arm co-operating with said points, a plunger extending exteriorly of said casing and co-operating with said arm to cause it to sweep said points, and a core of magnetically permeable material movable within said coil for controlling the strength of the induced current.

4. A device of the kind described comprising a casing longitudinally slotted, a slide movable in said slot, a core of magnetically permeable material secured to said slide, a centrally apertured induction coil within said casing within which said core is longitudinally movable, an electric circuit connector at one end of said casing and in circuit with the primary winding of said coil, and a switch interposed in the circuit of the primary winding of said coil consisting of a plurality of switch points in series and an arm.

5. A device of the kind described comprising a casing longitudinally slotted, a slide movable in said slot, a core of magnetically permeable material secured to said slide, a centrally apertured induction coil within said casing within which said core is longitudinally movable, an electric circuit connector at one end of said casing and in circuit with the primary winding of said coil, a switch interposed in the circuit of the primary winding of said coil consisting of a plurality of switch points in series and an arm, and an electric circuit connector pivotally mounted at the opposite end of said casing the terminals of which are in circuit with the secondary circuit of said coil.

6. A device of the kind described comprising a casing longitudinally slotted, a slide movable in said slot, a core of magnetically permeable material secured to said slide, a centrally apertured induction coil within said casing within which said core is longitudinally movable, an electric circuit connector at one end of said casing and in circuit with the primary winding of said coil, and a make and break device interposed in the circuit of the primary winding of said coil consisting of a plurality of switch points in series and an arm.

7. A device of the kind described comprising a casing, electric terminal connectors at opposite ends of said casing; one of which has pivotal motion, an induction coil within said casing the core of which is movable from the exterior of said casing, means for intermittently making and breaking the primary circuit of said coil; said terminal connectors being respectively included in the primary and secondary circuits of said coil.

8. A control device for a pulp tester comprising a casing, means for creating an induced current therein and manually operated means mounted within said casing for causing an intermittent flow of current, consisting of a plurality of switch points in series, an arm co-operating therewith, and means for moving said arm into open circuit.

9. A control device for a pulp tester comprising a casing, a plate of insulating material within said casing, a bell-crank switch arm pivotally mounted upon said plate, a plunger reciprocating transverse to the axis of said casing and co-operating with said switch arm, a series of switch points mounted in series upon said plate and arranged in an arc struck from the pivot of said arm, means for yieldingly holding said arm out of operative position, and an electric ter-

minal connector in the adjacent end of said casing and included within the circuit of said switch.

10. In a device of the kind described, a pivoted electric terminal connector comprising an element having a bore therein, a threaded shell of conducting material rotatable in said bore, a plug of non-conducting material disposed in the bore of said shell, a conductor mounted centrally of said plug, and conductors fixedly secured to said casing and extending respectively into contact with said shell and said centrally located conductor.

11. A device of the kind described comprising a casing, an induction coil having a core, means movable from the exterior of said casing for causing a relative movement between said coil and core, manually controlled means mounted within said casing for successively closing a plurality of contacts intermittently making and breaking the primary circuit of said coil, and a socket connected to the secondary circuit of said coil.

12. A control handle for an electrically operated instrument comprising a casing, an induction coil within said casing, the secondary winding of which is in circuit with the instrument to be mounted in the handle, and in the primary winding of which are interposed switch points in series, a switch arm co-operating with said points, a plunger extending exteriorly of said casing and cooperating with said arm to cause it to sweep said points, a core of magnetically permeable material for said coil, and means for causing a relative movement between said coil and core whereby to control the strength of the induced current.

13. A device of the kind described comprising a casing longitudinally slotted, a slide movable in said slot, a centrally apertured induction coil within said casing, a core therefor, said core being connected to said slide whereby to cause a relative movement between said coil and core, an electric circuit connector at one end of said casing and in circuit with the primary winding of said coil, and a switch interposed in the circuit of the primary winding of said coil consisting of a plurality of switch points in series and an arm.

14. A device of the kind described comprising a casing, an induction coil therein, a socket element interposed in the secondary circuit of said coil, manually operated automatically retractable devices housed within said casing for making and breaking the primary circuit of said coil, and means operable from the exterior of the casing for causing a relative movement between said coil and its core whereby the intensity of voltage may be varied.

Signed at Chicago, county of Cook and State of Illinois, this 28th day of March, 1923.

WILL J. CAMERON.