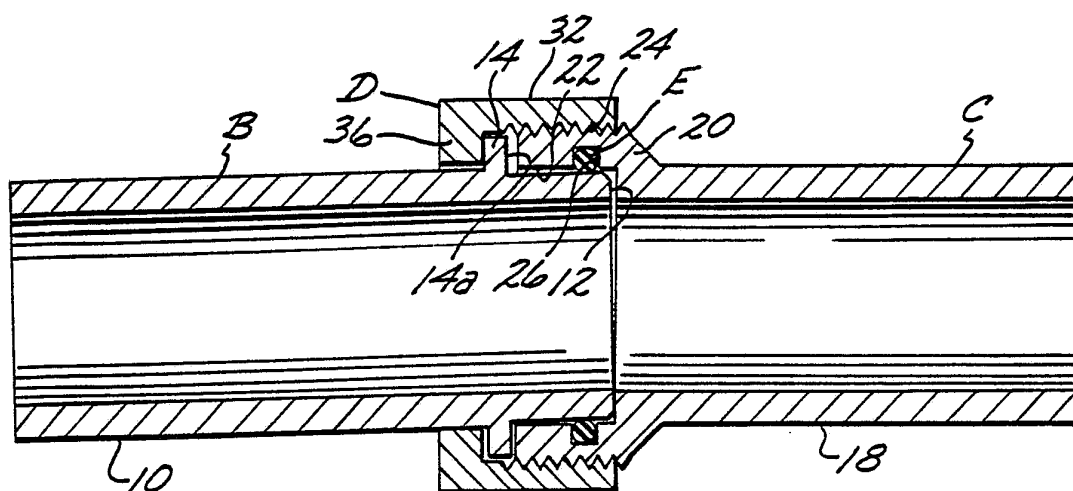




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<p> (21) International Application Number: PCT/US83/01858 (22) International Filing Date: 28 November 1983 (28.11.83) (71)(72) Applicant and Inventor: PITESKY, Isadore [US/US]; 4001 Linden Avenue, Long Beach, CA 90807 (US). (74) Agent: BABCOCK, William, C.; 100 E. Ocean Blvd., Suite 712, Long Beach, CA 90802 (US). (81) Designated States: CH (European patent), DE (European patent), DK, FR (European patent), GB (European patent), JP, NL (European patent), SE (European patent), US. Published <i>With international search report.</i> </p>		

(54) Title: COUPLING



(57) Abstract

A coupling that includes first (B) and second (C) tubular members that are removably held together in fluid communication by a threaded collar (D), with the seal between the tubular members being effected by a resilient ring (E) mounted on the second (C) tubular member that slidably and rotatably engages the first tubular member (B), and the collar (D) and ring (E) so cooperating with the first (B) and second (C) tubular members that the latter may pivot laterally relative to the first tubular member (B) without destroying the seal therebetween. In addition, the second tubular member (C) may be moved longitudinally away from the first tubular member (B) to the extent that communication is established between the interior of the tubular members and the ambient atmosphere without disconnecting the second tubular member (C) from the collar (D) and such communication resulting in equalization of pressure between the interior of the tubular members and the exterior thereof.

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COUPLING
BACKGROUND OF THE INVENTION

Field of the Invention

Description of the Prior Art

5 In the past, numerous couplings have been developed for removably effecting fluid and gas communication between first and second conduits that are connected to the coupling. The prior art couplings are of such structure that one of the
10 fluid and gas carrying conduits cannot flex relative to the other thereof without breaking the seal therebetween. Also, the prior art couplings did not establish communication between the interiors thereof and the ambient atmosphere prior to the components
15 of the coupling being separated. This failure to establish such communication in which the pressure between the interior of the coupling and the ambient atmosphere was equalized, resulted in the tendency of fluid under pressure in the coupling to spurt
20 when separation of the components of the coupling was effected.

 A major object of the present invention is to provide a coupling that meets the federal requirements of being "sanitary", in that, the coupling
25 has no interior threads, crevices or recesses in which material may lodge from one operation to contaminate a following operation. Minute particles have been found to remain in interior threads, crevices and recesses even though the coupling is
30 washed and rinsed between the two operations.

 Another object of the invention is to provide a coupling that is adapted to all tube and pipe sizes, even as small as hypodermic tubing, with the coupling being self-aligned and self-supporting,
35 and capable of being disposed in a fluid-tight condition by force exerted from the fingers without the use of tools.

Yet another object of the invention is to furnish a coupling in which the sealing is accomplished by fluid pressure with venting of pressurized fluid within the coupling occurring before the coupling is disassembled, and the tubing or pipe leading to the coupling capable of being adjusted in three different planes after the coupling is tightened to define a sealed longitudinally extending fluid passage.

A still further object of the invention is to supply a coupling that has a simple mechanical structure, can be fabricated from conventionally available materials and is inexpensive to manufacture.

SUMMARY OF THE INVENTION

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The coupling includes first and second tubular members that are connected to first and second conduits. The first tubular member has a first end and a circular rib that projects outwardly therefrom and has the face closest the first end located a first distance therefrom. An internally threaded collar that includes a second inwardly extending rib is provided with the collar slidably and rotatably mounted on the first tubular member, and the internal diameter of the second rib substantially greater than the external diameter of the first tubular member.

The second tubular member has a first end portion of substantially greater diameter than the balance of the second tubular member, with this first end portion having threads on the exterior surface thereof that are engaged by the threaded collar. The interior surface of the first end portion of the second tubular member has a transversely disposed circular groove defined on the interior surface thereof, and in which groove a resilient sealing ring is disposed. The interior diameter of the first end portion of the second tubular member is substantially greater than the external diameter of the first end portion of the first tubular member over which it extends and with which the resilient ring effects a seal. The groove is located from the first end of the second tubular member a second distance that is less than the first distance on the first tubular member.

When the collar is loosely made up on the threads on the second tubular member, the resilient ring effects a seal with the external surface of the first tubular member, and this seal is not destroyed when the second tubular member is flexed on pivoted laterally on the resilient ring relative to the first tubular member. Such flexing of the second tubular member relative to the first tubular member is possible, due to the internal diameters of the second rib and the first end portion of the second tubular member being greater than the external diameter of the first tubular member. The interior of the coupling will be placed in communication with the ambient atmosphere to equalize the pressure between the two, when the coupling is partially unscrewed from the threads on the first tubular member and the second tubular member moved away from the first tubular member to the extent the resilient ring no longer seals with the first tubular member. This venting of the interior of the

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coupling to the ambient atmosphere prior to the first and second change of the pressure of the fluid within the coupling.

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BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is a perspective view of the coupling in communication with first and second fluid carrying conduits;

5 Figure 2 is a longitudinal cross-sectional view of the coupling taken on the line 2-2 of Figure 1;

10 Figure 3 is the same view as shown in Figure 2, but with the second tubular member moved longitudinally away from the first tubular member to break the seal between the ambient atmosphere and the interior of the coupling, but without the collar disengaged from the second tubular member; and

15 Figure 4 is the same view as shown in Figure 2 illustrating how the second tubular member may pivot relative to the first tubular member when the first end of the second tubular member is longitudinally spaced from the first rib on the first tubular member.



DESCRIPTION OF THE PREFERRED EMBODIMENT

The coupling A of the present invention includes a first tubular member B as may best be seen in FIG. 1 that slidably and sealingly engages a second tubular member C, with the two tubular members being removably held together in end to end fluid carrying relationship by a collar D. When the two tubular members B and C are held together by collar D, the seal between the two tubular members is effected by a resilient ring E, such as a commercially available O-ring. The first and second tubular members B and C are illustrated in FIG. 1 with first and second fluid carrying conduits B' and C' connected thereto.

The first tubular member B as best seen in FIGS. 2 to 4 includes a first rigid tube 10 that has a first end 12, with a first circular rib 14 projecting outwardly from the first tube. The first rib 14 has a first ring-shaped face 14a that is located inwardly a distance 16 from the first end 12. The importance of distance 16 will later be explained.

Second tubular member D includes a second rigid tube 18 that has an enlarged first end portion 20 that has an interior cylindrical surface 22 of a diameter 22a greater than the external diameter 10a of tube 10. Threads 24 are defined on the external surface of first enlarged end portion 20. A transverse groove 26 is formed in interior surface 22 as shown in FIGS. 2, 3 and has the resilient sealing ring E disposed therein, with the ring projecting outwardly from the groove. The edge of the groove 26 nearest the first end 20a of first end portion 20 is located a second distance 28 therefrom that is substantially less than the first distance 16.

Collar D as may be seen in FIG. 2-4 includes a cylindrical shell 32 that has internal threads 34 thereon that loosely engage threads 24. A second circular rib 36 projects inwardly from one end of shell 32, which second rib has an internal diameter 38 that is greater than the diameter 10a of first tube 10.

In FIG. 2 the coupling A is shown made up to establish fluid communication between first and second conduits B' and C', with the resilient ring E being in pressure fluid sealing contact with the external surface of tube 10.

When it is desired to break fluid communication between first and second conduits B' and C' that may be flexible or pliable hose, the threads 34 are partially unscrewed from

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threads 24 as shown in figure 3. The second tubular member C is now moved to the right relative to first tubular member B as shown in FIG. 3, and due to the distance 28 being less than the distance 16, the resilient ring E moves out of sealing contact with tube 10 prior to collar D being disengaged from second tubular member C. After such disengagement the pressure on the interior of the coupling A may equalize with that of the ambient atmosphere due to the loosely engaging threads 24 and 34 providing an air passage therebetween that is in communication with the space defined between the interior surface 22 and exterior surface of tube 10.

In Figure 4 it will be seen that the second tubular member C may pivot laterally relative to the first tubular member C without destroying the seal therebetween. When such lateral pivoting takes place, the resilient seal acts as a pivot point. Such pivoting may take place due to the diameter 22a of the cylindrical surface 22 being larger than the diameter 10a of tube 10, and the internal diameter 38 of second rib 36 being greater than the diameter 10a.

The use and operation of the coupling A has been described previously in detail and need not be repeated.



WHAT IS CLAIMED IS:

1. A coupling capable of removably connecting a fluid discharge conduit and a fluid receiving conduit that may be moved relative to one another, said coupling including:

a. a first rigid tubular member that has a first end portion and a second end, said first end portion connected to said fluid discharge conduit, said first tubular member including a circumferentially extending first rib that is disposed inwardly a first distance from said second end said rib having first and second ring-shaped surfaces;

b. a second rigid tubular member that has a first end portion and a second end, said first end portion connected to said fluid receiving conduit, with a longitudinal section of said second tubular member adjacent said second end being of greater interior and external diameter and effecting a ring-shaped seat at the junction with the balance of said second tubular member, said section having first threads defined on the exterior surface thereof, and said section having a circumferential groove formed on the interior surface thereof that is located from said second end a second distance substantially less than said first distance;

c. a resilient sealing ring mounted in said groove, said sealing ring extending inwardly beyond the interior surface of said section, and said sealing ring slidably and sealingly engaging the exterior surface of said first tubular member between said first rib and second end thereof, and said first surface of said rib serving as a stop to limit longitudinal movement of said second tubular member relative to said first tubular member; and



.9.

d. a collar that has a first end and a second end, a second circular ring-shaped rib that extends inwardly from said second end of said collar, said rib having an interior diameter substantially greater than the external diameter of said first tubular member but less than the external diameter of said first rib, said collar having second threads defined on the interior surface between said second rib and said first end of said collar, said collar when encircling said first tubular member and rotated in a first direction with said second threads in engagement with said first threads moving said second tubular member longitudinally towards said first member to dispose the free end of said section adjacent said second tubular member when so disposed capable of being pivoted laterally with breaking the seal between said first and second tubular members, and said collar when rotated in a second direction allowing said second tubular member to be moved longitudinally away from said first tubular member, with said sealing ring moving out of sealing engagement with said first tubular member prior to said first and second threads becoming disengaged, and the interior of said first and second tubular members being in communication with the ambient atmosphere when said sealing ring moves out of sealing engagement to permit the pressure in said interior to equalize with that of the ambient atmosphere.

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2. A multi-piece coupling¹⁰ for removably connecting adjoining end portions of first and second conduits to establish an unrestricted, circumferentially sealed longitudinal passage therebetween through which pressurized fluid may flow without leaking both when said first and second conduits are axially aligned as well as when said second conduit is rotated or pivoted laterally within a predetermined angle relative to said first conduit, said coupling capable of being assembled and disassembled without the use of tools, and said coupling automatically venting said longitudinal passage to the ambient atmosphere prior to being completely disassembled, said coupling including:

a. a first elongate rigid tubular member that has a first end portion and a second end, a circumferentially extending rib that projects outwardly from said first tubular member and is intermediately disposed between said first end portion and said second end, said first end portion in communication with said first conduit, said rib of rectangular transverse cross-section, and said rib defining first and second ring-shaped side surfaces, said second side surface a first longitudinal distance from said second end;

b. a second elongate tubular member that has a first end portion and a second tubular end portion that has a second end and an interior surface of a diameter greater than the external diameter of said first tubular member, said interior surface having a ring-shaped groove extending outwardly therefrom, with the portion of said groove most adjacent said second end of said tubular member being spaced therefrom a second longitudinal distance less than said first distance, said second tubular end portion of said second tubular member having first threads on the exterior thereof;

c. a resilient sealing ring disposed in said groove, said sealing ring having an internal diameter that is less than the external diameter of said first tubular member; and

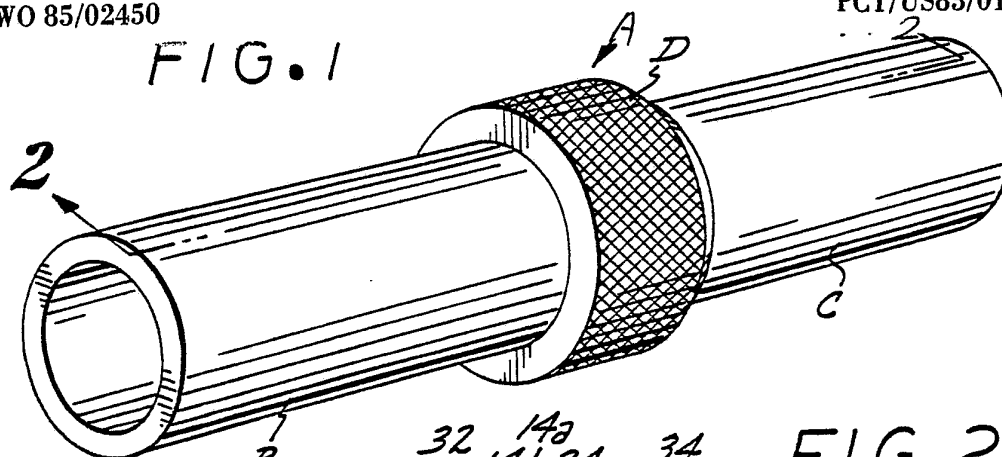
d. a tubular elongate collar that has first and second ends, a second circular rib that extends inwardly from said second end of said collar, said collar having second threads on the interior thereof that loosely engage said first threads when said collar is mounted on said first tubular member and extends over said first rib, with said collar when rotated in a first direction moving said second tubular member longitudinally

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towards said first collar a distance greater than said second distance to dispose said sealing ring in sealing engagement with the exterior surface of said second end portion of said first tubular member after which said second tubular member may be rotated or pivoted laterally relative to said first tubular member without breaking the seal therebetween, and said collar when rotated in a second direction allowing said second tubular member to be moved longitudinally away from said first tubular member to the extent said sealing ring separates from sealing contact with said first tubular member prior to said first and second threads separating, with the interior of said coupling after said separation being vented to the ambient atmosphere through said loosely fitting first and second threads.



FIG. 1



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FIG. 2

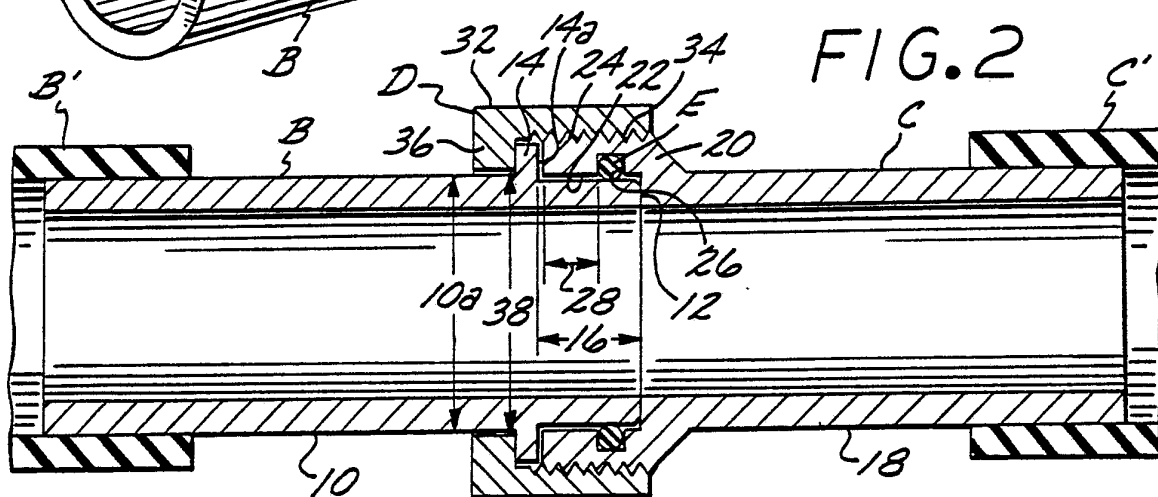


FIG. 3

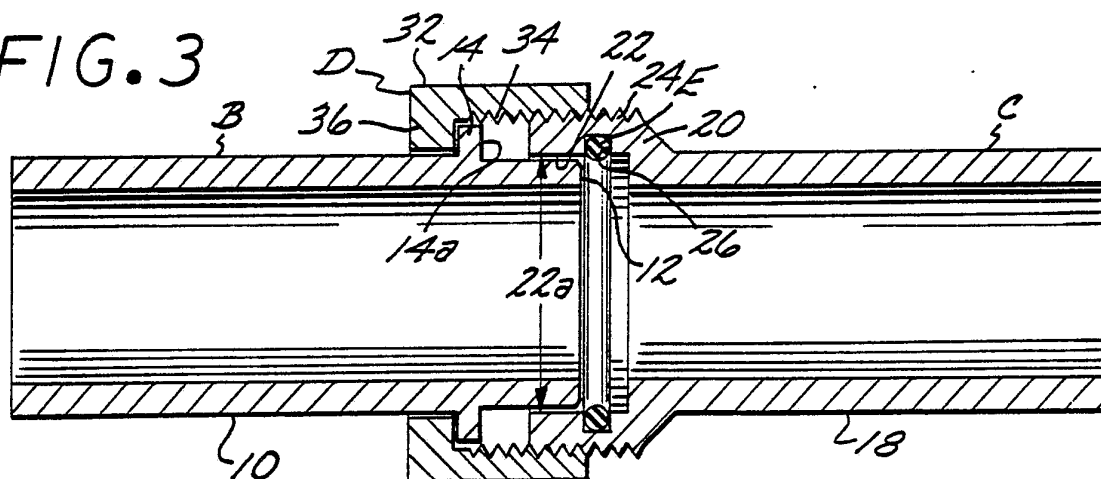
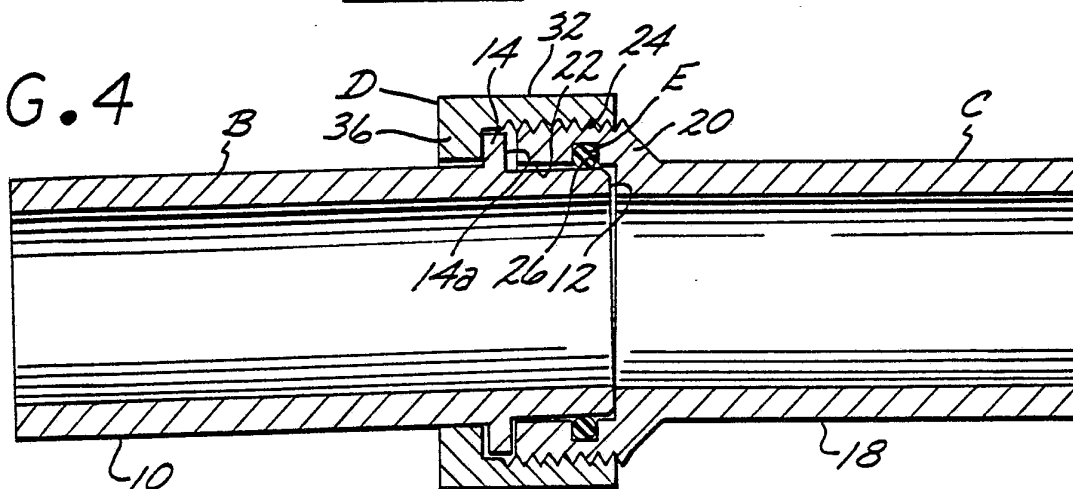


FIG. 4



INTERNATIONAL SEARCH REPORT

International Application No. **PCT/US83/01858**

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ³
 According to International Patent Classification (IPC) or to both National Classification and IPC **Int. Cl.3 F16L17/02**
U.S. CL. 285/354, Dig 25

II. FIELDS SEARCHED

Minimum Documentation Searched ⁴

Classification System	Classification Symbols
U.S.	285/354, 386, 223, 231, Dig 25, 126, 38, 349

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched ⁵

III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴

Category [*]	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
Y	BE A 558301, (KeeLavite) 3/1960 Note Fig 2	1,2
Y	US A 3,540,760, (Miller) 17 Nov 70	1,2
A	US A 3,476,414, (Condrac) 4 Nov 69	1,2
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IV. CERTIFICATION

Date of the Actual Completion of the International Search ²

6 March 84

Date of Mailing of this International Search Report ²

12 MAR 1984

International Searching Authority ¹

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Signature of Authorized Officer ²⁰

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