(No Model.) 2 Sheets—Sheet 1.

C. C. LUSBY & C. H. RICHARDSON.

SYRINGE.

No. 526,452. Patented Sept. 25, 1894.

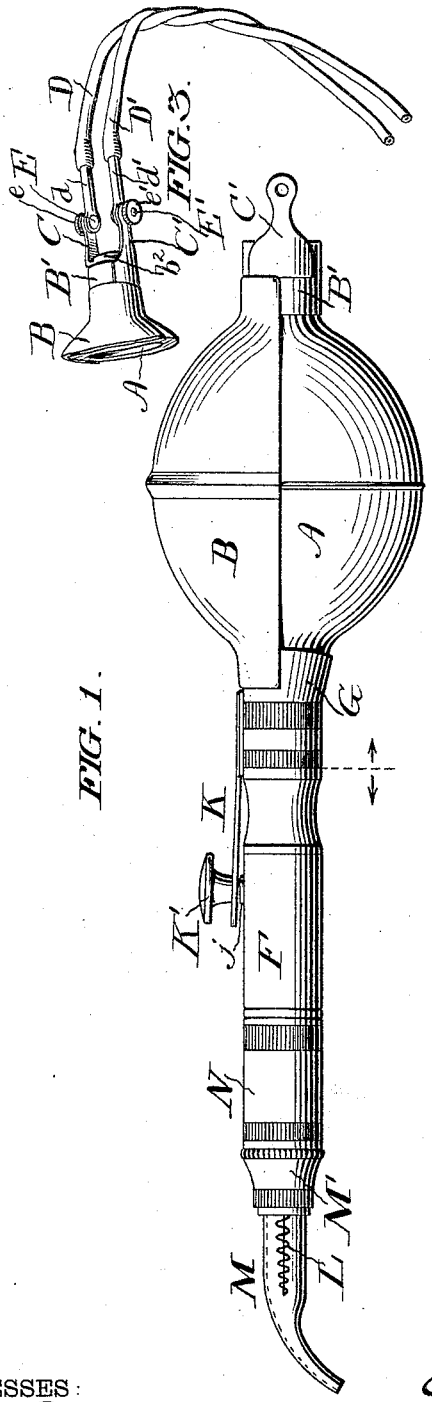

FIG. 1.

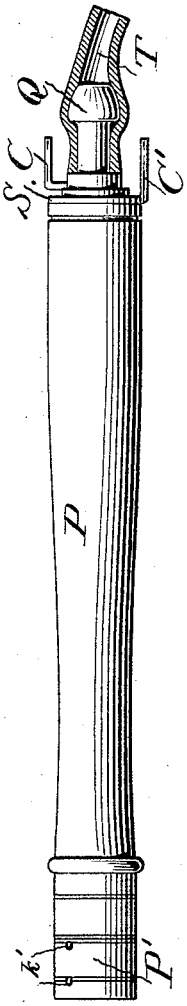

FIG. 3.

WITNESSES:

H. E. Paige

Edw. F. Simpson, Jr.

C. C. Lusby INVENTORS

C. H. Richardson

By Atty J. C. Hazleton

(No Model.) 2 Sheets—Sheet 2.

C. C. LUSBY & C. H. RICHARDSON.

SYRINGE.

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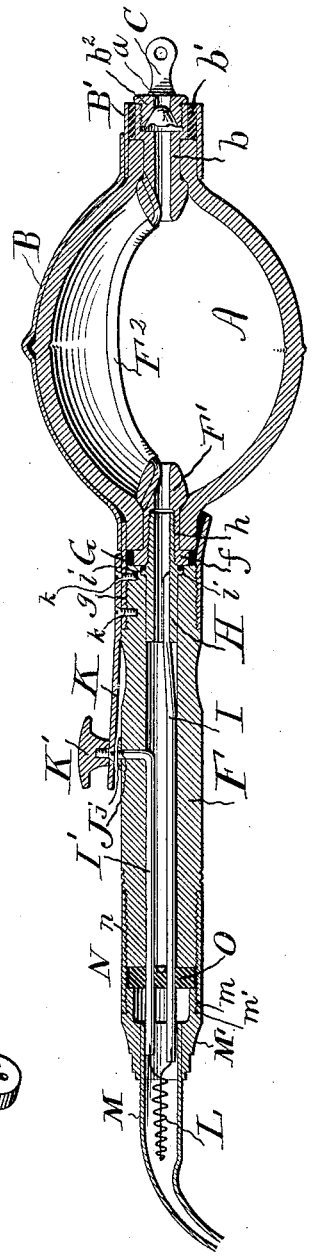

FIG. 2.

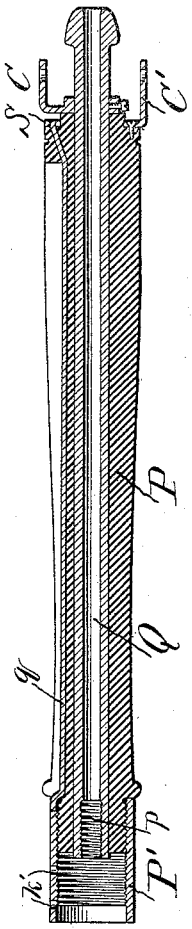

FIG. 6.

FIG. 4.

WITNESSES:

A. E. Paige.

Edwd. P. Simpson, Jr.

INVENTORS

C. C. Lusby

C. H. Richardson

By Atty J. S. Peyton,

UNITED STATES PATENT OFFICE.

COMEGYS C. LUSBY AND CHARLES H. RICHARDSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF SAME PLACE.

SYRINGE.

SPECIFICATION forming part of Letters Patent No. 526,452, dated September 25, 1894.

Application filed March 22, 1894. Serial No. 504,736. (No model.)

To all whom it may concern:

Be it known that we, COMEGYS C. LUSBY and CHARLES H. RICHARDSON, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Syringes; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to certain improvements, as hereinafter claimed, in syringes of the class employed by dentists, surgeons, and others, adapted for electrically heating atmospheric air or other gases or fluids forced through them.

In the accompanying drawings, which show a suitable embodiment of our improvements, Figure 1 is a side elevation with the flexible conducting cords omitted. Fig. 2 is a view showing most of the apparatus in central longitudinal section. Fig. 3 is a view in perspective showing parts of the flexible conducting cords and their connections with the syringe. Fig. 4 is a view in perspective of the perforate disk. Fig. 5 is a longitudinal view, showing a modified support or carrier for the syringe which may be substituted for the carrier of bulb form; and Fig. 6 is a view in longitudinal central section of this modified carrier.

A bulb A to which air is admitted by a suitable valve *a*, and by the compression of which the air may be forced through and from the syringe, is partly surrounded by a rigid shield B of metal. This shield serves as a means for grasping and steadying the syringe, and constitutes with the bulb a support or carrier for the syringe, as is well understood. The chamber or casing for the air-inlet valve *a* is provided at the outer end of a short metal tube or hollow plug *b* secured in one end of the syringe bulb, and this end of the bulb is snugly embraced by a metal ring or short tube B′ rigid with the shield of the syringe bulb. Between this tube of the bulb shield and the tubular plug *b* of the bulb is interposed a ring *b′* of non-conducting material, such as rubber. A conductor terminal C is provided upon the tubular plug *b* of the bulb into which plug the terminal is screwed by its threaded tube b^2 which constitutes a valve seat, and another conductor terminal C′ is provided upon the shield tube B′. To these terminals are electrically and detachably connected flexible conducting cords D D′, the connection being by means of coupling ends *d d′* of the flexible conductors and screws E E′ passing through the coupling ends and through the terminals and provided each with a nut *e e′*. It will be seen that the flexible exterior conductors D D′ may quickly be connected with or disconnected from the terminals C C′.

Secured within that end of the bulb adjacent to the syringe delivery tube F is a short metal tube or hollow plug F′ which is electrically connected by a flexible conductor F^2 with the tubular plug *b* at the opposite end of the bulb. A collar or annular shoulder *f* is provided upon the tubular plug F′ outside the bulb. The inner ends of the plugs *b* F′ are shouldered to prevent their accidental separation from the bulb. The end of the bulb shield opposite that which is provided with the tube or ring B′ is rigidly connected with a metal tube or sleeve G embracing the bulb end and internally threaded at *g* for a portion of its length.

The syringe delivery tube F composed of suitable non-conducting material, such as vulcanized-fiber or hard rubber, is screwed at its inner end into the tube G, and snugly embraces, for a portion of the length thereof, a metal coupling tube H externally threaded at *h* and screwed into the tubular plug F′ of the bulb. Pins *i i* are provided on this coupling tube for engaging grooves in the syringe tube so as to positively prevent turning of the coupling tube in the syringe tube instead of depending solely upon frictional contact between these parts to guard against the turning of the one independently of the other. A conductor I within the syringe delivery tube is secured at one end to the coupling tube H

so as to be electrically connected by way of this coupling tube, the bulb plug F′, conductor F², bulb plug *b* and terminal C, with the external flexible conductor D. A conductor I′ within the syringe delivery tube is bent at its rear end and projects through the side of this tube at J and is provided with a fixed contact *j* outside the tube to be electrically engaged by a movable contact shown as formed by a spring K provided with a push button K′ and attached by screws *k k* both to the tube G of the bulb shield and to the syringe delivery tube F. It will be seen that when the movable contact is actuated to connect it with the fixed contact *j* connection is made between the internal conductor I′ and the flexible external conductor D′ by way of the bulb shield, its tube, and terminal C′. A spiral or coiled platinum conductor or resistance piece L of much less conducting capacity than the conductors above described is electrically connected with the ends of the conductors I I′ (see Fig. 2) to complete the circuit. With proper current the resistance piece L may be heated to the point of incandescence, without unduly heating the conductors connected therewith.

The syringe delivery tube nozzle M best made of glass is properly fixed, as by the use of cement, to a metal holder M′ within which the inner or rear end of the nozzle is fitted, and this holder is provided with an external screw thread *m* at its inner end, the thread terminating at an annular shoulder *m′* of the holder. An internally threaded coupling sleeve N engages the nozzle holder screw threads, and also engages an external screw thread *n* of the syringe delivery tube, and so detachably connects the nozzle with the syringe tube. Between the inner end of the nozzle holder and the outer end of the syringe delivery tube there is placed a perforated disk O of non-conducting material such as hard rubber, vulcanized fiber, &c. This disk fits snugly within the coupling sleeve N and serves to separate and support the conductors I I′ near their connections with the resistance piece L. Besides the holes through which the conductors I I′ pass, the disk is provided with other holes of any desired number and area in cross section (two such holes being shown) to permit of the passage of air through the syringe. The air passage openings are connected by a groove in the disk (see Fig. 4) to facilitate the flow of the air.

From the above description it will be seen that a current of electricity, obtained from any suitable source, passing through the conductors may be employed to heat the resistance piece L to the desired degree; that the air forced through the syringe by compression of its bulb is heated in passing the resistance piece L; that by the employment of a glass nozzle the resistance piece can readily be viewed by the user of the syringe so as to show the degree of heat to which the resistance piece is brought; that the heating of the resistance piece may be controlled at will by means of the movable contact in the electric circuit; and that various portions of the apparatus are easily assembled and separated.

If it be desired to dispense with the compression bulb and employ the syringe tube, its nozzle, and the resistance piece in connection with a reservoir of compressed air, nitrous-oxide gas, or other suitable fluid under pressure, we employ means such as shown by Figs. 5 and 6, in lieu of the bulb and its shield and parts permanently connected therewith.

To employ the modification shown by Figs. 5 and 6 it is necessary to first detach the flexible exterior conductors from the terminals carried by the bulb and its shield, and separate the bulb and shield from the syringe tube F after detaching the securing screws *k k* by which the movable contact is held in place. It will be understood that in detaching the syringe support or carrier, constituted by the bulb and its shield, from the syringe tube the sleeve G and tubular plug F′ are unscrewed from the syringe tube and coupling tube H, respectively. Next, a syringe carrier composed of a tubular handle P, of suitable non-conducting material, such as hard rubber or vulcanized fiber, is secured upon the end of the syringe tube from which the sleeve G was detached, this carrier being engaged with the syringe tube by a metal coupling sleeve P′ internally threaded for engaging the threaded ends of the syringe tube and carrier. A metal tube Q extending through the carrier and through which the air, &c., passes, is engaged by its internal thread *p* with the coupling tube H and serves to make electrical connection between the conductor I, terminal C, and the flexible conductor D when coupled in place. The movable contact K is secured upon the coupling sleeve P′ and to the syringe tube by the screws *k k* which engage the syringe tube after passing through this sleeve at *k′ k′*. Electrical connection between the external flexible conductor D′ and the internal conductor I′, is made by way of the movable contact K, the coupling sleeve P′, a conductor *q* in a groove in the carrier, a metal ring S, and the terminal C′ formed with this ring. A flexible tube T connects the tube Q of the syringe carrier with a suitably valved outlet of the reservoir of compressed air or other fluid, so that the fluid may be forced through the syringe, heated and directed as desired as it issues from the nozzle of the delivery tube F.

We claim as our invention—

A syringe adapted to heat the contents thereof which consists of an elastic bulb partly surrounded by a metallic shield, hav-

ing a screw fitted delivery tube carrying electric conductors extending within it and terminating near the end thereof in the resistance piece adapted for generating heat, and suitable conducting devices whereby a current may be sent through the resistance piece at will, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

COMEGYS C. LUSBY.
CHARLES H. RICHARDSON.

Witnesses:
HARRY E. HANKSAULT,
R. DALE SPARHAWK.