United States Patent [19]

Seelbach

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[45] **Dec. 25, 1973**

[54] **LIGHTING DEVICE**

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[73] Assignee: **Firma Reininghaus & Co.,** Brockhauser Ebene, Ludenscheid, Germany

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[30] **Foreign Application Priority Data**

Dec. 8, 1970 Germany ..... P 20 60 262.4

[52] **U.S. Cl.** ..... **339/14 R,** 339/21 R

[51] **Int. Cl.** **H01r 3/06**

[58] **Field of Search** 339/14, 20–24

[56] **References Cited**

UNITED STATES PATENTS

3,503,032	3/1970	Routh et al.	339/14 R
3,611,252	10/1971	Fremont	339/21 R
3,613,045	10/1971	Routh et al.	339/21 R
3,422,387	1/1969	Sprigings et al.	339/14 R
3,081,442	3/1963	Platz	339/14 R

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Assistant Examiner—Robert A. Hafer
Attorney—Ernest G. Montague

[57] **ABSTRACT**

A lighting device which comprises a carrier rail open on one side and to be secured to a securing face and including a conduit rail carrier. A connection box has a receiving channel. The carrier rail includes on both sides of the receiving channel holding tongues-receiving grooves as well as a plurality of electric conduit rails, each in a conduit rail carrier arranged in pairs in planes and mirror symmetrically to a longitudinal center plane extending from the insert side to the securing side of the carrier rail and disposed on top of each other, accessible from the inside, and forming a plurality of current circuits operating independently from each other. Three conduit rails constitute pole rails and one conduit rail constitutes a zero-conduit rail. The connection box is insertable with a set-off head part into the inner part of said carrier rail and carrying lighting members. The connection box is equipped with a plurality of spring tongues constituting holding- and contact-tongues disposed in planes on top of each other and by means of a switching member operable from the outside selectively into an engagement and contact position with a pole- and zero-conduit-rail and into an inoperative position, respectively, and with a grounding tongue cooperating with a special grounding rail. The carrier rail receives at its insert side of the connection-box within a side stay of the carrying rail the grounding rail projecting one-sided relative to the side-stay inwardly on parts of its cross-sectional width into the receiving channel of the connection box. A grounding contact on the side of the connection box cooperates with the grounding rail as a sliding contact. The sliding contact projects over parts of its total length on the side of the connection box pointing toward the grounding rail on the side of the carrier rail with a slide contact section laterally from the box, and biased in contact direction by a spring on the inside of the box outside of the sliding contact location. The receiving grooves on the side of the carrier rail for the holding tongues are formed with the formation of line-engagement faces for supporting the holding tongues as undercut and freely cut grooves, respectively. The carrier rail has on the insert side of the connection box, outside and on one side next to the receiving channel of the connection box a worked-in, continuously passing-through guide groove and accessible from the side of the carrier rail, and a guide ledge projection cooperates with the guide groove on the corresponding side of the connection box.

4 Claims, 7 Drawing Figures

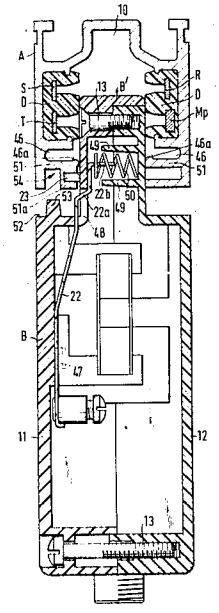


Fig.1

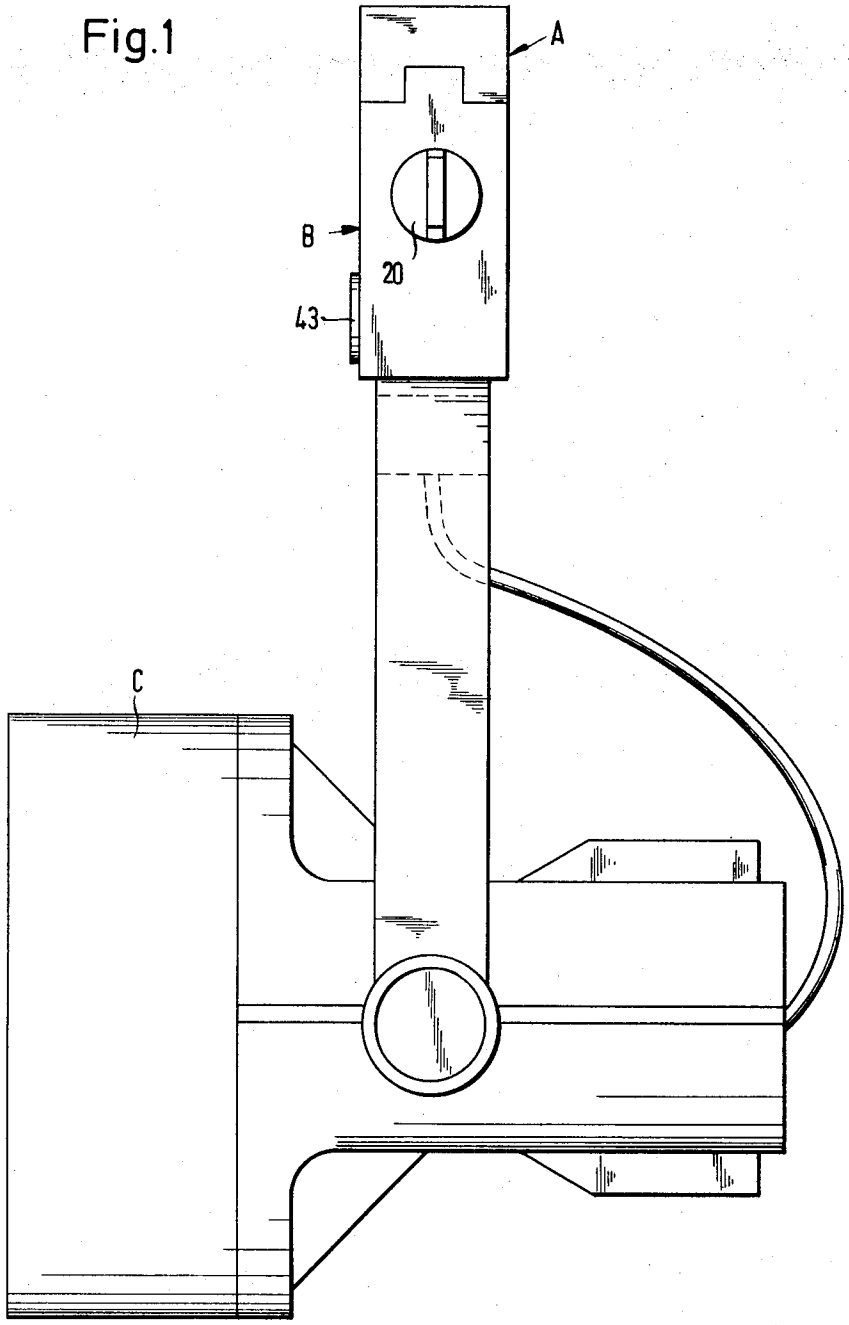


Fig.2

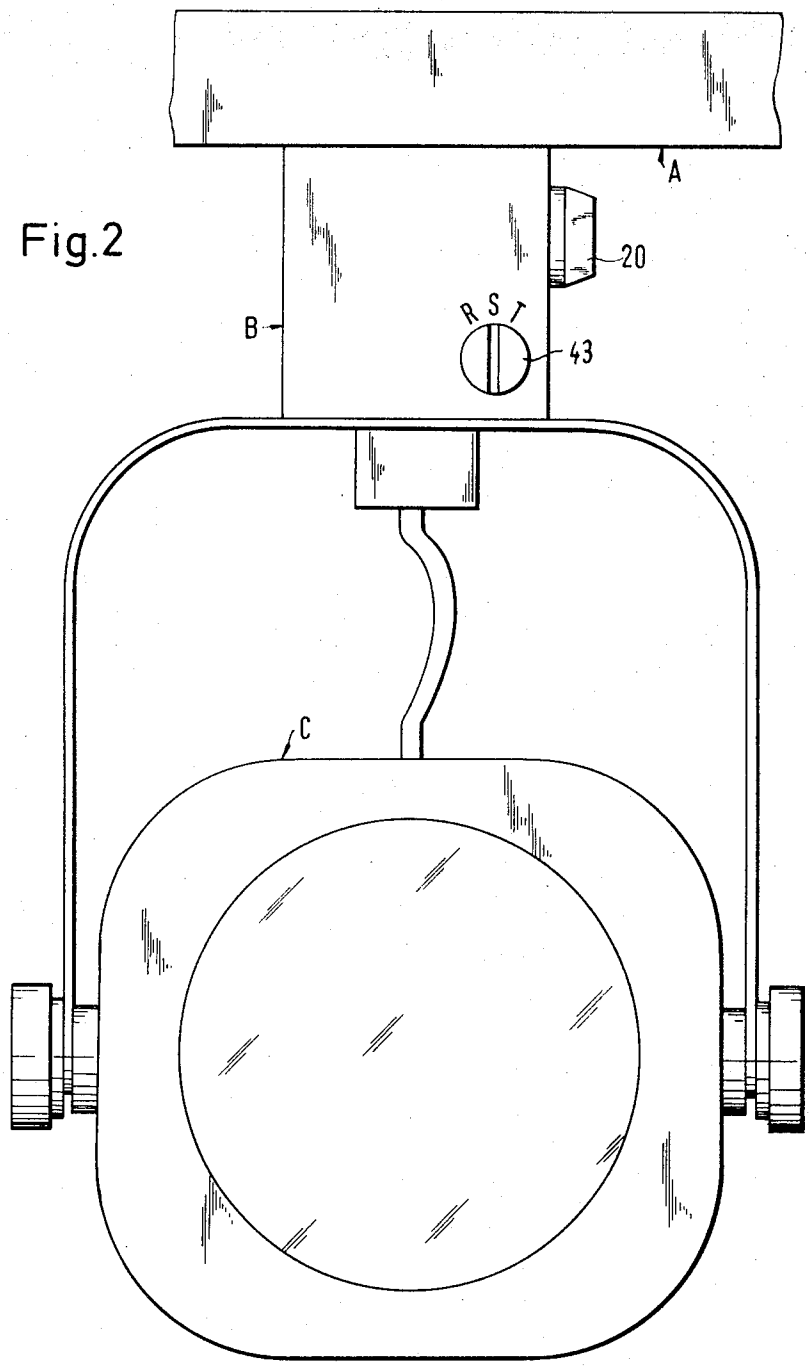
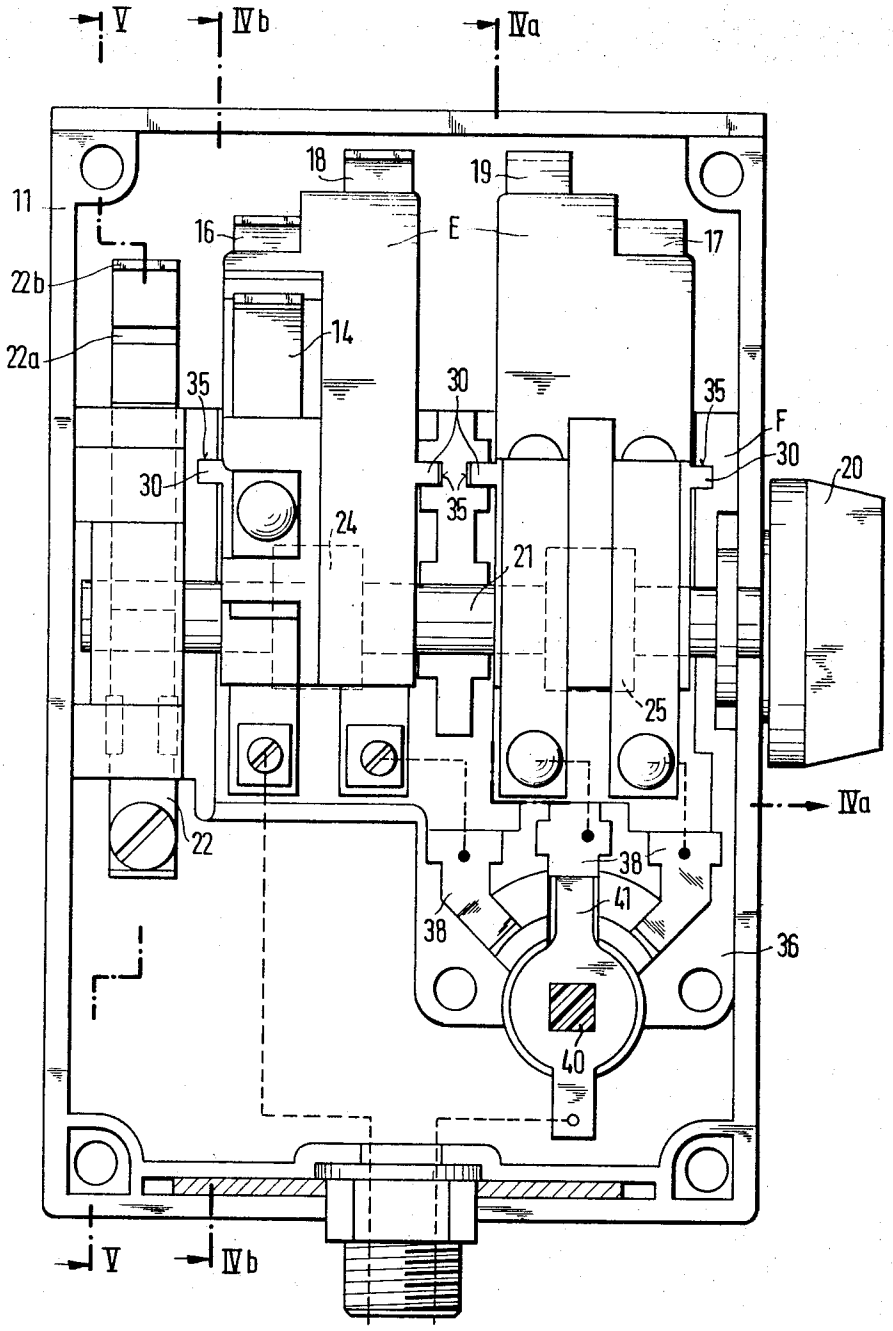


Fig.3


V
IVb
IVa
18
19
11
16
E
17
22b
22a
14
35
30
35
F
30
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30
35
24
21
25
IVa
22
38
38
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36
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V
IVb

Fig.4

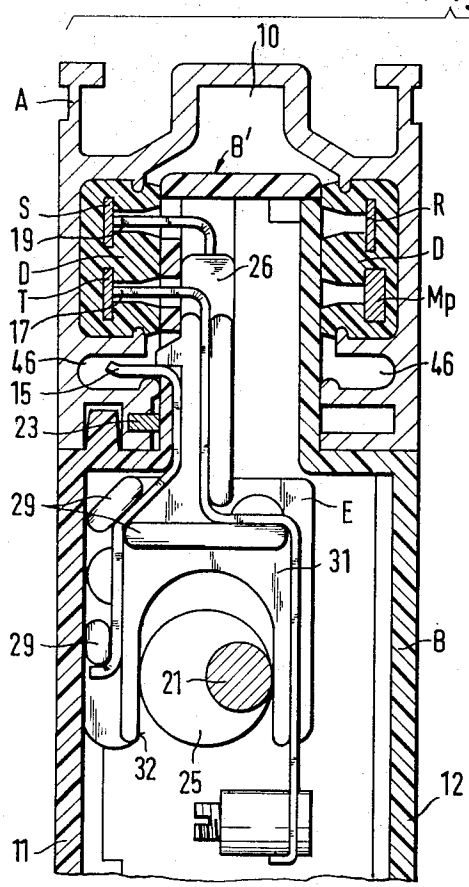


Fig.4a

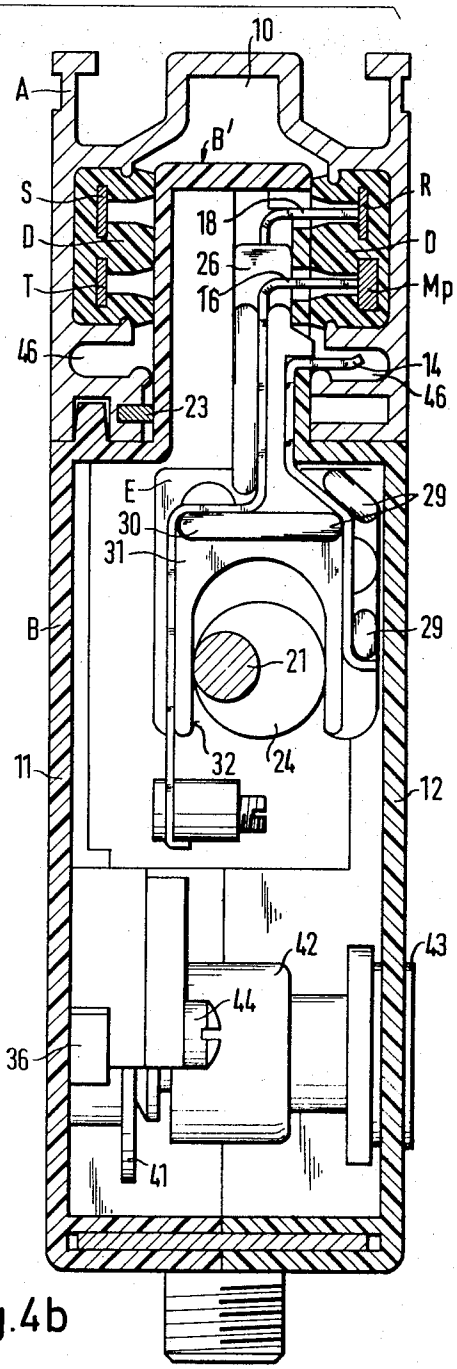


Fig.4b

Fig.5

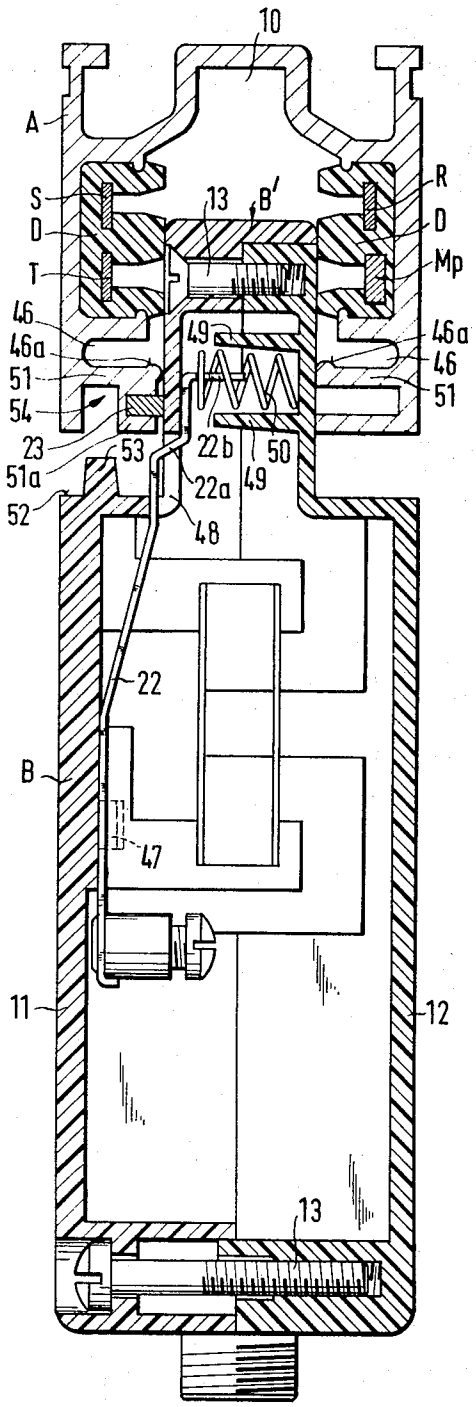
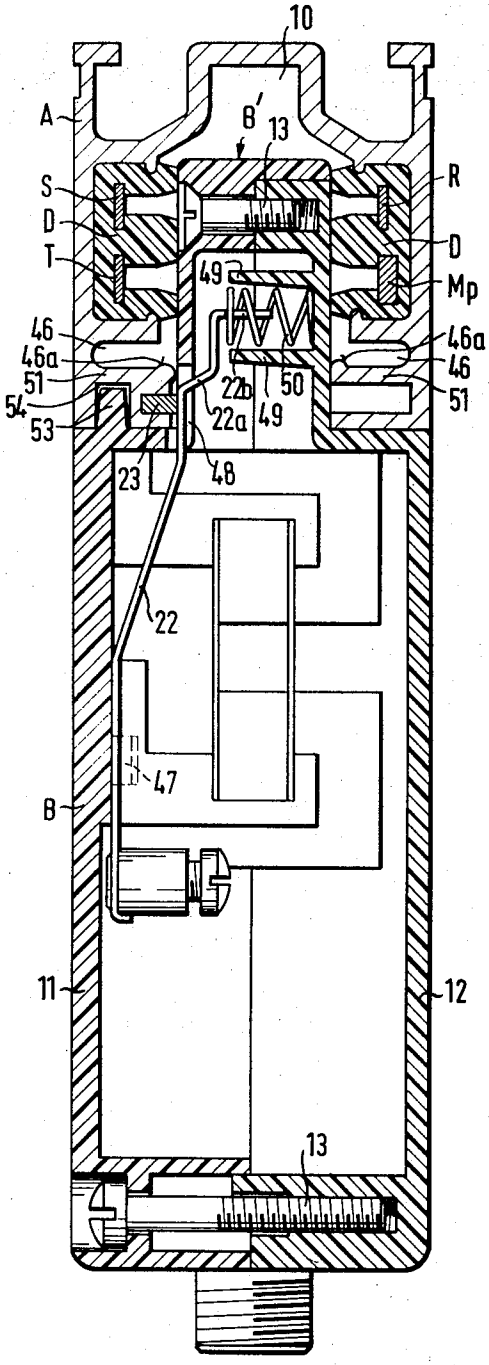

10
A
S
D
T
46
46a
51
54
23
51a
52
53
22b
22a
48
49
50
R
D
Mp
46a
46
51
22
B
47
11
12
13
B'

Fig.6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LIGHTING DEVICE

The present invention relates to a lighting device, which comprises, on the one hand, a carrier rail to be secured in, on or at a distance of a securing face, and open towards one side, which carrier rail receives electric conduit rails, each in a conduit rail carrier at its inside on both sides of a receiving channel of a connection box holding tongues-receiving grooves, as well as a plurality of electrical conduit rails arranged in pairs and mirror-symmetrically to a longitudinal center plane extending from the insert side to the securing side of the carrier rail, and arranged on top of each other, accessible from the inside and forming a plurality of operating current circuits operating independently from each other. Three conduit rails, constitute pole rails and one conduit rail constitute a zero conduit rail, and a connection box on the other hand, having a set-off head portion and insertable to the inner space of the carrier rail and supporting lighting units. The connection box is equipped with a plurality of spring tongues constituting holding and contact tongues disposed on top of each other in planes and operable by means of a switch from the outside selectively into an engagement- and contact- position with a pole- and zero- conduit rail, or in the non-operative position, as well as equipped with a grounding tongue cooperating with a separate grounding rail.

The present invention differs from the lighting devices of the above described type at first in an advantageous manner substantially by the fact, that the carrier rail receives at its insert side of the connection box within a carrier rail-side stay, grounding rail projecting on one side relative to the side stay inwardly over parts of the cross-sectional width into the connection box receiving channel. A grounding contact on the side of the connection box cooperates with a sliding contact with the grounding rail. The grounding contact projects over part of its total length on the side of the connection box pointing towards the grounding rail on the side of the carrier rail with a sliding contact section laterally from the box and is charged outside of this sliding contact location by a spring disposed inside of the box in contact direction. Furthermore, the receiving grooves on the side of the carrier rail for the holding tongues are formed by formation of line-engagement faces for the support of the holding tongues in the grooves as grooves which are under-cut or freely cut, respectively. Finally, for the insertion determined for the insert position of the connection box in the carrier rail, the latter has on the insertion side of the connection box outside and on one side adjacent the receiving channel of the connection box a worked in guide groove accessible from the bottom side of the carrier rail and continuously passing through, with which guiding groove cooperates a guide ledge protection at the corresponding side of the connection box.

By the practical realization of the present invention it has been at first brought about to comply with the requirements set for the contact between a grounding rail on the side of the carrier rail and a grounding spring on the side of the connection box, because it has been achieved now to render possible a cooperation of the grounding contact during insertion of the connection box into the carrier rail as a so-called sliding contact with the grounding rail, so that an absolute contact guarantee exists. By this arrangement the subject matter of the present invention is far superior over the known lighting devices in which the grounding tongue cooperates merely by a spring load in point like contact engagement withoud sliding function with a grounding rail provided on the bottom side of the carrier.

Also importance should be given to the structural arrangement of the grounding rail as well as the constructive design of the grounding tongue in the connection box in the framework of the present invention, because, on the one hand, it has not only been obtained, to provide the grounding rail within the carrier rail in the proper arrangement to the electric conduit rails in a compact structure, rather also the grounding tongue causes by its structure and this arrangement a safe function concerning the sliding on the grounding rail and warrants a safe contacting in the contact position.

Merely structurally it is thereby of advantage if the grounding contact is formed as a flat contact spring, which is retained in the connection box, and projects above its securing location in the set off step range of the connection box, that means, that in transfer range between the box and the set off head part with a section of the sliding contact from the box and above the latter is transformed in the connection to a juggling step directed towards the inside of the box into a supporting stay, which enters into a pressure spring arrested in the head part in holders provided on the side of the connection box.

With the advantages obtained by the present invention of the safe grounding contact, the advantages of the subject matter of the present invention is not exhausted by far. It is within the scope of the present invention also of advantage, that between the holding tongues and the holding tongue-receiving grooves in the carrier rail a line-engagement takes place, so that upon insertion of the connection box and upon the transfer of the holding tongues in their holding position no too large friction forces are created between the tongues and the groove walls, whereby also a contact pressure increase for the electrical spring tongues is created. It is thereby obtained an appreciable friction reduction. Connected with this friction reduction a higher contact pressure and thereby, also a safe contact is brought about.

Within a framework of the embodiment of the line-engagement between the holding tongues and the holding tongues-receiving grooves, it is also of advantage, if for the line engagement of the holding tongues in the receiving grooves on the side of the carrier rail, the receiving grooves are merely provided on their opening side pointing towards the receiving channel of the connection box within the range of the groove stay limiting on the underside the groove, a stay bead rising over a part of the groove height, seen in the width direction of the carrier rail, and extending relative to the stay over a part of the depth of the open groove height.

Finally, by a further proposed construction improvement, in accordance with the present invention, it is achieved, that the connection box can be inserted always only in a very predetermined position into the carrier rail, so that no wrong inserts can be produced.

Constructively this solution can find its answer such, that the connection box is equipped on the horizontally extending set off step part in the set off range towards the head part at the grounding contact side with a guide ledge extending at least over parts of the box length and

rising into a height corresponding with the depth of the guide groove on the side of the carrier rail.

In summary, it is thus obtained by the present invention, a lighting device of the first mentioned type in a highly advantageous and suitable manner, whereby, seen from the electrical point of view, the highest safety is offered and which complies with all requirements. It sets for the practice a technically highest usable solution and is far superior over the known devices.

With these and other objects in view, which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

FIG. 1 is front elevation of the lighting device designed in accordance with the present invention and consisting of the carrier rail, the connection box and a lighting unit.

FIG. 2 is a side elevation turned for 90° compared with the elevation shown in FIG. 1;

FIG. 3 is an elevation of the connection box whereby a housing portion has been removed, for the sake of a better showing;

FIG. 4*a* is a longitudinal section of the connection box along the lines IV*a*—IV*a*;

FIG. 4*b* is a longitudinal section of the connection box along the lines IV*b*—IV*b*;

FIG. 5 is a section of the connection box along the lines V—V of FIG. 3; and

FIG. 6 is a section corresponding to that shown in FIG. 5 in the completely inserted end mounting position in the connection box.

Referring now to the drawings and in particular to FIG. 1, the lighting device, desinged in accordance with the present invention, comprises substantially three main parts, namely, a carrier rail A, at least one connection box B, as well as a lighting unit C connected with the connection Box B. The carrier rail A can be secured by any conventional securing means (not shown) on a securing face, by example in a suspended arrangement and has a connection box-receiving chamber **10** formed inside in a longitudinal channel. In a laterally opposite arrangement to the receiving chamber **10**, electric conduit rails, namely pole rails R, S and T and a zero conductor rail M*b* are provided in the carrier rail A in a conduit rail carrier D.

Each connection box B comprises two housing cups **11** and **12** which are connectable together by means of screws **13**. It has a basic configuration of substantially parallelopiped shape and is formed at its end insertable into the hollow space **10** of the carrier ledge A as a head part B' set off step like as to its width. In the connection box itself are disposed holding tongues **14** and **15**, which cooperate with the holding grooves **46**, to be further explained below and disposed on the side, of the carrier rail, as well as contact tongues **16, 17** and **18, 19**, respectively. These resilient tongues are provided in form of grooves on switching elements E, which are provided crosswise displaceable in the connection box, and are operable by means of a switching device **20** over its shifting shaft **21**. Furthermore in the connection box is disposed a spring biased grounding tongue **22**, which is still more clearly described below and which cooperates with a grounding conduit rail **23** of the carrier rail A.

Within the connection box are disposed two friction elements E arranged in series in axial direction of the switching shaft **21** and effective in the sense of their cross movement in the connection box by eccentrics **24** and **25** running opposite to each other so that upon rotation of the switch member **20** clock-wise, the switching elements are moved such that the contact spring-tongues and the holding-tongues are brought into engagement with the carrier rail A, whereby the switching element adjacent the switch member moves towards the left on the drawing, while the switching element remote from the switching member is moved to the right of the drawing. Upon rotation of the switching member counter clockwise, a return movement of the switching element in opposite direction occurs.

Each switching element E is substantially a fork shaped structural body, in the head portion **26** of which in adjacent arrangement open insertion slots for contact springs are provided. Furthermore, a holding tongue **14** and **15** can be received between the holders **29**. Laterally on opposite places this fork-shaped body E is equipped with guide ledges **30**, over which the one guide of the switching elements E in a guide insert F is obtained. The foot part **31** is formed as a fork, whereby a guide **32** is disposed between the fork arms **31**, with which guide **32** cooperates an eccentric of the switching shaft **21**.

The guide insert F has guide grooves **35**, in which the guide ledges **30** of the switching element E can be received. The guide insert can be extended one sided downwardly by formation of a switching socket **36** and has here fan-like disposed receptions for receiving contact stays **38** constituting electrical contact points. Furthermore, the socket receives a switching shaft **40** of a switch consisting of a switching shaft **40**, a switching bridge **41**, a switch covering cup **42** and a switching member **43**. The switch covering cup **42** is retained together in the guide insert F by joint securing screws **44** in the housing cup **11**.

As particularly is apparent from FIG. 3 the individual pole contact springs **17, 18** and **19** are connected by means of the conduit connection with the contact stays **38** of the switch **38–43**. The zero conduit contact tongue **16** has its own connection conduit to the lighting device C.

The grounding tongue **22** is effective in the present embodiment upon insertion of the box B as a sliding contact with the inside disposed grounding rail **23** arranged on the side of the carrier rail, which grounding rail **23** is arranged such, that it projects over parts of its length into the receiving channel **10** of the carrier rail. The grounding tongue **22** is at one end secured at **47** inside of the connection box. Its contact end emerges at one side of the connection box in the transfer range to the head part B' by a lateral opening **48** and is equipped also in this range with a juggling step **22***a*, which is directed towards the inside of the box. In connection with this juggling step **22***a* is arranged the tongue **22** as a supporting stay **22***b* and enters thereby in a loadspring **50** retained in holders **49** of the box.

In order to obtain between the holding tongues **14** and **15** of the connection box B and the holding tongue-receiving grooves **46** on the carrier rail side a line engagement, these receiving grooves **46** are designed under-cut such, that they have their side pointing towards the connection box-receiving channel **10** a stay bead **46***a*, which extends from the stay **51** limiting on the underside the groove **46** over part of the open height of the groove as well as over part of the depth. The hold-

ing tongues are supported solely on the supporting beads 46a.

For the insertion of the connection box B for a determined position into the carrier rail A, the connection box has in the range of the set off step 52 a guide ledge projection 53, which rises relative to the set off step 52 and extends over part of the length of the box. The carrier rail A on the other hand has in one of its foot stays, by example, in the foot part or side stay 51a having the grounding rail 23, a longitudinally extending guide groove 54, in which the ledge 53 is insertable. Only if the connection box B is inserted in this position shown in FIGS. 5 and 6 a contact is obtained.

The operation of the lighting device assigned in accordance with the present invention is to be understood as follows:

As can be ascertained from FIG. 3, the switching bridge 41 of the selection switch brings about a contact connecting the pole-contact tongue 19, which in turn is a contact connection therewith in the inserted state with the pole-rail S, so that between the pole-rail S, the pole contact tongue 19 over the switching bridge 41, in connection with the zero conduit M_p an operating current circuit for the lighting device is created.

One can in this manner, depending on the position of the switching bridge, bring also each other pole contact tongue into an operative current circuit whereby, however, the preselection of the circuit, which should be effective, is performed by switching the selection switch prior to the insertion of the connection box B into the carrier rail A. Upon the insertion takes place then merely the mechanical movement of the switching elements E over the switching shaft 21.

It is to be understood finally automatically, that the shown and described embodiment is to be considered merely a possible example for the practical realization of the present invention, which however, is by no means limited thereto, rather the lighting contact of the grounding tongue, the line engagement of the holding tongue and also the guide means causing a position determined insertion can be designed in a deviating manner.

While I have disclosed one embodiment of the present invention, it is to be understood that this embodiment is given by example only and not in a limiting sense.

I claim:

1. A lighting device comprising

a carrier rail open on one side forming a receiving channel and to be secured to a securing face and including a conduit rail carrier,

a connection box,

said carrier rail including on both sides of said receiving channel receiving grooves for holding tongues as well as a plurality of electric conduit rails, each in a conduit rail carrier arranged in pairs in planes and mirror symmetrically to a longitudinal center plane extending from an insert side to the securing side of said carrier rail and disposed on top of each other, accessible from the inside, and forming a plurality of current circuits operating independently from each other,

three conduit rails constituting pole rails and one conduit rail constituting a zero-conduit rail,

said connection box having a set-off head part inserted into said receiving channel of said carrier rail and carrying lighting members,

said carrier rail formed with a side stay at said insert side,

a grounding rail disposed on said carrier rail within said side stay,

said connection box being equipped with a plurality of spring tongues constituting holding tongues and contact tongues disposed in planes on top of each other,

a switching means operable from the outside selectively positioning said tongues into an engagement and contact position with said pole-rail and zero-conduit-rail, and into an inoperative position, respectively, and

a grounding tongue in said connection box cooperating with said grounding rail,

said grounding rail projecting on one-side relative to said side stay inwardly on parts of its cross-sectional width into said receiving channel of said carrier rail,

said grounding tongue constituting a grounding contact on a side of said connection box cooperating with said grounding rail as a sliding contact,

said grounding contact having a slide contact surface, projecting laterally from said connection box over part of its total length on the side of said connection box extending toward siad grounding rail, said slide contact surface contacting said grounding rail while the connection box is non-rotatably inserted in a direction perpendicular to said receiving channel into said open end of said carrier rail, and

spring means biasing said slide contact surface in a contacting direction toward said grounding rail and disposed on the inside of said connection box

said receiving grooves on said sides of said carrier rail being formed with line-engagement which faces support said holding tongues

said carrier rail formed adjacent, outside of and one side of said receiving channel a continuously extending guide groove, and

a guide ledge projection on a corresponding side of said connection box cooperating with said guide groove.

2. The lighting device, as set forth in claim 1, wherein

said grounding contact is formed as a flat contact spring,

said flat contact spring is retained at one end thereof in said connection box and emerges from said box thereabove in said set-off head part of said connection box in at said slide contact surface, said flat contact spring is formed above said slide contact surface in connection with a joggling step directed towards the inside of said box into a supporting stay, and

said supporting stay operatively entering a pressure spring arrested in said head part in holder means on the side of said connection and biasing said flat contact spring toward said grounding rail.

3. The lighting device, as set forth in claim 1, further comprising

said carrier rail forms a receiving groove stay limiting the underside of each of said receiving grooves,

a stay head formed on said groove stay at said receiving grooves on the side of said carrier rail on opening sides thereof pointing toward said receiving channel of said connection box and said stay bead each rising over a part of the height of the opening of the height of said receiving groove and extend-

ing, in a direction of the width of said carrier rail, over a part of the depth of said receiving groove, for a line engagement of said holding tongues in said receiving grooves on the sides of said carrier rail.

4. The lighting device, as set forth in claim 1, wherein said connection box having a horizontally extending set-off part in a set-off range of said head part on a side thereof adjacent said grounding contact and formed on said horizontally extending set-off part with said guide ledge projection extending at least over parts of the length of said connection box and rising to a height corresponding with the depth of said guide groove on a corresponding side of said carrier rail.

* * * * *