

No. 693,162.

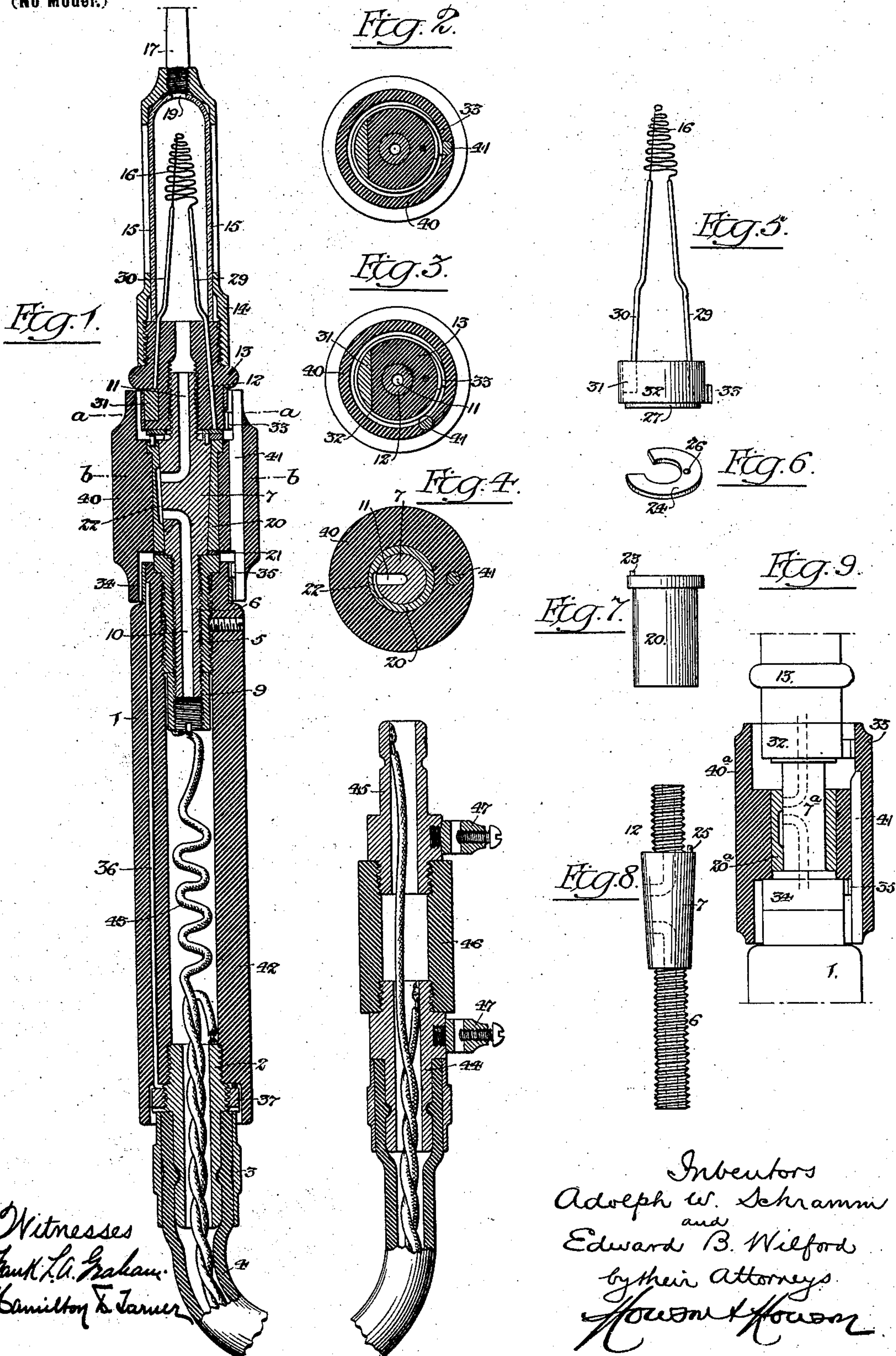
Patented Feb. 11, 1902.

A. W. SCHRAMM & E. B. WILFORD.

HOT AIR SYRINGE.

(Application filed May 15, 1901.)

(No Model.)



UNITED STATES PATENT OFFICE.

ADOLPH W. SCHRAMM AND EDWARD B. WILFORD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO ELECTRO DENTAL MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

HOT-AIR SYRINGE.

SPECIFICATION forming part of Letters Patent No. 693,162, dated February 11, 1902.

Application filed May 15, 1901. Serial No. 60,388. (No model.)

To all whom it may concern:

Be it known that we, ADOLPH W. SCHRAMM and EDWARD B. WILFORD, citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Hot-Air Syringes, of which the following is a specification.

Our invention relates to that class of hot-air syringes in which the air in its flow to the nozzle of the syringe passes over an electrically-heated coil, one object of our invention being to so construct an instrument of this class as to simplify the operation of the same, a further object being to prevent injury to the coil by overheating, and a still further object being to so convey the electric current and the supply of air to the syringe that the free manipulation of the latter will not be interfered with. These objects we attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section, on an enlarged scale, of a hot-air syringe constructed in accordance with our invention, part of the nozzle and part of the flexible air-conveying pipe being broken away. Fig. 2 is an enlarged transverse section on the line *a a*, Fig. 1. Fig. 3 is a similar view showing one of the parts in a different position from that represented in Fig. 2. Fig. 4 is a transverse section on the line *b b*, Fig. 1. Figs. 5, 6, 7, and 8 are detached views of parts of the syringe, and Fig. 9 is a longitudinal section illustrating a modification of the invention.

1 represents the handle of the syringe, which is made of hard rubber or other insulating material and has screwed into or otherwise attached to its lower end a projecting metallic plug 2, to which is secured, by means of a sleeve or ferrule 3, the upper end of the flexible tube 4, through which the supply of air is conveyed to the syringe. The handle 1 is hollow and has screwed into or otherwise secured to the upper end of it a tubular sleeve 5, into which in turn is screwed the lower threaded stem 6 of a plug 7, which is further secured to the sleeve 5 by means of a nut 9 on the lower end of the threaded stem 6. The plug 7 has formed in it two disconnected

passages 10 and 11, the adjoining ends of which extend outwardly and terminate one above the other at one side of the plug. The upper threaded stem 12 of the plug receives the lower threaded end of a hollow block 13 of insulating material, to which is secured the shield 14, which protects the transparent casing 15, in which the heating-coil 16 is located. The shield 14 carries at its outer end the delivery-nozzle 17 of the syringe, and the casing 15 has at its outer end an opening 19 in line with the bore of said nozzle. The inner end of the casing 15 bears upon the block 13, and the two form a casing for a chamber in which the air is heated by contact with the coil 16.

The plug 7 is tapered, being larger in diameter at the top than at the bottom, and surrounding said plug is a sleeve 20, correspondingly tapered internally and maintained in snug contact with the plug by means of a spring-washer 21, interposed between the lower end of the sleeve 20 and the upper end of the sleeve 5. The sleeve 20 has in one side a recess or chamber 22, and the sleeve is free to turn to a limited extent on the plug 7, so that said chamber 22 may be caused to open communication between the passages 10 and 11 of the plug or may be turned away from the ends of said passages, so as to cut off the flow therethrough. The sleeve 20 has at the upper end a projecting pin 23, which enters a segmental recess formed in a washer 24, resting upon the top of the plug 7 and prevented from turning by means of a pin 25, which projects from the top of said plug and enters an opening 26 in the washer. The washer 24 is in contact with another washer 27 at the lower end of the insulating-block 13, and said washer 27 is connected to one terminal 29 of the heating-coil 16, the other terminal 30 of said coil being connected to a block 31, which is secured to a ring 32, the latter surrounding the lower portion of the insulating-block 13 and being slit or severed throughout a portion of its circumference, so as to form a projecting spring-finger 33. A similar ring 34, with projecting spring-finger 35, surrounds the upper end of the hollow insulating-handle 1 of the syringe and is connected to a wire 36, em-

bedded in the handle 1 and having its lower end confined between said handle and a nut 37 on the plug 2, to which one of the electrical conducting-wires is soldered or otherwise electrically connected, the other of said wires being soldered or otherwise electrically connected to the nut 9, which is applied to the lower end of the threaded stem 6 of the plug 7. The current thus passes from one of the conductors to the plug 2, nut 37, wire 36, ring 34, and spring-finger 35, and from the other conductor to the nut 9, stem 6, plug 7, washers 24 and 27, thence to and through the heating-coil to the block 31, ring 32, and spring-finger 33, said spring-fingers 33 and 35 thus constituting terminals of an electric circuit. Hence when these terminals are connected the current will flow through the coil 16, properly heating the same, and when the connection between said terminals is broken the flow of current through the heating-coil will cease. The making and breaking of the circuit is effected by means of a ring 40, composed of insulating material and secured to the sleeve 20, so as to move therewith, said ring 40 having at one side a bar 41, which when the ring is at one limit of its movement contacts with and provides connection between the spring terminal fingers 33 and 35, as shown in Figs. 1 and 2, but when said ring 40 is at the other limit of its movement is moved away from said terminal fingers, as shown in Fig. 3, and therefore breaks the connection between the same. The sleeve 20 and ring 40 move as a unit and practically form one part. Hence they may be regarded as a single sleeve and are so regarded in some of the claims. The chamber 22 in the sleeve 20 is wider than the passages 10 and 11 in the plug 7 and is so disposed in respect to said passages and to the bar 41 of the ring 40 that it will open communication between the passages before said bar 41 makes contact with the spring-terminals 33 and 35 and will not cut off communication between the passages 10 and 11 until after the bar 41 has been moved out of contact with said spring-fingers. Consequently the flow of air through the heating-chamber of the syringe is established before the current is turned onto the heating-coil 16 and continues until after the current has been cut off from said coil, thereby preventing any overheating of the coil which might result if the current was turned onto the same before the flow of air around the coil began. Furthermore, the control both of the air-flow and of the current is effected by the manipulation of but a single moving element of the instrument—namely, the ring 40—and all of the electric conducting elements of the instrument are thoroughly protected by insulating material, so that no accidental short-circuiting of the current can take place and no injury to the person handling the syringe can therefore result.

It is not necessary to the proper carrying out of our invention that the circuit-control-

ling switch should constitute a ring mounted so as to be partially rotatable around the air-plug, as a longitudinally-sliding ring—such, for instance, as represented at 40^a in Fig. 9—will attain the same result, the circuit being broken and the flow of air cut off when said sleeve is in its lowermost position, as shown in Fig. 9, but the flow of air being first established and the circuit then closed by a lifting movement of said sleeve.

The insulated conductors 42 and 43, whereby the current is conveyed to the syringe, pass through the flexible air-supply tube 4 and are electrically connected, respectively, to hollow metallic plugs 44 and 45, projecting from the opposite ends of a hollow block 46 of insulating material, the plug 44 being connected to the outer end of the flexible tube 4 and the plug 45 being intended to be connected to the tube whereby air is supplied to the instrument and each of said plugs being provided with a binding-post 47 for the attachment of the electrical conducting-wires. By this means all strain upon the electrical conductors 42 and 43 is prevented and liability of breaking the connections between said conductors and the other parts of the instrument is overcome.

When it is desired to control the air-pressure at the nozzle, the forward limit of movement of the sleeve 20 may be such that the chamber 22 will be carried forwardly beyond the passages 10 and 11 of the plug 7, so that the flow of air through said passages may be gradually restricted, the bar 41 remaining in contact with the spring-fingers 33 and 35 during such regulating movement, so as to insure the continued heating of the coil 16.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. The combination in a hot-air syringe, of a hollow handle, a casing inclosing the air-heating chamber and containing an electric heating-coil, a plug interposed between the handle and said air-heating chamber, and having disconnected passages therein, and a sleeve movable on said plug and having a chamber for opening communication between the passages of the plug.

2. The combination in a hot-air syringe, of a hollow handle, a casing inclosing the air-heating chamber and containing an electric heating-coil, a plug interposed between the handle and said air-heating chamber, and having disconnected passages therein, and a rotatable sleeve surrounding said plug and having a chamber for opening communication between the passages of the plug.

3. The combination in a hot-air syringe, of the hollow handle, a casing containing an air-heating chamber with electric heating-coil therein, a plug interposed between the handle and said air-heating chamber and having disconnected passages therein, electric conductor-terminals, of a circuit including the heating-coil and a sleeve movably mounted on the plug and having a chamber for con-

necting the passages thereof and a bar for connecting said electric terminals.

4. The combination in a hot-air syringe, of the hollow handle, a casing containing an air-heating chamber with electric heating-coil therein, a plug interposed between said handle and air-heating chamber and having disconnected passages therein, electric conductor-terminals, of a circuit including the heating-coil and a sleeve rotatable on the plug and having a chamber for connecting the passages thereof and a bar for connecting said electric terminals.

5. The combination in a hot-air syringe, of a hollow handle, a casing containing an air-heating chamber and having an electric heating-coil therein, a plug interposed between the air-heating chamber and the handle and forming part of an air-controlling valve and also part of one of the electric conductors for the heating-coil.

6. The combination in a hot-air syringe, of a hollow handle, a casing containing an air-heating chamber and having an electric heating-coil therein, a plug interposed between said air-chamber casing and the handle and constituting part of the air-valve, and also part of one of the electrical conductors for the heating-coil, and a sleeve movably mounted on said plug and constituting the other part of the air-valve and also a circuit making and breaking switch.

7. The combination in a hot-air syringe, of a hollow handle, a casing containing an air-heating chamber and having an electric heating-coil therein, a spring-finger mounted upon said air-chamber casing and constituting one of the terminals of an electric circuit containing the heating-coil, a similar spring-finger mounted upon the handle and constituting the other terminal of said circuit, and an insulating-sleeve movably mounted between the air-chamber casing and the handle and having a bar which by the movement of the sleeve is carried into and out of contact with said spring-terminals.

8. The combination in a hot-air syringe, of a hollow handle, a casing containing an air-heating chamber and having an electric heating-coil therein, a spring-finger mounted on the air-chamber casing and constituting one of the terminals of the circuit containing the heating-coil, a similar spring-finger mounted upon the handle and constituting the other terminal of said circuit, a plug interposed between the air-chamber casing and the handle and having disconnected air-passages therein, and a sleeve movably mounted on said plug and having a chamber for connecting the air-passages of the same and a bar for making and breaking connection between said spring-terminals.

9. The combination in a hot-air syringe, of a hollow handle, of insulating material, a casing containing an air-heating chamber and having an electric heating-coil therein, a sleeve of insulating material forming part of

said casing, a spring-contact finger mounted on said insulating-sleeve and constituting one of the terminals of the circuit containing the heating-coil, a spring-contact finger mounted upon the insulating-handle and constituting the other terminal of said circuit, and an insulating-sleeve movably mounted between the insulating-handle and the insulating-sleeve of the air-chamber casing and having a bar constituting a circuit making and breaking switch, said movable insulating-sleeve inclosing the spring-terminals so as to prevent access thereto from the outside of the instrument.

10. The combination in a hot-air syringe, of a hollow handle of insulating material, a casing inclosing an air-heating chamber and having an electric heating-coil therein, an insulating-sleeve forming part of said air-chamber casing a contact device mounted on said insulating-sleeve and forming one of the terminals of the circuit containing the heating-coil, a contact device mounted on the insulating-handle and forming the other terminal of said circuit, a plug interposed between the insulating-handle and the insulating-sleeve of the air-chamber casing and having disconnected air-passages therein, and an insulating-sleeve surrounding said plug and constituting a means for controlling the flow of air through the syringe, and also surrounding, and provided with means for making and breaking connection between, the terminals on the insulating-handle and on the insulating-sleeve of the air-chamber casing.

11. The combination in a hot-air syringe, of a hollow handle, a flexible air-conveying pipe attached thereto, a hollow insulating-block having projecting hollow plugs with binding-posts thereon, and flexible electrical conductors passing through the flexible air-pipe, and electrically connected, one to one of said plugs and the other to the other of the same.

12. The combination of a hot-air syringe having an air-passage with electric heating-coil therein, circuit-terminals for said heating-coil, and a movable element constituting an air-valve and a circuit making and breaking switch, the distance between the fixed and movable passages of the valve being less than the distance between the fixed and movable members of the switch when the valve is closed, to cause the flow of air before the closing of the circuit.

13. The combination in a hot-air syringe, of a hollow handle, a casing containing an air-heating chamber and having an electric heating-coil, a plug interposed between said hollow handle, and air-chamber casing and having disconnected passages therein, circuit-terminals for said heating-coil, and a sleeve movably mounted upon said plug and having a channel for connecting the passages of the latter, and a bar for connecting the circuit-terminals, the distance between the channel and passages being less than that between the bar and the circuit-terminals, whereby

communication between the air-passages will be established before the bar makes contact with the circuit-terminals.

14. The combination in a hot-air syringe, of
5 a hollow handle, a casing containing an air-heating chamber and having an electric heating-coil therein, a plug interposed between said hollow handle and air-chamber casing and having disconnected passages therein,
10 circuit-terminals for said heating-coil, and a sleeve partially rotatable around said plug and having a channel for connecting the passages of the latter, and a bar for connecting the circuit-terminals, the distance between

the channel and passages being less than that 15 between the bar and the circuit-terminals, whereby communication between the air-passages will be established before the bar makes contact with the circuit-terminals.

In testimony whereof we have signed our 20 names to this specification in the presence of two subscribing witnesses.

ADOLPH W. SCHRAMM.
EDWARD B. WILFORD.

Witnesses:

F. E. BECHTOLD,
JOS. H. KLEIN.