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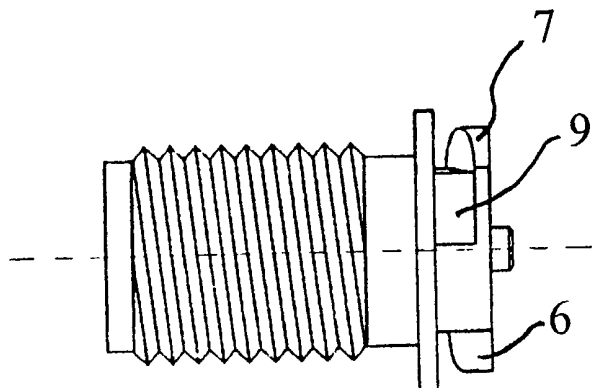
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- (71) Applicant (for all designated States except US): **VALTIMO COMPONENTS OY** [FI/FI]; PL 5, FIN-75701 Valtimo (FI).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **PIRINEN, Markku** [FI/FI]; Kalliojärventie 190, FIN-75710 Karhupää (FI).
- (74) Agent: **PATENTTITOIMISTO PITKÄNEN OY**; PL 1750, FIN-70211 Kuopio (FI).
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: RADIO FREQUENCY COUPLING FOR A COAXIAL CABLE MOUNTED ON A PANEL WITH A BAYONET TYPE OF COUPLING



(57) Abstract: The subject of the invention is a radio frequency coupling, which includes a tubular frame (1), a centre conduct (2), insulated from the frame, attaching elements (3, 4, 5) in the ends of the frame and a flange (4) at a distance from the other end of the frame. The radio frequency coupling according to the invention is characterized in that in the end of the frame (1) with the flange there is an end plate (5), with the surfaces against the flange (4) of at least one of the shoulders (6, 7) are at least partly in inclined angle thus forming the space between the shoulders and the flange (4) narrowing.



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Radio frequency coupling for a coaxial cable mounted on a panel with a bayonet type of coupling.

The present invention relates to radio frequency coupling, which includes a tubular frame, a centre conduct insulated from the frame, attaching elements in the ends of the frame and a flange at a distance from one end of the frame.

- 5 One of the important objectives of a construction of radio frequency cables and couplings is to prevent the induction of electromagnetic radiation to low frequency and dc-circuits possibly placed near them. A radio frequency cable consists usually at least of a centre conduct, an insulating layer on it, of conducting layer and a
10 conducting cover. The meaning of the conducting cover is to prevent the spreading of high frequency, disturbing electromagnetic radiation to the surrounding area.

- In order to prevent the leakage of disturbances coupling heads as well as couplings are been realised according to earlier mentioned principle. Therefore a radio frequency coupling includes a centre conduct, placed inside a tubular frame and adjustable to the centre conduct of a coupling head of a radio frequency coupling.
15 Many different kinds of coupling heads and couplings by construction exist and are in use. In one construction there is a flange in the middle point of the tubular frame, and on the both sides of the flange there is a thread. By means of the thread inside the adjusting object the coupling may be adjusted to an opening in the wall of the
20 outside the object a coupling head of a radio frequency coupling, with an adjusting nut suitable to the thread of the radio frequency coupling and suitable to a coupling may be adjusted.

- Development of communications techniques and generalization of internal networks have remarkable increased the use of high frequency components. Therefore the
25 use and installations of radio frequency couplings have notable increased recently. Because of this it is usual that couplings must be mounted in a small space. Attachment with nuts in close places is slow and difficult. To secure the attachment soldering seam is also used.

- The second problem of the thread attachment is the inclining of the coupling while
30 adjusting the nut. This is seen especially when the opening in the object is too big in respect to the frame of the coupling or the wall of the object has been made of thin or yielding material. When adjusting a nut of a radio frequency coupling to be attached to an opening that is too big, the flange of the coupling will be placed eccentric in respect to the opening. Therefore the edge of the opening will be

pressed eccentric and the coupling will be inclined in respect to the case of the coupling. The inclined position of the coupling will disturb the installation of the couplings near by and will cause malfunctions in the equipment. Furthermore there is the problem that the coupling may not be exactly in the middle of the opening.

- 5 The purpose of the invention is to provide a radio frequency coupling, which may be attached to a plate object, such as a wall of a case, easily and quickly without any special attaching elements or tools. The purpose of the invention is also to provide a radio frequency coupling, several of which may be attached near each other in a relatively small space and by using which turning into inclined position is
10 prevented. Furthermore, the purpose of the invention is to provide a radio frequency coupling which is always placed in the middle of the installation opening and in which the length of the portion going through the panel is minimized.

The object of the invention is accomplished by a radio frequency coupling, the characteristics of which are presented in the claims.

- 15 The radio frequency coupling according to the invention is characterized in that there is an end plate in one end of the frame, in which the surface of at least one shoulder against the frame are at least partly inclined, making the space between the shoulder and the flange narrowing. The shape of the opening in the wall of the case corresponds to the shape of the end plate, such making it easy to push the end plate
20 through the opening. After this has been done the coupling is turned such that the shoulder or shoulders will turn onto the plate and the plate is wedged between the shoulder (shoulders) and the flange and is firmly locked to it. Thus by means of a simple attaching element formed from the end plate and flange the radio frequency coupling may be attached to an opening of a plate object, such as a wall of a case,
25 easily and quickly without any tools. Because of the wedgelike space between the shoulders and the flange the radio frequency coupling may be attached to a wall simply by fingers reliably and quickly. The attachment may be secured, as usual, with soldering seam, welding, glue joint or by other suitable way.

- Because of the wedgelike space between the shoulders and the end plate the
30 thickness of the wall of the attaching object may vary. The thickness of wall of the attaching object defines the magnitude of the screwing angle. The same coupling may be used with plates of different thickness. In that case to attach the coupling it must be turned more if the plate is thin and less if the plate is thick. Advantage of the coupling according to the invention is also the fact that attaching element
35 created by the flange and the end plate does not need much space and does not

reach far from the edge of the attaching plate, so that several radio frequency couplings according to the invention may be attached to a small space. Furthermore, space is saved when the portion going through the plate is short.

5 In advantageous application of the invention there are at least two separate shoulders in the end plate. These shoulders are usually symmetric in regard to each other and the construction. Because of the symmetry of the shoulders of the end plates the radio frequency coupling is placed always in the middle of the opening, and it is always attached to the object always according to the perpendicular of its wall and always stays in this advantageous position.

10 In the third advantageous application of the invention there are carvings in the end plate in order to attach the radio frequency coupling. Because of the carvings the radio frequency coupling may be turned in the phase of attaching.

Next, the invention will be explained in more detail with reference to the accompanying drawings, in which,

15 figure 1 shows a radio frequency coupling according to the invention viewed from the side,

figure 2 shows a radio frequency coupling according to figure 1 with partial sections turned 90 degrees clockwise from the position in figure 1,

20 figure 3 shows a radio frequency coupling according to figure 1 viewed from the front,

figure 4 shows a radio frequency coupling according to figure 1 viewed from the back, and

figure 5 shows the centre conduct of the radio frequency coupling according to figure 1 viewed from the side.

25 An application of the radio frequency coupling according to figures 1 – 5 includes a frame 1, a thread 3 in the front-end of the frame, a back plate 5 in the back end, a flange 4 near the back end, a shaft-like centre conduct 2 inside and in the middle of the frame and insulating material 11 between the centre conduct and the frame. There are carvings 9 in the frame and parallel carvings 12 and 13 in the end plate
30 and shoulders 6 and 7 between them. Furthermore, drillings 8 and 10 of the centre conduct of the radio frequency coupling are shown in figure 5.

The end plate 5 of the radio frequency coupling according to figures 1 – 5 is of a shape of a arched ended rectangle according to figure 4 because of the crosswise carvings 12 and 13 in respect to the frame 1. Arched parts form shoulders 6 and 7 outwards from the end plate, and their surfaces on the flange side are in inclined angle in respect to the flange according to figure 2. Thus the space between the end plate and the flange is of a shape of a trapezium until the carvings 9 viewed from the direction of figure 2. The size and the shape of the shoulders and the end plate may vary in different applications of the invention. The wedgelike space between the end plate 5 and the flange 4 is essential.

10 In this application the surfaces on the side of flange 4 of the shoulders 6, 7 are placed in inclined angle in opposite direction in respect to each other. Thus a reliable locking and concentration of the coupling to the middle of the opening is realized. The opposite direction is, in this case, a direction to be defined; if you rotate the coupling a circle you find out that the surfaces are parallel, if you look
15 through the coupling, they are opposite in direction.

The radio frequency coupling according to figures 1 – 5 is meant to be attached to an opening mainly of a shape of an end plate 5 in a plate-like object. When attaching the end plate is pushed through the opening inside the wall such that the flange 4 will be against the edges of the opening. Then the radio frequency
20 coupling is turned, in this case, clockwise until the wall is attached between the inclined shoulders 6 and 7 and the flange 4. The sections 9 in the frame enable the turning of the coupling in attaching phase.

In the radio frequency coupling according to figures 1 – 5 the flange is placed clearly nearer the back end than the front end. This is because of the distance
25 between the end plate and the flange being relatively small corresponding to thickness of a wall of the most common attaching objects made of plate-like material. Because the distance between the flange and the end plate may also vary in different applications of the invention, the attaching element of a radio frequency coupling according to the invention is compatible in a wide range of thickness.

30 As presented in figures 1 – 3 the front end of this coupling is similar to a corresponding part of a recognized radio frequency coupling until the flange 4. The length of the thread 3, the pitch and the diameter 1 of the frame may, however, vary according to different types of couplings and depending on to what kind of radio frequency cable the coupling is meant to be attached. There are also couplings

without threads and this coupling model may also be applied to that kind of coupling.

In figure 5 there are the centre conduct 2, a shaft-like object with a drilling 8 in the thread end for the shaft of the centre conduct of the coupling end of the radio frequency cable. Naturally, a counterpart of a centre conduct according to figure 5 may be used as a centre conduct in the radio frequency coupling according to the invention. In that case a centre conduct according to figure 5 must be in the coupling end of the cable suitable to the coupling. There is a drilling 10 in the end of the end plate of the centre conduct 2 in the application according to figures 1 - 5, where the drilling, in this case, is meant to facilitate to attach the coupling wire to the centre conduct.

The attachment of the radio frequency coupling according to the invention may be applied in different types of radio frequency couplings. The attachment may be applied also, for example, with distributing couplings and adapters, in which there are two or several coupling heads and in which the signal transmitted in the radio frequency cable may be distributed to several equipment or with which two different kinds of cables may be attached together. The attachment of the coupling head of a radio frequency cable to a radio frequency coupling according to the invention may differ from the nut attachment presented in the application according to figures 1 - 5. Attachment may be realized with an adapter for the frame, as in antenna attachment of a television, or by means of shoulder shafts in the radio frequency coupling to be attached to the grooves in the coupling end of the radio frequency cable.

The size, shape, construction material and connections between separate parts of the radio frequency coupling according to the invention may vary. The frame 1 may be made of different kinds of materials conducting electricity. As insulation material different kinds of plastics or other suitable insulating materials not conducting electricity may be used. The flange and the end plate may be made of different material than the frame.

The invention is not limited to the presented advantageous application but it can vary within the frames of the idea of the invention formed in the claims.

CLAIMS

1. A radio frequency coupling, which includes a tubular frame (1), a centre
conduct (2) insulated from the frame, attaching elements (3, 4, 5) in the ends of the
5 frame, and at a distance from them, in the other end of the frame a flange (4)
c h a r a c t e r i z e d in that in the end with the flange of the frame (1) there
is an end plate (5), in which the surfaces against the flange (4) of at least one of the
shoulders (6, 7) are at least partly in inclined angle, thus forming the space between
the shoulders and the flange (4) narrowing.
- 10
2. A radio frequency coupling in accordance with claim 1,
c h a r a c t e r i z e d in that in the end plate (5) there are at least two
separate shoulders (6, 7).
- 15
3. A radio frequency coupling in accordance with claim 1 or 2,
c h a r a c t e r i z e d in that there are carvings (9) in the end plate (5).

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FIG. 1

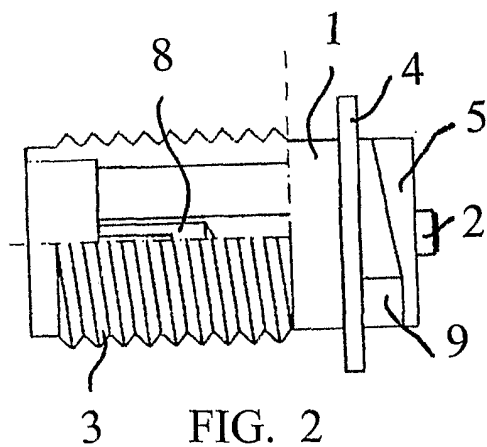
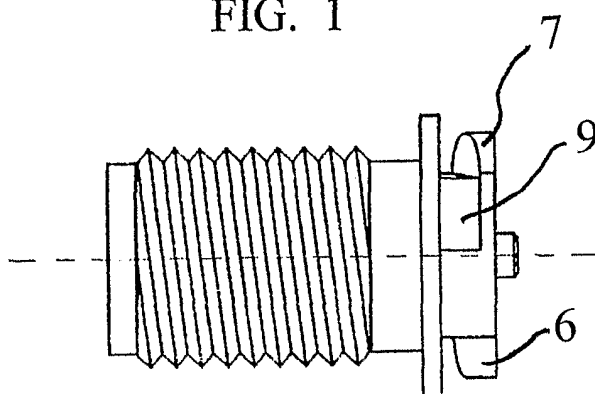


FIG. 2

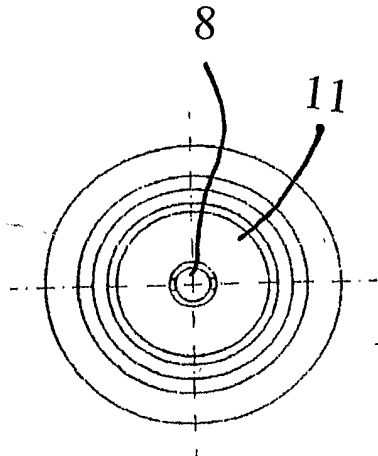


FIG. 3

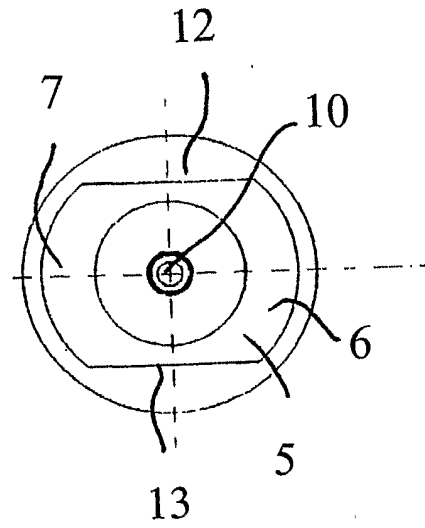


FIG. 4

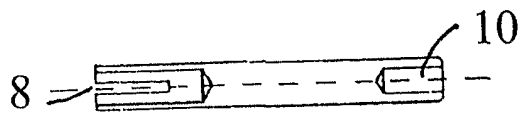


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 01/01023

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H01R 13/74, H01R 24/02, H01R 13/646

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)

IPC7: H01R

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

SE,DK,FI,NO classes as above

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

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0893852 A2 (ITT MANUFACTURING ENTERPRISES, INC.), 27 January 1999 (27.01.99), column 2, line 34 - column 5, line 10, abstract --	1-3
A	GB 878221 A (ASSOCIATED ELECTRICAL INDUSTRIES LIMITED), 27 Sept 1961 (27.09.61), figures 1-3 --	1-3
A	US 3671922 A (WILLIAM MAX ERICH ZERLIN ET AL), 20 June 1972 (20.06.72), figure 1, abstract --	1-3
A	US 4738626 A (HANS REICHLE), 19 April 1988 (19.04.88), figure 1, abstract --	1-3

 Further documents are listed in the continuation of Box C. See patent family annex.

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Name and mailing address of the ISA/

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

01a Engstrand/MP

Telephone No. +46 8 782 25 00

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International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5759064 A (NORIO SUGIYAMA), 2 June 1998 (02.06.98), figures 1-2, abstract -- -----	1-3

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/01/02

International application No.

PCT/FI 01/01023

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
EP	0893852	A2	27/01/99	US	6083040 A	04/07/00
GB	878221	A	27/09/61	NONE		
US	3671922	A	20/06/72	NONE		
US	4738626	A	19/04/88	AU	591893 B	21/12/89
				AU	5573286 A	16/10/86
				CH	668514 A	30/12/88
				EP	0198424 A	22/10/86
				JP	61239575 A	24/10/86
US	5759064	A	02/06/98	JP	9045444 A	14/02/97