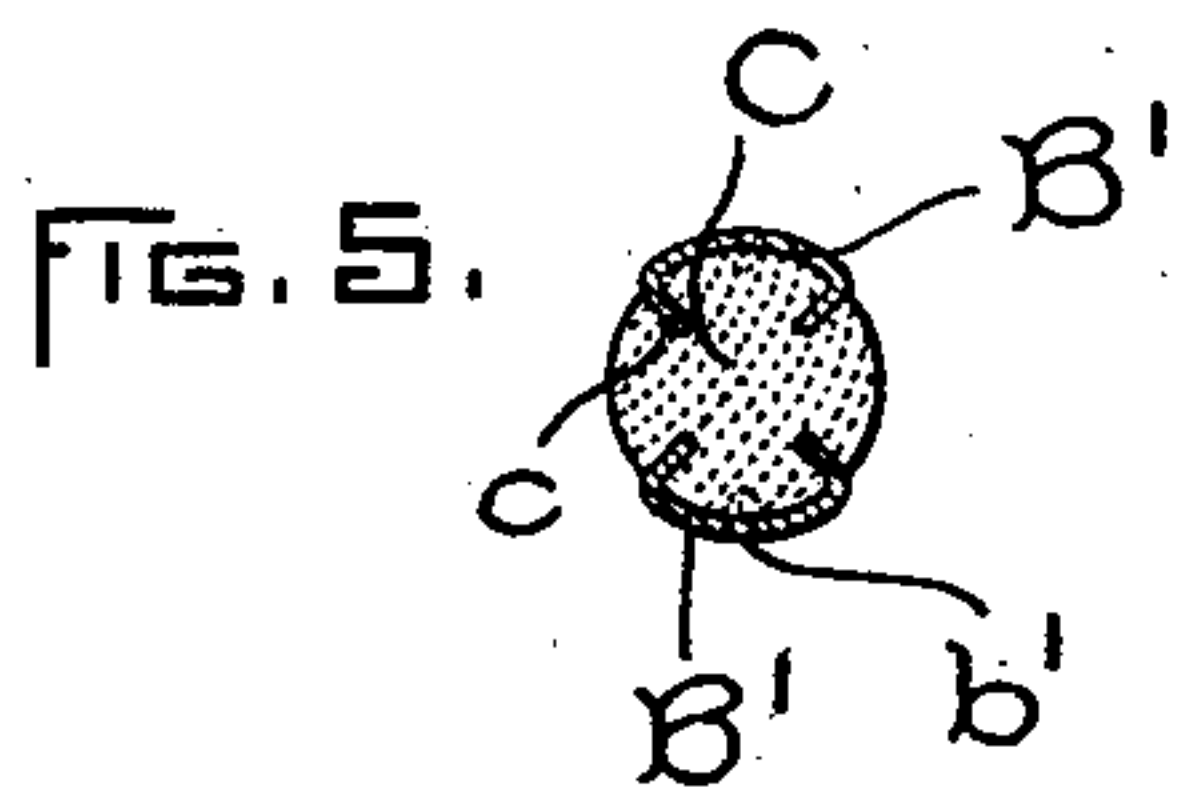
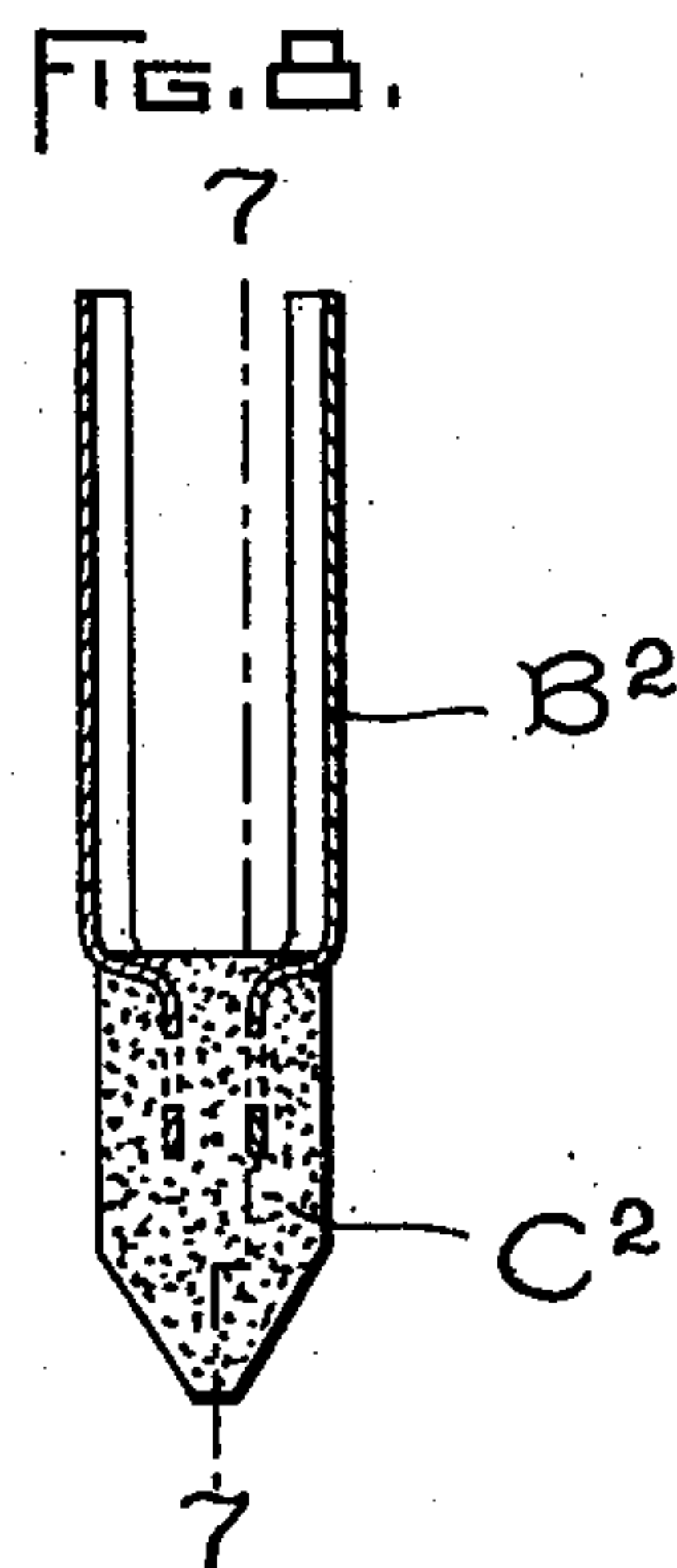
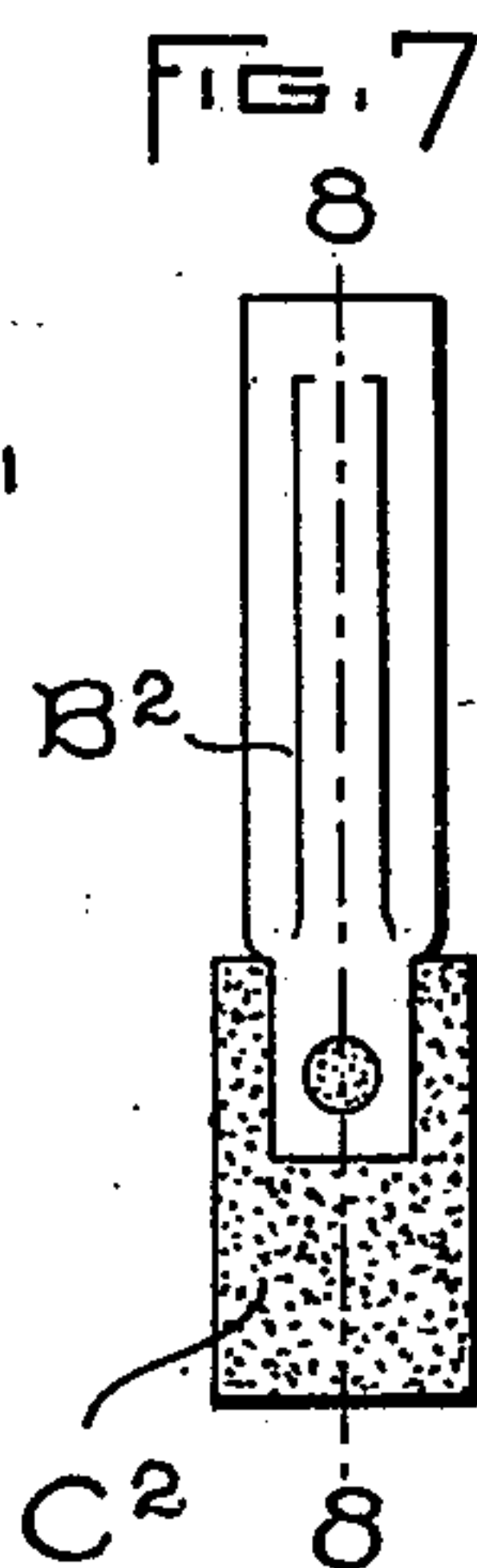
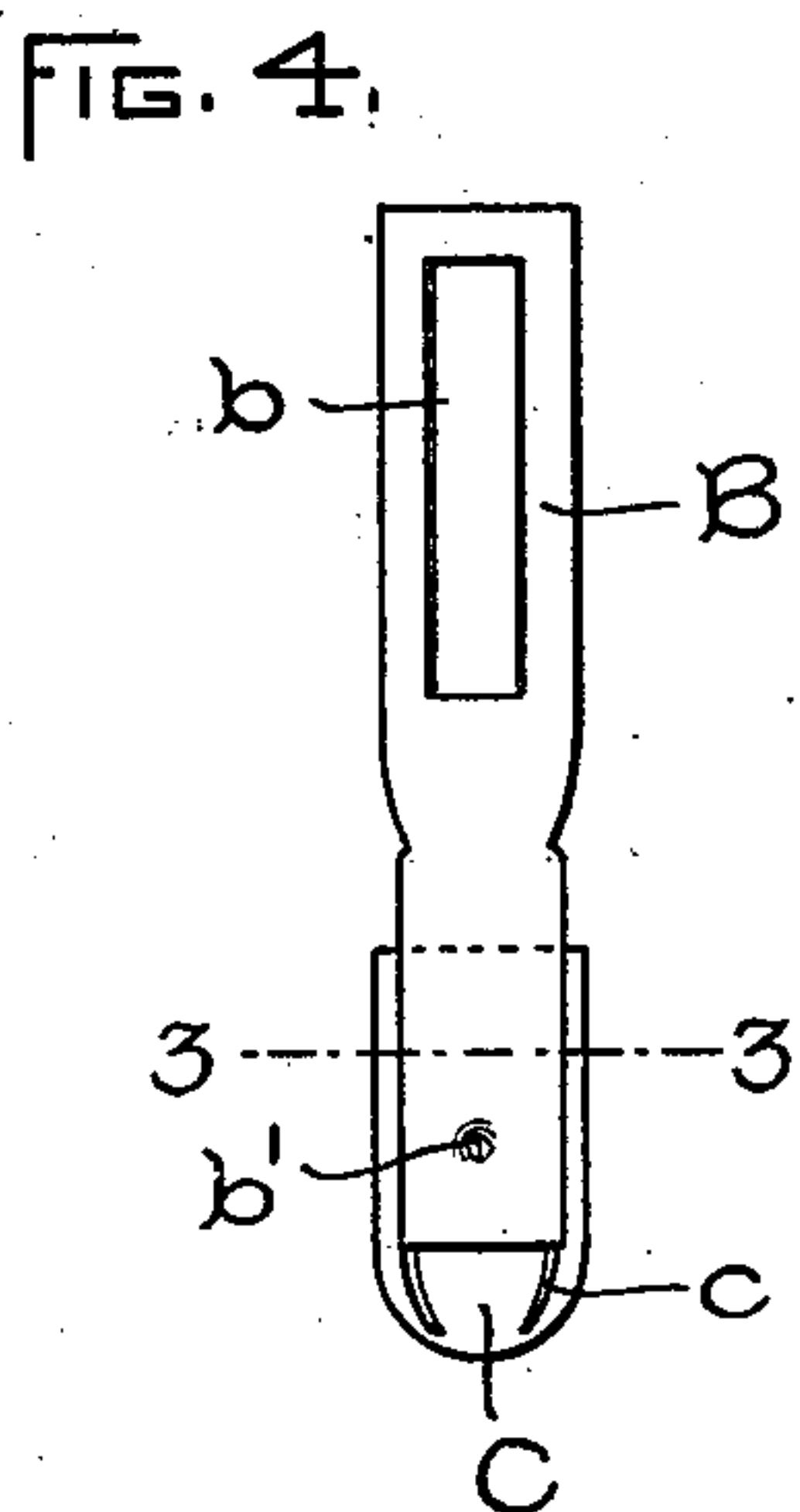
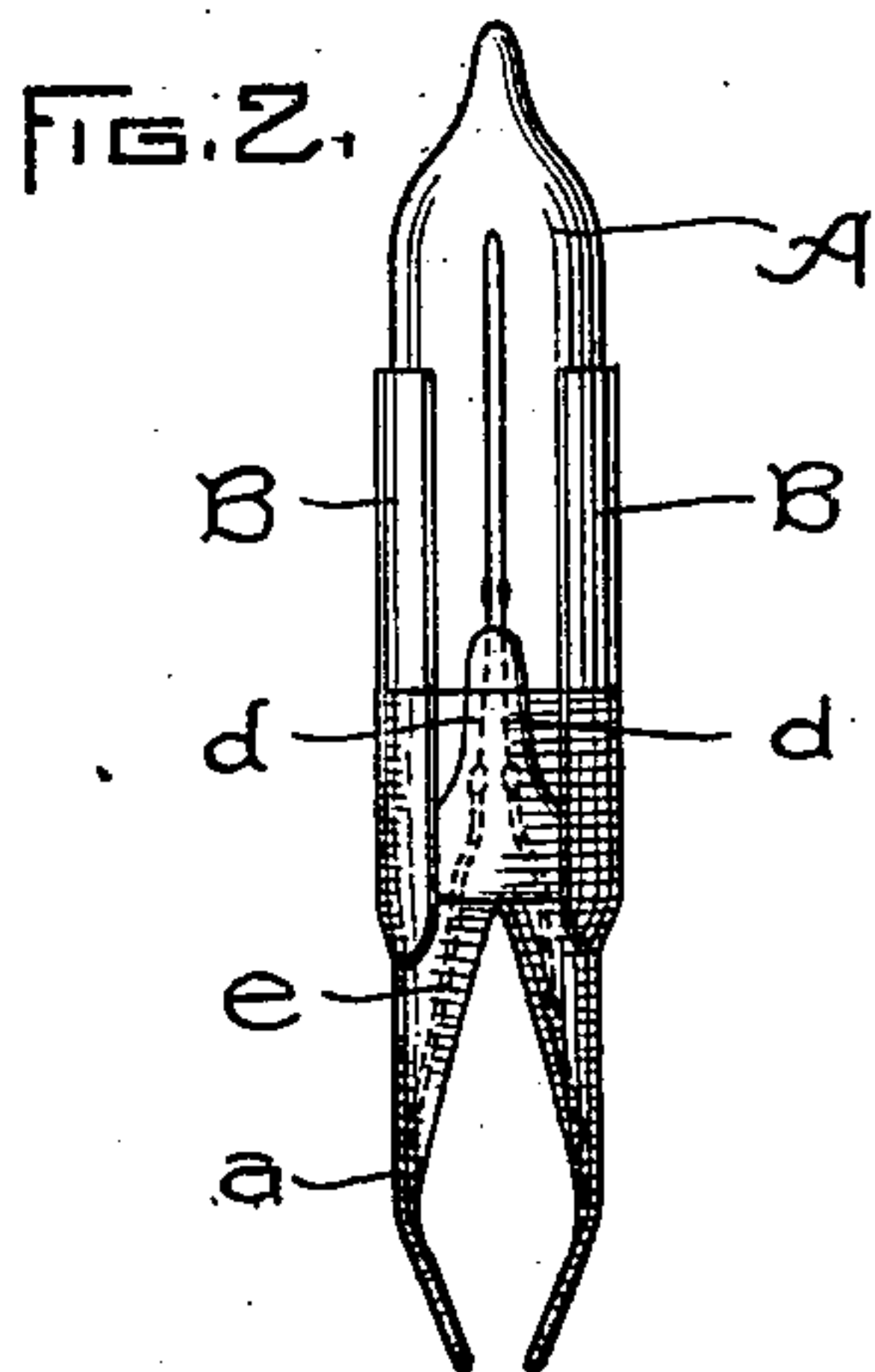
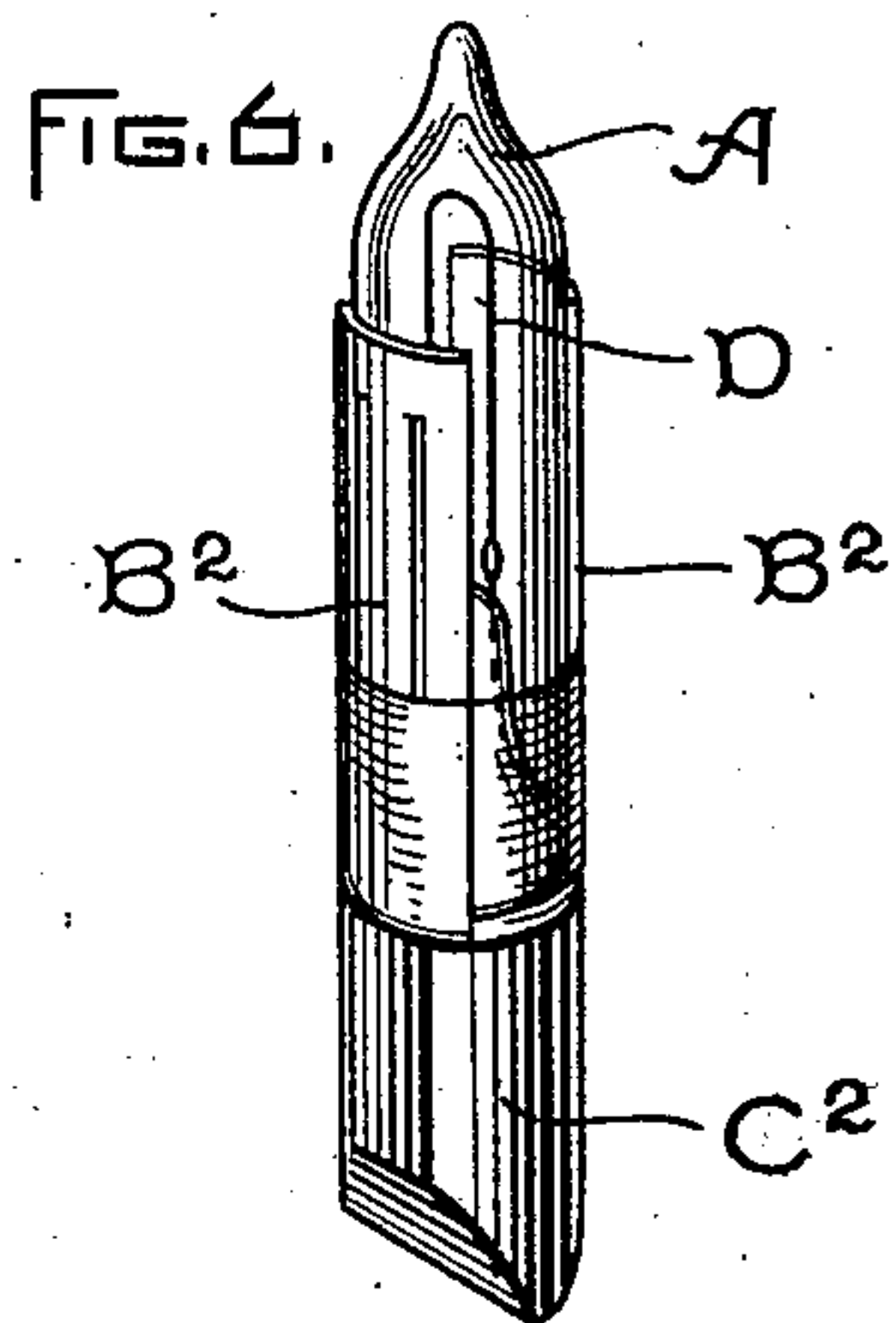
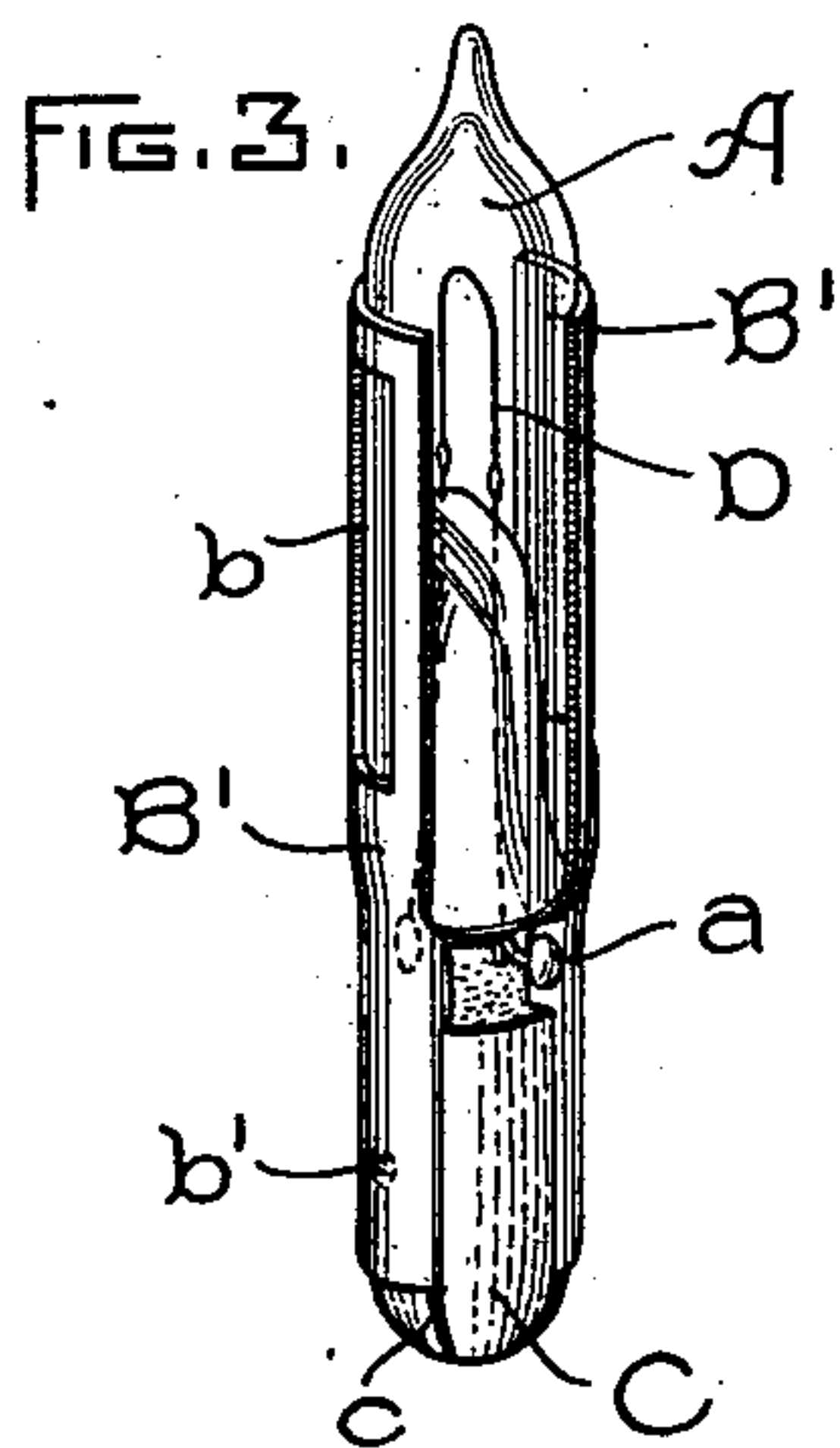
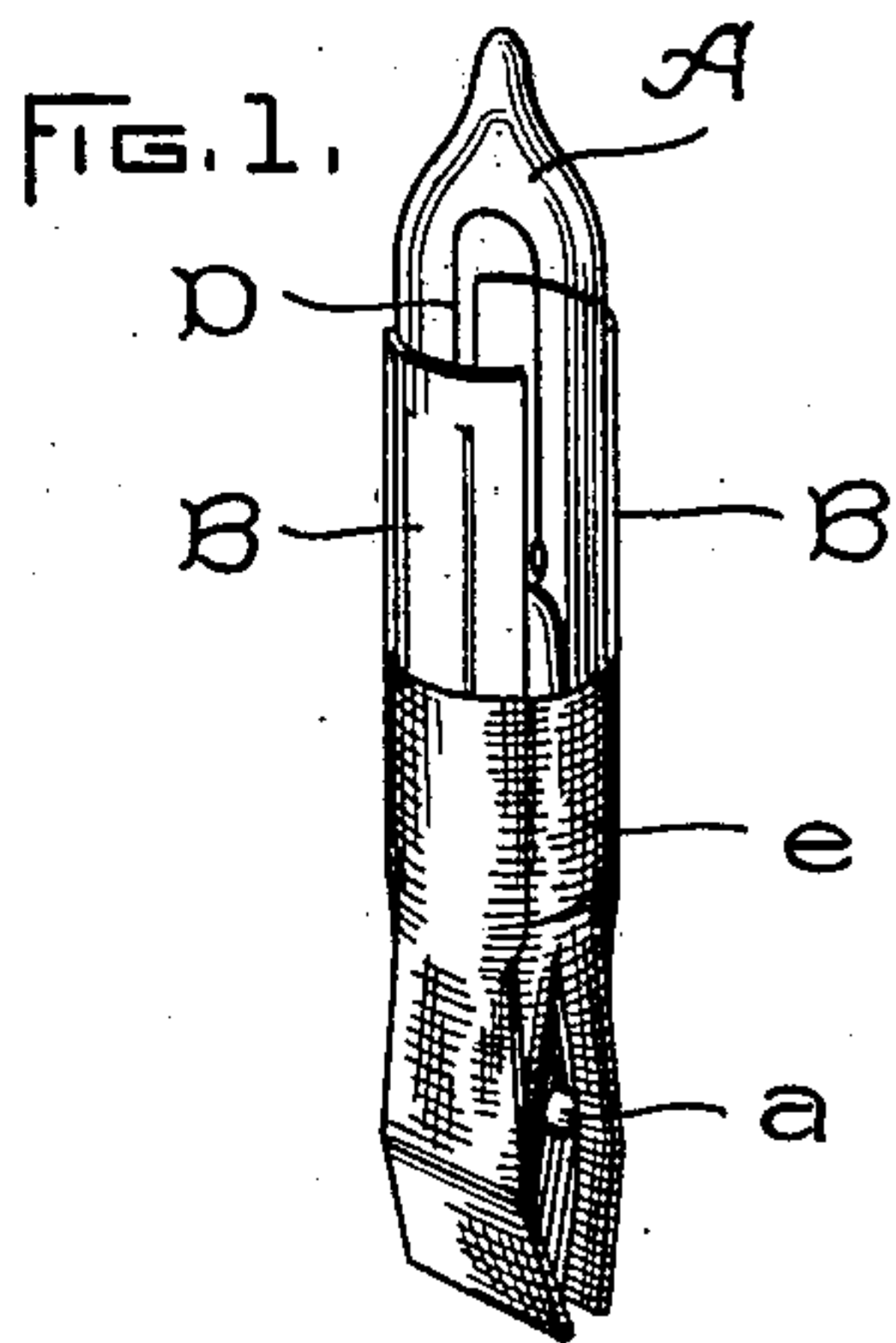


No. 669,306.

Patented Mar. 5, 1901.

J. W. HOWELL.
INCANDESCENT LAMP.
(Application filed Nov. 25, 1898.)

(No Model.)



WITNESSES.

A. H. Abell.

B. F. Macdonald.

INVENTOR.

John W. Howell,

by *Albert G. Davis.*
Atty.

UNITED STATES PATENT OFFICE.

JOHN W. HOWELL, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

INCANDESCENT LAMP.

SPECIFICATION forming part of Letters Patent No. 669,306, dated March 5, 1901.

Application filed November 25, 1898. Serial No. 697,335. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. HOWELL, a citizen of the United States, residing at Newark, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Incandescent Lamps, (Case No. 885,) of which the following is a specification.

My present invention relates to the construction of incandescent lamps of the type now commonly known in the art as "telephone-lamps," especially designed for use in telephone-switchboards, taking the place of other and more complicated forms of annunciators. The construction of these lamps has been peculiarly difficult. They are extremely minute, being only about a quarter of an inch in diameter. The old type, which my invention is designed to replace, was constructed of a small piece of glass tube having fitted to its sides a pair of copper terminals and provided with platinum lead-in wires for the filament, passing through the side of the lamp. As these lamps were designed to be used with small current and at low voltage and were provided with very attenuated filaments, the support of which was of platinum, and since a very high degree of skill was required in the construction, they were unduly expensive, costing several times as much as standard lamps of sixteen-candle power. As ordinarily constructed in the way just pointed out these lamps had no base, but were simply short pieces of glass tube having exterior terminals. They were peculiarly liable to breakage, and, since the seal between the platinum and the glass was so short, in a little time the contraction and expansion breaks the seal and impairs the vacuum. It is to obviate the difficulties attendant upon this style of lamp that I have devised my present invention.

In my improved lamp in one form I provide a base, to which the terminals are attached, and use a filament of the ordinary arched form, having lead-in wires of platinum sealed through the end of the lamp with a considerable thickness of glass by methods commonly in use. With such an extremely small lamp it is inconvenient to use any of the common forms of base or socket. The ordinary telephone-switchboard has simply a pair of clips, forming opposite terminals of a circuit, and

between these the lamp is slipped. The terminals, therefore, of my invention extend along each side of the lamp and furnish an efficient support for the fragile glass structure, so that the breakage is negligible.

In another form of my invention I may use the terminals in the way just pointed out—that is, connected to the filament by lead-in wires sealed through the end of the lamp, but extending along its sides and forming a support for the glass structure—without having any base attached to them. In this case it is preferable to insulate the ends of the terminals, so that if they be accidentally brought in contact there will be no short circuit formed. Inasmuch as the voltage at which these lamps are operated is so low, only a moderate insulation is needed for this purpose.

The accompanying drawings show several different forms of lamp which embody my invention.

In the drawings, Figures 1 and 2 are a perspective and side elevation, respectively, of a lamp made according to my invention. Figs. 3, 4, and 5 are a perspective of a lamp, a side elevation of one of the terminals and the base, and a section upon the line 3 3 of Fig. 4 of another form of lamp. Fig. 6 is a perspective of a different form, Figs. 7 and 8 being, respectively, sections on the line 7 7 of Fig. 8 and line 8 8 of Fig. 7 of the form of lamp shown in Fig. 6, the bulb being omitted.

A is the lamp in Figs. 1 and 2, of which B B are the terminals. Lead-in wires *d d*, of platinum, are secured to the opposite terminals B B by solder, as shown at *a*. A wrapping *e*, of fabric, covers the terminals and, as shown at the ends, completely envelops them, so that should the ends be pressed together they would still be insulated sufficiently for lamps of this type. A coating of insulating-varnish, such as shellac, is usually applied over the fabric, which should be thin and light. I have used ordinary adhesive court-plaster for this purpose with good success. Of course this construction might be applied to either of the other forms of lamp shown in the drawings; but in those provided with a base it will ordinarily be unnecessary.

In Figs. 3, 4, and 5, A' is the lamp, B' B' being the terminals. These are lightened by

slots *b* cut through them, the slots serving to make the terminals more flexible, so that they may be pressed into place readily. This has the further object of providing a flat place with which the terminals may register to hold the lamp in proper position, which in the other forms of lamp shown, as in Figs. 1 and 6, is effected by cutting a slot in the brass of the terminal without removing any part of the latter. C is the base, which in this case is formed of wood, though other insulation might be used. The terminals B' B' are crimped into the slots *c* in the base, and a punch-mark *b'* holds them against longitudinal displacement.

The form of lamp shown in Figs. 6, 7, and 8 also embodies the invention, though differing somewhat in construction from the others. In it the terminals are shown at B² B², D representing the usual high-resistance filament in all of the lamps. The terminals are embedded in the base C², as shown in Figs. 7 and 8, the latter being formed of any suitable insulation, which may be molded. Glass may be used for this purpose or any other desired substance.

An essential feature of novelty in the invention is the support of the bulb or vacuum-chamber by the terminals, which extend along its sides and which are connected to the filament by lead-in wires, sealed in through the ends of the lamp. This construction may be embodied in a lamp with or without a base, as is manifest from the examples here shown; but any form of lamp employing it I consider within my invention.

While my invention is intended principally for use in telephone systems, it may be employed in all cases where a very small lamp is required, as for medical or dental purposes, where it is required to explore the recesses of the body.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. An incandescent lamp having terminals upon the sides of the bulb, and lead-in wires sealed in through the end of the lamp.

2. In an incandescent lamp, the combination of a glass chamber inclosing a filament

of high resistance, with lead-in wires of platinum sealed through the end of the lamp, and terminals extending along the sides of the bulb and supporting the lamp.

3. In an incandescent lamp, the combination of a tubular inclosure for the filament, terminals extending along the sides of the inclosure and secured to the base, and lead-in wires passing through the ends of the lamp and connected to the terminals.

4. A miniature incandescent lamp of tubular form, having lead-in wires sealed into the ends and permanently connected to curved terminals of sheet metal embracing the sides of the tube, and means carried by the tube for clamping the sheet-metal terminals into close engagement with the wall of the tube.

5. A miniature incandescent lamp having lead-in wires through the base, a glass seal of greater length than the thickness of the bulb, and terminals permanently secured to the lead-in wires embracing the sides of the bulb.

6. A miniature incandescent lamp having an arched filament, lead-in wires sealed into the base through a glass seal of greater length than the thickness of the bulb, and two terminals mounted on the sides of the bulb.

7. In a telephone-lamp, the combination of an inclosed chamber for the filament, terminals extending along the sides of the chamber and held in place by a piece of compressed molded insulating material surrounding a portion of them, and lead-in wires sealed through the end of the lamp and connected to the terminals.

8. In a telephone-lamp, the combination of a tubular vacuum-chamber inclosing the filament, terminals on the sides of the lamp, lead-in wires passing through the end of the lamp and connected to the terminals, and a wrapping of fabric holding the terminals in place.

In witness whereof I have hereunto set my hand this 18th day of November, 1898.

JOHN W. HOWELL.

Witnesses:

S. N. WHITEHEAD,
JOHN E. MITCHELL, Jr.