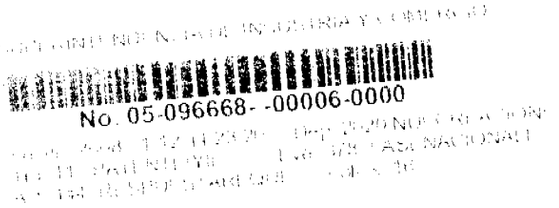
Señores

Superintendencia de Industria y Comercio

División de Nuevas Creaciones

E. S. D.



Ref: Expediente No. 05-096.668

Solicitud de registro de patente de invención denominada "Sistema de Contención en Tubería"

Solicitante: Omega Flex Inc.

Darío Cárdenas Navas, identificado como aparece al pie de mi firma y obrando en mi condición de apoderado de la sociedad **Omega Flex Inc.**, solicitante de la patente en referencia, a continuación doy respuesta al Oficio **No. 10934**, mediante el cual se presenta en Concepto Técnico No. **2251**, que fue notificado por fijación en lista el 29 de Agosto de 2.008.

1. En cuanto a las objeciones a la Claridad de los dibujos y las Reivindicaciones

1.1. Nuevos Dibujos:

Teniendo en cuenta que en el numeral 3.1. Descripción (artículo 28 D. 486), del Concepto Técnico citado, el señor Examinador afirma lo siguiente:

"Se sugiere al solicitante presentar nuevos dibujos ya que en los presentados no se distinguen algunos elementos por ejemplo el hombro (26). [...]".

Atentamente, me permito manifestar a ese Despacho que con el ánimo de realzar en forma clara y precisa **las diferencias técnicas** existentes entre el objeto de la presente solicitud y lo ya conocido en el estado del arte más cercano, **es deseo del solicitante,** presentar un nuevo juego de figuras (o dibujos) ilustrativas de la invención, compuesto por cuatro figuras

características que permiten distinguir perfectamente los elementos técnicos esenciales de la presente invención.

En este punto, vale la pena llamar la atención de ese Despacho al hecho de que el nuevo juego de figuras ilustrativas, ***no incluye ninguna modificación adicional***, simplemente se presenta para reemplazar las figuras originalmente presentadas que no eran lo suficientemente claras por lo cual dificultaban la comprensión de la presente invención.

1.2. Modificaciones al Capítulo Reivindicatorio:

Adicionalmente, en el numeral 3.2. Reivindicaciones (artículo 30 D. 486), del mismo Concepto Técnico citado, el señor Examinador afirma lo siguiente:

- *"Se sugiere al solicitante presentar un nuevo capítulo reivindicatorio aparte de la descripción, eliminando las numeraciones de las páginas (sexta pagina, séptima página……..).*

  […]

- *Se sugiere al solicitante incluir dentro de las reivindicaciones el número consecutivo de cada elemento entre paréntesis () sin hacer referencia a las figuras.".*

Sobre este particular, me permito manifestar a ese Despacho, que es deseo del solicitante presentar un nuevo capítulo reivindicatorio compuesto por 15 reivindicaciones, similares a las de la correspondiente patente numero **US 7,004,510 B2**, que cobija la misma materia de la presente solicitud, y que encuentran su debido sustento en el capítulo reivindicatorio originalmente presentado y en las cuales se han tenido en cuenta las observaciones hechas por parte del señor Examinador, por lo cual se han separado de la descripción y se han hecho las siguientes modificaciones:

1. En la nueva reivindicación 1, siguiendo las sugerencias del señor Examinador se han incluido los números de referencia de cada uno de los elementos que hacen parte de la invención, de acuerdo con la numeración empleada en los dibujos (figuras 1 a 4) y la descripción

originalmente presentada, con el fin de hacer mas fácil y sencilla la comprensión de la materia objeto reivindicada.

2. En la misma reivindicación 1, se ha modificado la expresión *"una tubería que lleva el fluido posicionado internamente a dicha manga"*, para caracterizar en forma mucho mas clara dicha tubería, de la siguiente forma: *"una tubería corrugada, flexible, de metal (12), que lleva el fluido, posicionada internamente en dicha manga"*. El sustento requerido para dicha modificación se encuentra en la descripción originalmente presentada, específicamente, en resumen y en la descripción detallada de la invención, así como en la figura 3, en la cual se observa una tubería corrugada (12) posicionada en el interior de la manga (16).
3. Adicionalmente, se ha incluido en la última parte de la nueva reivindicación 1, ***el ajuste (42)*** que es objeto de la reivindicación 8 originalmente presentada, con el fin de hacer una mejor caracterización de la invención y de permitir una mejor comprensión de la misma. Por lo tanto, la última parte de la nueva reivindicación 1, ahora dice lo siguiente: *"un ajuste de metal (42) asegurado a dicha tubería (12) y acoplado a una superficie interior de dicho acople (18).".* Dicha modificación también encuentra su debido sustento en la descripción originalmente presentada, en particular en la descripción detallada.
4. En conexión con lo anterior, se ha eliminado la reivindicación 8, y se han renumerado las restantes reivindicaciones 9 a 16, como nuevas reivindicaciones 8 a 15. Adicionalmente, se ha modificado su dependencia para conservar la coherencia del nuevo capítulo reivindicatorio.

Sobre este particular, atentamente me permito manifestar al señor Examinador que las modificaciones realizadas en el capítulo reivindicatorio, **NO** amplían de ninguna manera el alcance de la invención, **sino que por el contrario tienen como finalidad especificar claramente las características novedosas e inventivas del sistema de contención en tubería que es objeto de la invención objetada, así como también delimitar de forma apropiada la misma materia objeto**, para propiciar un mejor entendimiento de la presente solicitud de patente.

2. Argumentos que realzan la NOVEDAD de la presente invención

En el reporte del Examen Técnico, ese Despacho sostiene que la invención reivindicada carece de Novedad en vista de las enseñanzas del documento **US 3506039 (D1),** para lo cual el señor Examinador afirma lo siguiente:

"5.1.3 Al comparar elemento por elemento de la invención, tal como esta definido en la reivindicación uno (1) con el documento D1, encontramos que el mencionado documento revela todos los elementos y características de dicha reivindicación. [...]

De acuerdo con lo anterior, todos los elementos que forman parte del "SISTEMA DE CONTENCIÓN EN TUBERIA" mostrados en la reivindicación independiente uno (1), ya fueron divulgados en D1, por lo cual se podría considerar que ***carece de novedad****.*

5.1.4 El capítulo reivindicatorio no muestra en forma concisa lo nuevo que se pretende aportar a la técnica ni aporta diferencias a lo ya existente. ".

Sobre este particular, atentamente me permito llamar la atención del señor Examinador al hecho de que la caracterización realizada en el nuevo capítulo reivindicatorio presentado, permite diferenciar el novedoso sistema de contención en tubería ahora reivindicado, del sistema de ventilación revelado en D1. En efecto, la caracterización mejorada que se hace del sistema de contención revelado en la presente solicitud de patente, permite que al llevar a cabo el análisis de patentabilidad y en particular, una comparación de elemento por elemento entre la presente invención y lo revelado en D1, se encuentren grandes diferencias técnicas relevantes que permiten diferenciarlas claramente, de las cuales las siguientes tres características permiten realzar la novedad de la presente invención.

- En primer lugar, tanto en la descripción detallada de la invención como en la nueva reivindicación 1, se establece que el sistema de tubería ahora reclamado comprende: una manga (16), una tubería

de metal corrugado, flexible (12), un acople (18), un ajuste de metal (42), entre otros; y particularmente, se establece en cuanto a la tubería (12), que no se trata de cualquier tubería, sino que **se refiere a una tubería de metal corrugado**, lo cual claramente significa para una persona medianamente versada en la materia (que podría ser un ingeniero mecánico), que la tubería al tener una estructura de crestas y valles (que corresponde a la estructura de un corrugado) permite cierto grado de movimiento en la estructura de la tubería, lo cual significa que es una **tubería flexible**; mientras que a lo largo del texto del documento D1, se enseña un sistema de tubería 25, que es completamente rígido, y en ninguno de los apartes de dicho documento citado (D1), se indica su aplicación en una tubería con una estructura corrugada, es decir, que en D1 no se enseña una tubería flexible como la reclamada en la nueva reivindicación 1. Prueba de que lo revelado en D1, es un sistema completamente rígido, diferente al de la presente invención se encuentra en la columna 1, líneas 15 a 25 del mismo documento D1, constituyéndose en una diferencia técnica fundamental completamente notoria entre lo revelado en D1 y lo reclamado por el solicitante.

- Ahora bien, en segundo lugar se puede notar que el sistema de la presente invención no solo se diferencia por la flexibilidad de la tubería, sino que sumado a la flexibilidad, se encuentra el hecho de que **el sistema ahora reivindicado incluye un acople (18), que tiene un primer extremo (22) y un segundo extremo (30), en donde el primer extremo (22) esta provisto de un rosca interior, la cual se enrosca y desenrosca a la superficie externa de la manga (16)**. Por el contrario, lo que enseña D1, es un conducto o tubería 26 que aparece roscada al aceptar la rosca del reborde 35 de la manga para ajustarla con el conducto mediante el borde 38 del conducto o tubería 26, lo cual muestra un sistema de unión entre la tubería y la manga bastante diferente en cada uno de los casos.

  En efecto, en D1 se realiza un ensamblaje muy sencillo juntando la rosca interna de la manga con la rosca ubicada en la superficie del

conducto o tubería (para mayor claridad ver la figura 2 del documento D1), mientras que en la presente invención, la unión entre la manga (16) y la tubería de metal corrugado (12), se hace a través de un acople (18), el cual se rosca a la superficie externa de la manga (16), configurando un sistema de unión completamente diferente al revelado en D1.

- En tercer lugar, existe otra característica fundamental de la presente invención que permite diferenciarla en forma clara de lo revelado en D1, y se encuentra en el hecho de que el nuevo sistema reivindicado incluye **un ajuste de metal (42)**, el cual esta asegurado a la tubería (12) y acoplado a la superficie interior del acople (18), contribuyendo a mantener unidas la tubería corrugada, flexible (12) con la manga (16). Este tipo de elemento, es decir, **el ajuste de metal (42), es un elemento que ni siquiera es sugerido por las enseñanzas de D1**, pues en dicho documento del arte anterior, el acople entre la tubería y la manga se hace roscando directamente la manga con la tubería y el ajuste de da al juntar el borde 35 en la manga con el borde 38 en la tubería, lo cual a todas luces para una persona medianamente versada en la técnica, resulta completamente diferente al sistema de acople que incorpora el acople (18) con un ajuste de metal (42), que se revela en la presente invención.

Así las cosas, resulta evidente que **de la comparación de elemento por elemento** entre las enseñanzas de la presente invención y el estado del arte mas cercano representado por el documento D1, **se encuentra que la estructura específica del sistema ahora reclamado NO es revelada por ninguno de los apartes del documento citado**, lo cual constituye una prueba mas que razonable, de que la forma y estructura específica del sistema de sujeción de la presente solicitud, **si reviste la NOVEDAD requerida para poder gozar del privilegio de patente solicitado**.

3. **Argumentos adicionales que prueban la novedad**

Como se ha demostrado en el numeral 2 del presente escrito, el sistema de ventilación descrito en el documento D1, no resulta suficientemente

relevante para desvirtuar la novedad de la invención en cuestión, debido a que no existe evidencia dentro del mismo documento D1, que enseñe una tubería de metal corrugado (12), un acople (18), ni mucho menos un ajuste de metal (42), tal y como es requerido por el sistema de contención en tubería de la presente invención.

En concordancia con lo anterior, atentamente me permito dirigir la atención de ese Despacho a lo que establece con respecto a la novedad de una invención, entre muchos otros, el acápite: "9.4. Análisis de la Novedad" del *"Manual para el Examen de Solicitudes de Patentes de Invención en las Oficinas de Propiedad Industrial de los Países de la Comunidad Andina"* (en adelante Manual de Patentes), el cual resulta útil para demostrar en forma contundente que la presente invención, se ajusta cabalmente a la Normativa Andina en lo referente al requisito de novedad que deben cumplir todas y cada una de las invenciones para poder gozar del privilegio de patente solicitado. El acápite 9.4, a la letra dice:

"*Para determinar la novedad de la invención,* ***se debe comprobar*** *si existen anticipaciones del estado de la técnica* ***que contengan explícitamente todas las características técnicas esenciales de la invención****. El examen de novedad se efectúa comparando elemento por elemento de la invención tal como está definido por las reivindicaciones con los del estado de la técnica"* [1] (Resaltado fuera de texto).

De acuerdo con las enseñanzas del citado Manual de Patentes, es claro que en el análisis de novedad realizado en el presente caso, se **cita un documento (D1) que NO enseña en forma explícita todas y cada una de las características técnicas esenciales** del sistema de tubería, que se reclama en las nuevas reivindicaciones 1 a 15; en particular, nada dentro del documento D1 enseña el empleo de tuberías de metal corrugado (12) flexibles, o el empleo de un acople (18) y un ajuste de metal (42) para mantener juntos la manga (16) y la tubería (12).

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[1] COMUNIDAD ANDINA, Secretaría General, "Manual para el Examen de Solicitudes de Patentes de Invención en las Oficinas de Propiedad Industrial de los Países de la Comunidad Andina", 2ª Edición, Quito, Ecuador, Junio de 2004, página 65.

Es decir, que al llevar a cabo el examen de novedad frente a las enseñanzas de un documento que a pesar de que se desarrolla en el mismo campo tecnológico de la presente invención, no puede constituir una anticipación relevante de la estructura específica ahora reivindicada, toda vez, que en ninguno de sus apartes enseña una tubería como la de la presente invención, la cual esta hecha de metal con una estructura de crestas y valles (corrugado) que la hacen flexible, así como tampoco se revelan el acople (18) y el ajuste de metal (42), que en la presente invención son completamente fundamentales para poder mantener unidas la manga (16) y la tubería (12), y de esta manera conseguir que el sistema contenga las fugas de materia que pueda llegar a presentar la tubería (12). Por lo tanto, es evidente que las enseñanzas del documento citado D1, no resultan lo suficientemente relevantes como para desvirtuar la novedad del sistema reclamado en las nuevas reivindicaciones 1 a 15, en las cuales se reivindica exactamente el mismo objeto de las anteriores reivindicaciones 1 a 16 originalmente presentadas.

En consecuencia, es claro que el documento **US 3506039 (D1) NO revela explícitamente todas las características técnicas esenciales de la presente invención**, sino que simplemente esta limitado a describir un sistema de ventilación para los gases en una tubería rígida, con características técnicas completamente diferentes a las del sistema de la presente invención, lo cual, hace que una persona medianamente versada en la materia no encuentre que lo revelado en D1 y en la solicitud bajo estudio pueda ser considerado como igual, quedando demostrada la NOVEDAD de la invención solicitada sobre lo ya conocido en el estado del arte, particularmente en D1.

Finalmente, como un hecho que permite comprobar la patentabilidad de la materia objeto del presente caso, me permito llamar la atención de ese Despacho al hecho de que la novedad de la misma materia objeto de las nuevas reivindicaciones 1 a 15, ya ha sido reconocida y aceptada por parte de los señores Examinadores de la Oficina de Marcas y Patentes de los Estados Unidos (USPTO), quienes han concedido el privilegio de patente bajo el número **US 7,004,510 B2**. La materia objeto reivindicada en la

151
152

solicitud Colombiana **No. 05-096.668**, corresponde a la misma materia objeto protegida en las correspondientes patentes Estadounidense.

Sobre este particular, me permito llamar la atención del señor Examinador al hecho de que la concesión de patente para la misma materia objeto de la solicitud colombiana, por parte de las Oficinas de Estados Unidos (USPTO), si bien no obliga su concesión en Colombia, si constituye un fuerte indicio que permite demostrar que la presente solicitud sí cumple con los requisitos necesarios de novedad, aplicación industrial y nivel inventivo requeridos sobre las enseñanzas del estado del arte anterior, como para que le sea concedido el privilegio de patente solicitado.

4. Conclusión

Mediante la comparación directa entre lo revelado en el documento D1, y el sistema de tubería (ver nuevas reivindicaciones 1 a 15) de la presente solicitud de patente; específicamente comparando elemento por elemento, se ha podido demostrar en forma contundente el carácter novedoso del sistema de contención en tubería de la presente invención, debido a que las enseñanzas del estado del arte (documento D1), NO revelan todos y cada uno de los elementos esenciales del nuevo sistema reclamado, por lo cual el sistema de tubería de las nuevas reivindicaciones 1 a 15 contenidas en el expediente No. 05-096.668, resulta completamente NOVEDOSO e INVENTIVO, debido a que se presentan elementos novedosos que lo diferencian de lo conocidos, y que a su vez le permiten superar problemas técnicos específicos de una forma diferente a la revelada previamente en el estado del arte mas cercano, y por lo tanto, la materia objeto de la invención en cuestión, tampoco podría llegar a ser considerada como obvia o evidente para la persona versada en la materia que conozca las enseñanzas reveladas en el documento **US 3506039 (D1)**.

5. Anexos

- *Recibo oficial de caja No.* 09-88.897 correspondiente al pago de las tasas por las modificaciones realizadas.
- Nuevas figuras 1 a 4, en las cuales se puede apreciar en forma clara el sistema de tubería reclamado en el nuevo capítulo reivindicatorio.

- Nuevo capítulo reivindicatorio modificado, en el que se han hecho las modificaciones descritas en el numeral 1.2 del presente escrito.

6. En vista de lo anterior, me permito muy atentamente solicitar a ese Despacho, se sirva llevar nuevamente a cabo el estudio de la presente solicitud a la luz de las modificaciones y de los argumentos aquí presentados, para conceder el privilegio de patente solicitado para el sistema de contención en tubería reivindicado.

Atentamente,

Darío Cárdenas Navas
C.C. 17.066.629 de Bogotá
T.P. 1.250 Consejo Superior de la Judicatura

AMR/d:/Patentes/general/Memorial Caso P-354

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REIVINDICACIONES

05-096668

11

dicho acople tiene un durómetro más alto que dicha manga.

6. El sistema de tubería de la reivindicación 1, que comprende además:

un aro-o en el interior de dicho acople próximo a dicho primer extremo.

7. El sistema de tubería de la reivindicación 1, en donde:

dicha tubería es de acero inoxidable corrugado.

8. El sistema de tubería de la reivindicación 1, en donde:

dicho ajuste tiene una extensión de rosca y se engancha en la superficie interior de dicho acople en dicho segundo extremo.

9. El sistema de tubería de la reivindicación 8, en donde:

dicho ajuste es hecho de metal.

10. El sistema de tubería de la reivindicación 8, que comprende además:

un aro-o posicionado entre dicha extensión y dicho acople.

11. El sistema de tubería de la reivindicación 1, en donde:

dicha tubería tiene un manguito.

12. El sistema de tubería de la reivindicación 11, en donde:

dicho manguito está perforado.

13. El sistema de tubería de la reivindicación 1, en donde:

dichos bordes tiene una sección cruzada triangular.

14. El sistema de tubería de la reivindicación 1, que comprende además: una manguera conectada a dicho orificio de ventilación.

15. El sistema de tubería de la reivindicación 1, que además comprende: un detector que monitorea el fluido desde dicho orificio de ventilación.

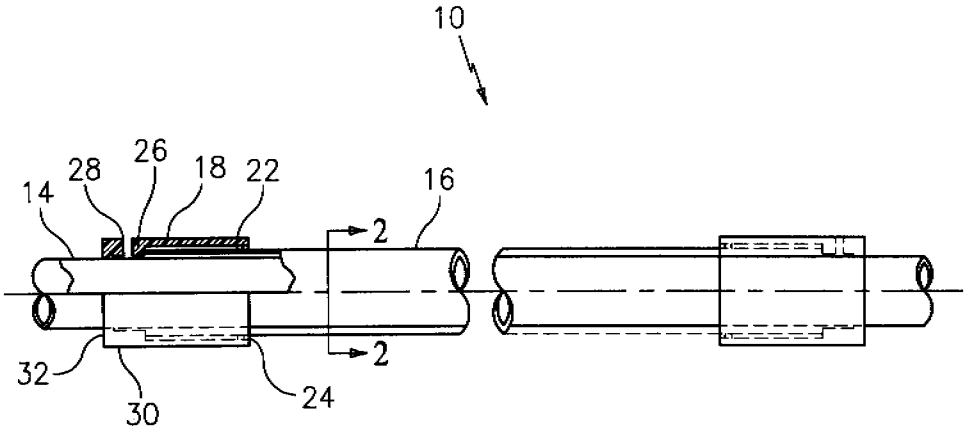

FIG. 1

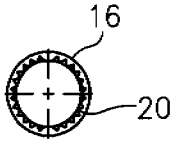

FIG. 2

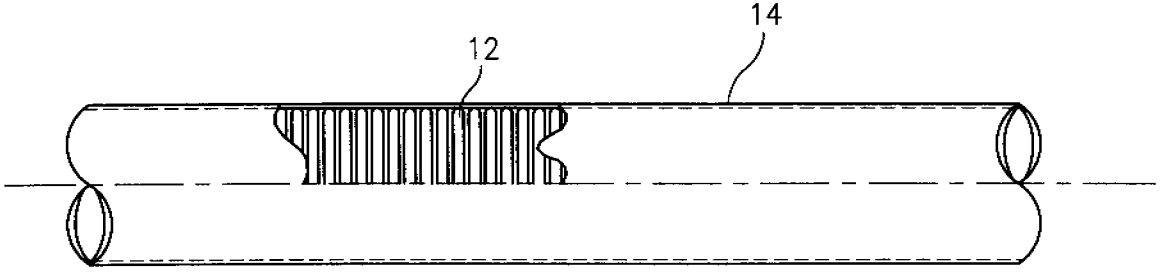

FIG. 3

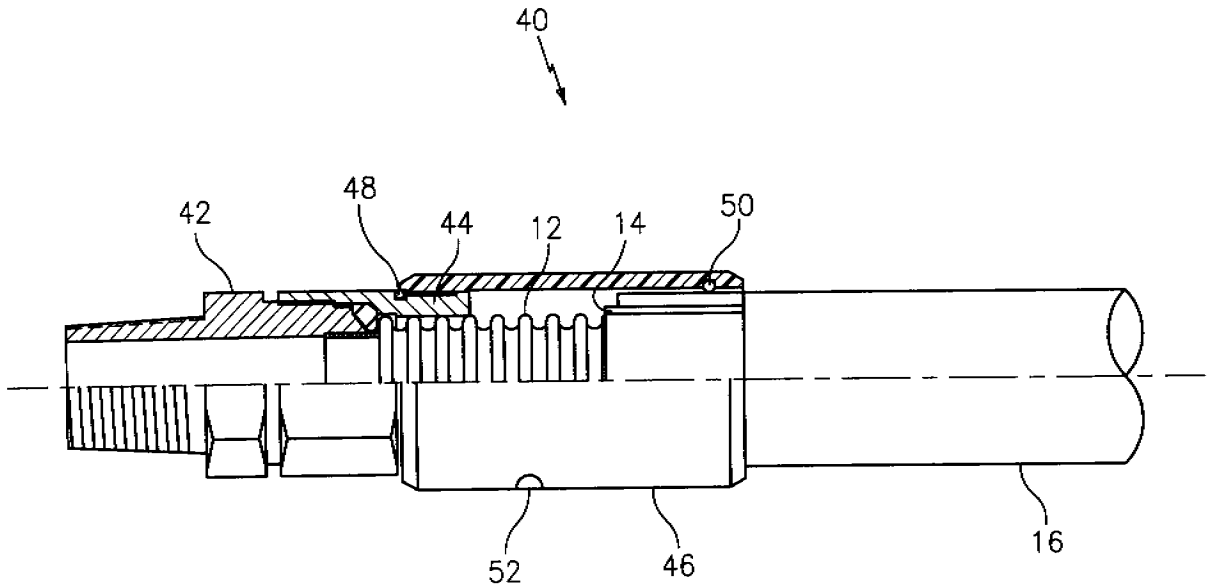

FIG. 4

US005713607A

United States Patent [19]

Webb

[11] Patent Number: 5,713,607

[45] Date of Patent: Feb. 3, 1998

[54] **PIPE COUPLING ASSEMBLY, SYSTEM AND METHOD**

[75] Inventor: **Michael C. Webb**, Chester Springs, Pa.

[73] Assignee: **Environ Products, Inc.**, Lionville, Pa.

[21] Appl. No.: **320,665**

[22] Filed: **Oct. 11, 1994**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 306,680, Sep. 15, 1994, abandoned.

[51] **Int. Cl.**[6] **F16L 41/00**

[52] **U.S. Cl.** ..... **285/133.1**; 285/156; 285/92; 73/40.5 R

[58] **Field of Search** ..... 285/133.1, 133.2, 285/137.1, 92, 131, 156, 138; 405/52; 73/40.5 R

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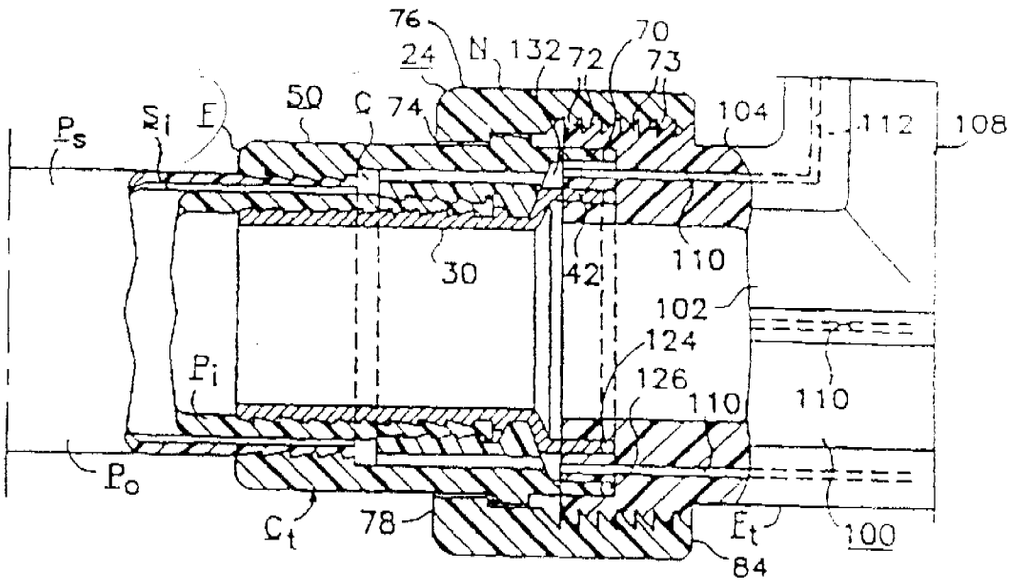
Primary Examiner—Terry Lee Melius
Assistant Examiner—Heather Shackelford
Attorney, Agent, or Firm—Seidel, Gonda, Lavorgna & Monaco, PC

[57] **ABSTRACT**

A pipe coupling assembly for use with at least one terminal end of a fluid transfer pipe having an inner tubular member for transferring fluid, an outer tubular member, and an interstitial space therebetween. The pipe coupling assembly comprises a transition coupling for attachment to the pipe to provide a first path for the transfer fluid in the inner tubular member and a second path for the transfer pipe's interstitial space, and a transition fitting for attachment to the transition coupling to provide separate access to the transfer fluid and the transfer pipe's interstitial space.

32 Claims, 7 Drawing Sheets



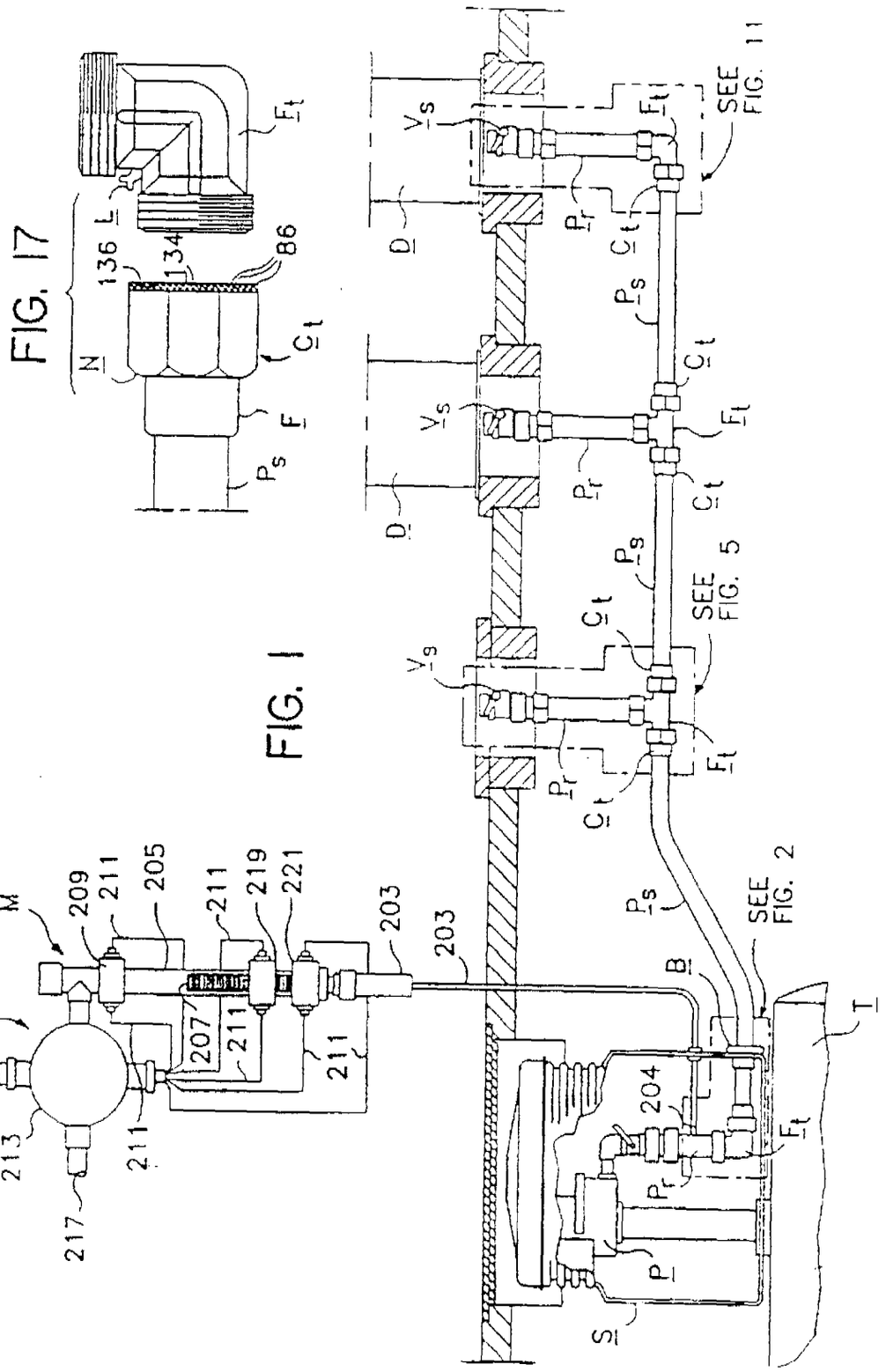


FIG. 17
FIG. 1
SEE FIG. 11
SEE FIG. 5
SEE FIG. 2
M
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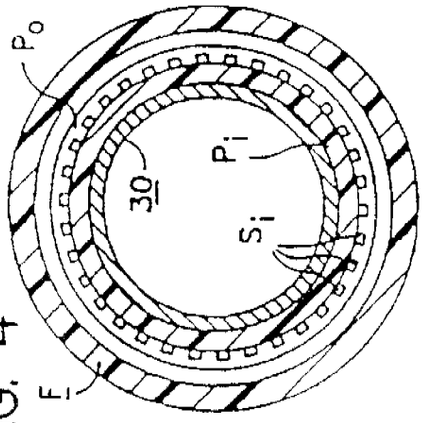


FIG. 4

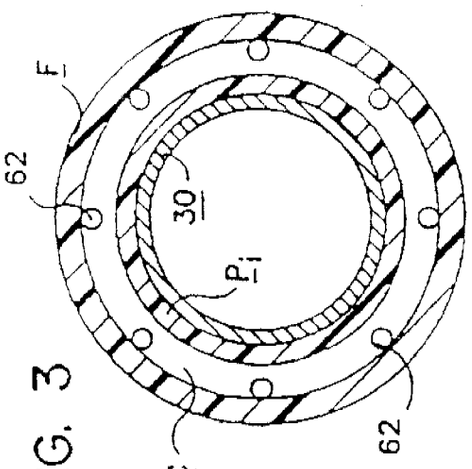
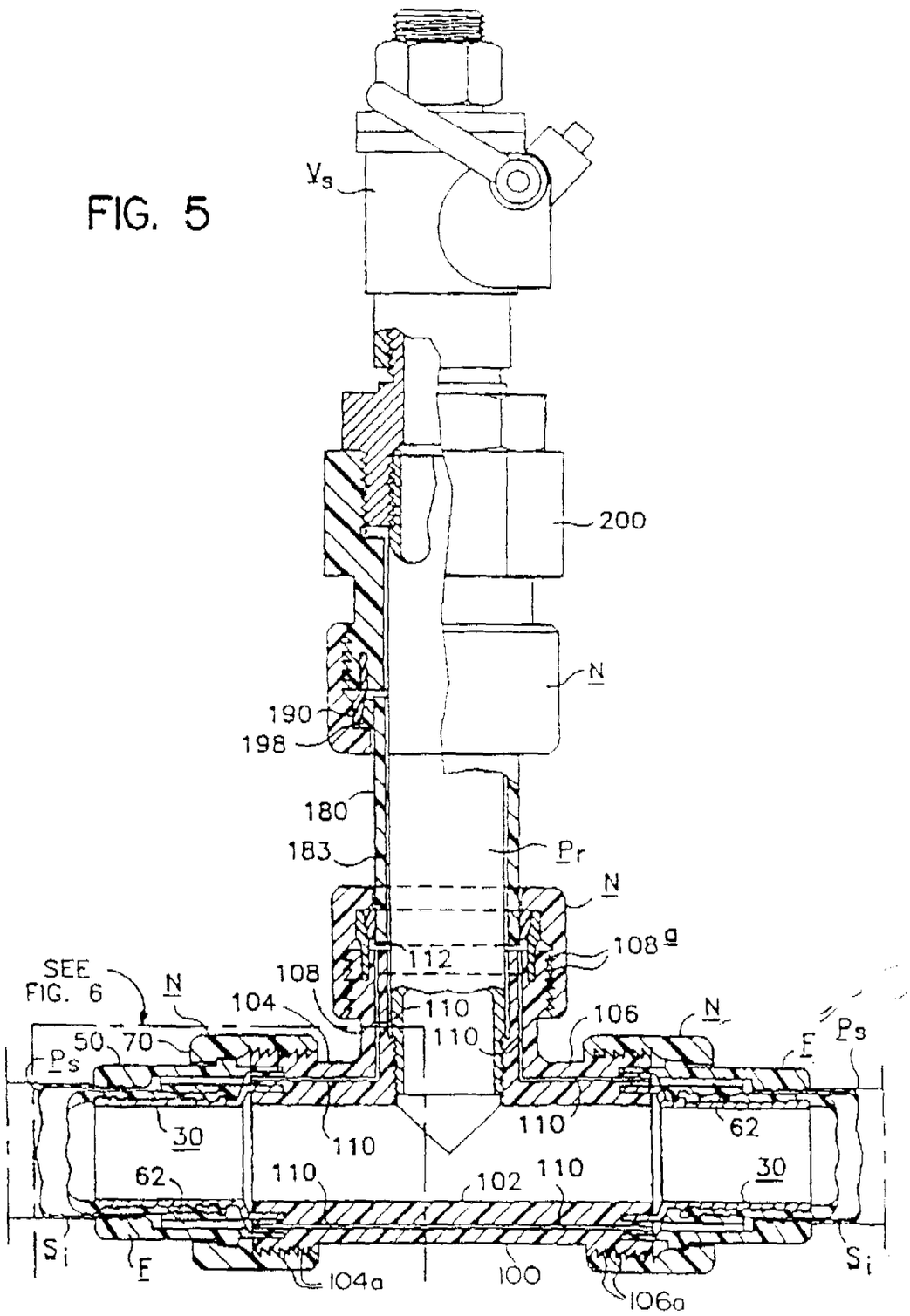


FIG. 3

FIG. 2

FIG. 5


Vs
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SEE FIG. 6
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FIG. 6

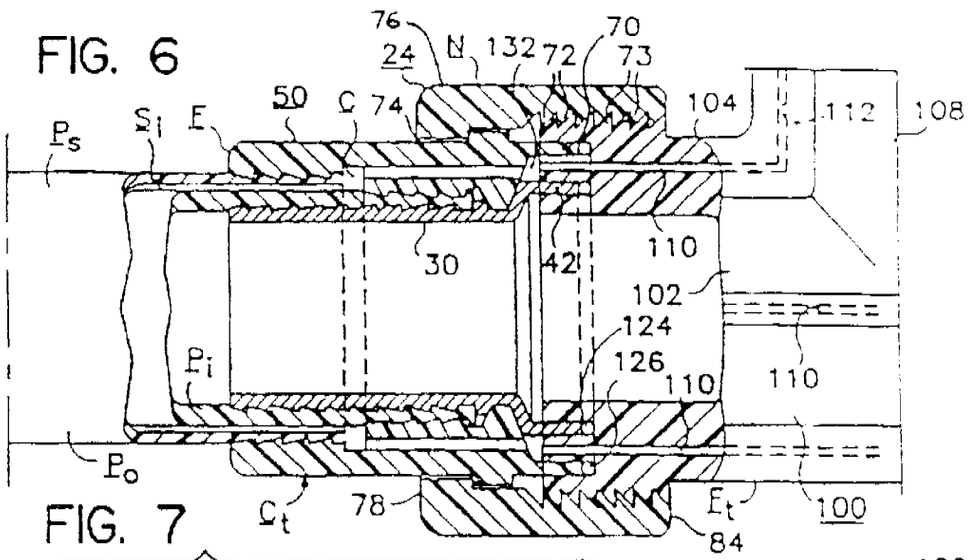


FIG. 7

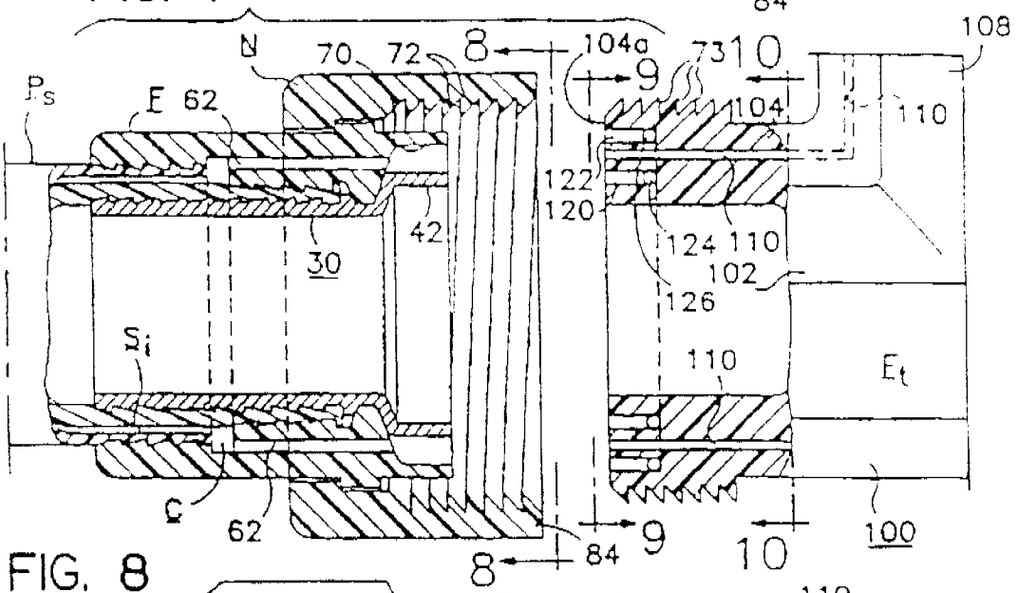


FIG. 8

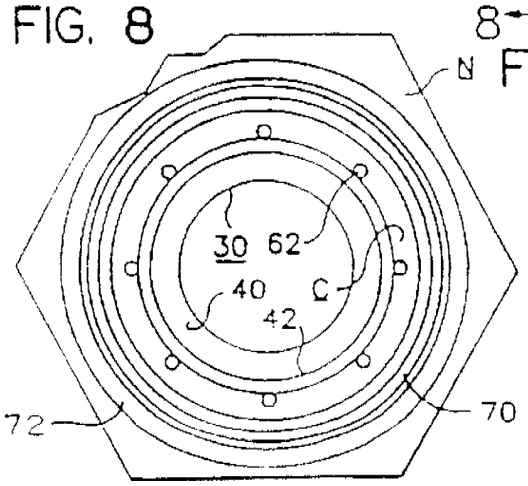
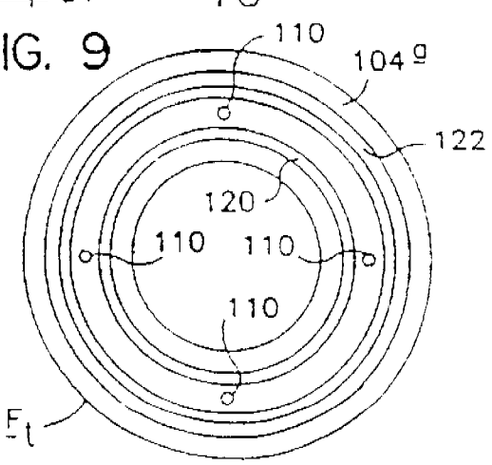


FIG. 9



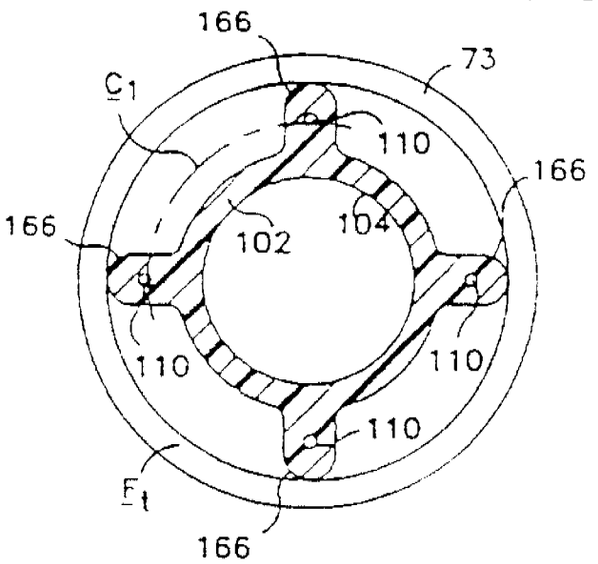


FIG. 10

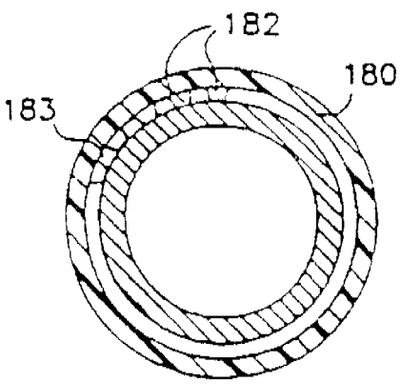


FIG. 12

FIG. 11

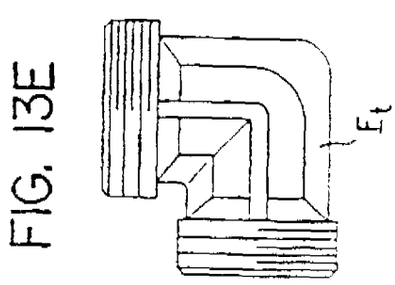


FIG. 13E

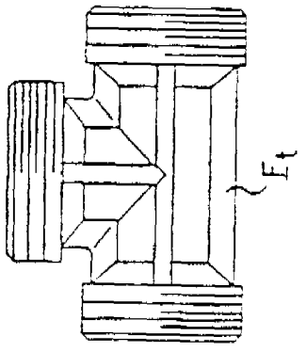


FIG. 13D

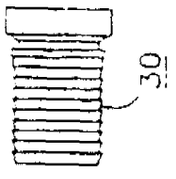


FIG. 13C

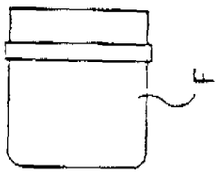


FIG. 13B

FIG. 13A

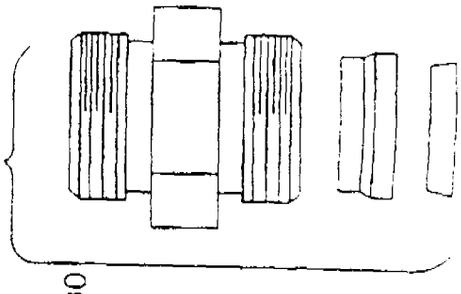


FIG. 13J

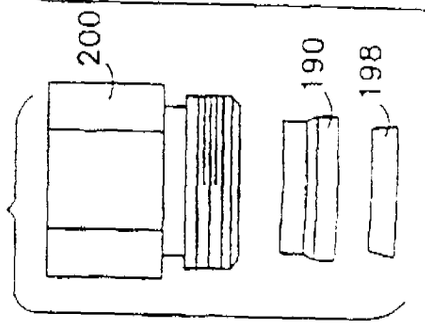


FIG. 13I

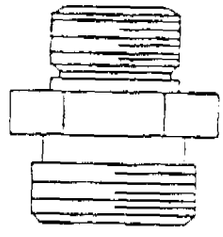


FIG. 13H

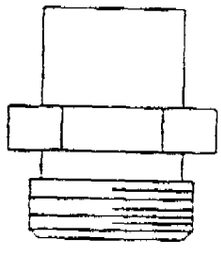


FIG. 13G

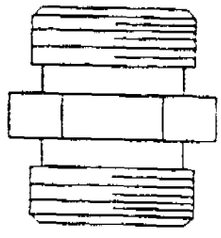


FIG. 13F

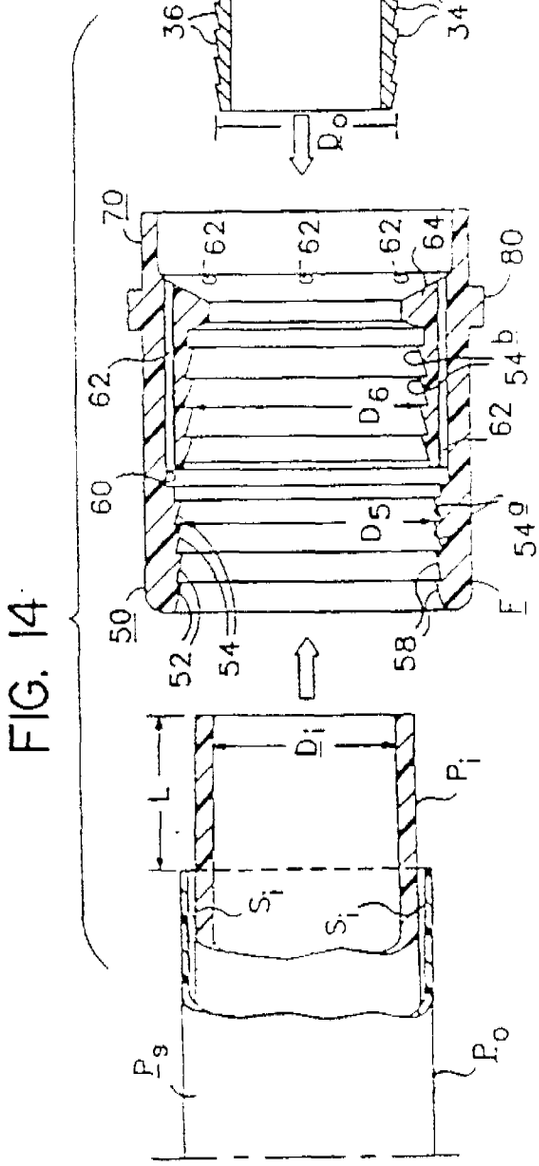


FIG. 14

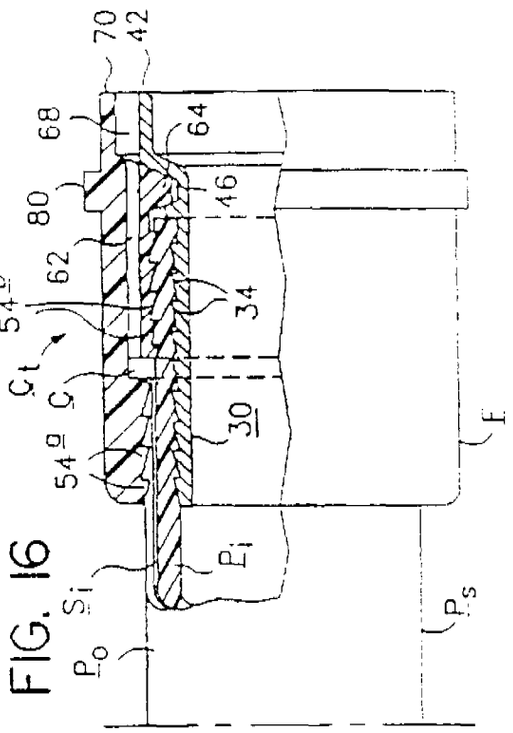


FIG. 16

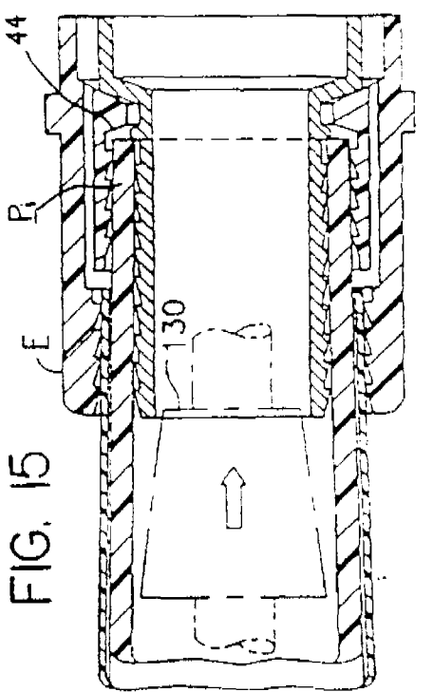


FIG. 15

PIPE COUPLING ASSEMBLY, SYSTEM AND METHOD

This is a continuation in part of my application filed Sep. 15, 1994, and having Ser. No. 08/306,680, now abandoned, entitled PIPE COUPLING ASSEMBLY.

FIELD OF THE INVENTION

This invention relates to transition coupling and fitting assemblies for connecting segment of pipes into systems. More particularly, the invention relates to a new system using an assembly for coupling coaxial pipes, such as flexible coaxial pipes, of the type used in environmentally conscious petroleum transfer systems.

BACKGROUND OF THE INVENTION

The fundamental concern in the petroleum products industry relates directly to the basic nature of underground storage of hazardous fluids in large tanks. As a large tank is installed, it is normally filled first with gasoline, or whatever fluid is intended for its use, before earth is back filled and compacted around the tank so that settling is minimized. The added weight of the liquid assists in locating and anchoring the tank.

Over time, as the tank is emptied and refilled, the buoyancy of the tank changes. Rather than remain in one place as might be expected for a large tank packed into the ground, it has been discovered that the tank will shift. If the surrounding soil is wet or even worse subjected to underground water table pressure, the tank may seem to float underground. Even when the tank is effectively prevented from substantial movement, such as when the ground above the tank has been filled and covered with concrete or asphalt, the tank and all the appurtenances are subjected to considerable force. This phenomenon is defined by the term "shifting tank syndrome". Pipes, pumps, sumps and risers and all the myriad fittings and connections associated with the tank and with the pipe system are subjected to substantial stress. With these stresses comes the risk of failure of the tank and the appurtenances, especially of the joints and connections.

In the past, rigid pipes such as steel and fiberglass piping have been used for connecting varied tanks to pumps and other dispensing units. When the tanks experience the shifting tank syndrome over time, there was a real risk that pipes would burst, valves would fail, fittings would break, and sumps would crack thus failing to collect leaking fluids. In addition to these concerns, the tank, pipes, fittings, sumps and the like have been subjected to attack and degradation from the environment. Petroleum products and other hazardous materials are not compatible with many materials, so that transferring fluid from the tank to an above-ground pump subjects the internal portions of the system to potential leaks causing damage and degradation over a long period of time. An even greater concern is that the external ambient underground environment will also have a material adverse affect on the system. Metal, of course, can rust or corrode if it is not protected. Other materials such as rubber and plastic can degrade and eventually fail when exposed to certain transfer fluids and the ambient underground environment.

Because the petroleum equipment market is becoming more environmentally conscious, a significant shift has occurred from the use of rigid underground piping to the use of flexible piping. Rigid piping has a number of drawbacks, including the fact that it must be laid out accurately with precise angles using 90° elbows, 45° elbows and the like, even when the underground fuel storage tanks and pumps are not properly aligned with respect to each other. A primary reason for this shift from rigid to flexible piping is that flexible piping has many fewer pipe connections than rigid systems, since the flexible system can accommodate virtually any orientation or alignment of the pumps and tanks. With fewer pipe connections, the piping system is perceived by the industry to be more environmentally safe. Movement of the tank due to the shifting tank syndrome buoyancy forces are more easily accommodated by the use of flexible underground piping.

In addition to environmental concerns, flexible underground piping systems have also gained in popularity because these systems are more easily installed than rigid piping systems. Rigid systems require on-site measurements and cutting of each piece, along with the intensive labor involved in making two pipe connections every time the piping undergoes a change in direction. In some cases, flexible underground piping systems have been installed at a lower total cost than that of conventional rigid piping systems.

As part of the development of underground piping systems, it has been found necessary to provide a means of secondary containment for both the primary piping and for the associated fittings in order to provide a margin of safety in case of leaks or damage to the system. A secondary containment pipe offers external protection for the primary supply pipe from the ambient environment and from inadvertent damage, and further, provides for a method of containing the fluid from the primary pipe in the event of a rupture or leak of the primary pipe.

Presently, there are several types of double wall flexible piping systems on the market. These include systems with a small flexible pipe housed in a larger flexible containment pipe. One such system is described in U.S. Pat. No. 4,971,477 (the '477 Patent), wherein access chambers are separated by a secondary containment pipe which in turn is sized to accept a primary pipe within the secondary containment pipe. This system has a number of drawbacks, including the fact that the primary and secondary pipes are installed separately and that fittings are required for each of the two types of pipes. Moreover, because each of the pipes connects with an access chamber, a rapid and simple method of monitoring the condition of the primary piping would not be possible. Sumps of the type in the '477 Patent are capable of being monitored visually by an attendant, but the demand of other tasks eventually leads to fewer and fewer inspections. Most important is that leaks occur randomly, not only just prior to a visual inspection especially when such inspections grow less frequent over time.

As can be seen from the '477 Patent, flexible piping and its secondary containment, as described therein, requires a sump or access chamber each time sections of the flexible pipe are joined together. Most other systems also require a sump at each location where sections of flexible pipe are joined together. Other systems which have met with some degree of success using coaxial pipes and a secondary containment pipe are shown in U.S. Pat. Nos. 5,263,794 (the '794 Patent), and 5,297,896 (the '896 Patent) the entire disclosures of which are incorporated herein by reference. The advantages of flexible pipe systems are well disclosed by these systems. Nevertheless, it is still necessary to make individual connections each time sections of pipes are joined together.

The '794 and the '896 Patents provide various definitions that have become standard in the industry, for example,

"tanks", "pumps", "dispensers" and the like. Also contained therein are extensive descriptions of double wall piping systems which provide for a secondary containment. In a system that employs secondary containment, a primary pipe is designated to carry the petroleum product or other hazardous material from the underground tank to the above-ground dispenser. The primary pipe, also known as the supply pipe, is located inside a larger, outer secondary containment pipe, known also as the containment pipe. Access sumps and other containment components are deployed around the tank pump, underneath the dispenser and at various junctions of piping.

Various types of double wall piping systems are generally disclosed in the '896 Patent and are good examples of the various systems. Among those systems are: (1) a non-flexible fiberglass supply pipe fully contained by a larger non-flexible fiberglass containment piping system; (2) a non-flexible fiberglass or steel supply pipe contained by a combination of larger, flexible and non-flexible polyethylene telescoping containment pipe; (3) a system like the preceding one but with only a larger, non-flexible polyethylene telescoping containment pipe; (4) a fiberglass or steel non-flexible supply pipe contained by a flexible membrane trench liner; (5) a system like the preceding one but with a non-flexible fiberglass trench line; (6) a flexible nylon composite supply pipe contained by a larger flexible polyethylene containment pipe; and (7) a flexible rubber composite supply pipe contained in a larger, flexible polyethylene composite containment pipe.

Some or all of those pipe systems have been utilized in the past. More recently, a significantly more effective pipe system has become available and has met with substantial success in the industry. This more effective pipe system's supply pipe is a flexible double wall pipe comprising an inner pipe and an outer pipe in radial communication with the outside surface of the inner pipe. Most preferred are pipes of this configuration that have internally facing longitudinal ribs on the inner surface of the outer pipe, or externally facing longitudinal ribs on the outer surface of the inner pipe. In either such design, a plurality of circumferentially spaced ribs extend radially from one pipe member to the other pipe member such that the ribs have a surface that confronts and snugly engages the other pipe to define an interstitial space between the two pipes.

The flexible double wall pipe described above is also disclosed in substantial detail in my co-pending Patent Application entitled ENVIRONMENTALLY SAFE UNDERGROUND PIPING SYSTEM, filed Jun. 1, 1993, and having Ser. No. 08/070,271 (the '271 Application), the entire disclosure of which is incorporated herein by reference. These '271 Application co-axial pipes are normally suited for use with hazardous material transfer pipe systems of the type described herein. The inner most layer is formed from a material highly resistant to the hazardous transfer fluid such as nylon, polyethylene or the like. The outer jacket of the double wall pipe, which is exposed to the ambient underground environment, is formed from a material highly resistant to the ambient underground environment that does not degrade over time such as nylon, polyethylene or the like. Between the outer wall of the primary pipe and the inner wall of the containment pipe is an intermediate layer, either in a form of ribs projecting from one surface to the other, or in a standoff layer formed from a cylindrical portion having circumferentially spaced ribs that define the interstitial space between the two pipes. As noted in the '271 Application, other layers can be present in the design, such as intermediate layers formed from materials of lower cost and further, the intermediate layers do not directly contact either the hazardous material being transported or the ambient underground environment.

The environment for both surfaces of the pipe is an important design aspect which needs to be considered. Product components which make up primary or secondary containment systems for hazardous liquids, and in underground applications particularly, must be designed, manufactured and independently tested to insure that they will not fail due to material deterioration. The selection of plastic resin used in these types of product components must be capable of withstanding long term exposure to a variety of anticipated conditions expected in this type of underground system. Some of the most common conditions to which the pipe would be exposed are contact with petroleum fuels, alcohol blended fuels, brown water, microbial growth, high humidity and heat. The product could fail due to degradation and the contained hazardous liquids could then escape into the environment if the wrong plastic were selected. For example, the use of primary and secondary containment products made of exposed polyethylene has already resulted in failures across the United States with reports of leaking products escaping into the surrounding environment. Some plastics, such as polyethylene and nylon, are excellent performers upon exposure to a wide variety of chemicals and conditions and do not chemically degrade when exposed to these chemicals and conditions. The appropriate plastic material, such as nylon or polyethylene, must not have an adverse reaction to water, micro-organisms, solvents, heat, oxygen, sunlight or burning. Products designed for primary and secondary containment of liquid fuels in underground storage and piping applications may expect to be subjected to at least four of these seven conditions at any given time.

The material must be resistant to hydrolysis, as it is expected that water and high moisture conditions will exist in underground burial applications both for contained and non-contained underground piping applications. Some forms of elastomers suffer an irreversible breakdown of the polyester chain when exposed for lengthy periods to hot water, moisture vapor or tropical climates. Exposure of the materials to solvents, such as alcohols found in oxygenated fuels and many fuel additives, must be expected to be present in both contained and non-contained underground piping applications. Tests are available to assure that the plastic materials that have been chosen will resist whatever hazardous material is being transported, such as 90% fuel/10% methanol mixtures. The exposure to micro-organisms must be expected in both contained and non-contained piping applications because of the existence of high moisture and heat. In this type of environment, micro-organisms multiply very rapidly and the enzymes released by these micro-organisms cause breakdown of certain chemical linkages and destruction of some forms of elastomers. Temperatures inside tank sumps have been found to exceed 100° F. due to solar heating of the steel manhole covers located just above the tank sumps.

In all instances, care should be taken to select the appropriate materials so that these materials are nondegradable when contacted by the specific environment in which they are put to use.

In addition to the tanks, pumps, pipes and dispensers that are used in these underground piping systems, there are a number of sumps used as part of the secondary containment system. One sump surrounds the pump on the tank and another sump is generally positioned below each dispensing system. Sumps typically have a base portion, a riser and a lid and are provided with means for permitting piping to enter

and exit the sump. In a typical sump under a dispensing station, a supply pipe and secondary containment pipe will enter one side of the sump base to engage a tee fitting. The fuel is then directed upwardly to the dispensing pump and outwardly through the opposite side of the sump base to the next part of the system. Each time pipes are connected to one another, they are typically enclosed in a sump which, of course, requires an entry port, or so-called boot and an exit boot. Even with the use of flexible piping, the entire arrangement of a complex underground piping system involves the placement of many sumps and other fixtures, all of which are subject to attack by the ambient environment, transfer fluid and to the stresses caused by the shifting tank syndrome as previously described.

As can readily be appreciated, every pipe must eventually end. It then becomes necessary to connect that end of the pipe to either a pump or to a fitting joining two or more other pipes. For the most part the inner, or primary supply pipe, has been directly connected to fittings and the like, and other primary supply pipes have been connected to the other end or ends of the fittings. Merely connecting the inner supply pipes, as in the past, has been no different than connecting a single pipe system. In the evolution of piping systems as discussed above, the relationship of the outer, or secondary containment, pipe to the system has become more complex.

Initially, non-flexible pipes functioning as a containment pipe were attached to the sump or other chambers by merely enlarging the hole to permit entry or exit of the outer pipe from the sump, and later by various fastening and sealing method and devices. Initially, the interstitial space between the inner and outer pipes merely served as a conduit for fluid leakage to flow downhill into the next sump in the piping system, system. Leaks could come from either the inner pipe, spilt fuel, or from the secondary or outer pipe as ambient environmental liquids, such as water, penetrate the outer pipe.

Leak detection initially consisted of opening the sump chamber and inspecting the bottom of the sump for fluid accumulation. Of course, whatever can be visually inspected can be monitored automatically. Systems were proposed for monitoring the liquid levels in the bottom of sumps. However, every sump had to have a monitoring device since each sump by design represented a low point where fluid could collect. The difficulty in such two pipe systems can easily be seen by viewing FIG. 2 of '477 Patent where the outer pipe has a very limited, minor function of simply isolating the primary supply pipe from the ambient environment. Also shown in that Figure, is the way that the interstitial space between the primary pipe and containment pipe merely opened into the larger sumps without any recognition that there may be other purposes for the interstitial space. As is shown in FIG. 3 of the '477 Patent, the secondary containment pipe just serves as a housing or conduit for sections of the primary supply pipe which may be inserted or removed as desired.

In my co-pending '271 Application, I disclosed a connecting boot which substantially improves utilization of the interstitial space. Specifically, the connecting boot comprises a device which fits on one terminal end of a supply pipe, allowing the inner primary supply pipe to extend out from the boot while the outer secondary containment pipe terminates inside the boot. The exit end of the boot where the primary supply pipe exits is clamped to, or otherwise sealingly engages, the outer surface of the primary pipe. The entrance end of the boot, which fits over the exterior of the secondary containment pipe, is also clamped to, or is sealingly engaged with, the outer pipe surface. In between these two sealed ends is a chamber which communicates with the interstitial spaces of the two pipes and also communicates with a radially extending port. An elbow fitting and tube is usually provided which can be connected to the radially extending port and elbow fitting on the adjacent pipe, to which the primary pipe has been attached in a conventional manner. Thus, for the first time, it is possible to connect not only the interstitial spaces of two adjacent pipes but the interstitial spaces of an entire system which are connected to a single monitor. The entire interstitial space of all of the piping is then filled with a liquid to a level which registers in a predetermined range of the monitor indicating a securely contained system. When the level of the fluid in the interstitial space either drops below a certain amount or rises above a certain amount, indicating a change in the system, an alarm will sound.

The test boot, as the '271 Application connecting boot is called, has provided a substantial advance in the hazardous fluid piping system industry, primarily by permitting the interconnections of all of the system wide interstitial spaces. Nevertheless, as can be seen from the drawings illustrating the test boot, it is not as structurally solid as an access sump, for example, and thus still needs to be enclosed in a sump for protection. Even then, over time, it is significantly probable that the test boot may eventually leak and defeat the purpose of system wide interconnected interstitial spaces. Even with the greatest care in selecting the material from which the test boot is constructed and with substantial attention to the assembly of the test boot, shifting tank syndrome and other stresses can eventually weaken the boot, requiring that it be replaced or at least inspected on a regular, periodic basis.

All of the secondarily contained piping systems, access sumps and other equipment described above have been developed over a relatively short period of time. These developments have been in response to a continuously changing industry where environmental and safety regulations are becoming more strict and the industry itself is becoming more concerned. As these developments take place, various manufacturers and other organizations have developed their own design criteria in response to the concerns which they have at the time. Accordingly, none of the systems described above is truly effective in resolving the environmental issues while maintaining an efficient and effective fluid transfer piping system.

There are several additional considerations that need to be addressed in designing connections between sections of pipes, particularly flexible coaxial pipes. First, it is generally desirable to avoid connecting plastic to plastic, since vibration and time will cause a flow of the plastic material so that a truly effective connection is not always secured. A much better seal is achieved when metal and plastic are joined together since the metal does not melt or flow and the plastic tends to accommodate itself to the metal. However, in such cases it is necessary to protect the metal from the environment to avoid an otherwise potentially corrosive and unsafe condition. Coatings on metal often times peel off or become damaged during handling of the metal parts. Also, if the coatings are sufficiently thick, the necessary metal to plastic contact to establish an effective seal is not achieved.

As will be apparent from reviewing the above referenced patents, there is an interstitial space between the inner primary supply pipe and the outer secondary containment pipe. This interstitial space in the past has been used as a means for transferring leaked fluid into the containment sump or access chamber. Typically, in early systems, the access chambers were inspected on a regular basis to see if quantities of fluid had collected. This of course does not

provide a rapid response to a major leak of fluid such as fuel from the primary supply pipe.

As shown in the '794 and the '876 Patents, the entire system is connected such that the primary pipe functions as a closed system, transporting fuel from the supply tank to the various dispensers. However, the interstitial space between the primary supply pipe and the secondary containment pipe is, at least in '477 Patent merely a conduit allowing leaked fluid to flow to an access chamber for observation. Although it is possible to monitor the conditions of one or all of the access chambers, for example by visual inspection, no simple method of monitoring the entire system is possible.

Accordingly, a principal object of the present invention is to provide an underground piping system which employs coaxial pipe, such as those pipes described above, which include a primary supply pipe and a secondary containment pipe, in which the interstitial space between the two pipes can be connected to the interstitial spaces in other segments of piping to form a continuous closed system of interstitial space.

Another object of the present invention is to provide a coupling assembly for use with coaxial pipes which permits coupling of the interstitial space between the coaxial pipes with corresponding interstitial spaces in other segments of pipe.

Still another object of this invention is to provide a coupling assembly which facilitates connection of a plurality of coaxial pipes without the use of containment chambers or sumps.

Yet another object of this invention is to provide a coupling assembly in which the seal between the pipes is accomplished by a plastic on metal seal in a manner that protects the metal portion of the seal from exposure to the environment so that the coupling assembly will operate effectively underground without additional protection from sumps and the like.

Finally, it is an object of this invention to provide an underground piping system that can be directly buried in the ground without the needs for sump devices at every junction of pipes or fittings and without the need for separate secondary containment of any type.

Other objects will appear hereinafter.

SUMMARY OF THE INVENTION

It has now been discovered that the above and other objects of the present invention may be accomplished in the following the manner. Specifically, an improved pipe coupling assembly has been discovered which permits junction of a variety of pipe segments, particularly those having an inner wall, an outer wall and an interstitial space between those walls. The pipe coupling assembly attaches to these pipe segments at the coupling end of the pipe segments and thereby defines a direction of flow from the pipe segments to the next part of the system. The system for transporting hazardous fluids in an underground piping system has also been discovered that provides many improved features. As part of the present invention, an improved coupling assembly, system and method are also provided for joining flexible co-axial pipe segments and their fittings.

The present invention provides the following advantages. The coupling assemblies of the present invention have a double wall design and provide for interstitial transition in ways which have previously not been possible. The seal is extremely effective, employing a double O-ring seal and a mechanically locked seal. The mechanical closure further has a back-off restrictor locking lug device that prevents vibrations from causing back-off of the mechanical lock. The components of the present invention are formed from non-permeable, nondegradable plastic materials such as nylon and polyethylene, and all metallic pans are totally protected from the external ambient underground environment of the piping system. The coupling portion of the present invention effectively seals the inner tubular member and the outer tubular member simultaneously. Riser pipes formed from steel and other metals may be secondarily contained and dielectrically isolated from the environment.

One major advantage of the present invention is that it permits the interstitial space of the entire piping system to be interconnected into one closed system. Thus, the interconnected interstitial space can be subjected to pressurized air or preferably pressurized nitrogen, to test the entire system at one time. Moreover, liquid or gas interstitial monitoring is readily obtained using the present invention. The most important advantage of the present invention is that all couplings, fittings and connectors are non-metallic and nondegradable so that they may be buried directly in the ground without the need for any additional protection.

The present invention will provide a number of benefits to the industry. Installation will be much faster and more efficient, and the system will not corrode. The system can be directly buried in the soil, eliminating the need for costly containment chambers because the fittings, couplings and adapters are made of a impermeable plastic resin that prevents long term surrounding contamination. Additionally, the pipe coupling assembly, system and method is capable of withstanding stress from movement of the system as tanks are filled and emptied and as water tables effect the components of the system.

The present invention is suited for long term secondary containment of hazardous fluids which are transferred in underground systems. In terms of monitoring, the present invention provides for a totally contained, interconnected, interstitial space which is capable of withstanding higher internal pressure, in part because test boots have been eliminated. Further, this system can be used either alone or in conjunction with known fluid detection systems.

The coupling assembly includes a ferrule attached to the outer wall of the pipe segment at the coupling end. The ferrule has an outer annular ring extending from the coupling end of the pipe segment in the axial direction of flow. The ferrule also has a pocket which aligns with the interstitial space of the pipe segment to define and present a chamber at the coupling end for communication with other pipe segment interstitial regions via channels in the ferrule.

The coupling assembly further includes an insert, preferably made of metal, which is attached to the inner wall of the pipe segment at its coupling end. The insert, which is expanded into the inner tubular member wall, includes an inner annular ring extending from the coupling end of the pipe segment in the direction of fluid flow.

The second component of the coupling assembly is an externally threaded transition fitting which is to be attached to the ferrule. The transition fitting includes a channel which is aligned with the chamber of the ferrule. The transition fitting further includes an outer seal channel for sealing engagement with the outer annular ring on the ferrule. The transition fitting still further includes an inner seal channel for sealing engagement with the inner annular ring on the metal insert. By bringing the transition fitting into contact with the ferrule and metal insert, a metal to plastic seal is achieved. Moreover, the interstitial space from the pipe

segment through the ferrule to the transition fitting is effectively sealed by the interaction of the annular rings and the sealed chambers. A final component of the coupling assembly is a coupling device for locking the coupling assembly, such as a swivel nut which is keyed to the ferrule to prevent removal in the axial flow direction, although it is removable in the direction opposite the axial flow.

The invention also includes a system as well as a method in which an underground source of liquid or fluid is connected to at least one dispenser for the fluid by a double wall coaxial pipe having an interstitial space, with the connection being accomplished using the coupling assembly described alone. A direct burial system is possible for the first time, using the present invention in its preferred embodiment.

The integrity of the system is tested by applying pressure or vacuum to the interconnected interstitial spaces of the pipe segments which have been formed into a closed system. Obviously, if the pressure or vacuum does not hold over a reasonable period of time, the system has one or more fluid leaks. The fittings and other components can then be inspected to locate the leaks. Moreover, after the entire system has been operating, the interstitial space may again be subjected to pressure or vacuum to test for leaks.

It is also possible, in accordance with this invention, to continuously monitor the interstitial space. To do so, a test fluid is added to the interstitial space of the closed system to fill the entire interstitial space. This test fluid is then monitored, either visually or automatically, so that a sudden or gradual increase or decrease in the amount of test fluid in the interstitial space will indicate that the system has failed and that a leak exists. For example, if the inner tubular member were to be damaged for whatever reason, a substantial increase in fluid in the interstitial space would occur, causing the fluid level in the monitoring device to rise. Similarly, if the outer tubular member were to break, the test fluid would leak into the ambient environment and the fluid level in the monitoring device would drop indicating that break in the system. In all cases, controls are provided to override any pumps in operation at the time, shutting down the system where necessary.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the present invention of the various details of the operation and construction thereof are hereinafter more fully set forth with reference to the accompanying drawings, wherein:

FIG. 1 is a schematic illustration of an underground piping system for delivering petroleum products from an underground supply tank to various above-ground dispensing units incorporating a coupling system in accordance with the present invention;

FIG. 2 is a an enlarged fragmentary sectional, elevational view of the detail contained in the dot and dash box of FIG. 1 and designated as FIG. 2 showing the details of a coupling in accordance with the present invention connecting a pipe riser to one of the underground piping system;

FIG. 3 is an enlarged sectional view taken along the lines of 3—3 of FIG. 2 showing details of the transition coupling in accordance with the present invention;

FIG. 4 is an enlarged sectional view taken along the lines 4—4 of FIG. 2 showing the interstitial spaces or channels in the co-axial piping segments;

FIG. 5 is an enlarged fragmentary sectional, elevational view of the detail contained within the dot and dash box of FIG. 1 and designated FIG. 5 showing details of the transition coupling and T transition fitting;.

FIG. 6 is an enlarged fragmentary sectional view of the details contained within the dot and dash box of FIG. 5 and designated FIG. 6 of the transition coupling and a portion of the tee fitting;

FIG. 7 is an exploded sectional view similar to FIG. 6, prior to assembly of the transition coupling to the transition tee fitting;

FIG. 8 is a view taken on lines 8—8 of FIG. 7, showing the axial end face of the transition coupling;

FIG. 9 is a view taken on lines 9—9 of FIG. 7, showing the axial end face configuration of the transition tee fitting;

FIG. 10 is a sectional view taken on lines 10—10 of FIG. 7;

FIG. 11 is an enlarged fragmentary elevational view of the details contained within the dot and dash box of FIG. 1 and designated as FIG. 11 with parts broken away to show the construction of the various elements including an embodiment of transition coupling and transition fitting in accordance with the present invention;

FIG. 12 is a sectional plan view taken on lines 12—12 of FIG. 11;

FIG. 13A, 13B and 13C, are various elements or components of a transition coupling in accordance with the present invention;

13D is a transition tee fitting in accordance with the present invention;

FIG. 13E is a side, elevational view of a transition elbow fitting in accordance with the present invention;

FIG. 13F is a side, elevational view of a connector fitting in accordance with the present invention;

FIG. 13G and 13H are female and male adapters;

FIG. 13I is an exploded view of a shear valve adapter;

FIG. 13J is an exploded view of the elements comprising a riser adapter;

FIG. 14 is an exploded view of parts shown in sections of the elements of the transition coupling prior to assembly to a co-axial pipe segment;

FIG. 15 is a sectional view showing the transition coupling prior to expansion of the coupling insert to secure the transition coupling to the co-axial pipe section;

FIG. 16 is a view similar to FIG. 15 after outward swaging of the coupling insert; and

FIG. 17 is an exploded side elevational view showing a slightly modified transition coupling and associated pipe disengaged from a slightly modified elbow fitting, the modifications consisting of a circumferentially extending equally spaced anti-rotation saw teeth on the terminal end face of the swivel nut and a tang projection on the fitting that interengages with the saw teeth of the coupling, allowing free rotation in one direction only.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and particularly to FIG. 1 thereof, there is shown schematically an underground piping system for conveying petroleum products from an underground storage tank to a plurality of above-ground dispensing pumps. The piping system incorporates a novel coupling means in accordance with the present invention. More specifically, the pipe coupling assembly of the present invention is particularly adapted for interconnecting the interstitial regions in the piping to provide a closed, continuous monitoring system for detecting leaks that has certain advantages over prior art piping systems used for this purpose.

As best illustrated in FIG. 1, the basic elements of a pumping system include a storage tank T for containing a large quantity of a petroleum product, connected to a pump P housed in a sump S. As shown in FIG. 2, pipe segment P_s extends through a hold in the wall of the sump S, and is flexibly mounted in a flexible entry boot assembly B. The pump P is connected to a piping system comprising a plurality of interconnected pipe segments P_s and pipe risers P_r to conventional product dispensers D located above ground. Shear valves V_s are located in predetermined locations in the piping system to provide a means for shutting down delivery of petroleum products under certain operating conditions. A monitoring system broadly designated M is provided for detecting leaks in the underground piping system which essentially detects variation in the pressure of the interstitial spaces which are connected in a manner to define one closed circuit or path. The system provides early warning of leaks in the underground piping system and thereby to minimize chances of contaminating the underground environment.

The pipe segments P_s are preferably co-axial pipes of the type shown and described in my co-pending application entitled ENVIRONMENTALLY SAFE UNDERGROUND PIPING SYSTEM, filed Jun. 1, 1993, Ser. No. 08/070,217, (the '217 Application) and commercially available under the trademark GEOFLEX™ which comprises an inner tubular member P_i made of a nondegradable or inert material with respect to the petroleum products being handled in the piping system such as nylon or polyethylene and an outer tubular member P_o made of a nondegradable or inert material when exposed to the ambient environment such as nylon or polyethylene and thus is suitable for direct burial applications. The co-axial pipe also has a series of circumferentially spaced longitudinally extending ribs defining a series of longitudinal interstitial spaces or passageways S_i extending from end to end in the pipe segments P_s. Even though the present invention is shown and described in association with co-axial GEOFLEX™ pipe of the type described, the invention has application in other piping systems utilizing pipes having different or larger interstitial spaces between the elements of each piping section such as, for example, the space between a primary pipe housed in a secondary containment pipe as shown in the '477 Patent. Further, even though the interstitial space S_i in the pipe illustrated and described herein is defined by longitudinally extending ribs, it is to be understood that the interstitial space can be defined by other means such as axially aligned spacing members or helically wound spacing members as long as the interstitial space is continuous and provides a continuous fluid flow channel between the ends of the pipe segments P_s.

The coupling assemblies of the present invention incorporate novel structure and means for connecting the pipe segments P_s to facilitate monitoring of all of the elements of the underground piping system, including the coupling assemblies, utilizing a minimum number of parts which are easy and economical to assemble and are capable of direct burial applications without the need for utilizing additional secondary containments. To this end, the coupling assemblies incorporate novel arrangements of internal channels connecting the interstitial spaces S_i of the pipe segments P_s to one another in a closed circuit. The arrangement provides very precise and accurate monitoring which is capable of detecting leaks in the underground piping system.

The coupling assemblies comprise a transition coupling C_t assembled to terminal ends of the pipe segments P_s and a transition fitting F_t in the form of tee fittings or elbow fittings to which the transition couplings C_t can be readily assembled. The transition couplings C_t and transition fittings F_t having a novel arrangement of passageways and internal channels to fluidly link the interstitial spaces S_i of the pipe segments P_s in the manner described in more detail hereinafter. The transition couplings C_t and the transition fittings F_t are also characterized by novel features of construction and arrangement providing simple and effective sealing of the elements relative to one another, easy and quick application to pipe segments and assembly together at an underground site, and providing exceptional shear strength resisting possible failure when relative movements occur in the underground piping system due to settling or shifting of various components of the system such as the supply tank T or other components by the shifting tank syndrome.

Considering broadly the basic components of a coupling assembly in accordance with the present invention, the assembly comprises a transition coupling C_t mounted on the terminal end of a pipe segment P_s including a metal insert, a ferrule F circumscribing the outer peripheral surface of the outer tubular member P_o of the pipe segment P_s and a swivel nut N for securing the transition coupling C_t to a transition fitting F_t. The components of the transition coupling C_t and transition fitting F_t which are exposed to the ambient environment are preferably made of a nondegradable material such as nylon or polyethylene. The transition coupling C_t and transition fitting F_t are provided with internal channels or passageways, ports, and chambers to provide a direct fluid communication between the interstitial space S_i of the pipe segments P_s which are connected together by the coupling assemblies whereby the components of the underground piping system can be monitored via the interconnected interstitial network.

Considering now more specifically the structural detail and arrangement of a coupling assembly in accordance with the present invention, and considering first the details of the transition coupling C_t, the transition coupling C_t comprises an elongated hollow tubular sleeve member **30** engaging interiorly of the inner tubular member P_i of the pipe segment P_s which as illustrated in FIG. **14**, is initially of an outer diameter D_o less than the inner diameter D_i of the inner tubular member P_i to freely engage therein. The sleeve member **30** is preferably made of a metal such as stainless steel and other alloys which are deformable by a swaging operation to seat and firmly engage the transition coupling C_t to the end of the pipe segments P_s in a manner described in more detail below. The hollow tubular sleeve member **30** has a series of circumferentially extending axially spaced, beveled ribs **32** formed on its outer periphery defining teeth **34**. Each tooth **34** has a rearwardly and outwardly beveled face **36**. By this arrangement, when the sleeve **30** is expanded radially outwardly by swaging, the teeth **34** engage into the inner peripheral surface of the inner tubular member P_i in the manner shown in FIG. **16** and the sleeve **30** is firmly locked in place once assembled. Additionally, even if the sleeve **30** initially fits the inner peripheral surface rather snugly, the direction of the beveled faces **36** is such that the sleeve **30** may be pushed into place rather easily.

As shown in FIG. **14**, the inner end of the sleeve **30** has an offset, frusto conical outwardly directed wall **40** terminating in a short, axially directed circumferentially extending sealing flange or lip **42**. A locating rib **44** projects radially outwardly from the outer surface of the sleeve **30**. The locating rib **44** engages the outer axial end face of the inner tubular member P_i of the pipe segments P_s to locate the transition coupling C_t in the proper position relative to the pipe segments P_s to properly align a manifold in the ferrule F relative to the axial ends of the interstitial spaces S_i in the pipe segments P_s in a manner to be described in more detail below.

The rib **44** and frusto conical wall **40** define a circumferentially extending locating groove **46** defining a seat for a locating rib or flange on the ferrule F which aligns the ferrule F and sleeve **30** in a pre-determined axial alignment relative to one another to be described in more detailed hereinafter wherein the assembly of these components to the transition fitting F_t are set forth.

Consider now more specifically the structural details of the ferrule F. As best illustrated in FIGS. **7** and **14**, the ferrule F comprises an elongated hollow tubular sleeve member **50** having a series of circumferentially extending axially spaced inwardly beveled ribs **52** formed on its inner periphery defining teeth **54** for locking engagement with the outer peripheral surface of the pipe segments P_s. Each tooth **54** has a beveled rearwardly directed face **58** permitting easy application of the ferrule F over the outer peripheral surface of the pipe segments P_s in one direction, an assembly direction, and, when fully assembled as shown in FIG. **16**, resists axial displacement of the ferrule F to firmly lock the ferrule F in place in the assembled position.

The inner surface of the ferrule F as illustrated is of a stepped configuration defining an inner section of teeth **54**^{a} having a predetermined diameter D_5 and a rearward section of teeth **54**^{b} having a smaller diameter D_6 to snugly embrace the outer peripheral surface of the inner tubular member P_i of the pipe segment P_s. The ferrule F has a circumferentially extending groove **60** at the juncture of the teeth segments **54**^{a} and **54**^{b} and a plurality of circumferentially spaced axial passageways **62**, extending from the groove **60** to the inner axial end face of the ferrule F, the groove **60** defining an annular manifold or chamber C in the assembled relation as shown in FIGS. **7** and **15** communicating with the interstitial spaces S_i of the pipe segment P_s to provide a direct fluid communication from the interstitial spaces S_i through the ferrule F.

A circumferentially extending radially inwardly directed rib **64** is provided on the inner end of the ferrule F which engages in the locking groove **46** of the sleeve **30** to properly align the sleeve **30** and ferrule F relative to one another and to locate it in the desired position on the axial end of a pipe segment P_s in a manner described in more detail below.

The ferrule F also includes a rearwardly directed circumferentially extending lip **70** disposed radially outwardly of the axial passageways **62** which overlies and is concentric to the inner flange **42** of the sleeve **30** to define a pocket **68** therebetween.

The swivel nut N as best illustrated in FIG. **6** has a series of spiral threads **72** formed therein which interengage and mate with spiral threads **73** on the transition fitting F_t to secure the coupling elements in place in a manner shown in FIG. **6**. The swivel nut N has an opening **74** in its outer one end to freely fit over the ferrule F. The opening **74** is spaced inwardly from the side wall or skirt **76** to define a circumferentially extending shoulder **78** which abuts an outwardly directed lug **80** (FIG. **14**) on the ferrule F to hold the parts of the transition coupling C_t in place in the manner shown in FIG. **6** when the swivel nut N is threaded onto the transition tee fitting in the manner shown.

As shown in FIG. **17**, the inner axial end face **84** of the swivel nut N may be provided with a series of rachet teeth **86** which cooperate with a locking lug L on the transition fitting F_t when the parts are fully seated to lock the parts of the coupling in the assembled relation.

There are various types of transition fittings F_t as illustrated in the drawings. Consider first the structural arrangement and details of a transition tee fitting F_t generally designated by the numeral **100** adapted for connecting pipe segments P_s in the underground piping system to one another and to a pipe riser P_r in the manner illustrated for example, in FIG. **5**. To this end, the tee fitting **100** comprises a T-shaped hollow body **102** having a pair of horizontally aligned legs **104** and **106** and a vertically disposed leg **108**. The outer terminal ends of the legs are provided with spiral threads **104**^{a}, **106**^{a} and **108**^{a} respectively, cooperatively engagable by a swivel nut N to secure the elements of the coupling in the manner illustrated. A plurality of through ports or channels **110**, in the present instance four (4) is provided in the body portion of the tee fitting **100** which extend between the opposing axial end faces **104**^{b} and **106**^{b} of the horizontal legs **104** and **106** of the tee fitting **100**. A plurality of through ports or channels **112** are also provided in the body **100** of the tee fitting which extend from the axial end faces of the horizontal legs **104** and **106** of the tee fitting **100** to the axial end face **108**^{b} of the vertical leg **108**. In the present instance, the through ports or channels **110** and **112** are disposed on a circular trace C_1 having generally the same diameter as the axial passageways **62** in the ferrule F so that they are generally axially aligned in the same plane in the assembled relation as shown in FIG. **5**. This relationship is also true of the through ports or channels **112**.

As best shown in FIG. **7**, a pair of radially spaced, circumferentially extending pockets **120** and **122** are formed in the opposing axial end faces of the horizontal legs **104** and **106** of the tee fitting **100** which straddle the through ports or channels **110** and **112**. Flanges **42** and **70** of the transition coupling C_t engage in the pockets **120** and **122** when the coupling assembly is fully assembled. O-rings, **124** and **126** are mounted in the pockets **120** and **122**, respectively, to provide a tight, sealing engagement of these parts to resist leakage from the interstitial region thereby providing highly accurate monitoring in the manner described herein.

In the present instance, the peripheral wall of the vertical leg **108** of the tee fitting **100** is threaded to facilitate assembly of the pipe riser P_r. Vertical leg **108** is also provided with external screw threads to accommodate a modified form of swivel nut N and a suitable seal forming part of the connection to the pipe riser P_r.

Consider now assembly of a co-axial pipe P_s in a piping system of the type shown to the horizontal legs **104** and **106** of the tee fitting **100**. The outer tubular member P_o of the pipe segment P_s is prepared for application of the transition coupling C_t by trimming the outer tubular member P_o to expose a portion of the inner tubular member P_i at its axial end. The axial length L is predetermined so that when the pipe segment P_s is inserted into the annular space between the ferrule F and the insert sleeve **30**, the inner edge of the axial passageway **62** is generally aligned with the axial end face of the trimmed outer tubular member P_o to provide a circumferentially extending alignment of groove **60** with the interstitial spaces or channels S_i at one end of the pipe section P_s. It is noted that when the pipe section P_s is positioned between the ferrule F and the sleeve **30**, the axial end of the inner tubular member P_i abuts the locating rib **44** on the sleeve **30** to position the manifold or groove **60** in the manner described (see FIG. **15**). In this position, a swaging tool **130** is pulled through the sleeve **30** to press it radially outwardly so that the confronting teeth **54**^{a} and **54**^{b} on the ferrule F and the teeth **34** of sleeve **30** penetrate the inner and outer tubular members P_i and P_o of the pipe segments P_s to firmly lock the parts in place.

The circumferentially extending flanges **42** and **70** of the ferrule F and sleeve **30** are then aligned with the circumferentially extending pockets **120** and **122** in the axial end

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(54) **SELF-FLARING, SPLIT BUSHING PIPE FITTING AND HOSE ASSEMBLIES EMPLOYING SAME**

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(*) Notice: Under 35 U.S.C. 154(b), the term of this patent shall be extended for 0 days.

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(52) **U.S. Cl.** **285/55**; 285/334.5; 285/354; 285/903; 285/422

(58) **Field of Search** 285/334.5, 354, 285/903, 55, 422, 332

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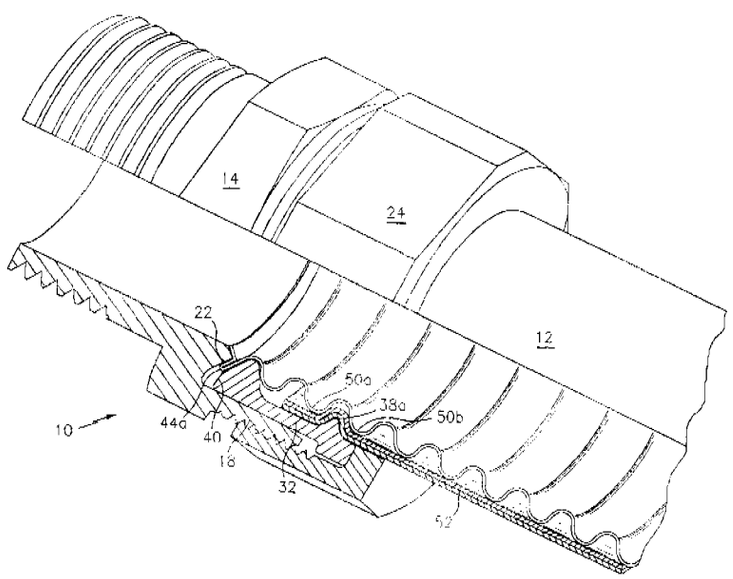
(57) **ABSTRACT**

A self-flaring fitting assembly for semi-flexible, convoluted tubes or pipes is provided. The inventive fitting assembly, which basically comprises an adaptor, a nut, and a split bushing assembly, eliminates the need for sealing gaskets, is reusable, and further facilitates the ease and speed of installation of semi-flexible piping systems. When used with jacketed tubing, the present inventive fitting assembly is capable of both preventing the undesirable movement of the jacket during installation and assembly and of reducing or eliminating exposure of the tubing located within the fitting assembly to contaminants or corrosive materials found in the surrounding environment.

26 Claims, 5 Drawing Sheets



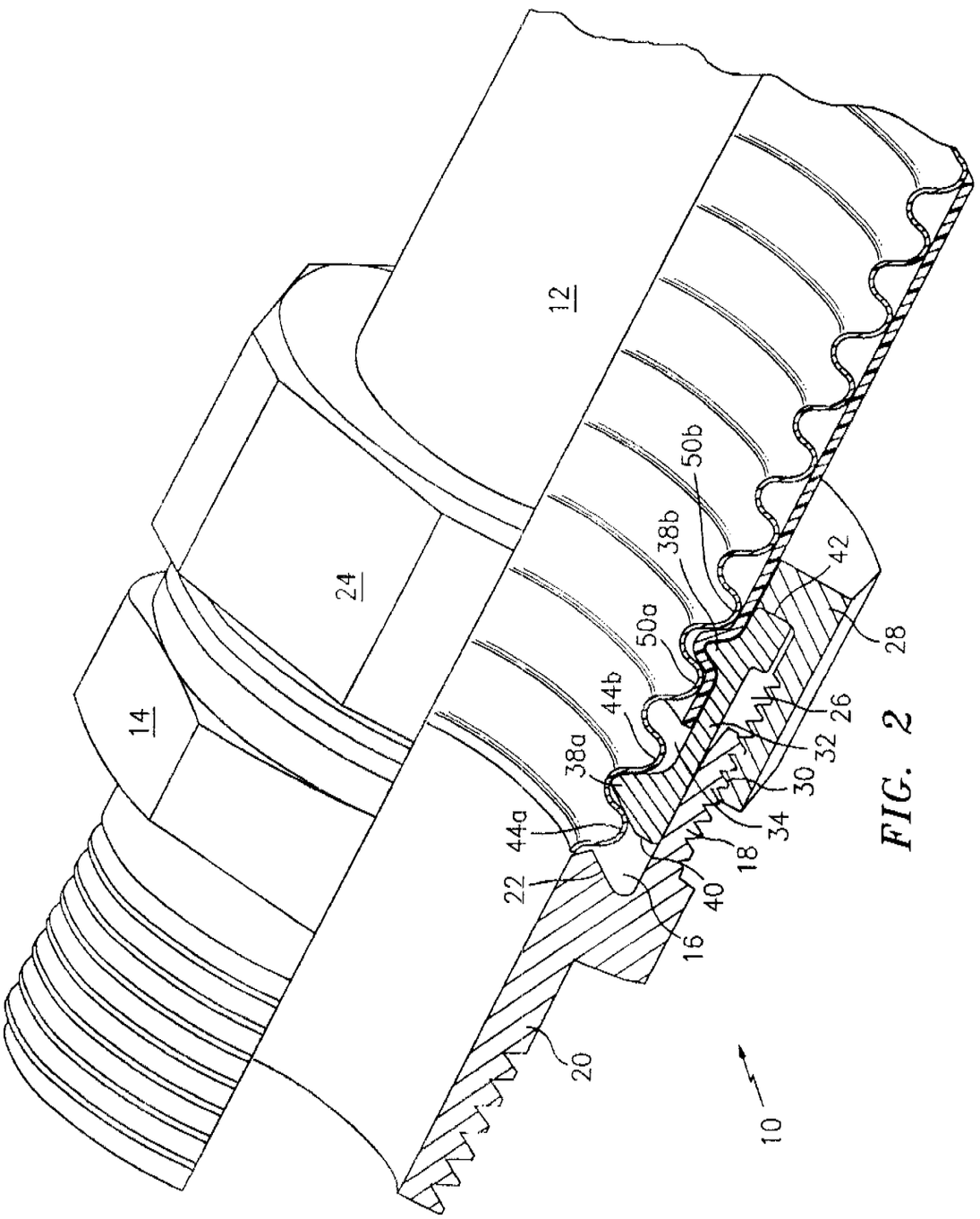


FIG. 2

The foregoing and other features and advantages of the present invention will become more apparent from the following description and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cross-sectional view of a prior art convoluted pipe fitting manufactured and sold Ward by Manufacturing, Blossburg, Pa., under the trade designation WARDFLEX™;

FIG. **2** is a cross-sectional view of a partially assembled fitting assembly constructed in accordance with a preferred embodiment of the present invention;

FIG **3** is a cross-sectional view of the fitting assembly of FIG. 2 that has been fully assembled; and

FIG. **4** is a cross-sectional view of another preferred embodiment of the present invention that employs a termination fitting.

FIG. **5** is a cross-sectional view of a fully assembled fitting assembly positioned on a jacketed, reinforced convoluted tube in accordance with a preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The present inventive pipe fitting assembly will be described hereinbelow mainly in association with interior fuel gas piping systems. However, the invention is not so limited. The inventive pipe fitting assembly can also be used for any convoluted hose application including, but not limited to, those applications dedicated to the transfer of chemicals, liquid petroleum, water and steam.

Moreover, although the inventive fitting assembly is described hereinbelow mainly in conjunction with convoluted stainless steel tubing or CSST, any type of semi-flexible tubing that can accommodate a wide variety of corrosive or aggressive fluids is envisioned, including, but not limited to, semi-flexible tubing made from thermoplastic, metal or metal alloy materials such as olefin-based plastics (e.g., polyethylene (PE)), fluorocarbon polymers (e.g., polytetrafluoroethylene (PTFE)), carbon steel, copper, brass, aluminum, titanium and nickel alloys.

Specific reference is now made to FIG. **1**, which depicts a prior art fitting, marketed under the trade designation WARDFLEX™, which is shown generally at **100**. The WARDFLEX™ fitting **100** is used in conjunction with jacketed, convoluted tubing **102** and is basically comprised of: an adaptor **104**; a nut **106**; adjustable interengaging means **108** on the nut **106** and on the adaptor **104**; a split retainer **110**; and a fiber sealing gasket **112**. The adaptor **104** has a pipe receiving bore **114** and a first section **116** and a second "reduced diameter" section **118** separated by a perpendicular stop shoulder **120**. The nut **106** has a pipe receiving bore **122** and a "reduced diameter" first end **124**, while the split retainer **110** has a bore **126**, two opposing arcuate sections **128***a, b* (not shown); three contiguous internal ribs **130***a, b, c;* and a first end **132** that is engageable with the "reduced diameter" first end **124** of the nut **106**.

When assembling the WARDFLEX™ fitting **100** on the jacketed tubing **102**, the jacket is first cut back from the end so as to expose at least seven convolutions on tubing **102**. The exposed end is then fed through the nut **106** and the split retainer **110** positioned thereon three convolutions back from the end. In particular, the internal ribs **130***a, b, c* of split retainer **110** each fit against and conform to circumferential grooves located between convolutions **134***a, b, c, d* of the jacketed tubing **102**. The fiber sealing gasket **112** is then fixed in position against the stop shoulder **120** of adaptor **104** and the nut **106** moved in threaded engagement toward the adaptor **104**. As the nut **106** moves toward the adaptor **104**, the three convolutions located between the split retainer **110** and the gasket **112** become compressed and thereby assumably form a gas tight seal. In the resulting fitting assembly, the jacket is not secured or locked in place by fitting **100** and the split retainer **110** is mechanically compressed only against the exposed end of tubing **102**.

As will be readily evident to those skilled in the art, non-metal, fiber gaskets must be handled carefully in order to avoid contamination and to prevent cutting or scoring the gaskets during assembly or damage resulting thereto from overtightening the fitting assembly. Moreover, fiber gaskets are adversely affected by weather, moisture and freeze-thaw cycles and therefore fitting assemblies that employ such fiber gaskets must be monitored to assure maintenance of gas tight seals.

Referring now to FIG. **2**, a partially assembled fitting assembly constructed in accordance with a preferred embodiment of the present invention is shown generally at **10**. The inventive fitting assembly **10** is shown in conjunction with jacketed, convoluted tubing **12** and is basically comprised of: an adaptor **14** having a pipe receiving bore **16**, which comprises: a first section **18** having a diameter a; a second section **20** having a reduced diameter b; and a radially inwardly extending interior stop shoulder **22**; a nut **24** having a bore **26** and a stop shoulder **28**; adjustable interengaging means **30** on the nut **24** and on the first section **18** of the adaptor **14** for moving the nut **24** in threaded engagement toward the adaptor **14**; and a split bushing assembly **32** having a bore **34**, which comprises: a pair of oppositely disposed, alignable, substantially arcuate and semi-circular bushing halves **36***a, b* (not shown) that when assembled together, define a circular opening; at least two spaced internal ribs **38***a, b* that serve to lock bushing halves **36***a, b* in place on an end of tubing **12**; a first end **40** which is engageable with the radially inwardly extending internal stop shoulder **22** of the adaptor **14**; and a second end **42** which is engageable with the stop shoulder **28** of the nut **24**. As will be readily apparent to those skilled in the art, internal ribs **38***a, b* are adapted to engage circumferential grooves on convoluted tubing **12**. Opposed bushing halves **36***a, b* engage the same grooves, which extend circumferentially around the tubing **12**. In this manner, the bushing halves **36***a, b* are substantially locked in place over the end of tubing **12**.

The second section **20** of adaptor **14** may adopt any configuration necessary to adapt it to the respective piping system. For example, second section **20** may adopt a step or normal "T", 45° or 90° configuration.

Moreover, nut **24** may also be modified to adopt any necessary configuration. For example, and as best shown in FIG. **4**, the nut **24** can be modified to accommodate a termination fitting **46**. In particular, nut **24** may further comprise a first section **48** capable of threadably engaging termination fitting **46**.

Contemplated materials for use in making adaptor **14**, nut **24**, and split bushing assembly **32** include thermoset resins such as phenolics, acrylics and epoxies, thermoplastic resins such as polyamides, styrenic polymers (e.g., ABS) and fluorocarbon polymers (e.g., PTFE), and metal and metal alloy materials such as carbon steel, copper, brass, aluminum, titanium, stainless steel and nickel alloy. In a preferred embodiment adaptor **14**, nut **24** and bushing assembly **32** are made of a brass alloy. The above-referenced

176

177

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIVISIÓN DE NUEVAS CREACIONES

202086
Bogotá, D.C.,

Abogado
DARIO CARDENAS NAVAS

ASUNTO	Radicación	05096668
	Trámite	011
	Evento	378
	Actuación	430
	Oficio	
	Folios	23

Patente de Invención	[X]	Patente de Modelo de Utilidad			[ ]
Vía Nacional	[ ]				
Vía PCT (fase nacional)	[X]	Cap.I	[X]	Cap. II	[ ]

No. Sol. Internacional PCT/US2004/008943
Fecha de Presentación Internal. Marzo 24 de 2004

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 le comunica:

1. Documentos estudiados

Descripción:	Folios: 51 a 55
Reivindicaciones:	Folios: 154 a 156
Dibujos:	Folios: 157 a 158
Prioridad:	Folios: 14 a 23 Marzo 26 de 2003. US 60/458.110
Rta. del Solicitante:	Folios: 143 a 152

2. Objeto de la invención

- Título de la solicitud: "SISTEMA DE CONTENCION EN TUBERIA" (folio 51).
- Objeto de la invención: la presente solicitud se refiere a un sistema de contención de tubería que tiene como objetivo retener líquido si la tubería gotea.

El solicitante dice que una incorporación del invento es un sistema de tubería que incluye una manga impermeable que tiene una pluralidad de bordes longitudinales espaciados formados en el interior de la manga. Un acople que tiene un primero y segundo extremo, el primero tiene roscas interiores que se enganchan con la superficie externa de la manga. El acople tiene una apertura en la comunicación fluida con el interior de la manga. El sistema de contención de tubería incluye una tubería (12) y el manguito (14) están contenidos dentro de una manga (16). La manga (16) puede ser de un material impermeable a fluidos como de polietileno u otro polímero adecuado que permita que los fluidos (por ejemplo gas, líquido, etc.) fluyan hasta los extremos de la manga (16) para ventilación. A cada extremo de la manga (16) existe un acople (18) que tiene un primer extremo (22) que cubre la superficie externa de la manga (16). Un sello (24) puede estar localizado en el primer extremo (22). El acople (18) incluye un hombre (26) que sirve como un tapón para limitar la profundidad de inserción de la manga (16) dentro del acople (18). El hombro (26) termina antes del manguito (14) para proporcionar paso a la apertura del orificio de ventilación (28). El acople (18) estará preferiblemente roscado y puede ser de polietileno u otro polímero mas fuerte que el de la manga (16), aunque también dicho acople puede ser de metal. Se proporcionan uno o mas orificios de ventilación (28) en el acople (18) localizado hacia el segundo extremo (30) del acople (18). Los orificios de ventilación (28) permiten que el fluido que se escapa de la tubería (12) salga de manera controlada a través del orificio de ventilación (28), se puede conectar una manguera u otro conducto al orificio (28) para desviar el fluido que se escapó.

- El objeto de la solicitud definido anteriormente se clasificó de acuerdo con el IPC así: ***F16L25/00; F16L39/02***.

3. De la solicitud de Patente

3.1. Reivindicaciones *(artículo 30 D 486)*

Sobre el **capitulo reivindicatorio** (folios 154-156) se hacen las siguientes observaciones y sugerencias:

- Se sugiere al solicitante incluir dentro de todas las reivindicaciones los números de referencia de cada uno de los elementos que hacen parte de la invención, de acuerdo con la numeración empleada en los dibujos (figuras 1 a 4), con el fin de hacer mas fácil y sencilla la comprensión de la materia objeto reivindicada.

4. Determinación del Estado de la Técnica

Teniendo en cuenta que la fecha de de prioridad reivindicada es 26 de marzo 2003, se encontró el siguiente documento relevante:

N.	Documento	Titulo	Fecha de publicación
D1	US5713607	PIPE COUPLING ASSEMBLY, SYSTEM AND METHOD	03-02-1998
D2	US6173995	SELF-FLARING, SPLIT BUSHING PIPE FITTING AND HOSE ASSEMBLIES EMPLOYING SAME	16-05-2001

~~179~~

5. Análisis de patentabilidad (artículo 81 D486)

5.1 Nivel inventivo (artículo18 D486)

Basándonos en el estudio de la invención y del estado de la técnica, se realizó el siguiente análisis:

Respecto de la solicitud de patente de invención esta revela el siguiente dispositivo:

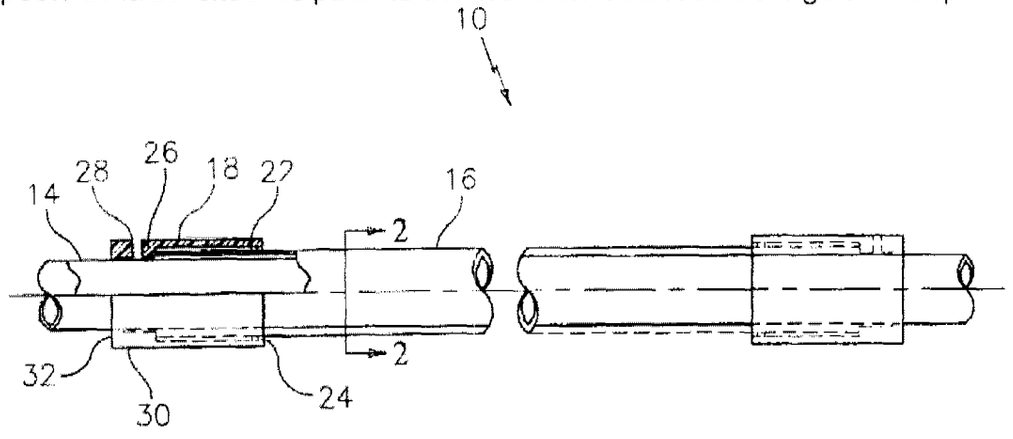


FIG. 1

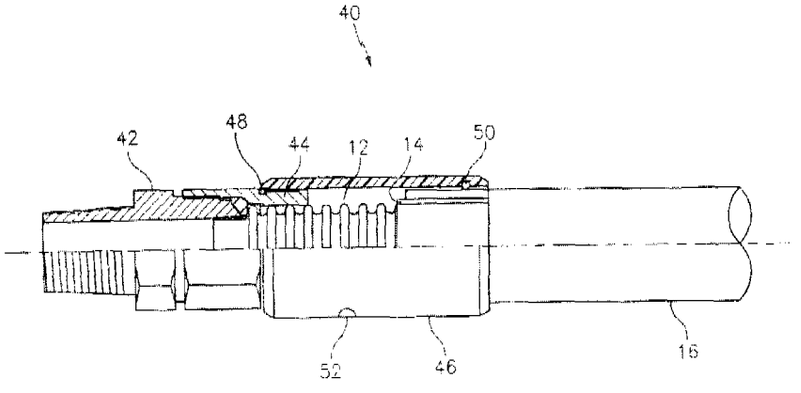


FIG. 4

Respecto al estado de la técnica:

El documento US5713607 (llamado en adelante como documento D1) se refiere a un sistema de contención de tubería compuesto por una línea de tubería un acople y un ajuste de metal ubicado entres estos.

El documento US6173995 (llamado en adelante como documento D2) muestra una unión para tubos semiflexibles que comprende básicamente un adaptador, una tuerca y un montaje de buje, eliminando así la necesidad de sellar las juntas, es reutilizable y reduce la exposición de la tubería a elementos contaminantes circundantes alrededor.

Las diferencias de la solicitud con respecto al estado de la técnica más cercano D1 se demuestran a continuación:

Comparando la invención tal como esta definida en la reivindicación uno (1, folio 154) con D1, encontramos que el mencionado documento revela la mayoría de los elementos y características de dicha reivindicación. Donde D1 contiene:

Reivindicación uno (1, folio 154)	*D1*
1) Un sistema de tubería que comprende: una manga (16) impermeable a fluidos que tiene una pluralidad de bordes longitudinales espaciados (20) formados en el interior de la superficie de dicha manga.	**SI** Ver: elementos 30, Ps. Po; figura 2; ver columna 11 fila 65, columna 12 fila 19, filas 35 a 36.
2) Una tubería corrugada, flexible de metal (12), que lleva el fluido, posicionada internamente en dicha manga.	NO La tubería no es corrugada.
3) Un acople (18) que tiene un primer extremo y un segundo extremo (30).	**SI** Ver: elemento N; figura 5; ver columna 13 fila 58.
4) Dicho primer extremo con rosca interior que se engancha y se desenrosca a la superficie externa de dicha manga (16).	**SI** Ver: elemento N; figura 5; ver columna 13 fila 58.
5) Dicho acople con orificio de ventilación (28) en comunicación fluida con interior de dicha manga (16).	**SI** Ver: elementos 62, C, Si, 30, Ps. Po; figura 6; ver columna 13 filas 29 a 35.
6) Un ajuste de metal (42) asegurado a dicha tubería (12) y acoplado a una superficie interior de dicho acople (18).	**SI** Ver: elementos F, N; figura 5; ver columna 13 filas 52 a 54.

La diferencia entre la solicitud y D1 radica en el tipo de tubería utilizada y específicamente hace referencia a una tubería flexible de metal corrugada (característica 2). De la tabla anterior se puede deducir que la solicitud tal como fue definida en la reivindicación independiente uno es nueva y cumpliría con lo estipulado en el artículo 16 de la Decisión 486 de la Comisión de la Comunidad Andina de Naciones.

Teniendo en cuenta que el objetivo de la solicitud es perfeccionar los sistemas de contención de tubería para contener líquidos (folio 51). El documento D2 aunque se diferencia básicamente con la solicitud en que no posee el orificio de ventilación y el ajuste de metal, sí sugiere la selección y el uso de tuberías corrugadas en juntas para sistemas de gas, transporte de químicos, líquidos, petróleo, agua o vapor. Este tipo de tubería tiene una estructura de crestas y valles que produce un efecto de flexibilidad es decir transmite cierto grado de movimiento en el sistema de tubería (Ver columna 3, filas 28 a 31, columna 4 filas 19 a 38). Por lo tanto se considera que el objeto de la presente solicitud -tal como fue reclamado en las reivindicaciones 1-15 (folios 154 a 156)- seria el resultado de combinar las enseñanzas de D1 y D2 junto con los conocimientos normales de una persona del oficio del nivel medio, resultando dicho objeto obvio y evidente del estado de la técnica.

El análisis anterior permitiría afirmar que la presente solicitud no cumple con lo estipulado en el artículo 18 de la Decisión 486 de la Comisión de la Comunidad Andina de Naciones.

~~181~~

6. Conclusión:

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

N°	Documento N°	Reivindicaciones afectadas	Requisito que afecta
D1	US5713607	1-15	NIVEL INVENTIVO
D2	US6173995	1-15	NIVEL INVENTIVO

- Se sugiere al solicitante tener en cuenta las observaciones hechas en el numeral tres (3) y realizar el CAMBIO DE MODALIDAD DE PATENTE DE INVENCION A PATENTE DE MODELO DE UTILIDAD, debido a que la presente solicitud no cumple con el requisito de nivel inventivo.

7. Respuesta a los argumentos del solicitante:

Después de estudiar los argumentos del solicitante (folios 150 a 151) se hacen las siguientes observaciones:

- Se le recuerda al solicitante que las concesiones de patentes en otros países no son vinculantes y no obligan a esta Oficina a tomar una decisión en el mismo sentido. Cada oficina tiene plena autonomía para analizar y evaluar el contenido de los documentos dentro del examen de patentabilidad y concluir si ellos afectan o no cualquiera de los requisitos de patentabilidad de la invención tal como esta fue definida en su capitulo reivindicatorio.

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 60 días contados a partir 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.

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 N° 10 de 2001.

ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe de División de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista, de fecha

19 DIC. 2008

CONCEPTO TÉCNICO No.3670	**EXAMINADOR TÉCNICO** Código No.202086