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S. BOGEN

2,449,736

ELECTRICAL CONNECTION OF SEPARABLE CHARACTER

Filed Aug. 23, 1946

2 Sheets-Sheet 1

FIG. 1.

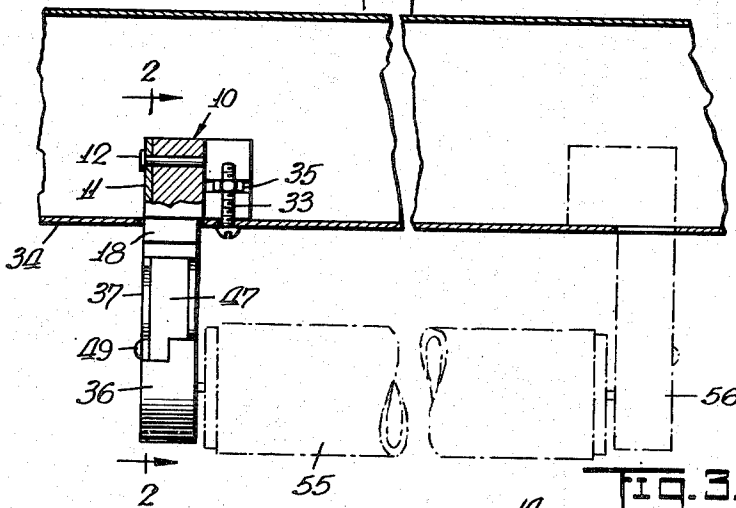


FIG. 3.

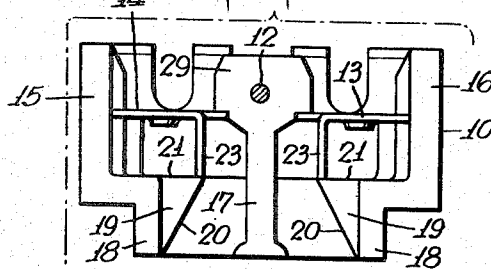
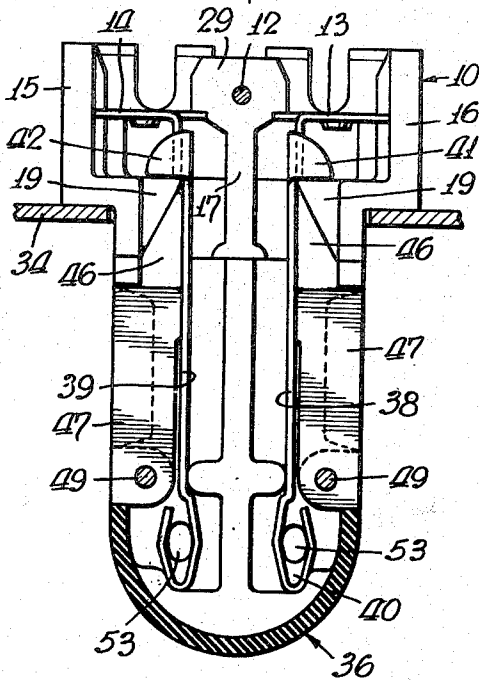
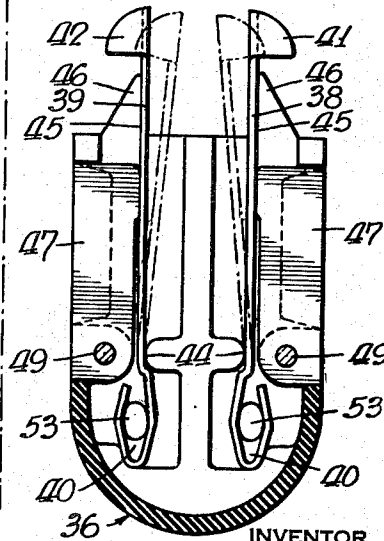


FIG. 2.



INVENTOR
Samuel Bogen
BY
Frederick Breitenfeld
ATTORNEY
46-301

Sept. 21, 1948.

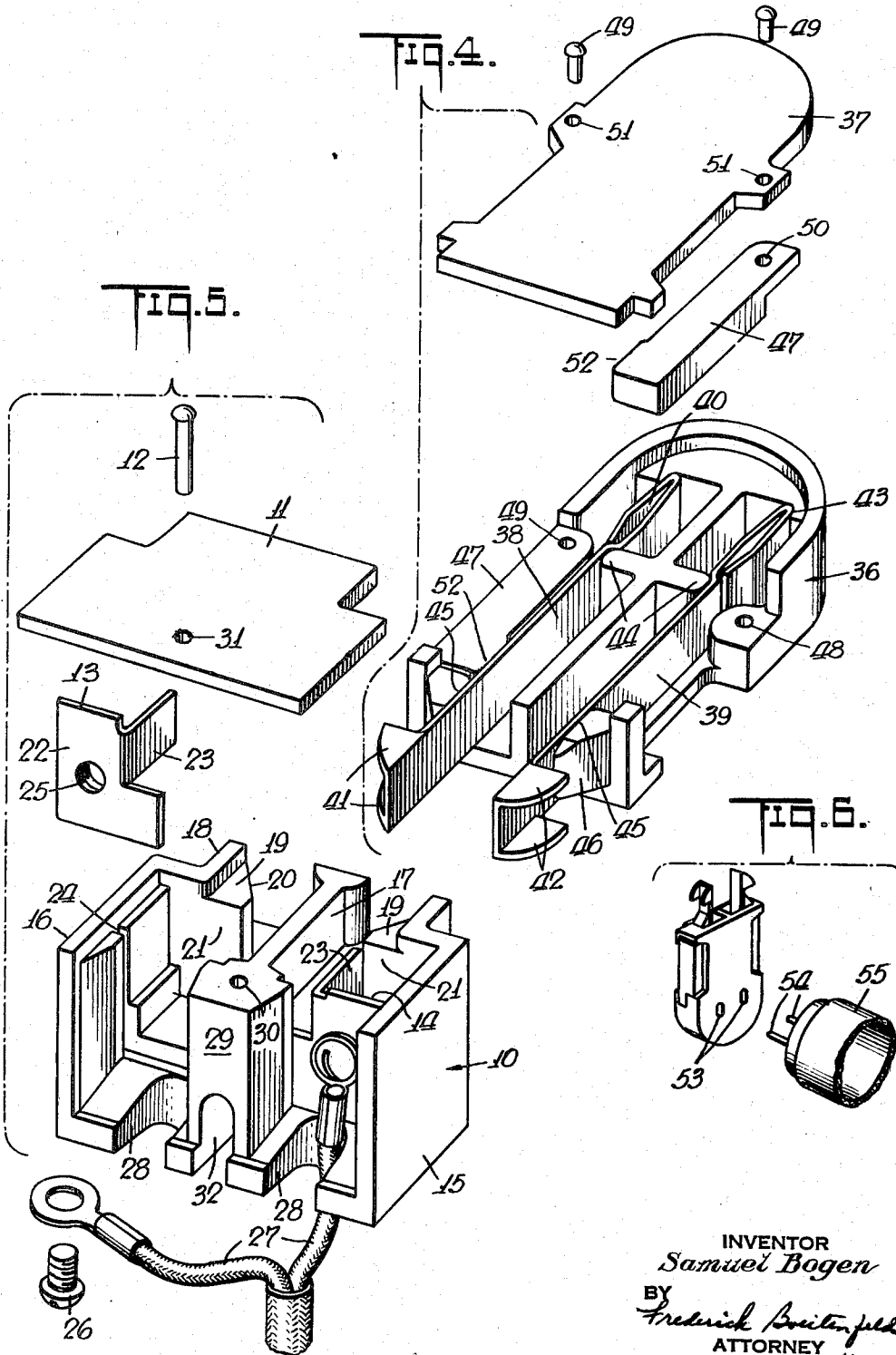
S. BOGEN

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INVENTOR
Samuel Bogen
BY *Frederick Brittenfeldt*
ATTORNEY 46-301

UNITED STATES PATENT OFFICE

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ELECTRICAL CONNECTION OF SEPARABLE CHARACTER

Samuel Bogen, New York, N. Y.

Application August 23, 1946, Serial No. 692,455

2 Claims. (Cl. 173—328)

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My present invention relates generally to electrical apparatus, and has particular reference to separable electrical connections, especially those related to the mounting of fluorescent lighting tubes or the like.

The invention is primarily designed for, and intended for use with, elongated lamps such as the well-known fluorescent lighting tubes, and aims to afford an improved means for mounting such tubes in removable association with a fixture.

The most common currently-conventional fixture comprises a housing within which there are accommodated a transformer, a starting device, and such other auxiliary apparatus as may be necessary or desirable, along with connections to a main source of power. Projecting through apertures in the housing wall are socket members to which the fluorescent or other lighting tube may be secured in removable fashion. One of the shortcomings of this arrangement lies in the fact that the socket members project from the housing by a considerable amount and are therefore quite susceptible to breakage during the shipment, installation, or other handling of the fixture. Moreover, if and when any of these socket members is damaged, the housing must either be dismantled in order to effect a repair or replacement, or it must be discarded in its entirety. It is among the primary objectives of the present invention to overcome this difficulty.

In accordance with my invention, the lighting tube is removably associated with a connector member which is entirely separable from the fixture housing, whereby the latter may be rendered devoid of disadvantageous projecting parts which may be damaged. This member, to which the lamp is connected, is of simple and inexpensive character, consisting essentially of an insulating enclosure provided with a pair of parallel projecting contact prongs. For cooperation with this prong member I mount within the housing a complementary socket member which is provided with openings adapted to receive said prongs and with interior contacts engageable therewith, the prong-receiving openings being exposed through an aperture in the housing wall.

The prong and socket members are designed for separable association, and one of the more specific objects of the invention is to prevent this separability from impairing the security with which the lighting tube is held in association with the fixture. This I achieve by providing a means which functions, preferably automatically, to secure said members against inadvertent separa-

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tion whenever they are brought into cooperable engagement. More particularly, the members are firmly locked against any pulling effect exerted upon the prong member by the weight of the lighting tube or otherwise. In the preferred embodiment of the invention, I provide a releasable spring-type latching means which operates as the prongs of the prong member are inserted into the openings of the socket member, and which firmly locks the members in physical interengagement.

The preferred construction involves forming at least one of the prongs itself as a movable spring latch, and providing a latch-engaging shoulder on the interior of the socket member. An unusually efficient result is achieved when both of the prongs are formed as movable spring latches, acting in opposed relation to each other.

Coupled with this latching arrangement is an exteriorly accessible means, preferably in the form of one or more finger grips, for releasing the latch or latches when the prong member is to be deliberately withdrawn from the socket member.

Certain phases of the prong and socket member cooperation, their interengagement, and their mutual release, are applicable to uses other than that of mounting a lighting tube upon a fixture. Accordingly, from certain aspects, the invention is more broadly directed to improvements in separable electrical connections generally, as will be readily appreciated by those skilled in the art.

Among the more general objects of the invention are the provision of an improved construction of the character described, which is wholly practical, which lends itself to known and economical manufacturing procedures, which is thoroughly efficient and reliable in performing its contemplated functions, and which complies with all the safety requirements of fire underwriters and other supervisory authorities.

The preferred way of achieving these several objects and advantages, and such other objects and advantages as may hereinafter appear or be pointed out, is illustratively exemplified in the accompanying drawings, in which:

Figure 1 is an elevational cross-sectional view of a typical ceiling fixture for a fluorescent lighting tube or the like, the features of the present invention being incorporated therewith;

Figure 2 is an enlarged cross-sectional view taken substantially along the line 2—2 of Figure 1;

Figure 3 is a view similar to Figure 2, taken in the same direction, showing the prong member

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and the socket member in separated relation; Figure 4 is an enlarged exploded view of the prong member and its constituent parts;

Figure 5 is a similar exploded view of the socket member and its constituent parts; and

Figure 6 is a fragmentary perspective view showing the preferred manner of associating the lighting tube with the prong member.

The socket member is best illustrated in the upper part of Figure 3, and in Figure 5. It is preferably composed of an integral molded body 10 provided with the requisite openings, apertures, shoulders, and so forth; and a flat cover element 11 which is secured thereto by a rivet or fastening element 12 after the contacts 13 and 14 have been positioned. More particularly, it will be observed that the body 10 has parallel opposed side walls 15 and 16, and a central partition wall 17. At one end, the side walls 15 and 16 merge into a neck 18.

Projecting from the side walls of the neck 18, toward the central partition 17, are the portions 19. The outwardly-facing surfaces 20 of these portions converge rearwardly, as shown most clearly in Figure 3. The rear or inner surfaces 21 of the portions 19 are arranged in a transverse plane and define interior latching shoulders.

The spaces on the opposite sides of the partition 17 define openings adapted to receive the prongs of the prong member.

Before describing the prong member, attention is directed to the fact that each of the contacts 13 and 14 is preferably composed of a flat strip of metal having a body portion 22, and a transverse contact portion 23 formed integrally therewith. The body portion 22 slides endwise into a slot 24 formed on the interior of the corresponding side wall 15 or 16, as the case may be. This positions the contact portion 23 in a plane substantially parallel to the partition 17, as shown most clearly in Figure 3.

The body portion 22 of each contact is preferably provided with a tapped hole 25 to receive a binding post 26 or the like, and to facilitate the electrical connection to the contacts 13 and 14 of lead wires 27 emanating from a suitable source of power (not shown). These lead wires are preferably disposed within recesses 28 formed in the rear end wall of the body 10. Between these recesses, the partition 17 has an enlarged portion 29 provided with an opening 30 adapted to receive the fastener 12 when the latter passes through the opening 31 in the cover plate 11. At the end of the portion 29 opposite the opening 30, there is a longitudinal slot 32, extending parallel to the partition 17, adapted to accommodate a bolt 33 (Figure 1) by means of which the socket member is held in position within a fixture housing.

A typical fixture housing is shown in Figure 1, and includes a wall 34 having an aperture through which the neck 18 of the socket member may project, to a slight extent, as indicated in Figure 2. The bolt 33 passes through an adjacent opening in the wall 34, engaging the socket member in the region of the slot 32. If desired, a nut 35 may be mounted in engagement with the bolt 33, the nut being accommodated within grooves formed in the opposite walls of the slot 32.

The details of the bolt 33, and its manner of engagement with the socket member, are not important, since the socket member may be held in position in any desired manner. Suffice it to

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point out that the socket member is on the interior of the fixture housing, as indicated in Figure 1, and that the only portion which is exposed is the neck 18 within which there are openings to receive the prongs of the prong member.

As indicated in the lower part of Figure 3, and also in Figure 4, the prong member is similarly composed of a molded body 36 and a cover plate 37. Mounted in longitudinally parallel relationship within the body 36 are strip contacts 38 and 39. The rear end of each contact is doubled back upon itself, thereby forming loops 40. At the forward end of each of the strips, integral wings are formed to serve as latch elements. Thus, it will be observed that the strip 38 is provided with the parallel outwardly-extending wings 41, while the strip 39 is provided with the similar outwardly-extending wings 42. The forward surfaces of the wings are convexly curved, as shown, and the rear edges of the wings are arranged in a transverse plane.

The strips 38 and 39 are formed as spring latches. That is, each strip is resilient and bendable to the extent indicated in dot-and-dash lines in Figure 3. The resilience is permitted to manifest itself by the manner in which the strips are supported within the body 36. The rear end of each strip abuts against a lateral shoulder 43, the portions directly in front of the loops 40 abut against shoulders 44, and the forward portions of the strips bear against surfaces 45. Thus, the outer surface of each strip bears against the portions 43 and 45, while the inner surface bears against the shoulder 44. This permits the forward part of each strip to be deflected as indicated in Figure 3, and the inherent resilience of the strip urges it constantly into the normal disposition shown in Figures 2 and 4 and in full lines in Figure 3.

The surfaces 45 are formed on projecting portions 46 whose outer surfaces have the same inclination as the surfaces 20 of the socket member.

The prong member is also provided with a pair of finger grips 47 whose rear ends are pivoted to the body 36. To accomplish this, the body 36 is provided with suitable openings 48 adapted to receive pivot pins 49. Each pivot pin passes through a pivot opening 50 in the rear end of the corresponding finger grip 47. If desired, the pins 49 may also pass through openings 51 in the cover plate 37, and may thus help to hold the latter in position after the parts are assembled. Additional fasteners or screws may also be used, if desired, to hold the cover plate 37 to the body 36.

The forward portions 52 of the finger grips 47 are adapted to bear against the outer surfaces of the strips 38 and 39, respectively, directly behind the portions 46 of the body 36.

Needless to say, all parts except the pivot pins and the electrical contact elements are composed of insulating material.

In the side of the body 36 which lies opposite and parallel to the cover plate 37, a pair of apertures 53 are formed, in alignment with the loops 40. These apertures are adapted to receive the prongs or pins 54 which project longitudinally from the end of a lighting tube 55.

When the lighting fixture is manufactured, the socket member is fixedly mounted within the fixture housing, as shown in Figure 1. Electrical connections, such as those indicated at 27, are established. Such other electrical connections as may be necessary or desirable are also made, e. g., connections to a starting socket or device, to a

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transformer, etc. The fixture housing is then ready for shipment, storage, and ultimate installation, and it will be observed that there are no undesirable projecting parts. It is true that the neck 18 projects by a slight amount, but the present drawings are somewhat exaggerated, and the extent of the projection is so slight as to be practically negligible.

When it is desired to mount a lighting tube or lamp 55 in association with the fixture, the tube is first associated with a pair of prong members, as indicated in Figure 6. The projecting pins 54 at one end of the tube 55 are pressed into the openings 53 of one prong member, and the corresponding pins at the opposite ends of the tube are similarly connected to a second prong member (indicated in dot-and-dash lines at 56 in Figure 1). The prong members are then inserted into the respective socket members. This operation is extremely simple, requiring nothing more than a movement which presses the projecting portions of the prongs 38 and 39 into the openings in the corresponding socket member. During this movement, the curved forward surfaces of the latch wings 41 and 42 encounter the surfaces 20 of the socket member. This cams or deflects the prong members toward each other, as indicated in dot-and-dash lines in Figure 3. As soon as the wings have passed behind the portions 19 of the socket member, the elements 38 and 39 snap back into their normal parallel relationship, whereby the rear edges of the wings engage firmly against the shoulders 21 of the socket member. This engagement is shown most clearly in Figure 2, and serves to prevent any inadvertent separation of the prong member from the socket member. More especially, this engagement prevents any pulling force to separate the two members. At the same time, it will be observed that the forward ends of the strips 38 and 39 contact firmly with the portions 23 of the corresponding contacts 13 and 14, thus establishing the desired electrical connections.

All the parts are thus firmly held together, and no possible displacement of the lamp 55 can take place.

Should it be desired to remove the lamp 55, each of the prong members must first be deliberately withdrawn from the corresponding socket member. This is accomplished by pressing inwardly upon the finger grips 47. This pressure deflects the prongs into the dot-and-dash positions (Figure 3) and permits the prongs to be withdrawn from the socket member. Thereafter, a simple pull will separate the lamp tube from the prong members at each of its ends.

Whenever the prong and socket members are in engagement, as shown in Figure 2, the portions 46 of the prong member body 36 are in firm abutting relation to the portions 19 of the socket member body 10. A neat, safe, and workmanlike interengagement is thus automatically effected.

Obviously, if desired, the parts may be so constructed and assembled that the prongs will not be automatically deflected as they are inserted into the socket member. Under certain circumstances, it may be desirable to require a deliberate manipulation of the finger grips 47 in order to effect an engagement of the members. In most cases, however, it is satisfactory to have the en-

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gagement effected automatically as the prong member is brought into association with the socket member, and to employ the finger grips 47 only for deliberately unhooking the members from each other.

In general, it will be understood that the details herein described and illustrated may obviously be modified in a number of respects by those skilled in the art without necessarily departing from the spirit and scope of the invention as expressed in the appended claims.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. In a separable electrical connection, a prong member provided with parallel projecting contact prongs, a socket member provided with openings adapted to receive said prongs and with interior contacts engageable by said prongs, each of said prongs comprising a metallic strip whose forward end is provided at its opposite edges with parallel latching wings arranged at substantially right angles to the plane of said strip, means for mounting said prongs so that they will deflect as spring latches, said openings in the socket member being provided with oblique walls for camming said prongs into deflected positions as they are inserted, latch-engaging shoulders at the inner ends of said oblique walls and adapted to be engaged by the rear edges of said latching wings when the prong member is inserted to its full extent, and wedge-shaped projections on the prong member adapted to fit within said openings and bear against said oblique walls when the prong member is in its fully inserted position.

2. In a separable electrical connection, a prong member provided with parallel projecting contact prongs, a socket member provided with openings adapted to receive said prongs and with interior contacts engageable by said prongs, each of said prongs comprising a metallic strip whose rear end is doubled upon itself to form a loop and whose forward end is provided with latching wings, means for mounting said prongs with their looped rear ends stationary and with their forward ends deflectable as spring latches, latch-engaging shoulders on the interior of the socket member adapted to be engaged by the rear edges of said latching wings when the prong member is inserted to its full extent into said socket member, and openings in the prong member in alignment with said loops, respectively, whereby said loops may serve as sockets for the contact pins of a lighting tube.

SAMUEL BOGEN.

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