SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

RAD: 14-157557- -2 **FECHA**: 2015-10-06 09:42:47
DEP: 2020 DIRECCION DE NUEVAS CREACIONES **EVE:** 378 FASE NACIONAL INCLUIDO CAPITULO I
TRA: 11 PCT-PATENTE DE INVENCION CAPITULOS I Y II **FOLIOS**: 10
ACT: 519 TRASLADOINFORME

DIRECCIÓN DE NUEVAS CREACIONES

2020
Bogotá, D.C.,

Abogado(a)/Señor(a)
JUAN PABLO CADENA SARMIENTO

Asunto: Radicación: 14-157557- -2
Trámite: 11
Evento: 378
Actuación: 519
Oficio: 11956
Folios: 10

Patente de Invención	X			Patente de Modelo de Utilidad	
Vía Nacional					
Vía PCT (Fase Nacional)	X	Capítulo I	X	Capítulo II	
No. Solicitud Internacional	PCT/US2012/070569				
Fecha de Presentación Internacional	19/12/2012				

Como resultado del Examen de Fondo realizado, con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se comunica:

1. Documentos estudiados

Descripción:	Rad. N° 14-157557-00000-0000	21/Julio/2014
Reivindicaciones:	Rad. N° 14-157557-00000-0000	21/Julio/2014
Dibujos:	Rad. N° 14-157557-00000-0000	21/Julio/2014
Prioridades:	EP 11194804.8	21/Diciembre/2011
	US 61/662,713	21/Junio/2012
	EP 12177024.2	19/Julio/2012

2. Análisis de la Prioridad

Se acepta la reivindicación de Prioridad porque: esta solicitud fue presentada dentro del plazo establecido (Art. 9 D 486) y su contenido técnico corresponde con el de la prioridad reivindicada.

3. Objeto de la invención

De acuerdo con lo establecido en el numeral 1.2.2.2 del Capítulo Primero del Título X de la Circular Única para efectos del examen de patentabilidad, se tendrá en cuenta la tasa pagada por el solicitante al momento de comenzar el examen para las reivindicaciones

adicionales; esto es que cuando la solicitud contenga más de diez (10) reivindicaciones y no se haya pagado la tasa complementaria, sólo se estudiarán las cubiertas por la tasa pagada. Por lo tanto, se estudiarán las reivindicaciones 1 a 14.

Título de la solicitud: “Cable con sensor para una red de energía” (Ver página 2 del radicado bajo el N° 14-157557-00000-0000).

El problema planteado en esta solicitud consiste en la necesidad de mejorar el contacto eléctrico y mecánico entre un circuito sensor de voltaje y una capa conductora o semiconductora de un cable, donde la capa conductora o semiconductora del cable se opera como un electrodo de un condensador de detección de un sensor de voltaje capacitivo.

Para resolver este problema técnico, la solicitud en estudio proporciona un cable sensor para la distribución de energía eléctrica en una red de energía, el cable con sensor comprende un conductor interno y una capa aislante dispuesta concéntricamente alrededor de por lo menos una sección axial del conductor interno, en donde el cable con sensor comprende adicionalmente un sensor de voltaje capacitivo para detectar un voltaje del conductor interno, caracterizado porque el sensor incluye un elemento de placa de circuito impreso, este se coloca sobre una pieza aislada eléctricamente de material conductor o semiconductor, la pieza aislada eléctricamente de material conductor o semiconductor se dispone sobre la capa aislante del cable y se opera para formar un electrodo de un condensador de detección del sensor de voltaje capacitivo.

El objeto de la presente Solicitud se relaciona con la Clasificación Internacional de Patentes (CIP): H02G 15/08; H01R 4/18; G01R 15/16.

4. Reivindicaciones relativas a un uso (Art 14 D 486)

El uso de las reivindicaciones 13 y 14 no es patentable, de acuerdo con el Art. 14.

5. De la Solicitud de Patente

Reivindicaciones (Art 30 D 486, Art 22 PCT)

Las reivindicaciones 1 y 8 a 11 no son claras porque mencionan: “por lo menos”, siendo una frase de carácter general que sugiere de forma imprecisa que la protección se extiende a otras posibles variaciones o modificaciones. Se sugiere definir un rango preciso.

Las reivindicaciones 1, 4 y 6 no son claras porque se refieren a “*(…) para detectar un voltaje del conductor interno (…) se puede operar para formar un electrodo de un condensador de detección del sensor de voltaje capacitivo (100).*”, “*(…) una regio conductora expuesta (62) proporcionar un área de contacto de superficie bidimensional extendida, en donde la región conductora expuesta está en contacto mecánico y eléctrico con la pieza aislada eléctricamente (40, 140) del material conductor o semiconductor en dos dimensiones y sobre un área extendida.*”, “*(…) en donde la región conductora expuesta (62) proporciona un área de contacto de superficie continua o un área de contacto de superficie modelada.*”, que son resultados a alcanzar, no definen al cable porque la invención no queda definida por el resultado a alcanzar, puesto que la reivindicación incluiría no sólo la solución propuesta por la solicitante, sino todas las alternativas presentes o futuras que lleguen a esos resultados. Se sugiere reemplazarlos por las características técnicas esenciales estructurales tangibles, que contribuyen a la obtención de esos efectos.

Las reivindicaciones 13 y 14 no son claras porque indican el uso que puede darse al producto reivindicado, el cual no es una característica técnica que defina a la invención. Se sugiere hacer la aclaración respectiva.

Por lo anterior, el capítulo reivindicatorio de la solicitud en estudio no cumple con el requisito de claridad acuerdo con el artículo 30 de la Decisión 486. En consecuencia, la solicitante deberá presentar un nuevo capítulo reivindicatorio**,** donde se hayan modificado las objeciones anteriormente citadas; dichas modificaciones no deben ampliar el objeto inicialmente presentado por la presente solicitud.

6. Determinación del Estado de la Técnica

El estado de la técnica se determinó con base en la fecha de presentación de la solicitud de prioridad: diciembre 21 de 2011, y se encontraron los siguientes documentos que anticipan el objeto de esta solicitud:

Ítem	Documento	Título	Fecha de Publicación
D1	Artículo 1*	"Coaxial Capacitive Voltage Divider With High Division Ratio For High Voltage Pulses With Very Fast Rise Times"	Junio/2011
D2	US 6,015,629	"Stress control for termination of a high voltage cable"	18/Enero/2000

*Coaxial Capacitive Voltage Divider With High Division Ratio For High Voltage Pulses With Very Fast Rise Times; Tonis Hobejogi and Juergen Biela; Laboratory for High Power Electronic Systems; Zurich, Switzerland; Pulsed Power Conference (PPC) IEEE, Chicago, IL, USA, 19-23 Junio, 2011.

El documento D1[1] divulga un divisor de tensión capacitivo con una alta relación de división de >1:1000 en base a un cable coaxial de alto voltaje y los condensadores de lámina discretos montados alrededor del cable. El divisor está diseñado para alta tensión de pulsos de hasta 200 kV y tiene un diseño relativamente simple y robusto. Para el divisor de tensión presentado, se presenta un modelo de circuito, que también está validado por mediciones usando un analizador de impedancia y por comparaciones con sondas de voltaje HV estándar (Pág. 1, Resumen).

El documento D2[2] divulga un sistema de dos partes para el control de la tensión eléctrica que incluye un material de control de esfuerzo conformable no pegajoso que se coloca en el borde escudo cortado de un cable de alimentación y un tubo de control de la tensión sobre el material de control de esfuerzo conformable no pegajoso. Una segunda región de material de control de esfuerzo conformable está situada adyacente al extremo del corte del aislamiento (Pág. 1, Fl. 1, Resumen)

7. Examen de Patentabilidad (Art 14 D 486)

Es importante mencionar que el siguiente análisis de patentabilidad se realizó teniendo en cuenta las objeciones de los numerales 4 y 5 de la presente comunicación.

Novedad (Art 16 D486)

La reivindicación 1 consiste en un "*Cable con sensor (1) para distribución de energía eléctrica en una red de energía, el cable con sensor (1) comprende un conductor interno (5) y una capa de aislamiento (10) dispuesta de forma concéntrica alrededor de por lo menos una sección axial del conductor interno (5)…"* (Ver página 23 del radicado Nº 14-157557-00000-0000).

Comparación de las características técnicas esenciales, con las del Estado de la Técnica:

1 http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6191436
2 https://docs.google.com/viewer?url=patentimages.storage.googleapis.com/pdfs/US6015629.pdf

Características esenciales	D1
Cable con sensor.	En la figura 19 se ilustra un cable con sensor (Fl. 6, Fig. 19).
Conductor interno.	En la figura 6 se ilustra un conductor interno (A) (Fl. 2, Fig. 6).
Capa de aislamiento dispuesta en forma concéntrica alrededor de una sección axial del conductor interno.	En las figuras 6 y 19 se ilustra una capa de aislamiento dispuesta en forma concéntrica alrededor de una sección axial del conductor interno (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
Un sensor de voltaje capacitivo.	En las figuras 6 y 19 se ilustra un sensor de voltaje capacitivo (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
El sensor incluye un elemento de placa de circuito impreso que se coloca sobre una pieza aislada eléctricamente del material conductor o semiconductor.	En las figuras 6 y 19 se ilustra que el sensor incluye un elemento de placa de circuito impreso que se coloca sobre una pieza aislada eléctricamente del material conductor o semiconductor (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
La pieza aislada eléctricamente del material conductor o semiconductor se dispone sobre la capa de aislamiento del cable.	En las figuras 6 y 19 se ilustra que la pieza aislada eléctricamente del material conductor o semiconductor se dispone sobre la capa de aislamiento del cable (Fl. 2, Fig. 6; Fl. 6, Fig. 19).

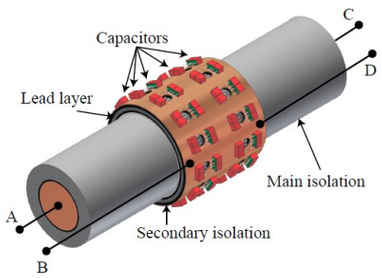

Fig. 6 del documento D1

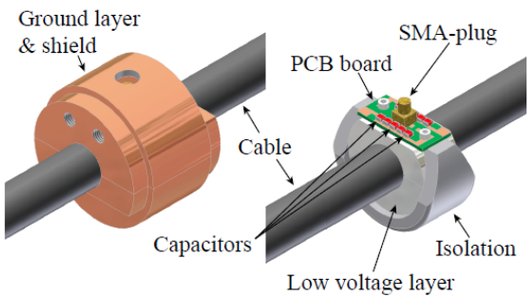

Fig. 19 del documento D1

De acuerdo con la tabla anterior, donde se comparan las características técnicas de la reivindicación 1 con la anterioridad D1, el cable descrito en dicha reivindicación, ya era conocido en el estado de la técnica. Por lo tanto, la reivindicación 1 no es nueva.

De acuerdo al análisis anterior, las reivindicaciones dependientes son afectadas por novedad por las razones dadas a continuación:

- Reivindicación 2: La figuras 6 y 19 ilustran que el elemento de placa de circuito impreso está en contacto eléctrico con la pieza aislada eléctricamente del material conductor o semiconductor (Lead layer y Low voltaje layer) (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
- Reivindicación 4: Las figuras 6 y 19 ilustran que el elemento de placa de circuito impreso comprende una región conductora expuesta que proporciona un área de contacto de superficie bidimensional extendida, en donde la región conductora expuesta está en contacto mecánico y eléctrico con la pieza aislada eléctricamente del material conductor o semiconductor en dos dimensiones y sobre un área extendida (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
- Reivindicación 6: Las figuras 6 y 19 ilustran que la región conductora expuesta (62) proporciona un área de contacto de superficie continua o un área de contacto de superficie modelada (Fl. 2, Fig. 6; Fl. 6, Fig. 19).

- Reivindicación 7: Las figuras 6 y 19 ilustran que el elemento de placa de circuito impreso comprende una porción flexible, y en donde la región conductora expuesta se dispone sobre la porción flexible (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
- Reivindicación 8: Las figuras 6 y 19 ilustran que el cable comprende una capa conductora o semiconductora, dispuesta de forma concéntrica con por lo menos una porción de la capa de aislamiento, y en donde la pieza aislada eléctricamente del material conductor o semiconductor comprende una primera porción de la capa conductora o semiconductora (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
- Reivindicación 9: Las figuras 6 y 19 ilustran que la primera porción de la capa semiconductora se extiende a lo largo de una circunferencia completa de por lo menos una porción axial de la capa de aislamiento (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
- Reivindicación 10: Las figuras 6 y 19 ilustran material conductor o semiconductor adicional, dispuesto de forma concéntrica alrededor de por lo menos una sección axial de la capa de aislamiento en ya sea cualquier lado de la pieza aislada eléctricamente del material conductor o semiconductor, el material conductor o semiconductor adicional que comprende dos secciones axiales conductoras o semiconductoras, las dos secciones axiales que se aíslan de forma eléctrica desde la pieza aislada eléctricamente del material conductor o semiconductor mediante secciones axiales no conductoras (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
- Reivindicación 11: Las figuras 6 y 19 ilustran que el cable comprende una capa conductora o semiconductora, dispuesta de forma concéntrica con por lo menos una porción de la capa de aislamiento, y en donde el material semiconductor adicional comprende por lo menos segunda porciones de la capa conductora o semiconductora (Fl. 2, Fig. 6; Fl. 6, Fig. 19).

Las reivindicaciones dependientes 2, 4 y 6 a 10 no mencionan alguna característica que haga nuevo al cable de la reivindicación 1, por lo cual se considera que no son nuevas.

Nivel Inventivo (Art 18 D 486)

Las reivindicaciones 3 y 5 consisten en un "*Cable con sensor (1) de acuerdo con una cualquiera de las reivindicaciones 1 o 2…"* y un "*Cable con sensor (1) de acuerdo con la reivindicación 4…"* (Ver página 23 del radicado Nº 14-157557-00000-0000).

Comparación de las características técnicas esenciales, con las del Estado de la Técnica:

Reiv.	Características esenciales	D1
1	Cable con sensor.	En la figura 19 se ilustra un cable con sensor (Fl. 6, Fig. 19).
	Conductor interno.	En la figura 6 se ilustra un conductor interno (A) (Fl. 2, Fig. 6).
	Capa de aislamiento dispuesta en forma concéntrica alrededor de una sección axial del conductor interno.	En las figuras 6 y 19 se ilustra una capa de aislamiento dispuesta en forma concéntrica alrededor de una sección axial del conductor interno (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
	Un sensor de voltaje capacitivo.	En las figuras 6 y 19 se ilustra un sensor de voltaje capacitivo (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
	El sensor incluye un elemento de placa de circuito impreso que se coloca sobre una pieza aislada eléctricamente del material conductor o semiconductor.	En las figuras 6 y 19 se ilustra que el sensor incluye un elemento de placa de circuito impreso que se coloca sobre una pieza aislada eléctricamente del material conductor o semiconductor (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
	La pieza aislada eléctricamente del material conductor o semiconductor se dispone sobre la capa de aislamiento del cable.	En las figuras 6 y 19 se ilustra que la pieza aislada eléctricamente del material conductor o semiconductor se dispone sobre la capa de aislamiento del cable (Fl. 2, Fig. 6; Fl. 6, Fig. 19).
4	El elemento de placa de circuito impreso comprende una placa de circuito impreso de doble cara.	No menciona
5	La región conductora expuesta comprende una capa de cobre bañada en oro.	No menciona

El documento D1 se considera el estado de la técnica cercano a la invención definida en las reivindicaciones 3 y 5 porque divulga un divisor de tensión capacitivo con una alta relación de división de >1:1000 en base a un cable coaxial de alto voltaje y los condensadores de lámina discretos montados alrededor del cable. El divisor está diseñado para alta tensión de pulsos de hasta 200 kV y tiene un diseño relativamente simple y robusto. Para el divisor de tensión presentado, se presenta un modelo de circuito, que también está validado por mediciones usando un analizador de impedancia y por comparaciones con sondas de voltaje HV estándar (Pág. 1, Resumen).

La diferencia entre la invención, definida en las reivindicaciones 3 y 5 y el cable de D1 consiste en que no menciona que el elemento de placa de circuito impreso comprende una placa de circuito impreso de doble cara y que la región conductora expuesta comprende una capa de cobre bañada en oro.

El efecto que logra el incluir que el elemento de placa de circuito impreso comprenda una placa de circuito impreso de doble cara es que permite la minimización de circuitos y una menor sensibilidad al ruido, y que la región conductora expuesta comprenda una capa de cobre bañada en oro es que permite una mayor conductividad.

Por lo tanto, el problema técnico objetivo que pretende resolver esta invención se puede formular así: “¿cómo modificar el cable conocido en D1 para minimización de circuitos, una menor sensibilidad al ruido y conseguir una mayor conductividad?”.

> Sin embargo, la utilización de que el elemento de placa de circuito impreso comprenda una placa de circuito impreso de doble cara para la minimización de circuitos y una menor sensibilidad al ruido, hace parte del conocimiento de la persona del oficio normalmente versada en la materia, la cual sabe que la gran mayoría de las tarjetas para circuitos impresos se hacen adhiriendo una capa de cobre sobre todo el sustrato, a veces en ambos lados (creando un circuito impreso virgen), y luego retirando el cobre no deseado después de aplicar una máscara temporal (por ejemplo, grabándola con percloruro férrico), dejando sólo las pistas de cobre deseado. Algunos pocos circuitos impresos son fabricados al ‘agregar’ las pistas al sustrato, a través de un proceso complejo de electro-recubrimiento múltiple. Algunos circuitos impresos tienen capas con pistas en el interior de este, y son llamados circuitos impresos multicapas. Estos son formados al aglomerar tarjetas delgadas que son procesadas en forma separada. Después de que la tarjeta ha sido fabricada, los componentes electrónicos se sueldan a la tarjeta[3].
>
> Asimismo, la utilización de que la región conductora comprenda una capa de cobre bañada en oro para conseguir una mayor conductividad, hace parte del conocimiento de la persona del oficio normalmente versada en la materia, la cual sabe que los pads y superficies en las cuales se montarán los componentes, usualmente se metalizan, ya que el cobre al desnudo no es soldable fácilmente. Tradicionalmente, todo el cobre expuesto era metalizado con soldadura. Esta soldadura solía ser una aleación de plomo-estaño, sin embargo, se están utilizando nuevos compuestos para cumplir con la directiva RoHS de la Unión Europea, la cual restringe el uso de plomo. Los conectores de borde, que se hacen en los lados de las tarjetas, a menudo se metalizan con oro. El metalizado con oro a veces se hace en la tarjeta completa[4].

En consecuencia, la persona del oficio normalmente versada en la materia, incluiría que el elemento de placa de circuito impreso comprenda una placa de circuito impreso de doble cara y que la región conductora expuesta comprenda una capa de cobre bañada en oro en el cable de D1 para llegar así al objeto de las reivindicaciones 3 y 5 de la

3 https://es.wikipedia.org/wiki/Circuito_impreso
4 https://es.wikipedia.org/wiki/Circuito_impreso

solicitud. Por lo cual se consideran obvias.

La reivindicación 12 consiste en un "*Cable con sensor (1) de acuerdo con una cualquiera de las reivindicaciones precedentes…"* (Ver página 25 del radicado Nº 14-157557-00000-0000).

Comparación de las características técnicas esenciales, con las del Estado de la Técnica:

Reiv.	Características esenciales	D1	D2
1	Cable con sensor.	En la figura 19 se ilustra un cable con sensor (Fl. 6, Fig. 19).	No se menciona
	Conductor interno.	En la figura 6 se ilustra un conductor interno (A) (Fl. 2, Fig. 6).	Un típico cable de alta tensión incluye un conductor interno rodeado por un blindaje del conductor que, a su vez, es rodeado por un material aislante que está rodeado por un blindaje eléctricamente semi-conductor exterior, en algunos casos, y el escudo de metal. Al terminar un cable como tal, es habitual eliminar o reducir cada capa sucesiva del cable para exponer la capa de abajo. Reducir el escudo eléctricamente semiconductor provoca una discontinuidad en el campo eléctrico resultante en la alta tensión eléctrica en el extremo de la pantalla. La alta tensión eléctrica puede causar que se produzcan descargas eléctricas, que a su vez tienden a causar ruptura del aislamiento del cable. La alta tensión eléctrica puede ser controlada por medios de control de tensión eléctrica (Fl. 7, Col. 1, líneas 40 a 52).
	Capa de aislamiento dispuesta en forma concéntrica alrededor de una sección axial del conductor interno.	En las figuras 6 y 19 se ilustra una capa de aislamiento dispuesta en forma concéntrica alrededor de una sección axial del conductor interno (Fl. 2, Fig. 6; Fl. 6, Fig. 19).	
	Un sensor de voltaje capacitivo.	En las figuras 6 y 19 se ilustra un sensor de voltaje capacitivo (Fl. 2, Fig. 6; Fl. 6, Fig. 19).	No se menciona
	El sensor incluye un elemento de placa de circuito impreso que se coloca sobre una pieza aislada eléctricamente del material conductor o semiconductor.	En las figuras 6 y 19 se ilustra que el sensor incluye un elemento de placa de circuito impreso que se coloca sobre una pieza aislada eléctricamente del material conductor o semiconductor (Fl. 2, Fig. 6; Fl. 6, Fig. 19).	No se menciona
	La pieza aislada eléctricamente del material conductor o semiconductor se dispone sobre la capa de aislamiento del cable.	En las figuras 6 y 19 se ilustra que la pieza aislada eléctricamente del material conductor o semiconductor se dispone sobre la capa de aislamiento del cable (Fl. 2, Fig. 6; Fl. 6, Fig. 19).	Un típico cable de alta tensión incluye un conductor interno rodeado por un blindaje del conductor que, a su vez, es rodeado por un material aislante que está rodeado por un blindaje eléctricamente semi-conductor exterior, en algunos casos, y el escudo de metal. Al terminar un cable como tal, es habitual eliminar o reducir cada capa sucesiva del cable para exponer la capa de abajo. Reducir el escudo eléctricamente semiconductor provoca una discontinuidad en el campo eléctrico resultante en la alta tensión eléctrica en el extremo de la pantalla. La alta tensión eléctrica puede causar que se produzcan descargas eléctricas, que a su vez

			tienden a causar ruptura del aislamiento del cable. La alta tensión eléctrica puede ser controlada por medios de control de tensión eléctrica (Fl. 7, Col. 1, líneas 40 a 52).
12	Alguna o todas las piezas aisladas eléctricamente del material conductor o semiconductor del material semiconductor adicional se fija a la capa de aislamiento por un adhesivo.	No menciona	El ejemplo C9 tenía una adherencia al núcleo de manera que al desenrollar el núcleo, el adhesivo se deforma y fractura a lo largo de las líneas de soldadura del núcleo helicoidal, y permanece firmemente adherido a la hebra de núcleo desenrollado (Fl. 12, Col. 11, líneas 30 a 34).

Los documentos D1 y D2 se consideran el estado de la técnica cercano a la invención definida en la reivindicación 12 porque divulgan un divisor de tensión capacitivo con una alta relación de división de >1:1000 en base a un cable coaxial de alto voltaje y los condensadores de lámina discretos montados alrededor del cable. El divisor está diseñado para alta tensión de pulsos de hasta 200 kV y tiene un diseño relativamente simple y robusto. Para el divisor de tensión presentado, se presenta un modelo de circuito, que también está validado por mediciones usando un analizador de impedancia y por comparaciones con sondas de voltaje HV estándar (D1, Pág. 1, Resumen), y un sistema de dos partes para el control de la tensión eléctrica que incluye un material de control de esfuerzo conformable no pegajoso que se coloca en el borde escudo cortado de un cable de alimentación y un tubo de control de la tensión sobre el material de control de esfuerzo conformable no pegajoso. Una segunda región de material de control de esfuerzo conformable está situada adyacente al extremo del corte del aislamiento (D2, Pág. 1, Fl. 1, Resumen)

La diferencia entre la invención, definida en la reivindicación 12 y el cable de D1 consiste en que no menciona que alguna o todas las piezas aisladas eléctricamente del material conductor o semiconductor del material semiconductor adicional se fija a la capa de aislamiento por un adhesivo.

El efecto que logra el incluir que alguna o todas las piezas aisladas eléctricamente del material conductor o semiconductor del material semiconductor adicional se fijen a la capa de aislamiento por un adhesivo, es que permite la adherencia de las piezas sin necesidad de piezas adicionales y eliminando el riesgo a la corrosión.

Por lo tanto, el problema técnico objetivo que pretende resolver esta invención se puede formular así: “¿cómo modificar el cable conocido en D1 para permitir la adherencia de las piezas sin necesidad de piezas adicionales y eliminando el riesgo a la corrosión?”.

Sin embargo, la utilización de alguna o todas las piezas aisladas eléctricamente del material conductor o semiconductor del material semiconductor adicional se fijen a la capa de aislamiento por un adhesivo, para permitir la adherencia de las piezas sin necesidad de piezas adicionales y eliminando el riesgo a la corrosión, ya está divulgada en el documento D2 que se refiere a que el ejemplo C9 tenía una adherencia al núcleo de manera que al desenrollar el núcleo, el adhesivo se deforma y fractura a lo largo de las líneas de soldadura del núcleo helicoidal, y permanece firmemente adherido a la hebra de núcleo desenrollado (Fl. 12, Col. 11, líneas 30 a 34).

En consecuencia, la persona del oficio normalmente versada en la materia, incluiría que alguna o todas las piezas aisladas eléctricamente del material conductor o semiconductor del material semiconductor adicional se fijen a la capa de aislamiento por un adhesivo de D2 en el cable de D1 para llegar así al objeto de la reivindicación 12 de la solicitud. Por lo cual se considera obvia.

8. Conclusión

Los requisitos de patentabilidad de la presente solicitud están afectados de acuerdo a las objeciones de los numerales 4 y 5 y así:

Ítem	Documento	Reivindicaciones afectadas	Requisito que afecta
D1	Artículo 1	1, 2, 4 y 6 a 11	Novedad/Nivel Inventivo
		3, 5 y 12	Nivel Inventivo
D2	US 6,015,629	12	Nivel Inventivo

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta (60) días contados a partir del día siguiente de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Se invita al solicitante se sirva indicar, si así lo considera, su renuncia al término faltante de sesenta (60) días para dar respuesta a este requerimiento y presentarla por escrito.

Finalmente, se le recuerda al solicitante que si como respuesta a este requerimiento llegara a modificar el capítulo reivindicatorio y éste contenga más de diez (10) reivindicaciones, no pagará la tasa de modificación voluntaria pero sí la correspondiente al pago por reivindicación adicional.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única No. 10 de 2001.

JESUS FERNEL GARCÍA GARCÍA
Director de Nuevas Creaciones (E)

El anterior requerimiento fue notificado por fijación en lista, de fecha 2015-10-13

Elaboró: Angelica Maria Ramirez
Revisó: Rosa Patricia Tellez Chavarro

Angelica Ramirez

Search history

Search 1:	separation valve (Results 504)
Search 2:	decanting valve (Results 11)
Search 3:	valve and deaeration and device (Results 608)
Search 4:	valve and fluid separation and decanting (Results 0)
Search 5:	drain valve (Results 19357)
Search 6:	drain valve (Results 19357)
Search 7:	drainage unit self-sealing (Results 0)
Search 8:	5 and 3 (Results 7)
Search 9:	2 and 5 (Results 1)
Search 10:	PN=(US5918622 OR WO2010067185 OR ES2156005 OR US3386581 OR FR2751625 OR US4051030 OR GB1062701) (Results 7)
Search 11:	FN=(18853776 OR 21280655 OR 25844871 OR 21713418 OR 22591289 OR 21607389 OR 21781467 OR 22831770 OR 824878 OR 158749 OR 1147308 OR 1039944 OR 1446292 OR 7232375 OR 4185310 OR 30153064 OR 2405131 OR 4806599 OR 4995662 OR 4266974 OR 5195705 OR 11678634) (Results 22)
Search 12:	FN=(31496511 OR 27988313 OR 31381888 OR 45170503 OR 55622220 OR 15622742 OR 28220994 OR 34273809 OR 30064523 OR 33189712 OR 44046512 OR 46803786 OR 47029899 OR 43683893 OR 48165359) (Results 15)
Search 13:	cable and sensor and capacitive (Results 1166)
Search 14:	13 and insulation (Results 90)
Search 15:	cable and capacitive voltage sensor and insulation (Results 0)
Search 16:	13 and insulat* and voltage (Results 160)
Search 17:	14 and voltage (Results 53)
Search 18:	15 and copper and gold (Results 0)
Search 19:	17 and copper and gold (Results 2)
Search 20:	cable and capacitive sensor and insulating layer and pcb (Results 1)
Search 21:	cable and capacitive sensor and pcb and gold (Results 0)
Search 22:	14 and copper (Results 11)

1) Family number: 3439026 (US4924172A)

Title: **Capacitive** **sensor** and electronic circuit for non-contact distance measurement

Abstract: Source: US4924172A A novel thin, three-terminal **capacitive** transducer which is positioned in a clearance gap to be measured is presented. This transducer comprises an **insulated** assembly having three parallel conductive planes with the first and second plane each containing a single electrode and the third plane containing a pair of spaced electrodes. Preferably, each electrode is composed of a thin layer of **copper** mounted on an **insulated** substrate such as an epoxy-glass composite. An air space is provided between each of the pair of electrodes in the third plane and the single electrode in the second plane. Another important feature of the present invention is a novel electronic circuit for use in conjunction with the novel three terminal **capacitive** transducer. This circuit provides a means of "synthetic resonance" whereby a small capacitance (such as generated by the three-terminal **capacitive** **sensor** of this invention) functions as if it were at or near series resonance with a synthesized large inductance. This is achieved by using a synthesized network (which is a variation of a known twin-tee circuit) in the feedback path of a high gain amplifier, thereby inverting the normal rejection notch into a resonance-like peak at a frequency determined mathematically.

Classifications:
International (IPC 1-7): G01B7/14 G01D5/24 G01R1/06 G01R1/067 H01G5/16 H03H7/065
CPC: G01B7/14 G01D5/2417
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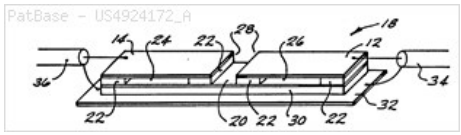
US: 324/664 324/690



Family:

Publication number	Publication date	Application number	Application date
DE3921650 A1	19900308	DE19893921650	19890630
JP2083401 A2	19900323	JP19890120225	19890512
US4924172 A	19900508	US19880236598	19880825

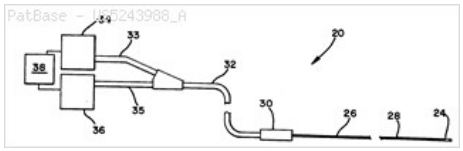
Priority:
US19880236598 19880825

Probable Assignee: KAMAN INSTRUMENTATION CORP
Assignee(s): (std)**:** KAMAN INSTRUMENTATION CORP ; KAMAN INSTRUMENTATION CORP N D ; KAMAN INSUTORUMENTEESHIYON COR
Assignee(s): KAMAN INSUTORUMENTEESHIYON CORP ; KAMAN INSTRUMENTATION CORP N D GES D STAATES CONN ; KAMAN INSTRUMENTATION CORP N D GES D STAATES CONNECTICUT COLORADO SPRINGS COL US
Inventor(s): (std)**:** HOLMGREN WILLIAM A ; UIRIAMU EE HORUMUGUREN
Inventor(s): HOLMGREN WILLIAM A COLORADO SPRINGS COL US

2) Family number: 8826099 (US5243988A)

Title: INTRAVASCULAR IMAGING APPARATUS AND METHODS FOR USE AND MANUFACTURE

Abstract: Source: US5243988A A device for ultrasonic imaging, and methods for the use an manufacture thereof, particularly of small coronary vessels. The device comprises an elongate member with a distal end that can be positioned within a small vessel of a patient's body while a proximal end is located outside the body, a transducer located at a distal end of the elongate member and operable to scan the distal coronary vessels with ultrasonic pulses, and a signal processor connected to a proximal end of the elongate member and to the transducer for generating and receiving pulses to and from the transducer. A motor may be also connected to the proximal end of the elongate member for rotating the transducer.



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International (IPC 1-7): A61B1/00 A61B1/04 A61B8/00 A61B8/12 A61B8/14 A61M25/01 G01B17/00 G01S15/89 G01S7/52
CPC: Y10S128/925 A61B8/445 G01S15/8956 A61B8/12 A61B8/4461 A61B8/4488 G01S7/52034 G01S15/8938 G01S15/899
European: A61B8/12 A61B8/44N6 G01S15/89D2B G01S15/89D3C G01S15/89D8 G01S7/52S2E K61B8/12 K61B8/44R2
US: 128/660.07 128/661.04 128/661.08 128/662.03 128/662.06 128/772 128/925 600/443 600/450 600/459 600/462 600/463 600/467 600/585

Family:

Publication number	Publication date	Application number	Application date
CA2082161 AA	19921104	CA19922082161	19920313
CA2090069 AA	19930822	CA19932090069	19930222
CA2090069 C	20001010	CA19932090069	19930222
EP0529069 A1	19930303	EP19920910470	19920313
EP0529069 A4	19950927	EP19920910470	19920313
EP0557127 A2	19930825	EP19930301240	19930219
EP0557127 A3	19960320	EP19930301240	19930219
JP2000070270 A2	20000307	JP19990069110	19990315
JP2000189421 A2	20000711	JP20000037776	19930222
JP2000189421 A2	20000711	JP20000037776	20000216
JP2003126095 A2	20030507	JP20020285746	20020930
JP3411929 B2	20030603	JP19930032121	19930222
JP3507391 B2	20040315	JP20000037776	19930222
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JP5344972 A2	19931227	JP19930032121	19930222
JP5508099 T2	19931118	JP19920510598T	19920313
US5243988 A	19930914	US19920926182	19920807
US5353798 A	19941011	US19920840917	19920221
US5438997 A	19950808	US19920895094	19920608
US5445155 A	19950829	US19940275022	19940713
WO9216147 A1	19921001	WO1992US02117	19920313

Priority:

US19910668919 19910313
US19920926182 19920807
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US19920895094 19920608
CA19932090069 19930222
JP19920510598 19920313
WO1992US02117 19920313
JP20000037776 19930222

Probable Assignee: SCIMED LIFE SYSTEMS INC

Assignee(s): (std)**:** BOSTON SCIENT LTD ; BOSTON SCIENTIFIC LIMITED ; SCIMED LIFE SYSTEMS INC ; SIEBEN WAYNE ; WHALEN MARK J

Assignee(s): SCIMED LIFE SYST INC ; SCIMED LIFE SYSTEMS INC A OF MN CORP ; BOSTON SCIENTIFIC LTD ; BOSTON SCIENTIFIC SCIMED INC

Inventor(s): (std)**:** SIEBEN WAYNE ; UEIN SHIIBEN ; WHALEN MARK J

Designated states: AT BE CA CH DE DK ES FR GB GR IE IT JP LI LU MC NL PT SE

3) Family number: 33497443 (US2001019494A)

Title: DC TRANSFORMER/REACTOR

Abstract: Source: US2001019494A The present invention relates to a DC transformer/reactor comprising a magnetic circuit, wherein the magnetic circuit comprises a magnetic core and at least one winding. The winding comprises at least one current-carrying conductor. Each winding comprises also an **insulation** system, which comprises on the one hand at least two semiconducting layers, wherein each layer constitutes substantially an equipotential surface, and on the other hand between them is arranged a solid **insulation**.

Classifications:

International (IPC 8-9): B60M3/00 H01B7/00 H01B7/02 H01F27/28 H01F27/32 H01F27/34 H01F3/10 H01F3/14 H02H9/00 H02J3/00 H02J3/18 H02K1/00 H02K1/16 H02K11/04 H02K15/00 H02K15/085 H02K15/12 H02K16/00 H02K3/12 H02K3/14 H02K3/28 H02K3/40 H02K3/48 H02K47/00 H02K47/18 H02K9/19
H02M3/00 (Advanced/Invention);
B60M3/00 H01B7/00 H01B7/02 H02K1/16 H02K3/40 H02K9/19
H02M3/00 (Advanced/Non-invention)

International (IPC 1-7): B60M3/00 B65H59/00 F02D21/00 H01R39/00 H02H9/00 H02J16/00 H02J3/00 H02J3/18 H02J3/36 H02K1/00 H02K15/08 H02K15/085 H02K16/00 H02K17/00 H02K19/00 H02K3/00 H02K3/02 H02K3/12 H02K3/30 H02K3/40 H02K47/00 H02K47/18 H02M3/00 H02M5/45

CPC: Y10S174/15 Y10S174/17 Y10S174/19 Y10S174/20 Y10S174/22 Y10S174/28 Y10S174/29 H02K15/00 H01F3/10 H01F3/14 H01F27/288 H01F27/323 H01F27/34 H01F2027/2833 H01F2027/329 H01F2029/143 H02K1/165 H02K3/14 H02K3/28 H02K3/40 H02K3/48 H02K9/19 H02K11/048 H02K15/12 H02K2203/15

European: H01F27/28G H01F27/32C H01F27/34 H01F3/10 H01F3/14 H02K11/04D H02K11/04D1 H02K15/00 H02K15/12 H02K3/14 H02K3/28 H02K3/40 H02K3/48 T01F27/28B2 T01F27/32F T01F29/14A T02K1/16B T02K203/15 T02K3/40 T02K9/19

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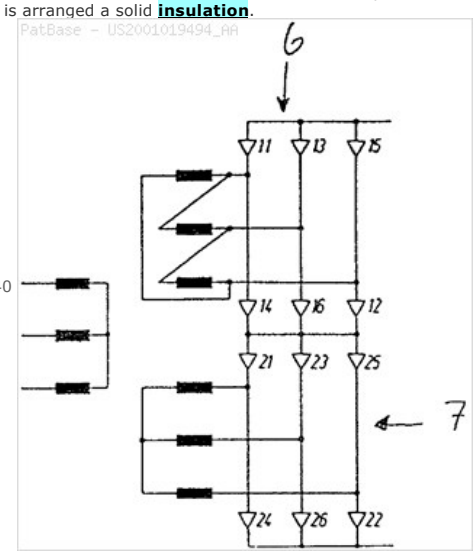

Family:

Publication number	Publication date	Application number	Application date
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CA2255768 AA	19981120	CA19972255768	19970527
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CA2255770 AA	19981120	CA19972255770	19970527
CN1083356 C	20020424	CN19971095034	19970527
CN1097335 C	20021225	CN19971095013	19970527
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CN1220051 A	19990616	CN19971095035	19970527
CN1225755 A	19990811	CN19971096553	19970527
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CZ9803882 A3	19990217	CZ19980003882	19970527
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EP0901703 A1	19990317	EP19970924468	19970527
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IL126943 A1	20030529	IL19970126943	19970527
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ZA9704704 A	19981130	ZA19970004704	19970529
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ZA9704734 A	19971201	ZA19970004734	19970529
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Priority:

SE19960002079 19960529 WO1997SE00886 19970527 WO1997SE00884 19970527
WO1997SE00887 19970527 WO1997SE00888 19970527 WO1997SE00890 19970527
WO1997SE00885 19970527

Probable Assignee: ASEA BROWN BOVERI

Assignee(s): (std)**:** BERGGREN BERTIL ; BERGGREN SOEREN ; FROMM UDO ; BJOERKLUND ANDERS ; HERNNAES BO ; CARSTENSEN PETER ; HOELLELAND MONS ; GERTMAR LARS ; DAVIDSSON GUNNAR ; BRANDT LENNART ; LEIJON MATS ; SASSE CHRISTIAN ; TEMPLIN PETER ; IVARSON CLAES ; SCHUETTE THORSTEN ; SOERENSEN ERLAND ; KYLANDER GUNNAR ; LARSSON BERTIL ; NYGREN JAN ANDERS ; RYDHOLM BENGT ; KALLDIN HANS OLOF ; ABB AB ; ASEA BROWN BOVERI

Assignee(s): ASEA BROWN BOVERI A B ; ASEA BROWN BOVERI AB ; LI MING ; JAKSTS ALBERT ; SCHUTTE THORSTEN ; SORENSEN ERLAND ; HOLLELAND MONS ; FROMME UDO ; BERGGREN SOREN ; HERNNAS BO

Inventor(s): (std)**:** CLAES IVARSON ; DAVIDSSON GUNNAR ; ERLAND SORENSEN ; FROMM UDO ; FROMME UDO ; GERTMAR LARS ; GUNNAR KYLANDER ; H LLELAND MONS ; HELNAS B ; HELNAS BIR ; HERNN S BO ; HERNNAES BO ; HERNNAS BO ; HOELLELAND MONS ; HOLLELAND MONS ; IVARSON CLAES ; JAKSTS ALBERT ; JERTRAMA RAS ; KALLDIN HANS OLOF ; KASTENGSEN B ; KASTENGSEN BIDDER ; KYLANDER GUNNAR ; LARS GERTMAR ; LARSSON BERTIL ; LEIJOJN MATS ; LEIJON M ; LEIJON MATS ; LI MING ; MATS LEIJON ; MONS HOLLELAND ; NYGREN JAN ANDERS ; PETER CARSTENSEN ; PETER TEMPLIN ; REIJOHN MATZ ; RYDHOLM BENGT ; S RENSEN ERLAND ; SASSE CHRISTIAN ; SCHUETTE THORSTEN ; SCHUTE THORSTEN ; SCHUTTE THORSTEN ; SOERENSEN ERLAND ; SOREN BERGGREN ; SORENSEN ERLAND ; TEMPLIN PETER ; BJOERKLUND ANDERS ; BJOKLUND ANDERS ; BJORKLUND ANDERS ; BRANDT LENNART ; BRANDT RENNAT ; CARSTENSEN PETER ; BERGGREN BERTIL ; BERGGREN SOEREN ; BERGGREN SOREN ; BERTIL BERGGREN ; BERTIL LARSSON ; WINDMAR DAN ; SUNESSON ANDERS ; ROTHMAN BENGT ; MING LI ; JONAS IVAN ; ISBERG JAN ; HYLANDER JONNY ; HOLMSTROM GORAN ; BERNHOFF HANS ; BERGVIST MIKAEL ; BERGKVIST MIKAEL ; BERGGEREN BERTIL ; BERGGEN SOREN ; EKBERG MATS ; EDMAN ARENE ; CARSTESEN PETER

Inventor(s): BO HERNNAS ; DAN WINDMAR ; BENGT RYDHOLM ; BENGT ROTHMAN ; ARENE EDMAN ; ANDERS SUNESSON ; ANDERS BJORKLUND ; ALBERT JAKSTS ; HANS OLOF KALLDIN ; HANS BERNHOFF ; GUNNAR DAVIDSSON ; GORAN HOLMSTROM ; JAN ISBERG ; JAN ANDERS NYGREN ; IVAN JONAS ; MIKAEL BERGVIST ; MIKAEL BERGKVIST ; MATS EKBERG ; LENNART BRANDT ; JONNY HYLANDER ; UDO FROMM ; THORSTEN SCHUTTE ; ANDERS BJOKLUND ; B HELNAS ; B KASTENGSEN ; BIDDER KASTENGSEN ; BIR HELNAS ; CARSTENSEN PETER AND ; CHRISTIAN SASSE ; TEMPLIN PETER AND ; THORSTEN SCHUTE ; M LEIJON ; MATS LEIJOJN

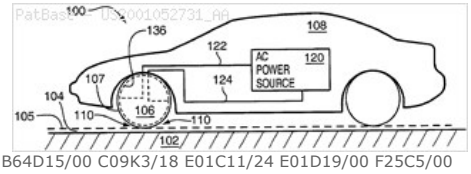
Agent(s): DYKEMA GOSSETT PLLC

Designated states: AL AM AT AU AZ BA BB BE BG BR BY CA CH CN CU CZ DE DK EE ES FI FR GB GE GH GR HU IE IL IS IT JP KE KG KP KR KZ LC LI LK LR LS LT LU LV MC MD MG MK MN MW MX NL NO NZ PL PT RO RU SD SE SG SI SK SZ TJ TM TR TT UA UG US UZ VN YU

4) Family number: 30114076 (US2001052731A)

Title: MODIFICATION OF ICE FRICTION IN TRANSPORTATION SYSTEMS

Abstract: Source: US2001052731A A plurality of electrodes in a solid object are located proximate to the contact interface between an ice layer and the surface of the solid object. A power source provides a potential difference across the electrodes to generate an electric field at the contact interface, thereby increasing the friction force between the solid object and the ice. Preferably, the power source is in AC power source. A capacitor in series between the power source and the electrodes creates an additional impedance for limiting the AC current to a level safe for human exposure.



Classifications:
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US20020222403 20020816

Probable Assignee: TRUSTEES OF DARTMOUTH COLLEGE

Assignee(s): (std)**:** DATEMOS COLLEGE BOARD ; DERESH LEV ; PETRENKO VICTOR ; PETRENKO VICTOR F ; SULLIVAN CHARLES R ; SULLIVAN CHARLES ; TRASTIZ OF DARTMUT KOLLEDZH ; TRUSTEES OF DARTMOUTH COLLEGE ; DARTMOUTH COLLEGE

Assignee(s): DARTMOUTH COLLEGE TRUSTEES OF ; PETRENKO VLCTOR F ; TRUSTEES OF DARTMOUTH COLLEGE HANOVER ; THE TRUSTEES OF DARTMOUTH COLLEGE ; NATIONAL SCIENCE FOU ; NATIONAL SCIENCE FOUDATION ; NATIONAL SCIENCE FOUDATION OFFICE OF GENERAL ; NATIONAL SCIENCE FOUNDATION

Inventor(s): (std)**:** CHARLES SULLIVAN ; DERESH LEV ; LEV DERESH ; PETELINK WIKTO F ; PETRENKO VICTOR ; PETRENKO VICTOR E ; PETRENKO VICTOR F ; PETRENKO VIKTOR ; PETRENKO VIKTOR F ; PETRENKO VLCTOR F ; SALLIVAN CHARL Z ; SULLIVAN CHARLES ; SULLIVAN CHARLES R ; VICTOR F PETRENKO ; VICTOR PETRENKO ; WIKTO F PETELINK

Inventor(s): SALLIVAN CHARL'Z

Agent(s): BIBBY WILLIAM MARK; LATHROP AND GAGE LC; LATHROP AND GAGEM LC; LATHROP AND GAGE LLP

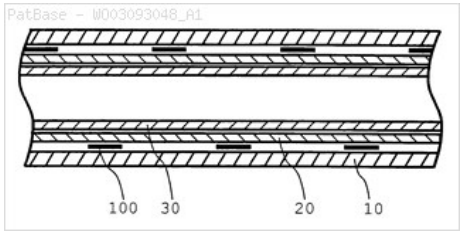
Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LI LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NE NL NO NZ PL PT RO RU SD SE SG SI SK SL SN SZ TD TG TJ TM TR TT TZ UA UG US UZ VN YU ZA ZM ZW

5) Family number: 29501491 (WO03093048A1)

Title: DEAD MAN'S DEVICE

Abstract: The invention relates to a dead man's device comprising at least one handle for directing and/or holding a follow-through and/or hand-held processing machine, a **capacitive sensor** which is disposed at least in one area of the handle, and an evaluation device which detects an electrical parameter of the **capacitive sensor**. The evaluation device supplies a signal to the processing machine according to the value of the electrical parameter. The **capacitive sensor** is provided with several layers (30, 20, 100, 10) alternately comprising a conductive material and a dielectric material. The aim of the invention is to create a dead man's device which can easily be adapted to the respective application such that secure and reliable detection of the hand contact is ensured. Said aim is achieved by providing the outermost layer (100) relative to the handle, which comprises a conductive material, with a surface that is significantly smaller than the surface of the area of the handle in which the **capacitive sensor** is disposed.

Classifications:
International (IPC 8-9): B25F5/02 B62D51/00 (Advanced/Invention);
H03K17/96 (Advanced/Non-invention);
B25F5/00 B62D51/00 (Core/Invention);
H03K17/94 (Core/Non-invention)
International (IPC 1-7): B60K28/04 B60K28/06 F16P3/00 F16P3/12 H03K17/955
CPC: B25F5/02 B62D51/001 H03K2017/9602
European: B25F5/02 B62D51/00B T03K17/96A



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Priority:
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Probable Assignee: MAGENWIRTH GMBH CO GUSTAV

Assignee(s): (std)**:** AMBOS STEFAN ; GUSTAV MAGENWIRTH GMBH AND CO ; KUFNER GUNTHER ; MAGENWIRTH GMBH CO GUSTAV

Inventor(s): (std)**:** AMBOS STEFAN ; KUFNER GUNTHER ; STEFAN AMBOS ; GUNTHER KUFNER

Designated states: AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NE NL NO NZ OM PH PL PT RO RU SC SD SE SG SI SK SL SN SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

6) Family number: 30544271 (US2004140095A)

Title: STAGED AND/OR PATTERNED HEATING DURING IN SITU THERMAL PROCESSING OF A HYDROCARBON CONTAINING FORMATION

Abstract: Source: US2004140095A A method for treating a hydrocarbon containing formation is described. The method for treating a hydrocarbon containing formation may include heating a first volume of the formation using a first set of heaters. A second volume of the formation may be heated using a second set of heaters. The first volume may be spaced apart from the second volume by a third volume of the formation. The first volume, second volume, and/or third volume may be sized, shaped, and/or located to inhibit deformation of subsurface equipment caused by geomechanical motion of the formation during heating.

Classifications:
International (IPC 8-9): E21B36/00 E21B36/02 E21B36/04 E21B43/00 E21B43/16 E21B43/18 E21B43/24 E21B43/243 E21B43/30 E21B47/00 E21B47/06 H05B3/78 (Advanced/Invention);
E21B36/00 E21B43/00 E21B43/16 E21B47/06 (Core/Invention)
International (IPC 1-7): E21B36/00 E21B36/02 E21B36/04 E21B43/00 E21B43/24 E21B43/30 E21B7/04 E21B7/15 G01V1/00 H05B3/02
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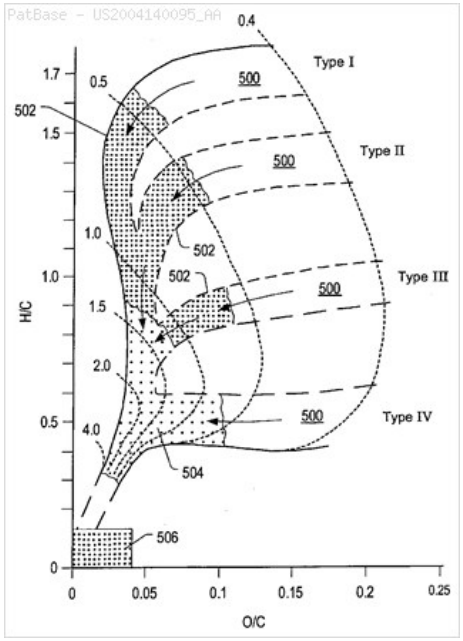
US: 166/245 166/250.01 166/252.1 166/252.100P 166/256 166/266 166/268 166/285 166/292 166/302 166/305.1 166/369 166/57 166/57S 166/59 166/6 166/60 166/60S 166/65.1 166/65.100S 166/66 175/45 175/61 367/37 392/301 392/301P 392/469 405/129.35 405/52



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	FAIRBANKS MICHAEL ; CARL FREDRICK GJR ; CARL FREDRICK ; DONALD BRUCE PALFREYMAN ; CARL ; BERCHENKO IIYA ; AYMOND JR DANNIE ANTOINE
Agent(s):	DEL CHRISTENSEN SHELL OIL CO; SHELL OIL COMPANY; SHELL OIL CO
Designated states:	AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LI LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NA NE NI NL NO NZ OM PG PH PL PT RO RU SC SD SE SG SI SK SL SN SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

7) Family number: 31944754 (US2005109841A)

Title: MULTI-INTERFACE COMPACT PERSONAL TOKEN APPARATUS AND METHODS OF USE

Abstract: Source: US2005109841A A compact personal token apparatus, suitably resembling a conventional USB memory fob in size, shape, and form which can be plugged into a PC and interfaced with the virtual world of the Internet. The apparatus is capable of loading and storing information from the Internet, via the PC to its flash memory or EEPROM and then using the stored information or value via its wireless interface in the real world. The apparatus is capable of implementing an auto-run application, when inserted into a personal computer. The apparatus is capable of exchanging information with other devices having compatible interfaces. The apparatus can also function as a firewall when plugged between an Internet connection and a PC.

Classifications:

International (IPC 8-9): B05D3/06 B23K26/36 B23P19/00 B32B27/00 B32B3/24 B32B37/02 B32B37/12 B32B38/10 B32B5/02 B42D15/00 B42D25/305 G01V15/00 G06F13/38 G06F15/16 G06F17/11 G06K19/00 G06K19/02 G06K19/06 G06K19/067 G06K19/07 G06K19/073 G06K19/077 G06K5/00 G06K7/00 G06K7/01 G06K7/06 G06K7/08 G06K7/10 G06Q20/00 G06Q40/00 G08B13/14 H01F38/14 H01F41/04 H01L21/263 H01L21/44 H01L21/58 H01L23/00 H01L23/02 H01L23/12 H01L23/48 H01L23/488 H01P11/00 H01Q1/22 H01Q1/24 H01Q1/36 H01Q1/38 H01Q1/40 H01Q1/52 H01Q11/12 H01Q13/00 H01Q17/00 H01Q21/29 H01Q3/44 H01Q7/00 H01Q7/06 H01R13/44 H01R4/00 H01R43/00 H01S4/00 H04B5/00 H04H1/00 H04H60/63 H04H60/74 H04L29/06 H05K1/02 H05K13/04 H05K3/00 H05K3/10 H05K3/30 H05K7/02 (Advanced/Invention);
H01F38/14 H04H20/93 H04H60/37 H05K1/02 (Advanced/Non-invention);
B32B27/00 B32B37/02 B42D15/00 G01V15/00 G06F13/38 G06F15/16 G06K19/02 G06K19/06 G06K19/07 G06K19/073 G06K19/077 G06K5/00 G06K7/08 G06Q20/00 G08B13/14 H01F41/04 H01L21/02 H01L23/48 H01P11/00 H01Q1/00 H01Q1/22 H01Q1/38 H01Q11/00 H01Q13/00 H01Q7/00 H01R43/00 H01S4/00 H04H1/00 H04L29/06 H05K13/04 H05K3/00 H05K3/30 H05K7/02 (Core/Invention);
G06F G06K (Subclass/Invention)

International (IPC 1-7): G06F G06K5/00 G06K7/00

CPC: G06K7/0008 G06K7/0013 G06K7/10346 G06F13/385 G06Q20/10 G06Q20/327 G06Q20/3278 G06Q20/425 G06K19/07767 G06K19/07784 G06K19/041 G06Q40/04 G06Q10/087 G06Q40/00 G06Q40/06 G06K19/07 H01L24/49 H01L2924/01019 H01Q1/2208 H01P11/00 H05K1/0298 H01L2224/48724 H01F41/041 H01F41/0612 H01L2224/05599 H01L2924/30107 H01Q1/52 H01F5/04 H01F27/40 H01F41/10 H01L24/06 H01L2224/4554 H01L2224/48599 H01L2224/48699 H01L23/48 H01L23/49855 H01L24/05 H01L24/46 H01L24/80 H01L2224/0401 H01L2224/04042 H01L2224/05553 H01L2224/05624 H01L2224/45025 H01L2224/451 H01L2224/45139 H01L2224/4569 H01L2224/4809 H01L2224/49111 H01L2224/8518 H01L2224/85201 H01L2224/85214 H01L2924/01002 H01L2924/01014 H01L2924/15153 H01L2924/1517 H01L2924/20751 H01L2924/20752 H01L2924/20753 H01L2924/20754 H01L2924/20757 H01L2924/20758 H01L2924/20759 H01L2924/2076 H01Q23/00 G07C2009/00095 G07C2009/00952 H01F5/003 H01F27/292 H01L2224/45014 H01L23/3107 H01L23/66 H01L24/04 H01L24/48 H01L2223/6677 H01L2224/4847 H01L2224/85205 H01L2924/20755 H01L2924/20756 G06K17/0022 B60R25/25 B60R25/252 B60R2325/101 B60R2325/105 G06K7/0034 G06K7/0043 G06K7/006 G06K7/0073 G06K7/10237 G06K7/10306 G06K19/048 G06K19/0716 G06Q20/3574 H01L2924/0102 H01L24/78 H01L2224/78 H01L2924/00014 H01L2924/01063 H01L2924/01074 H05K2201/10287 G06K7/10336 H04L67/06 H04L67/16 H04L67/02 H04H60/63 G06K7/0004 G06K19/07732 G06K19/07733 H04H20/93 H04H60/372 H04H60/74 H04L63/10 H04H60/73 H04H60/88 H04L2463/101 G06K19/07798 H01L2224/48799 H01L2224/48998 H04B5/0062 G06K19/0723 H01L2924/01087 G06K7/10178 H01P11/001 B42D15/00 B32B38/10 H01L2924/00 G06K19/07718 H01L2224/48472 H01L2924/3011 G06K19/06187 G06K19/06196 G06K19/07735 B23K26/365 G06K19/07773 Y10T29/49002 Y10T29/49071 Y10T29/49128 Y10T29/49073 Y10T29/4913 Y10T29/49169 Y10T29/49144 Y10T29/49149 G06K19/07779 G06K19/07781 H05K2203/0285 H01L2924/14 H05K3/0032 H05K3/321 H05K3/3431 H05K2201/09036 H01Q9/27 B32B37/1207 B32B2037/1269 B32B2305/342 B32B2425/00 G06K19/025 G06K19/0672 G06K19/07318 G06K19/07327 H01L2224/32225 H01L2924/15311 H01L2924/3025 Y10T156/10 Y10T156/1002 Y10T156/1082 H01F27/365 H01F41/16 H05K1/0233 H05K1/183 H05K3/1275 H05K2201/0218 H05K2201/0723 H01L2224/48227 H01L2224/48228 H01L2224/49109 H05K1/0239 H05K2201/086 H05K2201/1003 H05K2201/10098 H01L24/45 H01L24/85 H01L2224/45015 H01L2224/45144 H01L2224/45565 H01L2224/45639 H01L2224/4813 H01L2224/8385 H01L2224/85 H01L2924/01005 H01L2924/01006 H01L2924/01013 H01L2924/01015 H01L2924/01029 H01L2924/01033 H01L2924/01072 H01L2924/01075 H01L2924/01079 H01L2924/01082 H01L2924/014 H01L2924/10253 Y10T428/23986 B23K26/4075 B23K2201/40 H01Q7/06 G06K19/07722 G06K19/07745 G06K19/07749 G06K19/0775 H01L2224/16225 H01L2224/16227 H01L2224/45124 H01L2224/45147 H01L2224/48091 H01L2224/78301 H01L2924/01047 H01Q1/2225 H01Q1/38 H01Q1/40 H01Q7/00 G06K19/07728 G06K19/07775 G06K19/07754 G06K19/07783 G06K19/07752 H01F2038/143 G06K19/07794 G06K19/07771 G06K19/077 G06K19/07747 G06K19/07756 B23K26/20 G06K19/07769 H01F38/14 H01Q1/2216 H01Q1/2283 H01Q21/29 H05K3/103 Y10T29/49162 H05K1/165 H01L24/83 H01L24/27 H01L2924/1421 Y10T29/49016 Y10T29/49018 Y10T29/49117 Y10T29/49124 Y10T29/49167 Y10T29/49174 Y10T29/5313 Y10T29/532 G06K7/10009 H01L2224/48624 H01L2224/13101

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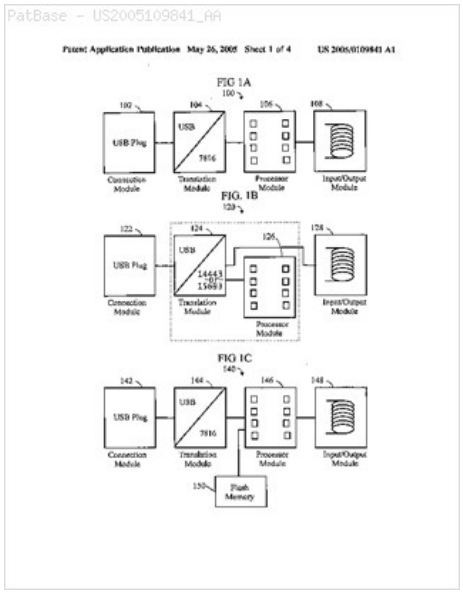

Family:

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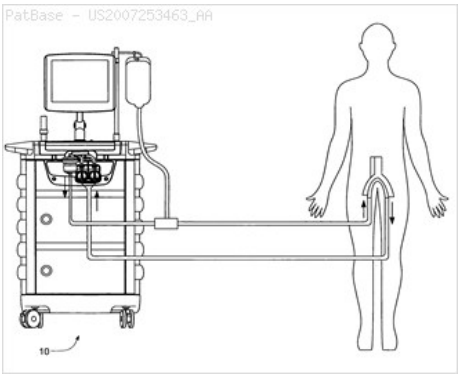
Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW

8) Family number: 40747106 (US2007253463A)

Title: THERMAL AND CONDUCTIVITY SENSING SYSTEMS, DEVICES AND METHODS

Abstract: Source: US2007253463A A sensing probe is described. The sensing probe includes a probe housing having a probe tip. A thermal **sensor** in the housing is also included. The thermal **sensor** has a sensing end and a connector end, where the sensing end is thermally coupled to the probe tip. Also included are at least two leads. The leads transfer electrical signals that are used to determine temperature and conductivity. Also included is a thermal well. The thermal well includes a hollow housing of a thermally conductive material. The housing has an outer surface and an inner surface. The inner surface is a predetermined shape so as to form a mating relationship with a sensing probe. The mating thermally couples the inner surface with a sensing probe. In some embodiments, the thermal well is located on a disposable portion and the sensing probe on a reusable portion.



Classifications:

International (IPC 8-9): A61B5/00 A61B5/11 A61F7/00 A61F7/12 A61J1/14 A61J3/00 A61J7/00 A61J7/02 A61M1/00 A61M1/10 A61M1/12 A61M1/14 A61M1/16 A61M1/28 A61M1/34 A61M1/36 A61M37/00 A61M39/22 A61M39/28 A61M5/00 A61M5/14 A61M5/142 A61M5/145 A61M5/168 A61M5/172 A61M5/36 B01D11/00 B01D19/00 B01D21/30 B01D35/30 B01D61/00 B01D61/24 B01D61/26 B01D61/28 B01D61/30 B01D61/32 B01D63/00 B01D65/02 B01F15/02 B01F15/04 B01F3/08 B01J4/00 C02F1/44 C02F11/00 C02F9/00 F04B13/02 F04B17/00 F04B23/02 F04B23/04 F04B23/10 F04B43/00 F04B43/02 F04B43/06 F04B43/073 F04B43/08 F04B43/10 F04B43/113 F04B43/12 F04B45/00 F04B45/04 F04B45/053 F04B49/00 F04B49/06 F04B53/00 F04B53/10 F04B53/16 F04B9/109 F04C5/00 F16B2/02 F16B2/10 F16K31/02 F16K31/06 F16K31/12 F16K31/14 F16K7/04 F16K7/06 F16M11/00 F16M13/02 F17D1/14 F17D3/00 F28D21/00 F28F13/06 F28F27/00 F28F3/14 G01D9/42 G01F1/00 G01F1/56 G01F1/66 G01F1/704 G01F11/08 G01F22/00 G01F23/00 G01J1/00 G01K1/00 G01K1/08 G01K1/16 G01K13/00 G01K7/00 G01L9/00 G01M3/18 G01N15/02 G01N21/59 G01N25/18 G01R21/14 G05B15/00 G05D11/00 G05D7/00 G05D7/06 G06F1/16 G06F19/00 G06F3/048 G06F3/0481 G06F3/0488 G06Q50/00 G06Q50/22 G06T5/00 G06T5/50 G06T7/00 H04L12/56 H04L29/08 H04N7/18 H05K7/14 (Advanced/Invention); A61F7/12 A61M1/10 A61M1/14 A61M1/16 A61M1/34 A61M1/36 A61M39/10 F04B43/08 F04B43/12 F04B45/06 F04C5/00 (Advanced/Non-invention); A61M1/00 A61M1/10 A61M1/14 A61M1/16 A61M1/28 A61M1/34 A61M1/36 A61M37/00 A61M39/00 A61M5/168 B01D19/00 B01D21/30 B01D35/30 B01D61/24 B01D65/00 B01F3/08 B01J4/00 F04B17/00 F04B23/00 F04B43/00 F04B43/02 F04B43/06 F04B43/12 F04B45/00 F04B53/00 F16K31/12 F16K7/00 F17D1/00 F28F13/00 F28F27/00 G01F11/02 G01F23/00 G01K1/00 G01N25/18 G06F3/048 (Core/Invention)

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Probable Assignee: DEKA PRODUCTS LP

Assignee(s): (std)**:** ALTOBELLI DAVID E ; BALLANTYNE TODD A ; BLUMBERG JR DAVID ; BLASI JOHN J ; DALE JAMES D ; DEKA PRODUCTS LP ; BODWELL JESSE T ; BIASI JOHN J ; DEKE PRODUCTS LTD PARTNERSHIP ; CHAWAN ARUN D ; KERWIN JOHN M ; FICHERA STEPHEN L ; FICHERA STEPEN L ; DESCH MARTIN D ; GARY LARRY B ; GORAYEB MARC J ; KARWIN JOHN M ; MERWE DIRK A VAN D ; KAMEN DEAN ; GRAY LARRY B ; LEONARD SCOTT A ; DEMERS JASON A ; GRANT KEVIN L ; KENLEY RODNEY S ; FLYNN CATHARINE N ; GIANT KEVIN L ; COLLINS DAVID E ; DEKA RES AND DEV ; PERRY N CHRISTOPHER ; TRACEY BRIAN ; VAN DER MERWE DIRK A ; WILT MICHAEL J ; OWENS KINGSTON ; TRACY BRIAN ; ROSSE JONATHAN P ; YEE BRIAN K ; TRACEY BRIAN D ; ROSSE JOHNATHAN P ; PRESCOTT SHANNON ; TRACEY BRAIN D ; TURNER JAMES G ; SCARPACI JACOB W ; THURBER JONATHAN R ; SCARPATI JACOB W ; DEKA PRODUCTIONS LTD PARTNERSHIP

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Inventor(s): (std)**:** ALTOBELLI DAVID ; ALTOBELLI DAVID E ; ARUN CHAWAN ; BAIER MICHAEL J ; BALLANTYNE TODD A ; BIASI JOHN J ; BODWELL JESSE T ; BRIAN TRACEY ; BRIAN TRACY ; CHAWAN ARUN ; CHRISTOPHER PERRY N ; CLARKE KAITYN S ; COLLINS DAVID E ; DALE D JAMES ; DALE JAMES ; DALE JAMES D ; DEAN KAMEN ; DEMERS JASON ; DEMERS JASON A ; DER MERWE DIRK A VAN ; FLYNN CATHARINE N ; BLUMBERG DAVID ; GIANT KEVIN L ; GRANT KEVIN I ; GRANT KEVIN L ; GRANT L KEVIN ; GRAY LARRY ; GRAY LARRY B ; KENLEY RODNEY S ; KERWIN JOHN M ; LANGENFELD CHRISTOPHER ; LANGENFELD CHRISTOPHER C ; KAMEN DEAN ; LEONARD SCOTT ; LEONARD SCOTT A ; MERWE DIRK A VAN D ; MERWE DIRK VAN D ; MURPHI COLIN H ; MURPHY COLIN H ; NORRIS MICHAEL G ; OWENS KINGSTON ; PARKER JONATHAN ; PAWLOWSKI DANIEL F ; PERET BOD D ; PERRY CHRISTOPHER ; PERRY CHRISTOPHER N ; PERRY N C ; PERRY N CHRISTOPHER ; PLACE MICHAEL S ; PRESCOTT SHANNON ; ROSSE JOHNATHAN P ; ROSSE JONATHAN P ; SABIN ERIK N ; SCHNELLIGER THOMAS S ; SHANNON PRESCOTT ; SLATE MICHAEL J ; THERRIEN ALEXANDER R ; TODD A BALLANTYNE ; TRACEY BRAIN D ; TRACEY BRIAN ; TRACEY BRIAN D ; TRACY BRAIN ; TRACY BRIAN ; USMAN FARRKH ; VAN DER MERWE DIRK ; VAN DER MERWE DIRK A ; WILT J MICHAEL ; WILT MICHAEL ; WILT MICHAEL J ; WITT MICHAEL J ; YEE BRIAN K ; ZOBRO JONATHAN ; ZASLOW BENJAMIN ; YOO BRIAN H ; USMAN FARRUKH ; TURNER JAMES G ; THURBER JONATHAN R ; SMITH STANLEY B III ; SMITH III STANLEY B ; SLOSS JAMES L ; SCARPACI JACOB W ; RIVINIUS GREGG W ; PRIBYL ERIC L ; PERET BOB DAVID ; PERET BOB D ; NEWMAN RICHARD M ; SCHNELLINGER THOMAS S ; SCARPATI JACOB W ; MORGAN FREDERICK ; MARCEK GEOFFREY A ; MANDRO MARC A ; LIM SIMON W ; LANIGAN RICHARD J ; LANIER JR GREGORY R ; JOHNSON MATTHEW J ; JANWAY JEFFREY M ; HEINZMANN RICHARD KURT ; GUPTA RAHUL ; GORAYEB MARC J ; GILL MATTHEW R ; GARY LARRY B ; FRIEDRICH THOMAS A ; FICHERA STEPHEN L ; FICHERA STEPHAN L ; FICHERA STEPEN L ; FARLOW JARED N ; LANIER GREGORY R JR ; KARWIN JOHN M ; DURAND KEVIN A ; DESCH MARTIN D ; DERMERS JASON A ; KANE DEREK G ; CLARKE KAITLYN S ; CHAWAN ARUN D ; CANNAN DAVID D B ; BRYANT ROBERT J JR ; BRYANT JR ROBERT J ; BLUMBERG JR DAVID ; BLUMBERG DAVID JR ; BLASI JOHN J ; BEAVIS RUSSELL H

Inventor(s): ARUN D CHAWAN ; BEAVIS RUSSELL HUS ; BLUMBERG DAVID JRUS ; BRYANT ROBERT J ; BRYANT ROBERT J JRUS ; CANNAN DAVID D BUS ; JOHNSON MATTHEW JUS ; DEMERS JASON AUS ; CLARKE KAITLYN SUS ; KANE DEREK GUS ; LANIER GREGORY R ; DURAND KEVIN AUS ; LANIER GREGORY R JRUS ; LANIGAN RICHARD JUS ; MANDRO MARC AUS ; SCARPACI JACOB WUS ; N CHRISTOPHER PERRY ; PERRY N CHRISTOPHERUS ; PERRY N ; PERET BOB DUS ; SCHNELLINGER THOMAS SUS ; SMITH STANLEY B ; SMITH STANLEY B IIIUS ; TRACEY BRIAN DUS ; TURNER JAMES GUS ; USMAN FARRUKHUS ; YOO BRIAN HUS ; YEE BRIAN KUS ; WILT MICHAEL JUS ; THERRIEN ALEXANDER RUS ; SLATE MICHAEL JUS ; SCOTT A LEONARD ; SABIN ERIK NUS ; ROSSE JONATHAN PUS ; PLACE MICHAEL SUS ; PAWLOWSKI DANIEL FUS ; PARKER JONATHANUS ; NORRIS MICHAEL GUS ; MURPHY COLIN HUS ; MICHAEL J WILT ; MERWE DIRK A VAN DUS ; MARCEK GEOFFREY ; KAMEN DEANUS ; LANGENFELD CHRISTOPHER CUS ; LARRY B GRAY ; KERWIN JOHN MUS ; KEVIN L GRANT ; GRAY LARRY BUS ; JAMES D DALE ; JASON A DEMERS ; JESSE T BODWELL ; GRANT KEVIN ; BLUMBERG DAVIDUS ; BODWELL JESSE ; GEOFFREY A MARCEK ; DAVID E COLLINS ; BIASI JOHN JUS ; BALLANTYNE TODD AUS ; BAIER MICHAEL JUS

Agent(s): GREENE SIMON KENNETH; HOFFMANN EITLE; CHAPMAN PATRICK; BROMBERG AND SUNSTEIN LLP; MICHELLE SAQUET TEMPLE; DEKA RESEARCH AND DEVELOPMENT C O WOLF GREENFIELD AND SACKS PC CORP; WOLF GREENFIELD AND SACKS PC; WOLF GREENFIELD AND SACKS P C; WOLD GREENFIELD AND SACKS PC; POMIANEK MICHAEL J; TEMPLE MICHELLE SAQUET; POMIANEK MICHAEL J ET AL; BEEDE MELISSA A; GORAYEB MARC J; WYNINEGAR JAMES D JR; WYNINEGAR JAMES D JR ET AL; WYNINEGAR JR JAMES D; WYNINEGAR JAMES D

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

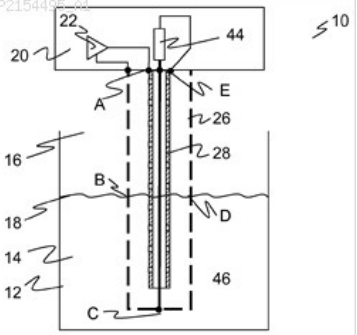
9) Family number: 44357342 (EP2154496B1)

Title: TDR-**SENSOR** UND -MESSVERFAHREN **SENSOR** AND MEASURING DEVICE

Abstract: The **sensor** has a probe for guiding an electromagnetic signal, and a transmitter and a receiver for transmitting and receiving the signal at a probe end. A controller controls distance of a boundary surface based on run-time in the probe and determines signals reflected at the boundary surface. The probe comprises two conductors (28a, 28b) and the controller is designed such that the signal of the conductors are coupled and/or evaluated in common-mode and/or push-pull control mode. The probe is coated with Teflon (RTM: PTFE). An independent claim is also included for a method for measuring a distance of a boundary surface to measure fill level in food industry.

Classifications:
International (IPC 8-9): G01F23/284 (Advanced/Invention); G01F23/284 (Core/Invention)
CPC: G01F23/284
European: G01F23/284

Figur 5



Family:

Publication number	Publication date	Application number	Application date
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EP2154496 A1	20100217	EP20080106008	20081217
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Priority:
EP20080105050 20080815 EP20080106008 20081217

Probable Assignee: SICK AG
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Designated states: AL AT BA BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK TR

10) Family number: 49179704 (US2011193573A)

Title: INTEGRATED **SENSOR** SYSTEM

Abstract: Source: US2011193573A An integrated **sensor** system for a lithography machine, the system comprising a projection lens system (132) for focusing one or more exposure beams onto a target, a moveable table (134) for carrying the target (9), a **capacitive** sensing system (300) for making a measurement related to a distance between a final focusing element of the projection lens system (104) and a surface of the target (9), and a control unit (400) for controlling movement of the moveable table (134) to adjust a position of the target (9) based at least in part on a signal from the **capacitive** sensing system. The **capacitive** sensing system (300) comprises a plurality of **capacitive** **sensors** (30), each comprising a thin film structure. The **capacitive** **sensors** and the final focusing element (104) of the projection lens system are mounted directly to a common base (112), and the **sensors** are located in close proximity to an edge of the final focusing element of the projection lens system.

Classifications:
International (IPC 8-9): B01J19/08 G01B21/20 G01B7/00 G01B7/02 G01B7/14 G01B7/30 G01D3/036 G01D5/24 G01D5/241 G01R27/26 G01R35/00 G03B27/58 G03F7/20 G03F7/207 G03F9/00 G03F9/02 H01L21/027
H03K17/955 (Advanced/Invention);
G03F7/20 H01L21/027 (Advanced/Non-invention);
G01B7/02 G01D5/24 G03F7/20 G03F9/00 (Core/Non-invention)
CPC: G01B7/023 G01D3/036 G01D5/2417 G03F9/7026 G03F9/7053 H01L21/0274
European: G01B7/02B G01D3/036 G01D5/241D G03F9/70B6F G03F9/70D2
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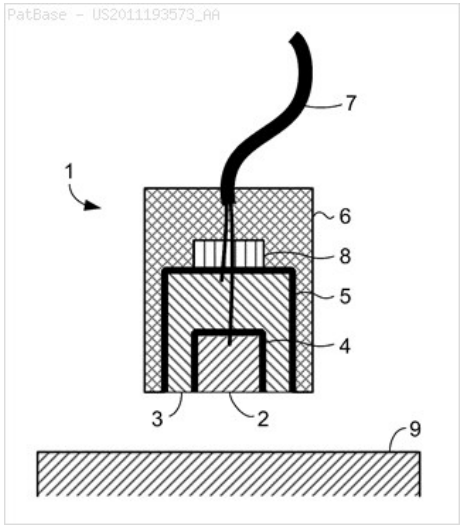

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Publication number	Publication date	Application number	Application date
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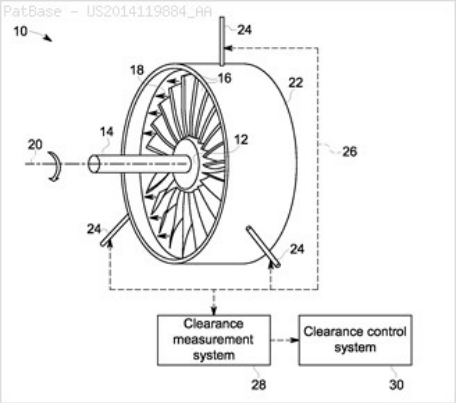
Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

11) Family number: 56342249 (US2014119884A)

Title: **CAPACITIVE** **SENSOR** DEVICE AND METHOD OF MANUFACTURE

Abstract: Source: US2014119884A A **capacitive** **sensor** device and a method of manufacture are provided. The **capacitive** **sensor** device includes at least one **sensor** tip that includes an electrode positioned at a first end of the **sensor** tip, and a stem member coupled to the electrode and extending toward a second end of the **sensor** tip. The device also includes a coaxial **cable** including a center conductor, the center conductor coupled to the **sensor** tip at the second end, and an **insulation** layer supporting the **sensor** tip between the first and second ends. The **insulation** layer includes a metallization on a portion surrounding the second end of the **sensor** tip. The device further includes a casing surrounding a portion of the coaxial **cable**, the metallization, and the coupling of the center conductor and the **sensor** tip, wherein a braze joint is formed between the casing and the metallization to form a hollow, hermetic cavity.

Classifications:
International (IPC 8-9): B23K31/02 F01D11/08 F01D11/20 F01D25/00 G01B7/00 G01B7/14 G01B7/15 G01D5/24 G01D5/241 G01R27/26 (Advanced/Invention)
CPC: G01B7/14
US: 228/176 324/690 415/118 415/13



Family:

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EP2728303 A1	20140507	EP20130190888	20131030
JP2014092544 A2	20140519	JP20130223790	20131029
US2014119884 AA	20140501	US20120665192	20121031

Priority:
US20120665192 20121031

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Agent(s): WILLIAMS ANDREW RICHARD
Designated states: AL AT BA BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR

COAXIAL CAPACITIVE VOLTAGE DIVIDER WITH HIGH DIVISION RATIO FOR HIGH VOLTAGE PULSES WITH VERY FAST RISE TIMES

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Abstract

In this paper, a capacitive voltage divider with a high division ratio of >1:1000 based on a high voltage coaxial cable and discrete foil capacitors mounted around the cable is investigated. The divider is designed for high voltage pulses up to 200 kV and has a relatively simple and robust design. For the presented voltage divider a circuit model is presented, which is also validated by measurements using a impedance analyzer and by comparisons with HV standard voltage probes.

I. INTRODUCTION

In many areas efficiency improvements are investigated to minimise global warming effects. This is also true for drilling processes, where novel methods are required for significantly improving efficiency. A promising approach is plasma channel drilling (PCD) ([1], [2]), which is based on electrical discharges through the rock as shown in Fig. 1. The voltage V_1 between the two electrodes must have a high amplitude, in the range of a few 100 kV and requires a very high dv/dt (>1 MV/μs), in order to achieve a discharge through the rock and not the water [1], [3]. With discharges through water the energy consumption rises and therefore reduces drilling efficiency.

For investigating the pulse parameters required for an efficient PCD process, a test setup has been built as shown in Fig. 2. On the left hand side, the high voltage capacitor, providing the energy, is shown. In order to be able to measure the energy, which is transferred to the plasma channel, and analyzing the breakdown conditions, the voltage across the two electrodes needs to be measured accurately. Next to the load a capacitive divider, which is based on the Haefely High Voltage Construction Kit and which consists of two high voltage capacitors, is shown in Fig. 2. The intended application area of the divider are lightning impulses and due to its relatively large capacitance, it influences the measurement result significantly. Additionally, its large dimensions result in a relatively large stray inductance and in a high sensitivity to noise as could be seen in Fig. 3. Since accurate measurements are required for obtaining the energy consumption of the PCD process, a compact and relatively simple coaxial capacitive is presented in the following.

In the considered PCD system, pulses with amplitudes of 200 kV and rise times below 100 ns from 0 V to 200 kV are generated. For measuring these voltages with an oscilloscope a high division ratio of at least 1:1000 is required,

TABLE I: Specifications of the considered pulse voltage measurement system.

Operating voltage V_1	< 200 kV
Division ratio	> 1:1000
Operating frequency	> 1 MHz

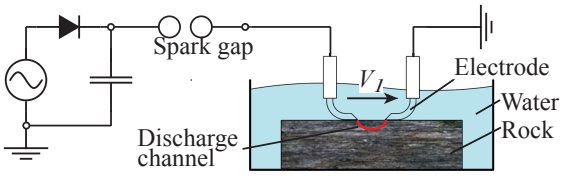

Fig. 1: Principle circuit for the plasma channel drilling (PCD).

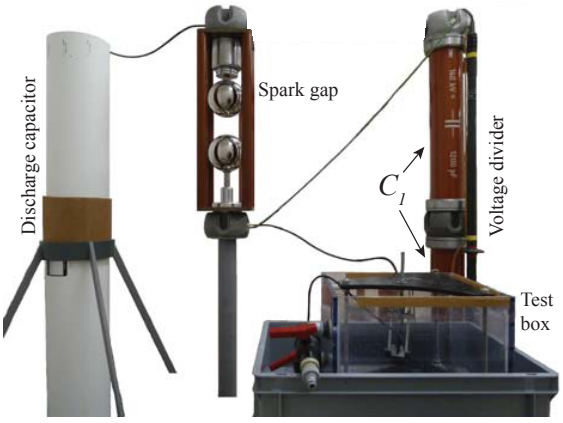

Fig. 2: Photo of the circuit arrangement for PCD (the charging unit is not shown).

so that the specifications given in Table I of the considered divider result. The division ratio of the divider directly depends on the values of the two series connected impedances

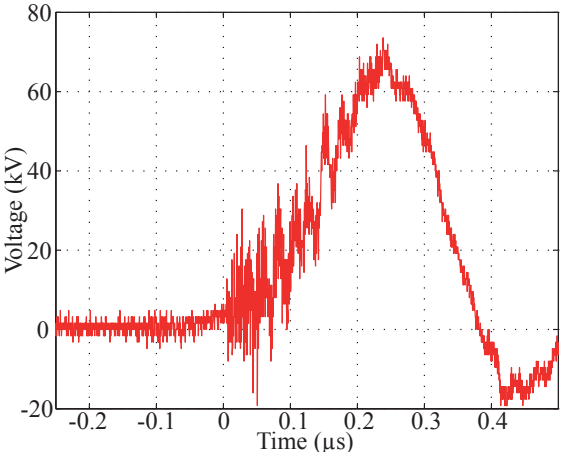

Fig. 3: Voltage measured with the capacitive divider shown in Fig. 2.

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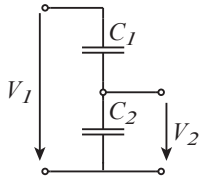

Fig. 4: Basic schematic of the voltage divider.

(Fig. 4) and can be calculated by

$$1 : n = \frac{C_1}{C_1 + C_2} \tag{1}$$

for an ideal capacitive divider, where C_1 is the primary capacitance, C_2 the secondary capacitance and n the division ratio.

For interconnecting the high voltage capacitor, the spark gap and the electrodes, connectors are required. There, coaxial high voltage cables can be used, which inherently provide the high voltage capacitor C_1 (cf. Fig. 4). This avoids the requirement for oil as insulation and results in a compact design. With the compact and optimized design also the parasitics are minimized, accordingly the performance of the voltage divider increases.

In Table II the data of published coaxial voltage dividers is given. All of them utilize self-made capacitors as secondary capacitor C_2. To achieve a high division ratio, a high difference between the value of C_1 and C_2 is needed. The value of C_1 is fixed by the high voltage cable and is usually in the range of few pF. Thus C_2 must be in the range of a few nF, in order to achieve a division ratio in the range of 1:1000 or higher. Such high capacitance values are difficult to achieve reliably with custom made foil capacitors. Therefore, most of the published dividers have a much lower division ratio. Also the maximum allowed voltage of the dividers is lower than the required 200 kV pulse voltage.

The divider with the number 4 in Table II is the only one, which does not use a cylindrical shape for C_2. It is based on a custom made layer of ceramic discs. Ceramic materials are very brittle and to achieve high capacitance very thin layers are required. Therefore, care and special supporting arrangement is required to maintain the capacitor in good shape.

In order to simplify the design and achieve a more robust setup, utilizing small discrete foil capacitors in combination with a high voltage cable is investigated in this paper. With such capacitors a very simple design results and high division ratios are possible. In **section** II first, the mechanical and electrical design of the divider is shown. Thereafter, measurement results are presented in **section** III. There, also the limitations of the presented design are discussed and in **section** IV possibilities to improve the design and performance of the divider are proposed.

TABLE II: Specifications of published coaxial dividers.

No.	Peak voltage	Division ratio	C_2	Reference
1	not specified	≈1:4.84/1:4.64	Self-made	[4]
2	<100 kV	≈1:2778	Self-made	[5]
3	not specified	not specified	Self-made	[6]
4	450 kV	1:3500	Self-made	[7]
5	100 kV	1:110	Self-made	[8]
6	≤20 kV	1:110	Self-made	[9]

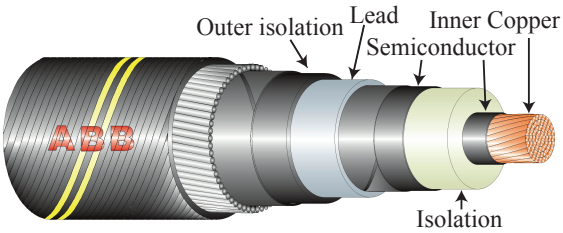

Fig. 5: Illustration of the applied HVDC cable.

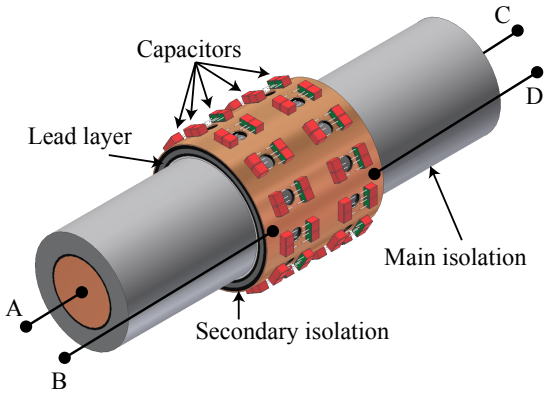

Fig. 6: Sketch of the cable with capacitors.

II. CONSTRUCTION OF THE DIVIDER

In a first step, the considered divider is based on a 200 kV HVDC submarine cable from ABB [10] (Fig. 5), which acts as C_1. In Fig. 5 all cable layers and in Table III the cable specifications are given. The first three layers were removed completely and for the coaxial part forming C_1, the lead and the outer isolation layer are used as can be seen in Fig. 6 and Fig. 7 showing the final design.

For C_2 different ideas mainly based on self-made capacitors have been proposed (Table II), but in the considered divider discrete foil capacitors distributed uniformly around the divider cable have been utilized.

After removing the outer layers, holes were drilled into the outer isolation layer to provide needed connection points for the discrete foil capacitors. The surface of the outer isolation was covered with copper foil to provide the ground layer.

For reducing the noise influence on the measurement, both capacitors C_1 and C_2 should have a relatively high capacitance value. This, however, increases the impact of the capacitive divider on the circuit due to the relatively large charging current flowing through C_1 and C_2. On the other hand, a very small capacitance value for the two capacitors

TABLE III: Divider dimensions.

Inner conductor diameter	48 mm
Inner diameter of the lead layer	86.6 mm
Outer diameter of the lead layer	92.6 mm
Outer diameter of the outer insulation	97.6 mm
Thickness of the copper foil	0.1 mm
Number of holes	24
Diameter of a hole	10 mm
Length of the coaxial cable (C_1)	100 mm
Total length of active the cable	320 mm

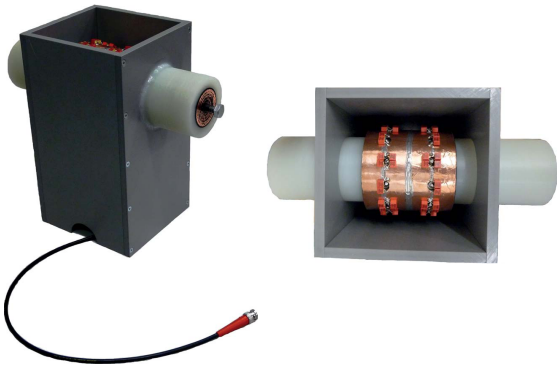

Fig. 7: Final setup of the divider. Left: side view; right: top view of the divider.

increases the impact of parasitic capacitances which might result in worst case in a varying division ratio depending on the measurement setup. Therefore, a compromise must be made, where also the maximum allowed voltage of the oscilloscope has to be respected.

The capacitance of the original HVDC cable was measured to be 307 pF/m and for obtaining a suitable value for C_1, the length of the divider has been set to 10 cm, so that ideally C_1=30.7 pF results. However, due to parasitic capacitances in the area, which is not covered by the lead layer, a value of C_1=44.4 pF results. This could also be seen in the COMSOL Multiphysics simulations, which have been performed for calculating the value of C_1. This results in C_1=37.6 pF. The COMSOL simulations also enable a better insight in the capacitance and inductance distribution of the divider and give indications of possible noise sources due to capacitive couplings to the surrounding. Theoretical calculations with the coaxial arrangement formula can be done as

$$C = \frac{2 \cdot \pi \cdot \varepsilon \cdot \varepsilon_0 \cdot l}{ln(\frac{D}{d})} \tag{2}$$

Where C- capacitance; ε_r- relative permittivity of the material; ε_0=8.85e-12 F/m; l- length of the material; d and D- inner and outer diameter of the material. The computed value C_1≈30 pF is close to the value of the ideal setup without parasitic capacitances. In section III-A more detailed measurement results for the considered divider are shown.

The voltage division ratio of the considered divider is set to 1:1200, so that with

$$C_2 = (n-1) \cdot C_1 \tag{3}$$

the value of C_2 could be determined tp be C_2=37.53 nF. The capacitance between the ground and the secondary layer (C_2') can be calculated with Eq. 2 which resulted in C_2'≈250 pF. For capacitor C_2, discrete WIMA FKP 2 film capacitors for pulse applications with a maximal operating voltage V=1000 V_{dc} and a capacitance of C_{cap}=470 pF ($\pm 5\%$) are chosen. These are through-hole devices, so that the pins can be directly soldered between the secondary ring and the ground layer. Capacitances C_2 and C_2' are in parallel and by knowing their values, the number of the required capacitors can be calculated according to

$$N = \frac{C_2 - C_2'}{C_{cap}}, \tag{4}$$

which results in 80 capacitors, that are soldered on the cable.

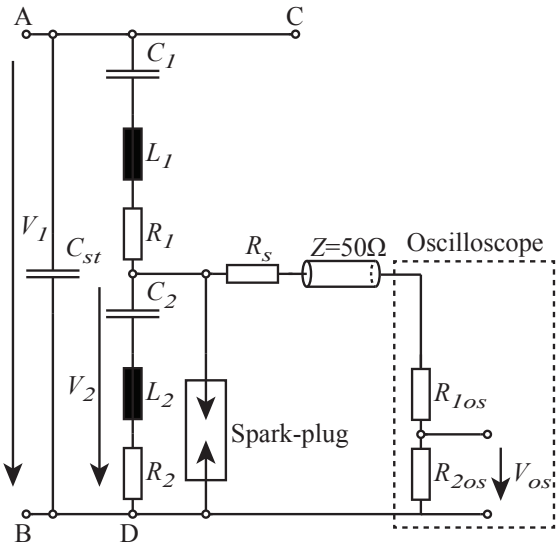

Fig. 8: Equivalent circuit of the divider and the measurement cables between the divider and the oscilloscope.

For interconnecting the divider with the measurement system a PCB with a resistor and a spark plug is soldered on the ground surface. To the PCB a 50 Ω BNC cable is soldered, so that a series resistance with R_s=50 Ω is required for impedance matching (Fig. 8). The added spark plug is used for safety reasons to protect the oscilloscope.

For mechanically supporting the device a plastic box is used as shown in Fig. 7. That provides the required safety distance to ground and helps to mechanically protect the device.

III. RESULTS

For evaluating the performance of the capacitive voltage divider, first measurements of the component impedance and the transfer function have been performed. Secondly, the performance of the divider in the PCD setup has been determined.

A. Impedance measurements

The equivalent circuit parameters of the circuit given in Fig. 8 and in Table IV have been identified based on impedance plots as given in Fig. 10, which have been measured with a Novocontrol Alpha-A impedance analyzer. With the measured circuit parameters the theoretical impedance curves as shown in Fig. 10 and the simulated transfer function of the divider as given in Fig. 11 can be calculated. The theoretical curves and the equivalent circuit enable a better understanding of the physical limits of the divider performance and allow to improve the device.

For determining the values of the capacitances C_1, C_2 and C_{st}, three measurements were conducted as described in Fig. 9. The capacitor C_{st} reflects the parasitic capacitance of the divider between the ground connection and the high voltage signal. There is also some stray capacitance between the signal layer an the high voltage signal, which is neglected as it is relatively small compared to C_2.

For the considered divider, the measurement results are: C_a=44.428 pF, C_b=256.59 pF and C_c=41.008 pF. Based on

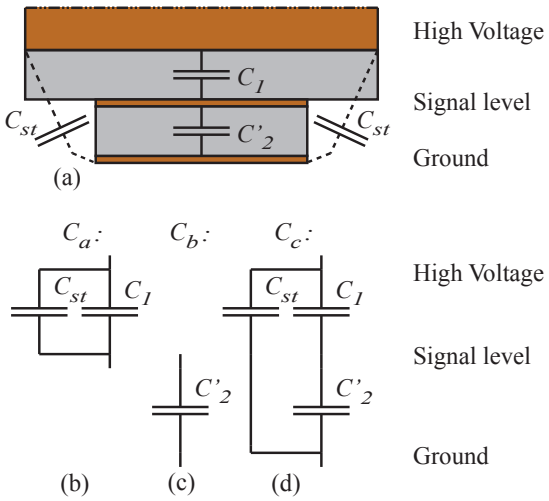

Fig. 9: (a) Capacitances between different layer. (b)-(d) Three measurements performed to get the values of C_a, C_b and C_c.

the equations:

$$C_a = C_1 + C_{st} \tag{5}$$
$$C_b = C'_2 \tag{6}$$
$$C_c = C_{st} + \frac{C_1 * C_2}{C_1 + C_2}, \tag{7}$$

the values for the capacitances can be determined: C_1=31.38 pF, C_{st}=13.05 pF, C'_2=256.59 pF and C_2=37.077 nF (cf. also Table IV). These values are well following expectations and theoretical calculations as described in section II.

In Fig. 11 the measured and simulated transfer functions V_2/V_1 of the divider are plotted. The simulations are performed with models implemented in Ansoft Simplorer. As can be seen, the measured and calculated transfer functions match quite well, except for the damping of the resonance, which is much higher in the measurement. This might be caused by HF resistances not included in the divider model.

Based on the performed measurements and simulations, the division ratio could be identified. With the measured transfer function, a division ratio of 1:1189 results. While from the simulation a division ration of 1:1199 results, which is very close to the measured value. Also the theoretical value 1:1183, which could be determined with equation 1 and the measured values of C_1 and C_2 from Table IV matches the others very well.

Finally, a signal generator was used to generate rectangular pulses in order to compare the divider with the

TABLE IV: Measured equivalent circuit parameters.

High voltage capacitance, C_1	31.38 pF
Low voltage capacitance, C_2	37.077 nF
Stray capacitance, C_s	13.05 pF
Capacitance Signal-to-ground, C'_2	256.59 pF
Parasitic inductance, L_1	500 nH
Parasitic inductance of the capacitors, L_2	450 nH
Series resistance of the measurement cable, R_s	50 Ω
Resistance of high voltage side, R_1	5 Ω
Resistance of low voltage side, R_2	0.01 Ω
Resistance of oscilloscope probe, R_{1os}	9 MΩ
Resistance of oscilloscope, R_{2os}	1 MΩ

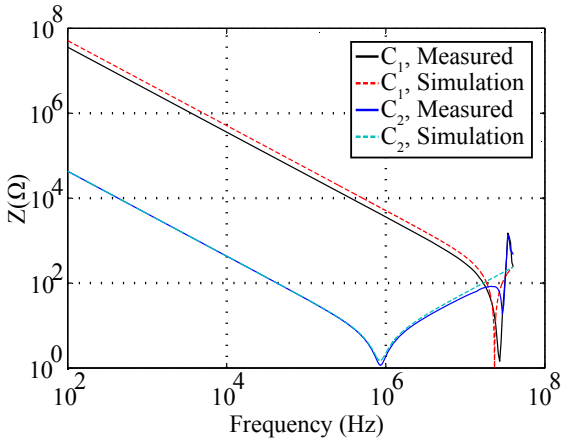

Fig. 10: Measured and calculated impedances of capacitor C_1 and C_2.

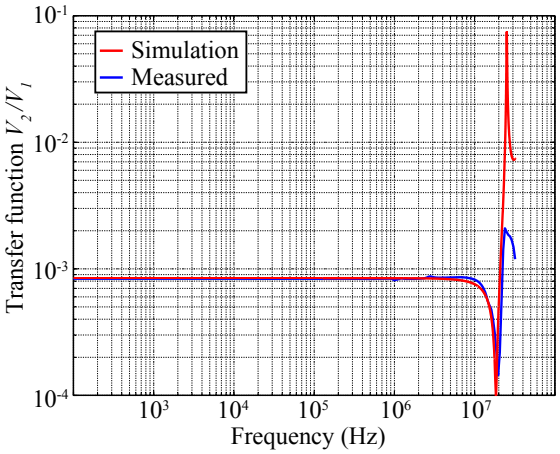

Fig. 11: Measured and calculated transfer functions of the voltage divider.

performance of a 20 kV LeCroy voltage probe. The results are given in Fig. 12 for a 1 MHz. Studying the results shows faster response of the cable divider compared to the the LeCroy 20 kV probe, otherwise the performance is similar. The ringing frequency, that can be seen in Fig. 12, is coherent with resonance frequencies (f_{res}=26 MHz).

B. Performance in the PCD setup

For modelling the complete PCD setup and determine the performance of the divider in the setup, the source impedance Z_{in} and the load impedance Z_{out} as seen by the divider have been measured with the impedance analyser (cf. Fig. 13). The results are given in Fig. 14.

In Fig. 15 one can see the circuit topology around the divider. The source impedance (Z_{in}) includes impedances of the discharge capacitor and connecting cables. The input impedance Z_{in} has a low resonance frequency as the used pulsed capacitor (custom made by Condenser Products, V=250 kV_{dc}, C=10 nF, L_σ=70 nH) has a relatively high capacitance. As can be seen, the load and the input impedance is not matched to the divider impedance, so that the measurement results are affected.

Using the equivalent circuit parameters of the divider together with input and output impedances allows plotting the transfer function that includes all circuit (Fig. 16). Com-

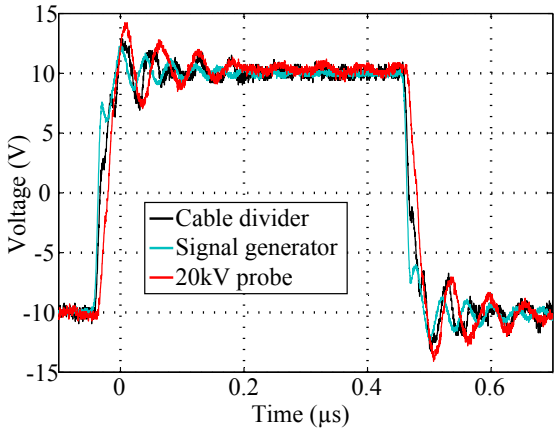

Fig. 12: Measured voltage curves while using a signal generator.

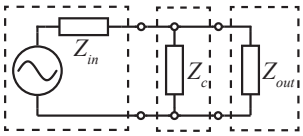

Fig. 13: General circuit scheme.

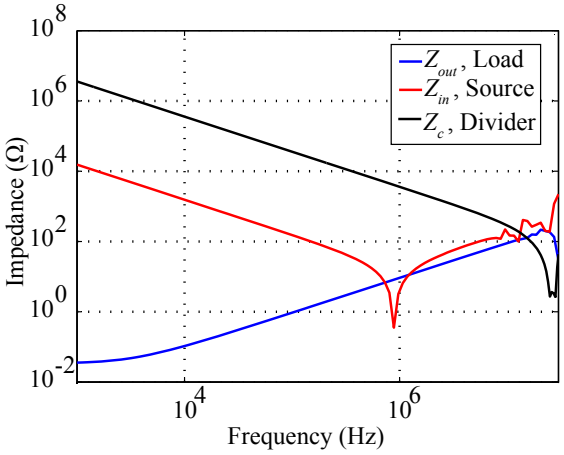

Fig. 14: Impedance curves for the source, the load (assuming a breakdown of the arc) and the divider.

pared to the case where the divider was investigated without PCD setup (Fig. 11) the resonance peak has been shifted to lower frequencies, since with the additional capacitances that have to be considered the resonance frequencies change. That emphasize the fact that for considering performance, all elements have to be involved.

For identifying the voltage divider performance, two comparisons have been performed. First, at relatively low voltages, a standard LeCroy 20 kV voltage probe was used for comparison. The result is given in Fig. 17 and it could be seen, that the coaxial divider matches the results of the LeCroy probe, except for the high frequency ringing, which is caused by the weakly damped oscillations caused by the parasitic elements of the coaxial divider. The reason for low resonance frequency comes from the relatively high C_1 value, caused by the HVDC cable itself. It could be reduced by limiting the length of the coaxial part of the cable, i.e.

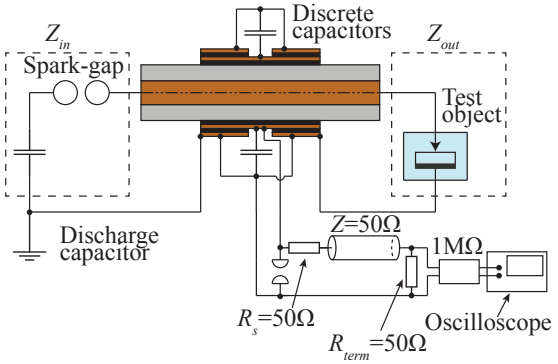

Fig. 15: Schematic of feed-through connection of the divider.

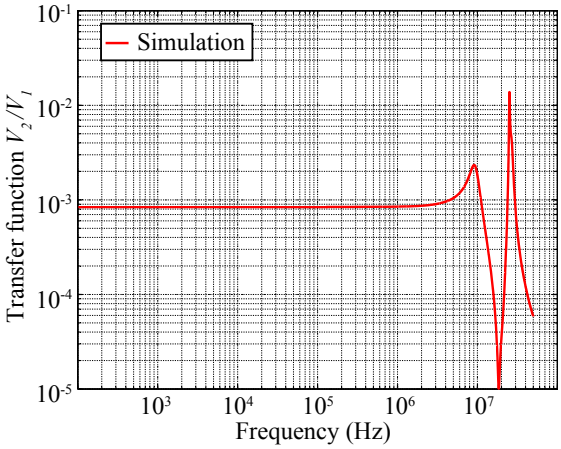

Fig. 16: Calculated transfer functions of the divider including input and output impedance.

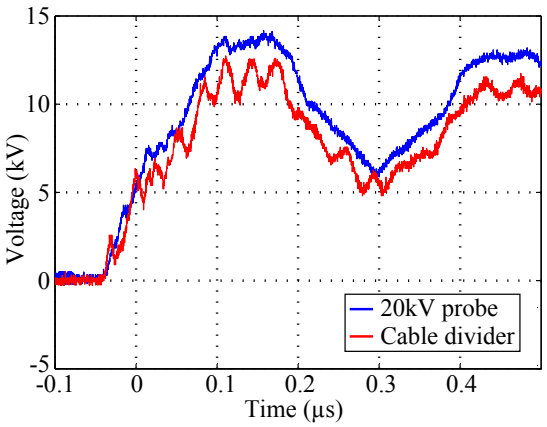

Fig. 17: Measured voltage curves while using medium voltage pulse.

decrease C_1. Moreover, a major limitation is the inductance introduced by interconnecting the discrete foil capacitors. To improve the performance, concentrated capacitors near the connecting point of the BNC cable can be used. In a further step, a new divider as discussed in section IV is designed to overcome the ringing problem.

In Fig. 18 the measurement results of the coaxial divider are compared with the signal obtained with the divider

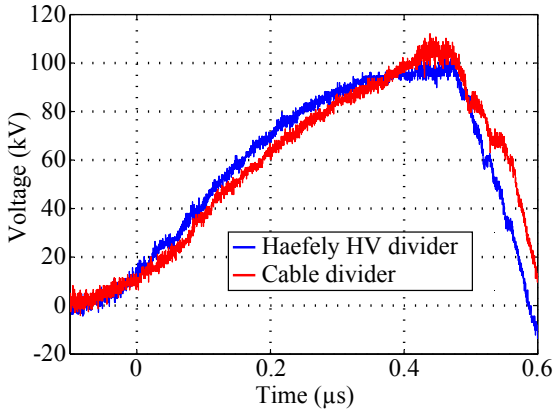

Fig. 18: Measured voltage curves while using high voltage pulse.

shown in Fig. 2. Due to the slower rise time, both dividers show well matching results.

IV. IMPROVEMENTS AND FUTURE STEPS

As discussed in the previous section, the relatively low resonance frequency of the coaxial divider results in oscillations distorting the measurement signal. The performance can be improved by reducing the capacitance value of C_1 and the parasitic inductance of C_2. The latter can be achieved by concentrating capacitors around measuring point.

Therefore, a new design has been developed as shown in Fig. 19. In this setup, the length of the interconnections has been further optimized by using SMD capacitors mounted on a PCB board in vicinity of the BNC connector. Furthermore, a shielding around the setup is used, in order to reduce the measurement noise. The new coaxial divider is based on a HV cable and has the specifications given in Table V.

V. CONCLUSION

In this paper, results for a coaxial capacitive voltage divider with a high division ratio of 1:1200 and a measurement range up to unit[200]kV are presented. The coaxial divider is based on a HVDC cable, which is used for implementing the first capacitor of the divider, and the second capacitor is realised by discrete foil capacitors.

For determining the performance of the coaxial divider and identifying the physical limits, a divider model including all the parasitics has been developed and measurements have been performed for comparing the results with other commercial dividers.

TABLE V: Specifications of the redesigned divider parameters.

Cable diameter	19.3 mm
Voltage withstand	200 kV_{dc}
Cable capacitance	0.1 pF/mm
Length of the coaxial cable (C_1)	20 mm
High voltage capacitance, C_1	2 pF
Low voltage capacitance, C_2	2 nF
Division ratio	1:1200

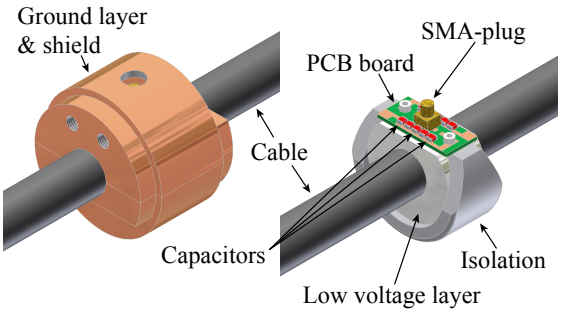

Fig. 19: Sketches of the new divider design. Left: divider with covering shield; right: supporting rings with PCB board and capacitors.

The measured results of the divider match quite well with the predictions. However, the relatively high parasitic inductance of the interconnection of the parallel connected discrete foil capacitors results in a relatively low resonance frequency of the divider and results in some ringing of the measurement signal. Therefore, a new setup is also introduced in the paper.

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