No. 740,585. PATENTED OCT. 6, 1903.

D. J. O'BRIEN.

SYSTEM OF ELECTRICAL CHARACTERS AND MEANS FOR FORMING SAME.

APPLICATION FILED NOV. 3, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

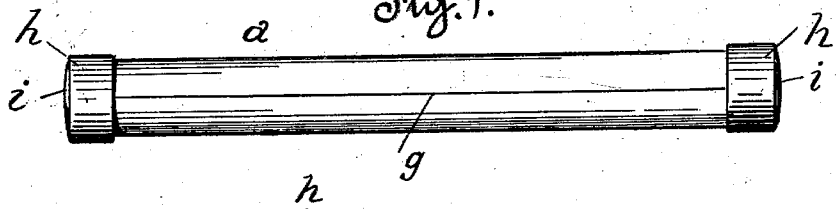


Fig. 2.

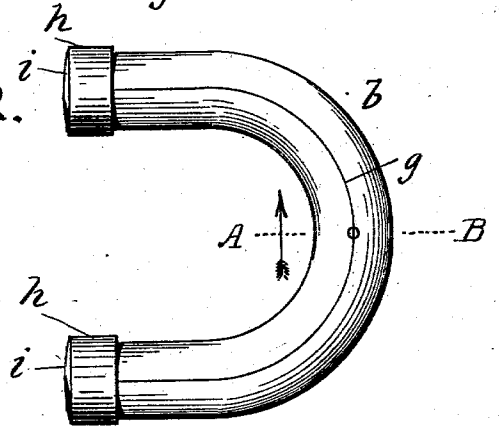


Fig. 3.

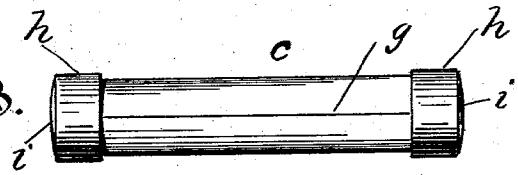


Fig. 4.

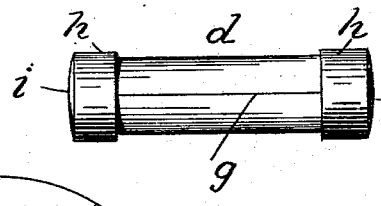
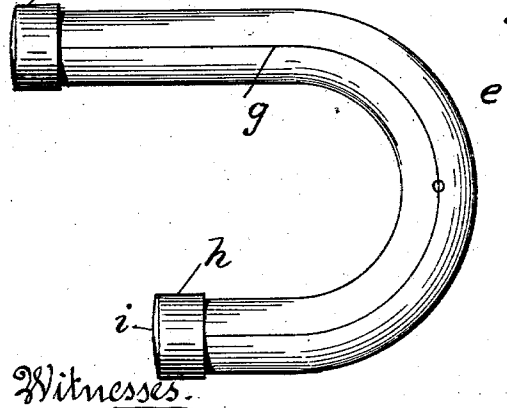


Fig. 5.



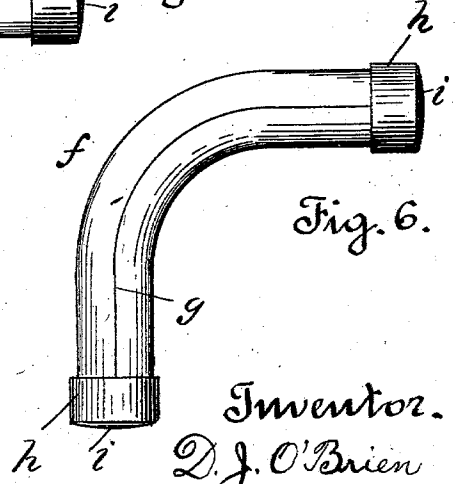


Fig. 6.

Witnesses.
Stellonteverde.
J. McKalloch

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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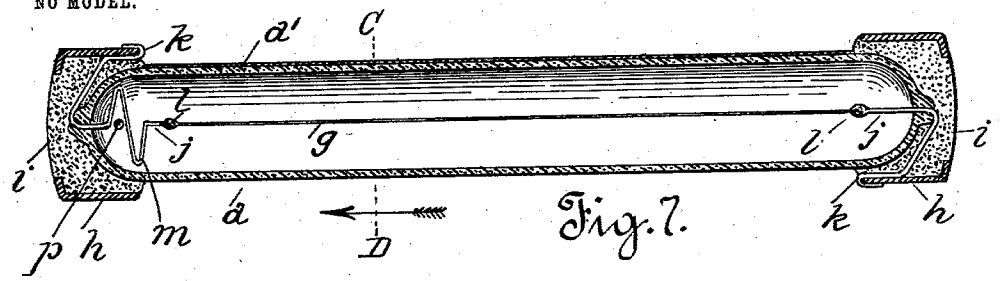


Fig. 7.

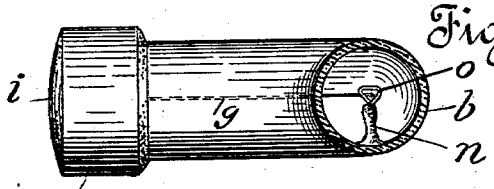


Fig. 8.

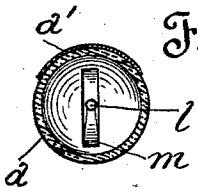


Fig. 9.

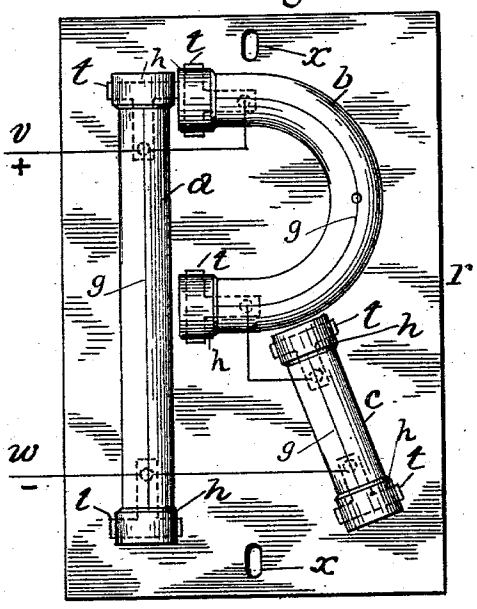


Fig. 10.

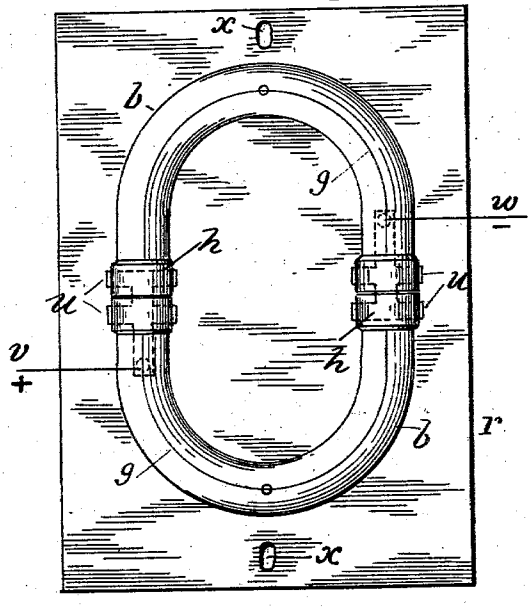


Fig. 11.



Fig. 12.

Fig. 13.

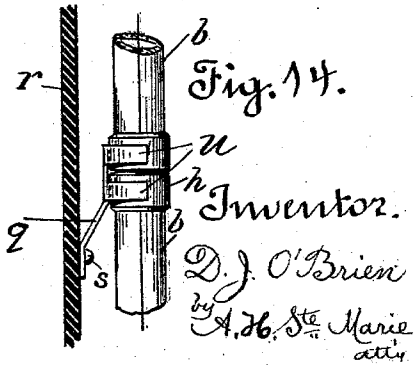


Fig. 14.

Witnesses.

F. Montevercle,

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NO MODEL. 3 SHEETS—SHEET 3.

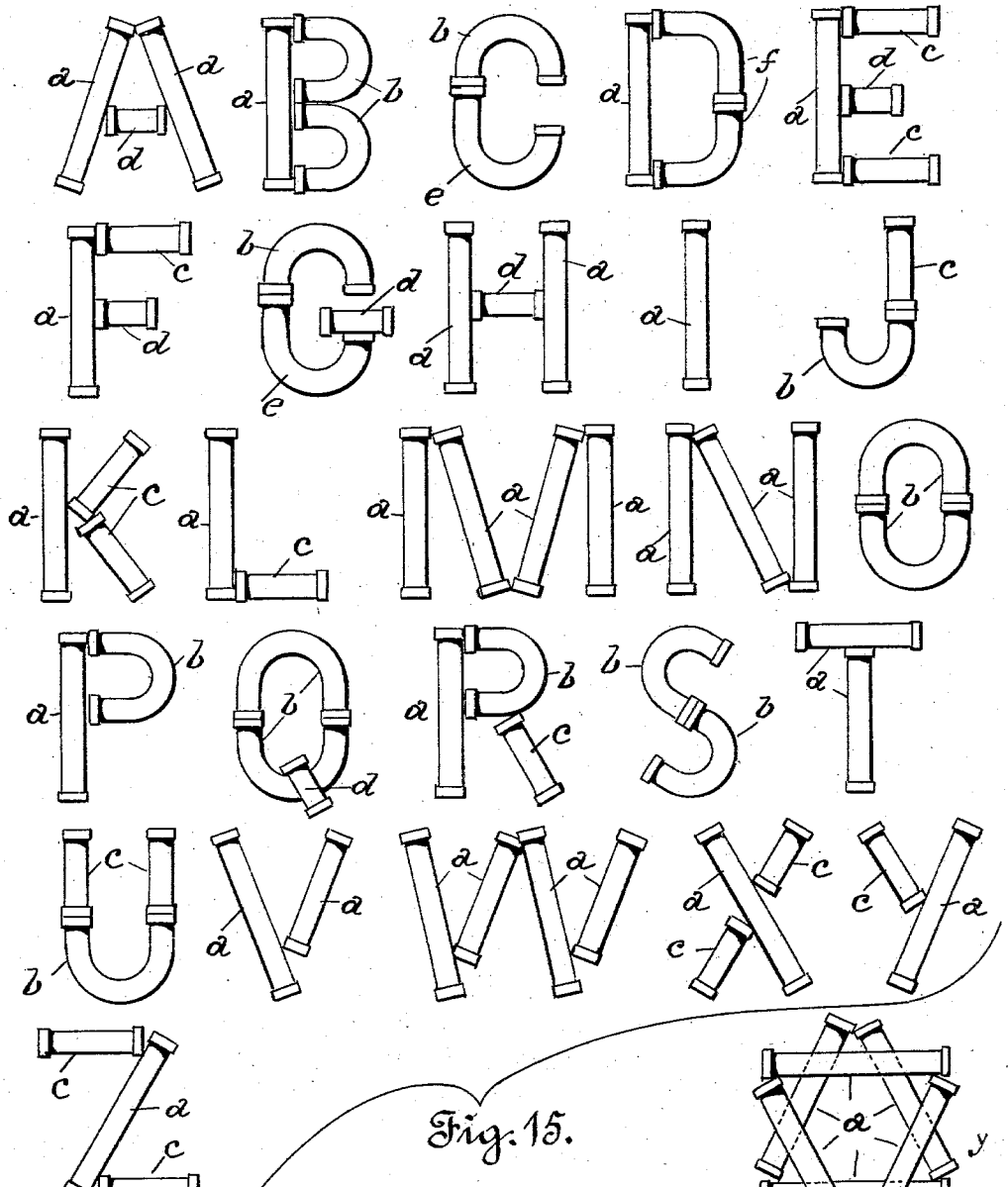


Fig. 15.

Fig. 16.

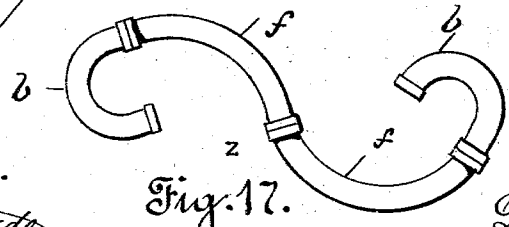


Fig. 17.

Witnesses.

H. Hartenverdo.

J. M. Kalloch

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by A. H. Ste Marie

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 740,585. Patented October 6, 1903.

UNITED STATES PATENT OFFICE.

DENNIS J. O'BRIEN, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO O'BRIEN ELECTRIC LIGHT LETTER COMPANY, A CORPORATION OF CALIFORNIA.

SYSTEM OF ELECTRICAL CHARACTERS AND MEANS FOR FORMING SAME.

SPECIFICATION forming part of Letters Patent No. 740,585, dated October 6, 1903.

Application filed November 3, 1902. Serial No. 129,977. (No model.)

To all whom it may concern:

Be it known that I, DENNIS JOSEPH O'BRIEN, a citizen of the United States of America, and a resident of the city and county of San Francisco, in the State of California, have invented a new and useful System of Electrical Characters and Means for Forming the Same, of which the following is a specification.

In the increasing use of electricity for the purposes of advertising, ornamentation, illumination, &c., the compactness, simplicity, and effectiveness of the apparatus employed and its constitutive elements are becoming more and more important.

Where the current leaves or passes out of the element or member at the same end at which it enters, as in the ordinary incandescent bulb, it is very difficult to vary the form thereof so as to give the best result or produce the most pleasing effect, and in a group of bulbs the several elements have no distinguishing trait or consequential individuality other than what is imparted to the mass. When other forms made on the same principle are resorted to, the cost of construction and application and the inherent defects of the separate members detract from their utility.

My invention is designed to provide a system of characters and the means for forming it embodying a principle which will combine the greatest strength and simplicity of construction with the most effective results, whether the elements are used singly or in groups and also irrespective of their size, shape, or proportions.

Where the invention is to be utilized for advertising purposes, which is the primary object, its elements are made into such shape that the very least possible number of them may be arranged or grouped together to form the different letters of the alphabet. These elements are so constructed that they may also be arranged as symbols, designs, &c., or simply disposed in plain lines for ornamentation or even illumination.

The said invention consists in the electrical appliances hereinafter set forth and claimed.

Referring to the accompanying drawings, in which the same reference-sign indicates the same part in each of the views in which it occurs, Figures 1, 2, 3, 4, 5, and 6 are plan views or elevations of the respective elements or members forming the group from which the system of characters is constructed. Fig. 7 is a longitudinal sectional view, on an enlarged scale, of one of the straight elements of said group with the addition of a mirror or reflector. Fig. 8 is a transverse sectional view of one of the curved elements of the group, taken on the line A B of Fig. 2 looking in the direction of the arrow. Fig. 9 is a similar view of the straight member shown in Fig. 7 on the line C D, again looking as the arrow points. Figs. 10 and 11 are elevations, respectively, of two of the characters formed from different members of the group, together with their respective mountings. Figs. 12 and 13 are detailed views, partly in section, showing one form of support for the elements in forming the characters. Fig. 14 is a similar view of a different form of support. Fig. 15 is a representation of the alphabet as formed in accordance with my invention, showing the manner of arranging the different elements of the group shown in Figs. 1 to 6, inclusive, to compose the different letters of the system. Figs. 16 and 17 are similar views of ornamental characters formed from a portion of said elements.

The letters of reference *a*, *b*, *c*, *d*, *e*, and *f* indicate, respectively, the outer portions of the elements shown in Figs. 1 to 6, inclusive, from which the characters of the system, alphabetical or otherwise, are formed. These elements may be of any suitable size or dimensions in length or cross-section and are made tubular, with all or a portion of the length of each provided with a transparent light-passage or adapted for the passage or emission of light-rays from the interior. I prefer to form each of them from an exhausted glass tube of substantially the same area in cross-section throughout its length. In this manner the different tubes or receptacles with their accompanying parts can be quickly and cheaply formed and arranged into the desired characters with a uniform and well-defined outline. As will be noted by an examination of said Figs. 1 to 6, the elements

are straight and curved, the straight ones, Figs. 1, 3, 4, varying in length only, but the curved ones, Figs. 2, 5, 6, varying in two particulars, the first two of them being substantially semicircular or U-shaped and the third one right-angled or elbow-shaped. The semicircular or U-shaped elements are further varied or differentiated from each other in that in one of them, Fig. 2, both legs or ends of the curve are of the same length, while in the other one, Fig. 5, one leg is longer than the other. From this group of varied elements all the letters of the alphabet and many designs and symbols can be readily formed.

Mounted within each tube or receptacle aforesaid is an illuminator, as an incandescent filament *g*, which extends from one end thereof to the other and is placed at each end in electrical connection with an electrical contact, such as a metallic cap or band *h*, which preferably encircles the tube and is secured thereon by means of cement or plaster *i*. A very desirable means of forming this attachment and support for the ends of the filament is shown in Fig. 7, in which *j* is a short piece of platinum sealed into each end of the tube in the usual manner and joined at its outer end to a suitable conductor, as a short piece of copper wire *k*, which in turn is joined to the band *h*. At its inner end each piece of platinum is suitably joined, as at *l*, to its respective end of the filament by being plated or otherwise secured thereon. As the filament expands and contracts from the effects of the electrical current, it is necessary to provide a means for counteracting such expansion and contraction, which can be done very effectively by an automatic take-up or elastic device—for instance, a spring formed or interposed in the length of the filament or its support. In Fig. 7 I have shown this elastic portion as a spring *m*, preferably Z-shaped and formed in the inner end of one of the platinum supports. The spring *m* can be readily made by flattening the platinum, as shown more particularly in Fig. 9, which will give the desired flexibility without otherwise detracting from the effectiveness of the support. In forming some of the elements, as the curved ones, the spring may be omitted, since the curvature of the filament will permit it to expand and contract without injury to the inclosing glass tube, although an additional support may then be provided, as a spur *n*, Fig. 8, formed in the tube and adapted to engage with the filament by a platinum loop *o*, the ends of the loop being "sealed in" at the end of the spur in the well-known manner. This will preclude the possibility of the heated filament reaching the glass and breaking it, especially when the element is placed in an inclined or depending position.

In forming the elements as above described the glass tube is cut off to the desired length and the filament with the platinum strips secured thereon is inserted. One of the strips, preferably the one having the spring, is then sealed in in the end of the tube. This will cause the other strip to extend to the other end of the tube, where it is also sealed in, after placing the filament under sufficient tension to stretch the spring to such an extent that the expansion of the filament from the action of the current will all be taken up by the retraction of the spring. By sealing in the platinum having the spring before sealing in the other end the proper tension can be given to the spring, as the other piece of platinum being straight or plain can be drawn out and fastened at any point, whereas if it were fastened first the spring might extend out too far, and thereby prevent its being sealed in properly to give the requisite tension to the filament. It will be seen that as applied the filament and the platinum pieces form a direct path for the current through the tube from one end to the other and all danger of damage from the action of the current is avoided. After the filament has been secured in position the tube is exhausted in the usual manner and sealed, as at *p*, Fig. 7, and the conductor *k* is fused or otherwise joined to the projecting portion of each platinum strip at one end and at the other end to the band *h*, the intermediate portion being embedded in the plaster *i*. Where the filament is supported by means of the spur *n*, one end of it is passed through the loop *o* before the platinum pieces are sealed in. As thus constructed each element is ready to be assembled with the necessary other elements to form the character which it is desired to produce, for all that is necessary is to place the respective ends in contact with the contact-points of an electrical circuit.

A convenient form of support for the end of the element is shown in Figs. 10 to 14, the same consisting of a bracket *q*, which is secured to a base *r* by means of a suitable fastener, as a screw *s*, and is provided with a spring-clip, either single or double, as *t* or *u*. The single clip *t* (seen in Figs. 10, 12, and 13) is of general application; but where the ends of two elements are to be held adjacent to and in line with each other I prefer to employ the double clip *u*. (Shown in Figs. 11 and 14.) The clip may engage with the end of the element in any desired manner, so as to support it against accidental displacement and establish electrical communication with the filament through its platinum; but I usually form it as an open-sided clamp of such shape and size as to firmly engage with the band *h* when the element is placed in position. If the element is cylindrical, the clip is semicylindrical with its ends extending slightly past the center of the cylinder. By securing the bracket to the base by means of a screw as aforesaid the screw may also be utilized for securing in position one end of either one of the wires used for connecting the element with the source of electrical energy, which wires are respectively marked *v w*.

The base *r* is formed from some non-conducting material—as slate, marble, &c.—and is held in position by means of any suitable fastener (not shown) passed through an opening *x* in the base, said opening being preferably elongated to permit a slight movement of the base in fitting it on the frame or other support upon which the sign, advertisement, ornamentation, or other object made from the elements is mounted.

As above described, it will be evident that with the group of six elements shown in Figs. 1 to 6 it is possible to form a system as an alphabet, for each of the letters is composed of straight lines or curved ones or a combination of the two. Thus the letters "A," "E," "F," "H," "I," "K," "L," "M," "N," "T," "V," "W," "X," "Y," and "Z" can be formed entirely of straight elements, while "C," "O," and "S" are formed entirely of curved elements, and the other letters will be formed from a combination or union of straight and curved elements. "C" and "G" are the only two letters that include the curve having the legs of unequal length, and "D" is the only letter requiring the use of the right-angled or elbow-shaped curve. In forming stars, scrolls, or other designs the curved and straight elements may each be used exclusively, or they may be combined or united in any desired manner to suit the requirements of the occasion or to please the fancy of the designer. Fig. 16 suggests such an arrangement of straight elements to represent a star *y*, and Fig. 17 shows a combination of curved elements for a scroll *z*.

One peculiar advantage which can be secured by the use of my invention is the facility which it affords for the formation of composite letters or characters in that the illuminating effect of each element may be changed or varied to adapt it for use relatively to the other elements of the character of which it forms a part or to the system or general assemblage of characters constructed from it and its fellows. This is accomplished by what is known as "flashing" the illuminator, as coating or otherwise increasing the size or cross-sectional area of the filament, which will change or alter the conductivity (or resistance) of the filament, and thereby change the voltage of the element. This change of course must be made before the filament is sealed in the tube and is determined by the length of the element and the position it is to occupy relatively to the other characters. Where the elements are of substantially the same length and receive the same amount of current—as, for instance, in the letters "M," "N," and "T" of Fig. 15—the filaments must of necessity be of the same area or conductivity and are what I shall call the "standard." In such simple characters the contacts are made to pass the current direct—that is to say, the current passes from the supply-wire through the element and directly to the return-wire in each instance; but when the character is more complex and is composed of or includes elements materially varying from the standard it is desirable to combine such elements with one another or with what otherwise would be a standard in order to obviate a multiplicity of connections, and consequently certain or all of these elements are better placed in series, which makes it necessary to so proportion the area or conductivity of the combined elements as to harmonize with that of the standard; otherwise the appearance of the character or device containing it would produce an undesirable effect by being weaker in some places than others. Therefore where the current is to pass through two or more elements in series—that is, from one end of one element to the adjacent end of another element—before it passes into the return-wire the size or area of the filament must be varied to correspond with the proportion (generally in length) that each element in series bears to the collection of elements of which it forms a part. Instances of this combination or arrangement of elements to cause the current to pass through them otherwise than direct is shown in the letters "R" and "O" in Figs. 10 and 11. In other letters the elements are placed in series according as it may be found convenient in practice to arrange them. Thus, referring to Fig. 15, the left element *a* and the element *d* may be connected in the letters "A," "E," and "H," so will be the two elements *c c* in "E," "K," "U," "X," and "Z," *c* and *d* in "F," *d* and *e* in "G," *b* and *c* in "J" and "R," *a* and *c* in "L" and "Y," and *b* and *d* in "Q." Other combinations are likewise made. By constructing and arranging the elements in this manner it is evident that each character can be so connected that it will be absolutely independent of all other characters and will only need two wires, which are connected directly with the supply and return wires, respectively. In this way the expense and trouble of cross-wiring from one letter or character to another, as where any of the elements are "off voltage," is avoided.

By forming the element of substantially the same cross-sectional area throughout its length, as in a cylinder, and locating a single filament therein substantially along its axis and extending it from end to end the illumination or emission of light is the same throughout the length of the element, thereby producing a more even and symmetrical outline than can be produced in any other way. This will permit the several elements and characters being made smaller, as in a sign, without detracting from its legibility, but actually increasing it, thereby effecting a saving of the electrical power required to produce the desired effect. With the ordinary bulb form of illumination the bulbs are placed at a distance apart, thereby breaking the continuity of outline and depending on the diffusion or

spreading of the light to fill in the space between them. Still another advantage that may be secured by this construction of the tube or receptacle and the single filament is that a mirror or reflector, as shown at *a'* in Figs. 7 and 9, can be formed upon or added to the side of the tube opposite that from which the light is to be emitted or projected. With only a single piece of material in the tube and it glowing with light there will be nothing to interfere with the passage of the light-rays directly from the filament or indirectly as to and from the reflector, and by providing means for keeping the filament under tension it will always retain the same position relatively to the axis of the tube and to the reflector at the side.

Although I have shown what I consider the more desirable manner of practicing my invention, it is evident that changes and modifications may be made therein, as by varying the size and shape of any or all of the parts of the same, and therefore I reserve the right to make such changes and alterations as will come within the scope of my said invention.

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

1. In an electric lamp, a vacuum-chamber of substantially the same cross-sectional diameter throughout, and a filament within the chamber having a permanent rigid connection with the exterior at one end and a permanent elastic connection with the exterior at the other end.

2. In an electric lamp, a transparent receptacle of substantially the same cross-section area throughout and rendered opaque in part, a straight-line filament therein having a rigid connection at one end and an elastic connection at the other end so as to keep said filament in line opposite the transparent portion of the receptacle.

3. In an electric lamp, a transparent receptacle, a straight-line filament therein, a rigid connection from one end of said filament to the exterior, and a Z-shaped spring connecting the other end of said spring to the exterior.

4. In an electric sign, a group of straight elements and curved elements for forming characters or symbols, the straight elements being of different lengths and each element being provided with a single-line filament having a rigid connection at one end and a flexible connection at the other end, and means for securing the elements in position, and means for placing each element in communication with a source of electric energy.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DENNIS J. O'BRIEN.

Witnesses:
A. H. STE MARIE,
GEO. T. KNOX.