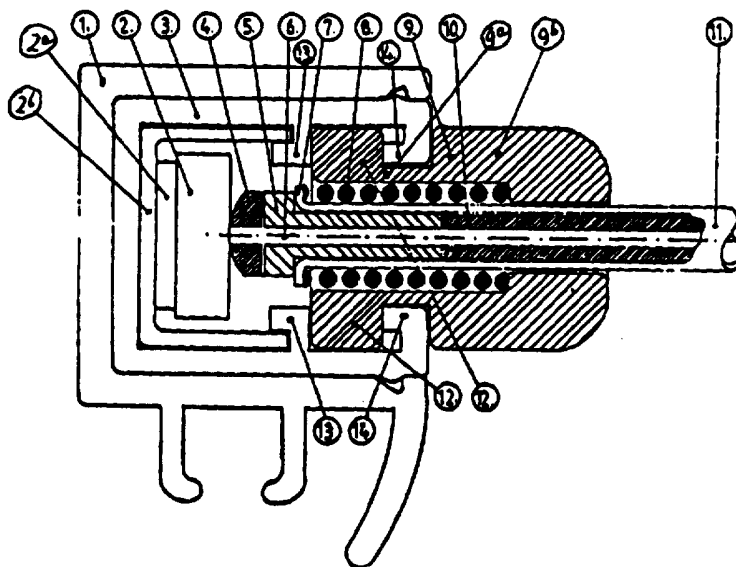




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : H01R 25/14, F21V 21/34</p>	<p>A1</p>	<p>(11) International Publication Number: WO 96/33532 (43) International Publication Date: 24 October 1996 (24.10.96)</p>
<p>(21) International Application Number: PCT/NL96/00170 (22) International Filing Date: 18 April 1996 (18.04.96) (30) Priority Data: 1000153 18 April 1995 (18.04.95) NL (71) Applicant (for all designated States except US): STICHTING KENNIS BEHEER NEDERLAND [NL/NL]; Lange Heul 506, NL-1403 PA Bussum (NL). (72) Inventor; and (75) Inventor/Applicant (for US only): MULHOLLAND, Robert, Christiaan [NL/NL]; Lange Heul 506, NL-1403 PA Bussum (NL). (74) Agent: LIPS, H., J., G.; Haagsch Octrooibureau, Breiterlaan 146, NL-2596 HG The Hague (NL).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments. In English translation (filed in Dutch).</p>

(54) Title: LIGHTING SYSTEM, AS WELL AS CURRENT CONDUCTOR RAIL AND CURRENT COLLECTORS TO BE USED WITH IT



(57) Abstract

Open current conductor rail, to lighting units provided with a hollow armature tube (11) can be connected. The current conductor rail has a U-shaped outer rail (3) with a strip-shaped inner rail (2) insulated from it. The outer rail (3) is provided with turned-back inner ridges (13) and end ridges (14). Each lighting unit has a contacting body (9) being slidable across the armature tube, in which a pressure spring lies around the fitting tube and is supported against an end flange rim (7) of the armature tube. The inner conductor of the fitting tube is connected to an insulated contact head (4) being situated behind the end flange rim. By inserting the contacting body into the contact opening of the current conductor rail, pushing through and performing a quarter turn, contacting takes place.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgystan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	KZ	Kazakhstan	SG	Singapore
CH	Switzerland	LI	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovakia
CM	Cameroon	LR	Liberia	SN	Senegal
CN	China	LT	Lithuania	SZ	Swaziland
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	LV	Latvia	TG	Togo
DE	Germany	MC	Monaco	TJ	Tajikistan
DK	Denmark	MD	Republic of Moldova	TT	Trinidad and Tobago
EE	Estonia	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	UG	Uganda
FI	Finland	MN	Mongolia	US	United States of America
FR	France	MR	Mauritania	UZ	Uzbekistan
GA	Gabon			VN	Viet Nam

Lighting system, as well as current conductor rail and current collectors to be used with it

The invention relates to a lighting system, comprising a current conductor rail for supply of electric current and
5 one or more lighting units, each having an armature consisting of a hollow, rigid, conductive armature tube with an insulated inner conductor led through it, and with the outer end of each fitting tube being provided with a current collector mountable to the current conductor rail,

10 said current collector having a conductive outer rail being U-shaped in cross-section and having hook-shaped end ridges turned inwardly, and a conductive inner rail extending across the bottom of the outer rail and being insulated in relation to it, and

15 said current collector having a conductive contacting body being provided with a central bore and being slidable with tolerance and rotatable over the armature tube; a metal coil spring slid over the armature tube and on contact being supported in the contacting body at one side and against a
20 widened end flange rim of the armature tube at the other side; and a rounded contact head contacting the end flange rim with intermediate insulation and being connected to the inner conductor of the armature,

the contacting body having an insert portion narrower
25 than the longitudinal opening between the turned-back end ridges of the outer rail of the current conductor rail, said insert portion having its end in one direction double-sidedly widened by opposing contact wings, to a length larger than the width of the longitudinal opening and slightly
30 narrower than the distance between the U-legs of the outer rail.

Such a system is known from the European Patent Application No. 640 309, in particular Fig. 10 thereof, which illustrates a current collector being connected to the
35 current conductor rail. With this known system, contacting and mounting the current collector can take place in a simple way by sliding the current collector by the contact wings in longitudinal direction of the contact gap between the turned-back end ridges of the outer conductor and pus-

hing them against the force of the spring until the contact head (133) presses against the inner rail (113), and both contact wings (132) are situated beneath the end ridges (122) of the outer rail. By subsequently performing a quarter of a turn and releasing, the contact wings will contact the end ridges of the outer rail, and the contact will have been established. Since such a contact does not guarantee a proper fastening, particularly not with the intended application in which the current conductor rail has its contact opening to the side, additional provisions have been made, namely the inner rail has been designed U-shaped in cross-section in order to more or less enclose the contact head, and the rounded extremities of the hook-shaped end ridge of the outer rail engage in corresponding grooves made in the respective contact wings, in order to obtain both the contact at that point and a locking with a view to mounting the armature to the rail.

However, such a system has a number of important disadvantages. Since the neck of the insert portion of the mounting body is of relatively narrow design with very wide tolerance in the plug-in opening, particularly with the lateral application shown, a torque is exerted that will result in the fact that the lower contact wing will be pushed out of its contact with the end ridge of the outer rail, which will make the fastening relatively wobbly, and furthermore can lead to contact interruption. In order to counteract this, the inner rail has been designed in U-shape, yet since the contact head lies pressed in said U-rail with a certain tolerance, sliding can occur here too, which could lead to contact reduction or contact interruption.

Since such an "open rail" system is a low voltage system, such contact malfunctions are a very critical factor. Further, the necessity of a U-shaped inner rail renders the device unnecessarily more complicated and expensive, and the choice of the narrow socket neck limits the size of the coil spring, so that in fact one has to work with springs that are too weak. Another point is, that the contact between the rounded end ridges and the grooves in the contact wings will not lead to an optimal contact, particularly not because of

the fact that during mounting, the rounded hook ridges of the end ridge of the outer rail will be slightly bevelled by scraping, so that contact with the slots in the contact wings will be deteriorate (flat against round).

5 The object of the invention is to eliminate these disadvantages and design the system in such a way, that a good contact and good fastening between current collectors and current conductor rail will remain guaranteed at all times.

10 To that end, the invention provides for a lighting system as defined in the preamble, characterized in that the insert portion fits closely into the longitudinal opening between the turned-back end ridges of the outer rail, and that in the U-shaped outer rail of the current conductor
15 rail, opposite inner ridges are formed beneath the end ridges at such a distance, that the contact wings of the insert portion of the contact body fit closely into the intermediate space between the end ridges and the inner ridges.

20 With the invention, on contacting, the contact wings are so to speak enclosed in sections, defined by the end ridges and inner ridges, which in itself already guarantees a reliable grip. Further, it is an advantage that contacting the wings through grooves can be completely left out, since
25 these are superfluous with the invention. The roundings of the hooks of the end ridges of the outer rail can further be efficiently polished, so that a good, wide contact surface will be obtained between the contact wings and the end ridge.

30 A further advantage lies in the fact that with such a construction, the U-shape of the inner rail can be left out and said inner rail can be manufactured simply and cheap as a strip, since the fastening of the wings between the inner ridges and the end ridges, in combination with the contact-
35 ing body insert portion fitting closely in the socket opening, guarantees an almost immobile grip.

Efficiently, the embodiment can be such, that the inner ridges are turned back in hook-shape and the inner rail is fixed to an insulation U-shaped in cross-section and being
40 held between the bottom of the outer rail and the turned-

back inner ridges.

In order to optimize the grip of the contact wings, c.g. the fastening of the current collector on the current conductor rail, the invention further provides for, that the
5 insert portion of the contacting body opens into a widened part forming a bearing surface, with the distance between the contact wings and said bearing surface substantially corresponding to the ridge thickness of the end ridges of the outer rail. Owing to this, the end ridges of the outer
10 rail are clasped almost completely, as a consequence of which any lateral deflection as a result of torque is excluded. Very efficiently, the embodiment can be such, that said widened part has a round shape, so that the bearing surface acts as an indicating surface at the same time. Therefore,
15 if one presses the current collector in the current conductor rail, one always achieves the proper position for rotating the contact wings, namely as soon as the bearing surface presses against the outer ridge of the rail.

According to the invention, the contact wings have
20 their ends efficiently rounded-off, in order to facilitate the quarter turn within the U-shaped current conductor rail.

Further, the invention provides for a current conductor rail as described above, as well as for current collectors to be used with it. Here, a great advantage is the fact,
25 that because of their relatively robust dimensions (an insert portion as wide as possible), the current collectors according to the invention can easily be manufactured integrally. At the same time, this robust embodiment implies that one can choose the coil spring to be used from a wide
30 variety of coil springs.

The invention will be explained further by means of an exemplified embodiment. In the drawing:

Fig. 1 shows in cross-section a current collector according to a lighting system of the invention mounted in a
35 current conductor rail;

Fig. 2 shows a plan view of the current conductor rail with current collector of Fig. 1; and

Fig. 3 shows a perspective view of the contacting body of the current collector of Fig. 1.

40 Fig. 1 shows a rail profile of U-shaped cross-section,

that is attached to a wall. In said rail profile, a current conductor rail is placed, consisting of a conductive inner rail 2 being in the shape of a strip, and being bonded (2a) on an insulation 2b of U-shaped cross-section positioned in 5 a conductive outer rail 3 having a U-shaped cross-section as well. Said outer rail has turned-back inner ridges 13 keeping the insulation 2b in place in downward direction. The outer rail further also has turned-back end ridges 14. Fig. 1 further shows a portion of an armature having a current 10 collector connected therewith.

The armature has a hollow armature tube 11 of conductive material provided with a widened end flange rim 7. An inner conductor 6 provided with an insulation 10 extends within said armature tube 11.

15 The current collector substantially consists of three parts, namely a rounded-off contact head 4 of conductive material, lying on the widened end flange rim 7 of the armature tube 11 via an insulation 5, and connected to the inner conductor 6.

20 The second element of the current collector is a contacting body 9 having a insert portion consisting of a neck 9a, having its diameter corresponding to the gap distance between the end ridges 14 of the outer rail 3, and contact wings 12 protruding in one direction two-sidedly. At the 25 other side of the neck 9a there is a widened portion 9b. The contacting body 9 consists of conductive metal and is made hollow, in such a way that it can slide and rotate across the armature tube 11.

The third current collector element consists of a 30 pressure spring 8 positioned around the armature tube, said spring being receivable in the hollow bore of the contacting body 9 rebounding against the end flange rim 7.

The contact wings 12 have a height dimension corresponding substantially with the distance between the inner 35 ridges 13 and the end ridges 14 of the outer rail 3 of the current conductor rail, and further, the distance between the contact wings 12 and the widened portion 9 approximately corresponds to the thickness of the end ridges 14.

In fig. 1, the current collector is shown in mounted 40 condition. This condition is achieved by pushing the current

collector - moved over a quarter turn - against the spring force of the pressure spring 8 down into the gap opening of the current conductor rail until the contact head 4 presses against the inner rail 2. By performing a quarter turn, the contact wings 12 will be subsequently rotated between the ridges 13 and 14, the rounded-off shape of the contact wings facilitating this action.

A thus fixed current collector has an excellent contact both through the current head with the inner rail 2 and through the contact wings 12 with the flat-polished lower edge of the end ridge 14. The advantageous filling of the contacting body between the inner ridges 13 and the end ridges 14 of the outer rail as well as the enclosure of said outer rail by the contacting body on the one hand causes the contact head 4 to be kept firmly pressed and centered on the strip-shaped inner rail, whereas on the other hand it is guaranteed that lateral forces or torque can not result in any deflection of the contacting body. Due to this, the current collector performs the function of both current contact member and that of fastening member in an efficient way.

According to a further embodiment, the widened portion 9b has a round shape, as consequence of which the bottom side is not only the upper supporting surface of the contacting body, but is also an index surface, so that on inserting the current collector into the current conductor rail, one need not look for the proper plug-in depth.

After having read the above, further variations and modifications will be apparent.

C L A I M S

1. Lighting system, comprising a current conductor rail for supply of electric current and one or more lighting units, each having an armature consisting of a hollow, 5 rigid, conductive armature tube with an insulated inner conductor led through it, and with the outer end of each fitting tube being provided with a current collector mountable to the current conductor rail,

said current collector having a conductive outer rail 10 being U-shaped in cross-section and having hook-shaped end ridges turned inwardly, and a conductive inner rail extending across the bottom of the outer rail and being insulated in relation to it, and

said current collector having a conductive contacting 15 body being provided with a central bore and being slidable with tolerance and rotatable over the armature tube; a metal coil spring slid over the armature tube and on contact being supported in the contacting body at one side and against a widened end flange rim of the armature tube at the other 20 side; and a rounded contact head contacting the end flange rim with intermediate insulation and being connected to the inner conductor of the armature,

the contacting body having a insert portion narrower than the longitudinal opening between the turned-back end 25 ridges of the outer rail of the current conductor rail, said insert portion having its end in one direction double-sidedly widened by opposing contact wings, to a length larger than the width of the longitudinal opening and slightly narrower than the distance between the U-legs of the outer 30 rail,

characterized in that

the insert portion fits closely into the longitudinal opening between the turned-back end ridges of the outer rail, and that in the U-shaped outer rail of the current 35 conductor rail, opposite inner ridges are formed beneath the end ridges at such a distance, that the contact wings of the insert portion of the contact body fit closely into the intermediate space between the end ridges and the inner ridges.

2. Lighting system according to claim 1, characterized in that the conductive inner rail is in the shape of a strip.

3. Lighting system according to claim 2, characterized in that the inner ridges are turned back in a hook-shape and the inner rail is mounted on an insulation having a U-shaped cross-section and being retained between the bottom of the outer rail and the turned-back inner ridges.

4. Lighting system according to claim 2 or 3, characterized in that the insert portion of the contacting body opens into a widened portion forming a bearing surface, the distance between the contact wings and said bearing surface substantially corresponding to the thickness of the end ridges of the outer rail.

5. Lighting system according to claim 4, characterized in that said widened portion is rounded, so that the bearing surface is an indicating surface at the same time.

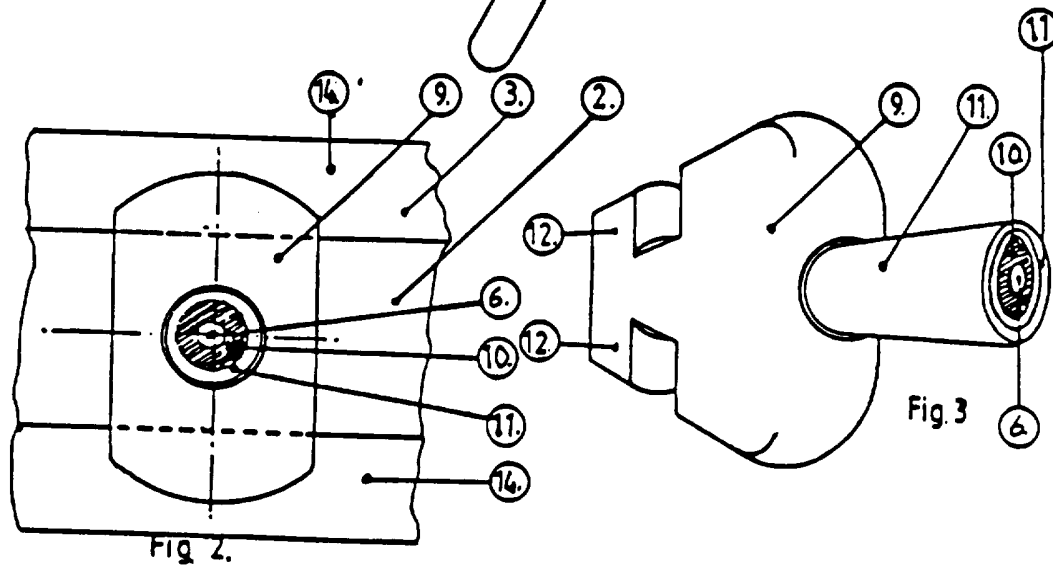
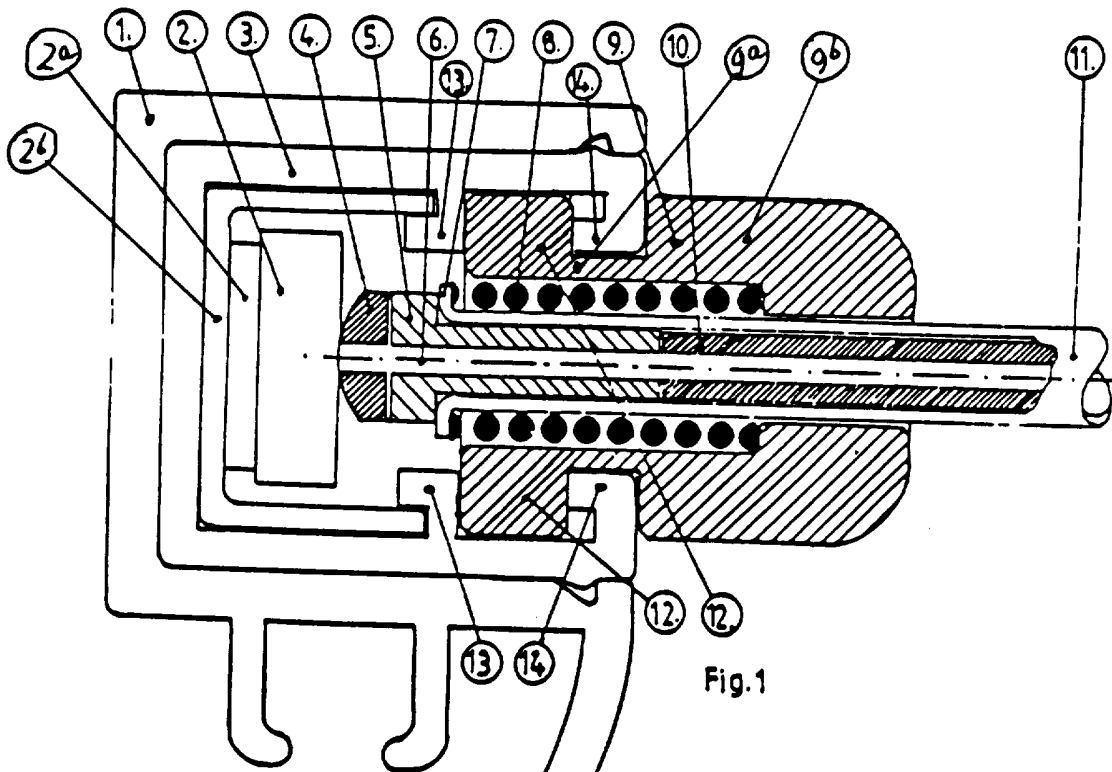
6. Lighting system according to one of the preceding claims, characterized in that the contact wings have their outer ends rounded-off.

7. Lighting system according to one of the preceding claims, characterized in that the contact planes of the end ridges of the outer rail are polished flat.

8. Current conductor rail, to be used with the lighting system of one or more of the claims 1 - 7.

9. Current collector to be used with the lighting system of one or more of the claims 1 - 7.

10. Current collector according to claim 9, characterized in that the contacting body is manufactured in one piece.



INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 96/00170

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H01R25/14 F21V21/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H01R F21V

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 640 309 (JSI ART FIX SYSTEMS BV) 1 March 1995 cited in the application see column 7, line 11 - column 8, line 29 see figures 10-13 ---	1
A	US,A,3 596 226 (MELTZER) 27 July 1971 see column 2, line 11 - column 3, line 8 see figures 1-17 ---	1
A	US,A,4 747 025 (BARTON) 24 May 1988 see column 4, line 4 - line 20 see column 4, line 54 - line 63 see column 5, line 30 - line 35 see column 6, line 14 - line 54 see figures 1-7 ---	1
-/--		

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

2 September 1996

Date of mailing of the international search report

05.09.96

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+ 31-70) 340-3016

Authorized officer

De Mas, A

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/NL 96/00170

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CH,A,483 132 (STAFF & SCHWARZ GMBH) 15 December 1969 see column 4, line 9 - column 6, line 18 see figures 2-4 ---	1
A	DE,B,10 90 317 (LIGHTOLIER, INC.) 6 October 1960 see column 3, line 41 - column 6, line 33 see figures 1-7 -----	1

INTERNATIONAL SEARCH REPORT

information on patent family members

Intern. Application No PCT/NL 96/00170

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-640309	01-03-95	NL-A- 9301434	16-03-95
US-A-3596226	27-07-71	NONE	
US-A-4747025	24-05-88	NONE	
CH-A-483132	15-12-69	BE-A- 682269	14-11-66
		DE-A- 1571451	10-12-70
		DE-A- 1589360	05-03-70
		DE-A- 1589361	18-06-70
		DE-A- 1589362	18-06-70
		FR-A- 1571451	20-06-69
		LU-A- 51255	06-08-66
		NL-A- 6607753	12-12-66
DE-B-1090317	06-10-60	GB-A- 838008	
		US-A- 2977566	28-03-61