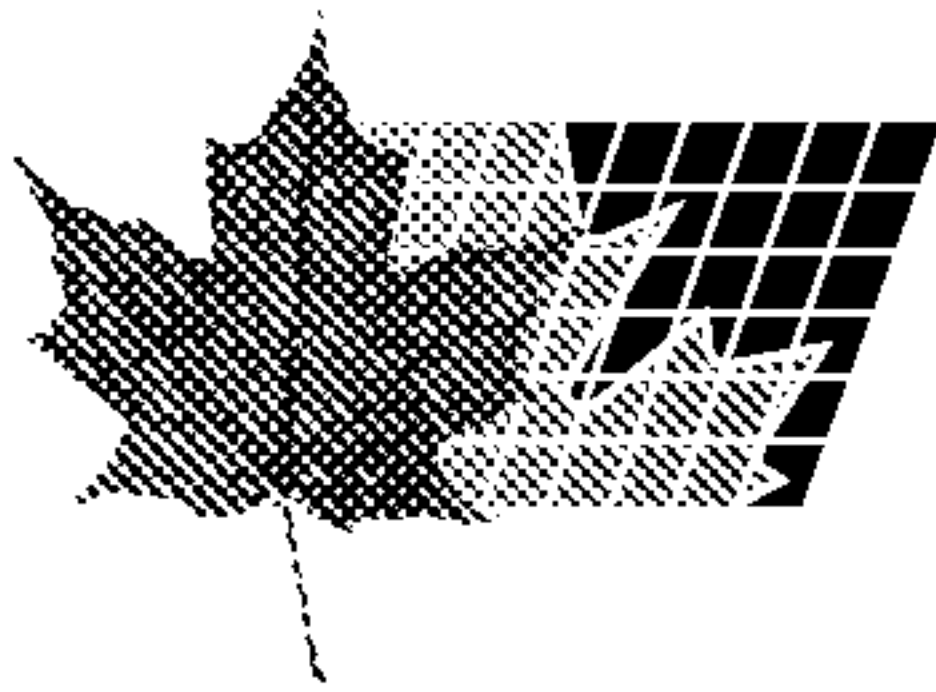




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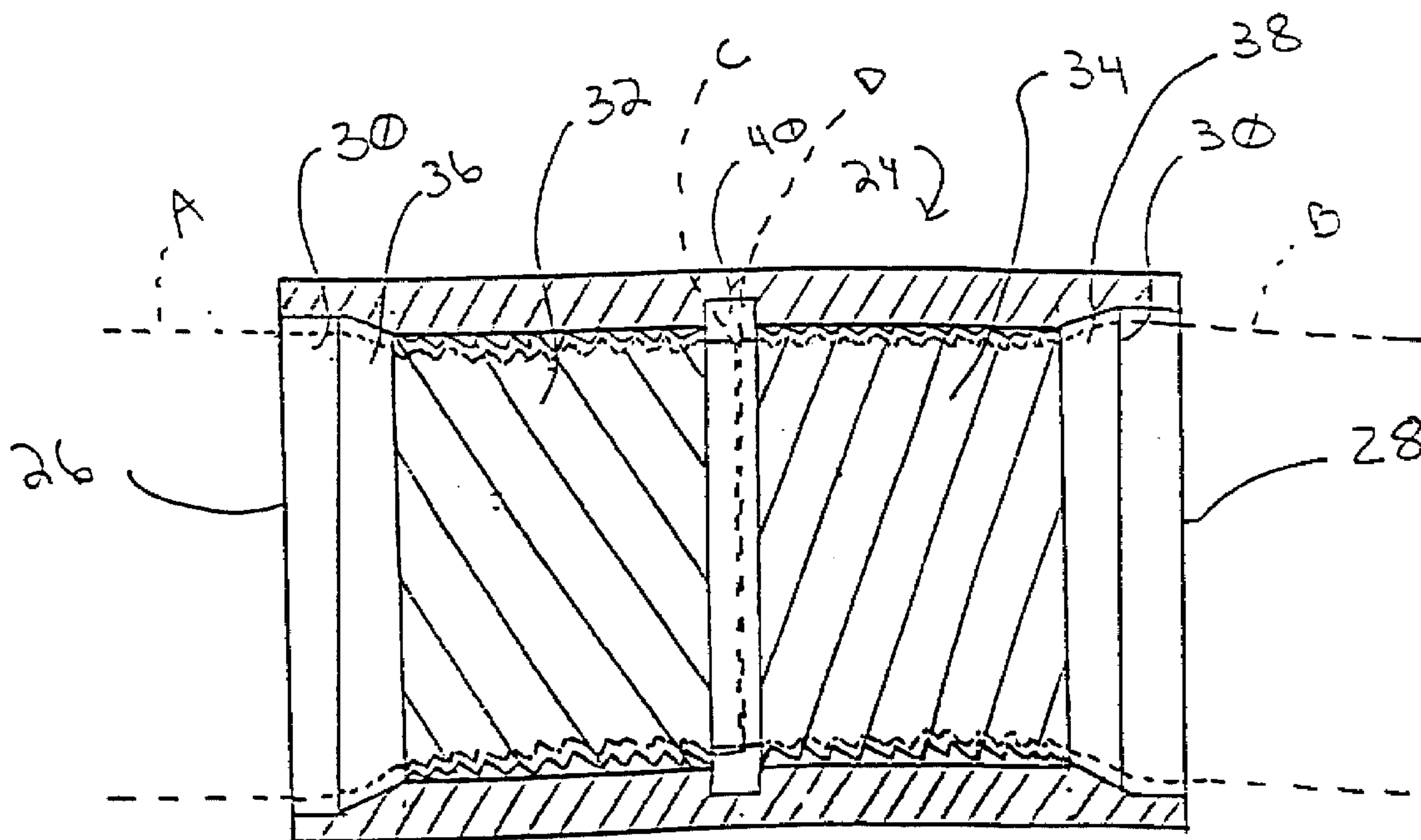
(51) Int.Cl.⁷ H02G 3/06, H02G 3/04

(30) 1999/04/13 (60/129,126) US

(30) 1999/12/06 (60/169,231) US

(54) **CONDUIT ELECTRIQUE ET RESEAU DE CONDUITS**

(54) **ELECTRICAL CONDUIT AND CONDUIT SYSTEM**



(57) An electrical conduit piece of the invention has threaded regions, particularly external, left hand, tapered or straight threaded regions at each end. This conduit piece is particularly well adapted to be used in conventional conduit systems by coupling to conventional conduit pieces through a coupling of the invention having two internal threaded regions, one threaded region having left hand threads and the other threaded region having right hand threads. A groove may be formed in the internal wall of the coupling, e.g., at or near its longitudinal center to provide an open region in which ends of conduit pieces inserted into the coupling can abut. In a preferred embodiment, the conduit piece is embodied as a curved or elbow conduit.

ABSTRACT

An electrical conduit piece of the invention has threaded regions, particularly external, left hand, tapered or straight threaded regions at each end. This conduit piece is particularly well adapted to be used in conventional conduit systems by coupling to conventional conduit pieces through a coupling of the invention having two internal threaded regions, one threaded region having left hand threads and the other threaded region having right hand threads. A groove may be formed in the internal wall of the coupling, e.g., at or near its longitudinal center to provide an open region in which ends of conduit pieces inserted into the coupling can abut. In a preferred embodiment, the conduit piece is embodied as a curved or elbow conduit.

ELECTRICAL CONDUIT AND CONDUIT SYSTEM

5

BACKGROUND OF THE INVENTION

1. Field of the Invention

10 This invention relates generally to piping and/or conduit systems and, more particularly, to an electrical conduit system for encasing and protecting flexible wires or cables, such as electrical, optical or communication type cables.

2. Description of the Currently Available Technology

15 In construction and architectural applications, electrical conduit systems are used to encase and protect flexible lines or cables, such as electrical power lines, telephone lines, fiber optic cables, computer network cables, etc., to prevent damage to these lines. Such electrical conduit systems are used within buildings, e.g., within the walls of
20 buildings, underground, and for exposed above-ground outdoor applications. Conventional electrical conduit systems consist of individual conduit sections or pieces usually made of rigid material, such as galvanized or stainless steel, PVC, or aluminum, coupled together to form the conduit system, generally
25 referred to as a "conduit run".

Examples of standard electrical conduit pieces include straight conduit sections, for example ten foot sections of conduit of various diameters with exterior or male threads on each end; so-called "nipples", i.e., shorter straight conduit
30 sections of various diameters with exterior or male threads on each end; and elbows, i.e., bent or curved conduit sections also with exterior or male threads on each end. By standard convention, the threads on the ends of the conventional conduit

pieces are all right hand threads. Adjacent conduit pieces are connected together by a female coupling having continuous, internal right hand threads.

To construct a conventional electrical conduit system, a first conduit piece, e.g., a nipple, is secured at one end of the conduit run, usually at the feed end. A female coupling is screwed onto the outer end of the first conduit piece until seated. Then, a second conduit piece, for example a straight ten foot section or an elbow, is inserted into the other end of the female coupling and turned to thread it into the female coupling to connect the second conduit piece to the first conduit piece. Additional conduit pieces, connected by additional female couplings, are successively added to form the electrical conduit system. The sections or pieces may be attached to walls or suspended from a ceiling by various known methods.

While generally acceptable for protecting cables, there are limitations associated with conventional electrical conduit pieces and electrical conduit systems. For example, in conventional systems each conduit piece must be successively coupled to the previous conduit piece. Once the conduit system is formed, it is difficult to reenter or access an intermediate section of the conduit system. Such reentry typically entails complete disassembly of the conduit system from one end to the point of desired access. This disassembly can be costly and labor intensive.

Alternatively, for complex conduit runs, access is sometimes gained to intermediate sections by destructive means, generally involving pipe cutting and wire pulling or cutting. However, this creates a problem, particularly in confined areas such as the interior of walls, in that the destroyed section of conduit cannot generally be replaced with the same type of conduit pieces since there is not sufficient room to thread the conduit pieces together, i.e., there is insufficient room to rotate the new conduit pieces, particularly curved conduit pieces, into the coupling. Therefore, complex clamping devices may be used. However, these known clamping devices are generally expensive to purchase and install.

Additionally, to connect conventional conduit pieces together the conduit pieces must be rotated or turned to thread the end of one conduit piece into the adjacent female coupling. Since conventional conduit pieces can weigh on the order of
5 several hundred pounds, several workers may be required to align and rotate larger conduit pieces. This rotation is particularly difficult with large elbow pieces which, in addition to the problem of their weight, also require enough clearance room, especially from wall installations, for the curved outer section
10 of the elbow to rotate while threading an end of the elbow into a conventional female coupling. The turning of such large conduit pieces increases the manpower requirement to form a conventional electrical conduit system and, hence, increases the cost of construction.

15 Further, since the conventional conduit pieces must be rotated during construction of the electrical conduit system, the cable or cables to be protected cannot be pre-positioned inside the disassembled conduit pieces. Rather, after the entire conduit system has been constructed, the cable is typically
20 pulled through the entire conduit system from one end to the other. This pulling may damage the cable and is particularly disadvantageous for optical fiber cables. For example, many conventional fiber optic cable systems have four or more spaced fiber optic cables passing through the conduit system. These
25 fiber optic cables are held in place by spacers in the conduit pieces. Because the conventional conduit pieces must be rotated to form the conduit system, the fiber optic cables cannot be inserted into the conduit pieces until the entire conduit system has been constructed to prevent twisting or damage to the cables.
30 However, pulling the fiber optic cables through the entire system presents an opportunity for the fiber optic cables to be broken, damaged or misaligned.

Therefore, it would be advantageous to provide an electrical conduit piece and/or conduit system which reduces or
35 eliminates at least some of the limitations associated with conventional electrical conduit systems.

SUMMARY OF THE INVENTION

A conduit system of the invention comprises a plurality of conduit pieces, at least one of the conduit pieces comprising a first conduit piece having a first end with a first threaded region and a second end with a second threaded region. A coupling of the invention is configured to engage at least one end of the first conduit piece and one end of an adjacent conduit piece. The coupling comprises a first threaded portion and a second threaded portion, with a groove region located therebetween and with the first threaded portion of the coupling being of different thread direction than the second threaded portion.

Another conduit system of the invention comprises a plurality of first conduit pieces, each having a first end with a first threaded region and a second end with a second threaded region. The first and second threaded regions have substantially the same first thread direction. At least one second conduit piece is provided having a first end with a first threaded region and a second end with a second threaded region, with the first and second threaded regions of the second conduit piece each having substantially the same second thread direction and with the second thread direction being different than the first thread direction. At least one coupling is provided and comprises a first threaded portion and a second threaded portion, with the first threaded portion having a different thread direction than the second threaded portion, with the first threaded portion of the coupling configured to reversibly engage the first threaded region on the first conduit piece, and with the second threaded portion of the coupling configured to reversibly engage the second threaded region on the second conduit piece to reversibly couple the first conduit piece with the second conduit piece.

A further conduit system is provided comprising a plurality of first conduit pieces having a first end and a second end, with first externally threaded regions located at each end, and with each first threaded region comprising right hand threads. A plurality of second conduit pieces is provided, each having a first end and a second end, with second, externally threaded regions located at each end, each second threaded region

comprising left hand threads. A coupling is located between adjacent first and second conduit pieces and is configured to reversibly engage one end of the first conduit piece with one end of the adjacent second conduit piece, the coupling comprising a
5 first, internally threaded, right hand thread portion configured to engage an end of a first conduit piece and a second, internally threaded, left hand thread portion configured to engage an end of a second conduit piece. The coupling has an internal groove region positioned such that when the coupled ends
10 of the first and second conduit piece are inserted into the coupling, the inserted ends of the conduit pieces abut in the internal groove region.

A method of forming a conduit system of the invention comprises the steps of providing a plurality of first conduit
15 pieces, each first conduit piece having a first end with a first threaded region and a second end with a second threaded region, with the first and second threaded regions having the same first thread direction; providing at least one second conduit piece having a first end with a first threaded region and a second end
20 with a second threaded region, with the first and second threaded regions of the second conduit piece being of the same second thread direction, and with the second thread direction being different from the first thread direction; providing a coupling having a first threaded portion and a second threaded portion,
25 with the thread direction of the first and second threaded portions being different from each other; engaging the first threaded portion of the coupling with a first threaded region on a first end of a first coupling piece; engaging the second threaded portion of the coupling with a second threaded region
30 on a second end of the second coupling piece; and rotating the coupling in a first direction to thread the first end of the first coupling piece and second end of the second coupling piece into the coupling until the coupled ends of the conduit pieces abut.

35 A method of retrofitting a conduit system having a plurality of first conduit pieces with opposed ends and threaded regions of the same thread direction located on each end is

provided. The first conduit pieces are coupled by first couplings having opposed ends with threaded portions of the same thread direction as the threaded regions of the first conduit pieces. The method comprises the steps of removing at least one
5 first conduit piece and at least one of the first couplings; replacing the removed first conduit piece with a second conduit piece having a first end and a second end, the first end having a first threaded region of the same direction as the first conduit piece and the second end having a second threaded region
10 of different thread direction than the first threaded region; replacing the removed first coupling with a second coupling, the second coupling comprising a first threaded portion having the same thread direction as the first threaded region of the second conduit piece and a second threaded portion of the same thread
15 direction as the second threaded region of the second conduit piece; engaging the second threaded portion of the coupling with the second end of the second conduit piece; engaging the first threaded portion with an end of an adjacent first conduit piece; and rotating the second coupling to engage the second end of the
20 second conduit piece with the adjacent end of a first conduit piece until the coupled ends of the first and second conduit pieces substantially abut.

An electrical conduit piece of the invention has threaded regions, particularly external, left hand, tapered or
25 straight threaded regions at each end. This conduit piece is particularly well adapted to be used in conventional conduit systems by coupling to conventional conduit pieces through a coupling of the invention having two internal threaded regions, one threaded region having left hand threads and the other
30 threaded region having right hand threads. A groove may be formed in the internal wall of the coupling, e.g., at or near its longitudinal center to provide an open groove region in which ends of conduit pieces inserted into the coupling can abut. In a preferred embodiment, the conduit piece is embodied as a curved
35 or elbow conduit.

A further embodiment of the invention comprises a conduit piece having external, right hand threads at one end and

external, left hand threads at the other end. The conduit pieces and coupling of the invention can be used in constructing new electrical conduit systems or in retrofitting existing conduit systems.

5 A complete understanding of the invention will be obtained from the following description when taken in connection with the accompanying drawing figures wherein like reference characters identify like parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

10 Fig. 1 is a plan view of a conduit piece (not to scale) of the invention;

Fig. 2 is a longitudinal, sectional view (not to scale) of a coupling of the invention;

15 Fig. 3 is a plan view of the conduit piece (not to scale) of Fig. 1 connected by the coupling of Fig. 2 to a conventional conduit section;

Fig. 4 is a schematic view of an electrical conduit system (not to scale) utilizing a conduit piece and couplings of the invention;

20 Fig. 5 is a plan view of an alternative conduit piece (not to scale) of the invention; and

Fig. 6 is a side, sectional view of the upper part of a coupling of the invention (not to scale) showing an exemplary thread profile.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

25 For purposes of the description hereinafter, the terms "upper", "lower", "right", "left", and similar spacial terms shall relate to the invention as it is oriented in the drawing figures. However, it is to be understood that the invention may
30 assume various alternative orientations and step sequences, unless expressly stated to the contrary. It is also to be understood that the specific dimensions illustrated in the attached drawings and described in the following specification are simply exemplary embodiments of the invention and are not to
35 be considered as limiting.

A conduit piece of the invention is generally designated 10 in Figs. 1, 3 and 4. As shown in Fig. 1, the

conduit piece 10 is formed of a hollow, substantially cylindrical body 12 made of rigid material, such as PVC or metals such as stainless steel, galvanized carbon steel or aluminum, or similar materials. The conduit piece 10 has a first end 14 and a second end 16. A first threaded region 18 is formed on the outer surface of the conduit piece 10 at or near the first end 14 and a second externally threaded region 20 is formed at or near the second end 16 of the conduit piece 10. In the preferred embodiment of the invention, the threaded regions 18 and 20 are both comprised of threads having the same thread direction, e.g., left hand, tapered or straight threads. While the conduit piece 10 in Fig. 1 is shown as a curved or elbow conduit, it is to be understood that the conduit piece 10 is not limited to elbow conduits but may be of any conventional electrical conduit configuration, e.g., a straight conduit section. The conduit piece 10 is preferably of substantially the same dimensions as standard conventional conduit pieces known in the art.

A hollow coupling of the invention is generally designated 24 in Figs. 2-4. The coupling 24 is preferably substantially cylindrical and may be made of the same materials as the conduit piece 10. The coupling 24 has a first end 26 and a second end 28. An internal recess 30, i.e., a region of larger internal diameter than the central region of the coupling 24, is formed at or near each end 26 and 28 of the coupling 24. The coupling 24 further includes a first internally threaded portion or region 32 and a second internally threaded portion or region 34. As shown in Fig. 2, a first tapered region 36 is located between the left recess 30 and the first threaded region 32 and a second tapered region 38 is located between the right recess 30 and the second threaded region 34. The threaded regions 32 and 34 are preferably comprised of tapered or straight threads of opposed thread directions, e.g., the first threaded region 32 may be comprised of right hand threads and the second threaded region 34 may be comprised of left hand threads. The threaded regions 32 and 34 are preferably of substantially the same length, which thread length preferably substantially corresponds to the length of the threaded regions 18 and 20 on the conduit

piece 10. Preferably each threaded region 32 and 34 is configured to provide nine full engagement threads so that the system of the invention meets the requirements of UL6 and qualifies as a class one conduit installation.

5 An internal circumferential groove 40 is formed in the internal wall of the coupling 24 and is preferably located approximately at or near the longitudinal center of the coupling 24. The groove 40 provides an open groove region in which the ends of conduit pieces inserted into the coupling 24 can abut.
10 For example, Fig. 2 shows two conduit pieces A and B (in phantom) engaged with the coupling 24. The inner end C of conduit piece A abuts or substantially abuts the inner end D of conduit piece B in the open area created by the groove 40. This promotes a good ground for the system. By "substantially abut" is meant
15 that the inner ends of the conduit pieces are less than one inch (2.54 cm) apart, preferably less than 0.5 inch (1.27 cm) apart, and more preferably are in contact with each other.

Use of the conduit piece 10 and coupling 24 of the invention will now be described. Fig. 3 shows how the conduit
20 piece 10 may be coupled by couplings 24 to conventional conduit pieces or sections 42, e.g., straight conduit sections having opposed ends with threaded regions at each end each threaded region being of the same thread direction, e.g., conventional right hand threads. Looking at the lower coupling 24 in Fig. 3,
25 for example, the first end 26 of the coupling 24 is slipped onto the outer end (first end) of the lower conduit section 42 until the right hand threads on the conduit section 42 contact, abut or initially engage the right hand threads on the first threaded region 32 of the coupling 24. One end, for example the second end
30 16, of the conduit piece 10 is then inserted into the second end 28 of the coupling 24 until the left hand threads on the second end 16 of the conduit piece 10 contact, abut or initially engage the left hand threads on the second threaded region 34 of the coupling 24. Next, the coupling 24 is rotated or turned to
35 simultaneously thread the second end of the conduit piece 10 and first end of the conduit section 42 into the coupling 24 until the inserted ends of the conduit piece 10 and conduit section 42

abut in similar manner as the conduit pieces A and B in Fig. 2. During this procedure, only the coupling 24, not the conduit piece 10 or conduit section 42, rotates to reversibly couple the conduit piece 10 and conduit section 42. As used herein, the
5 terms "reversibly couple" or "reversibly engage" mean that the coupled conduit pieces can be uncoupled by rotating the coupling 24 in an opposite direction to that used to couple the pieces together.

The recesses 30 permit a small amount of float or play
10 in case the respective ends of the conduit piece 10 and conduit section 42 being coupled are not started at exactly the same thread position in the opposed ends 26 and 28 of the coupling 24. The first end 14 of the conduit piece 10 can be similarly connected to the outer end of the upper conventional conduit
15 section 42 by another coupling 24 of the invention, with the second coupling region 34 (left hand threads) of the upper coupling 24 engaging the left hand threads on the first end 14 of the conduit piece 10 and the first coupling region 32 (right hand threads) of the upper coupling 24 engaging the right hand
20 threads on the outer (first or second) end of the upper conventional conduit section 42. Thus, the elbow-shaped coupling piece 10 does not itself have to be rotated to be connected into an electrical conduit system utilizing standard right hand threaded straight conduit sections 42. This is particularly
25 advantageous with larger elbow-shaped conduit pieces 10, which, in previously known systems, would have to be physically rotated and supported, usually by a crew of workers. Additionally, previously known elbow sections could only be placed in areas with sufficient clearance to allow the elbow to be rotated. In
30 the present invention, only the coupling needs to be rotated, not the elbow itself. This greatly reduces the manpower required for coupling large, particularly elbow-shaped, conduit pieces or sections which in turn lowers the cost of constructing a conduit system.

35 An electrical conduit system utilizing conduit pieces 10 and couplings 24 of the invention is designated 50 in Fig. 4. The conduit system 50 extends from a junction box or breaker box

52 to an outlet or breaker 54. In the conduit system 50 shown in Fig. 4, conventional conduit sections 42 having right hand external threaded regions may be used in the construction of the conduit system 50. For example, the conduit system 50 may be initially constructed as follows. A conventional nipple 56 can be connected to the breaker box 52. A first conduit piece 10a of the invention is then connected to the nipple 56 by a first coupling 24 in similar manner as described above. A second conventional conduit section 42b is then connected to the first conduit piece 10a by a second coupling 24 and so on until the electrical conduit system 50 has been constructed. By alternately coupling conduit pieces 10 of the invention and conventional conduit sections 42 by coupling pieces 24 of the invention, the entire conduit system 50 may be constructed without the need to rotate the conduit pieces 10 or conduit sections 42 themselves. This greatly reduces the manpower required for construction of the conduit system 50. Further, since none of the conduit pieces 10 or sections 42 needs to be rotated, the flexible member, e.g., wire or cable being encased, can be prestaged or threaded through the respective disassembled conduit pieces 10 or sections 42 before assembly. This means that the cable does not have to be pulled through the finally constructed system and thus reduces the chances of damaging the cable. This is particularly useful with respect to fiber optic cables.

Another advantage of the conduit system 50 over known systems is that the intermediate portion of the conduit system 50 can be easily accessed to examine or repair specific parts of the cable or to add additional conduit runs or branches without having to disassemble the entire conduit system 50 from one end. For example, a coupling 24 can be rotated to disassemble the end of one of the conduit pieces 10 from the associated end of an adjacent conduit section 42. All that is required is sufficient clearance of about a thread length, i.e., the length of a threaded region 18 or 20, to allow the end of the selected conduit piece 10 to be withdrawn from the coupling 24. The other end of the conduit piece 10 could then also be disassembled in

a similar manner by simply rotating the coupling 24 on the other end of the coupling piece 10.

Alternatively, the conduit piece 10 and couplings 24 of the invention can be retrofitted into an existing electrical conduit system. For example, the cable of the system can be pulled back from one end through the region to be accessed. An existing conduit section having right hand threaded ends can then be removed, such as by cutting, and replaced with a conduit piece 10 and couplings 24 of the invention. This would be particularly useful in retrofitting electrical conduit systems having elbow-shaped pieces located in confined areas, such as within buildings or within the walls of buildings, where portions of the building would normally have to be destroyed to allow sufficient clearance to add or replace an elbow section. This reduces the cost of replacing or retrofitting existing conduit systems. Further, the present invention is also well adapted for use in upgrading or reworking existing electrical conduit systems, such as by adding branch lines. For example, to add a branch line to the conduit system 50 of Fig. 4, one or more of the conduit pieces 10 can be removed as described above and replaced with a conventional junction or branch line. Additionally, since the conduit piece 10 and coupling 24 of the invention can be used with existing conventional right hand threaded conduit sections, the existing inventory of conventional conduit sections can still be used.

An alternative embodiment of a coupling piece of the invention is designated 60 in Fig. 5. The coupling piece 60 is configured as a straight conduit piece having a first end 62 with an external, first threaded region 64 and a second end 66 with an external, second threaded region 68. However, in this embodiment, the first threaded region 64 is comprised of left hand threads and the second region 68 is comprised of right hand threads. The coupling piece 60 is particularly well adapted to be placed in the straight section of a conduit run at a position the builder may later wish to access, for example to place a junction box or branch line. The second end 66 of the conduit piece 60 with right hand threads may be conventionally connected to a conventional conduit section with a conventional coupling.

However, the first end 62 of the conduit piece 60 can be attached by a coupling 24 of the invention with an adjacent conventional conduit section. This section of the conduit run can be later accessed simply by uncoupling the coupling 24, i.e., rotating the coupling to disengage the first end 62 from the adjacent conduit section and then removing the conduit piece 60 from the conventional coupling by rotating the conduit piece 60.

Another particularly well adapted use of the coupling piece 10 and couplings 24 of the invention is in electrical conduit systems for bridge decks encasing fiber optic cables. Presently, the bridge deck conduit sections for fiber optic cables are connected by a complex, right hand threaded coupling. However, these conventional bridge deck couplings can typically be removed by hand or with nothing more than a screwdriver, allowing unauthorized access to the fiber optic or communication cables running through the bridge deck electrical conduit system. This provides little or no protection against vandalism of the cables. However, the present invention can improve this protection. By constructing a bridge deck electrical conduit system utilizing the conduit piece 10 and couplings 24 of the invention but which does not allow sufficient clearance to uncouple the end of a conduit piece 10 from an adjacent coupling 24, the bridge deck conduit system cannot be accessed.

It will be readily appreciated by those skilled in the art that modifications may be made to the invention without departing from the concepts disclosed in the foregoing description. Such modifications are to be considered as included within the scope of the invention. Accordingly, the particular embodiments described in detail herein are illustrative only and are not limiting to the scope of the invention, which is to be given the full breadth of the appended claims and any and all equivalents thereof.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A conduit system, comprising:

a plurality of conduit pieces, at least one of the
conduit pieces comprising a first conduit piece with a first end
having a first threaded region and a second end having a second
5 threaded region; and

at least one coupling configured to engage one end of
the first conduit piece and one end of an adjacent conduit piece,
the coupling comprising a first threaded portion and a second
threaded portion with a groove region located therebetween, the
10 first threaded portion of the coupling being of a different
thread direction than the second threaded portion.

2. The system of claim 1, wherein the first and second
threaded regions of the first conduit piece both comprise left
hand threads.

3. The system of claim 1, wherein the first threaded
region of the first conduit piece comprises right hand threads
and the second threaded region comprises left hand threads.

4. The system of claim 1, wherein the first threaded
portion of the coupling comprises right hand threads and the
second threaded portion comprises left hand threads.

5. A conduit system, comprising:

a plurality of first conduit pieces, each first conduit
piece having a first end with a first threaded region and a
second end with a second threaded region, with the first and
5 second threaded regions having substantially the same first
thread direction;

at least one second conduit piece having a first end
with a first threaded region and a second end with a second
threaded region, with the first and second threaded regions of
10 the second conduit piece each having substantially the same

second thread direction, with the second thread direction being different than the first thread direction; and

at least one coupling, the coupling comprising a first threaded portion and a second threaded portion, with the first threaded portion having a different thread direction than the second threaded portion, with the first threaded portion of the coupling configured to reversibly engage the first threaded region on the first conduit piece and with the second threaded portion of the coupling configured to reversibly engage the second threaded region on the second conduit piece to reversibly couple the first conduit piece with the second conduit piece.

6. The system of claim 5, further comprising another coupling, the other coupling having a first threaded portion and a second threaded portion, with the first threaded portion having a different thread direction than the second threaded portion, the second threaded portion of the other coupling configured to engage the first threaded region on the second conduit piece and the first threaded portion configured to reversibly engage an end of another first conduit piece to couple the first end of the second conduit piece with an end of the other conduit piece.

7. The system of claim 5, wherein the first thread direction comprises right hand threads.

8. The system of claim 5, wherein the second threaded direction comprises left hand threads.

9. The system of claim 5, wherein the first threaded portion of the coupling comprises right hand threads and the second threaded portion comprises left hand threads.

10. The system of claim 5, wherein the coupling comprises an internal groove region positioned such that when the first and second conduit pieces are coupled by the coupling, the first end of the first conduit piece abuts the second end of the second conduit piece in the internal groove region.

11. The system of claim 5, wherein the first and second threaded regions of the first and second conduit pieces comprise external threads.

12. The system of claim 5, wherein the first and second threaded portions of the coupling comprise internal threads.

13. A conduit system, comprising:

a plurality of first conduit pieces having a first end and a second end, with first externally threaded regions located at each end, each first threaded region comprising right hand threads;

a plurality of second conduit pieces having a first end and a second end, with second, externally threaded regions located at each end, each second threaded region comprising left hand threads; and

10 a coupling located between adjacent first and second conduit pieces and configured to reversibly engage one end of a first conduit piece with one end of an adjacent second conduit piece, the coupling comprising a first, internally threaded, right hand thread portion configured to engage an end of a first
15 conduit piece and a second, internally threaded, left hand thread portion configured to engage an end of a second conduit piece, the coupling having an internal groove region positioned such that when the coupled ends of the first and second conduit piece are threaded into the coupling, the inserted ends abut in the
20 internal groove region.

14. A method of forming a conduit system, comprising the steps of:

providing a plurality of first conduit pieces, each first conduit piece having a first end with a first threaded
5 region and a second end with a second threaded region, with the first and second threaded regions having the same first thread direction;

providing at least one second conduit piece having a first end with a first threaded region and a second end with a second threaded region, with the first and second threaded regions of the second conduit piece being of the same second thread direction, with the second thread direction being different from the first thread direction;

providing a coupling having a first threaded portion and a second threaded portion, with the thread direction of the first and second threaded portions being different from each other;

engaging the first threaded portion of the coupling with a first threaded region on a first end of a first coupling piece;

engaging the second threaded portion of the coupling with a second threaded region on a second end of the second coupling piece; and

rotating the coupling in a first direction to thread the first end of the first coupling piece and second end of the second coupling piece into the coupling until the ends abut.

15. The method of claim 14, wherein the coupling has an internal groove region and the method comprises rotating the coupling such that the ends of the first and second conduit pieces abut in the groove region.

16. The method of claim 15, including rotating the coupling in a second direction to disengage the first conduit piece from the second conduit piece.

17. The method of claim 14, including inserting a flexible member through the first and second conduit pieces and the coupling before coupling the conduit pieces together.

18. The method of claim 14, including providing another coupling having a first threaded portion and a second threaded portion, with the thread directions of the first and second threaded portions of the other coupling being different;

5 engaging the second threaded portion of the other
coupling with the first end of the second conduit piece;
 engaging the first threaded portion of the other
coupling with an end of another first conduit piece; and
 rotating the other coupling in a first direction to
10 couple the first end of the second conduit piece with the end of
the other first conduit piece.

19. A method of retrofitting a conduit system having
a plurality of first conduit pieces with opposed ends and
threaded regions of the same thread direction located on each
end, the first conduit pieces being coupled by first couplings
5 having opposed ends with threaded portions of the same thread
direction as the threaded regions of the first conduit pieces,
the method comprising the steps of:

 removing at least one first conduit piece and at least
one of the first couplings;

10 replacing the removed first conduit piece with a second
conduit piece having a first end and a second end, the first end
having a first threaded region of the same direction as the first
conduit piece and the second end having a second threaded region
of different thread direction than the first threaded region;

15 replacing the removed first coupling with a second
coupling, the second coupling comprising a first threaded region
having the same direction as the first threaded region of the
second conduit piece and a second threaded portion of the same
thread direction as the second threaded region of the second
20 conduit piece;

 engaging the second threaded portion of the coupling
with the second end of the second conduit piece;

 engaging the first threaded portion with an end of an
adjacent first conduit piece; and

25 rotating the second coupling to engage the second end
of the second conduit piece with the adjacent end of a first
conduit piece until the coupled ends of the first and second
conduit pieces abut.

20. The method of claim 19, wherein the second coupling comprises a groove region and the coupled ends of the conduit pieces abut in the groove region.

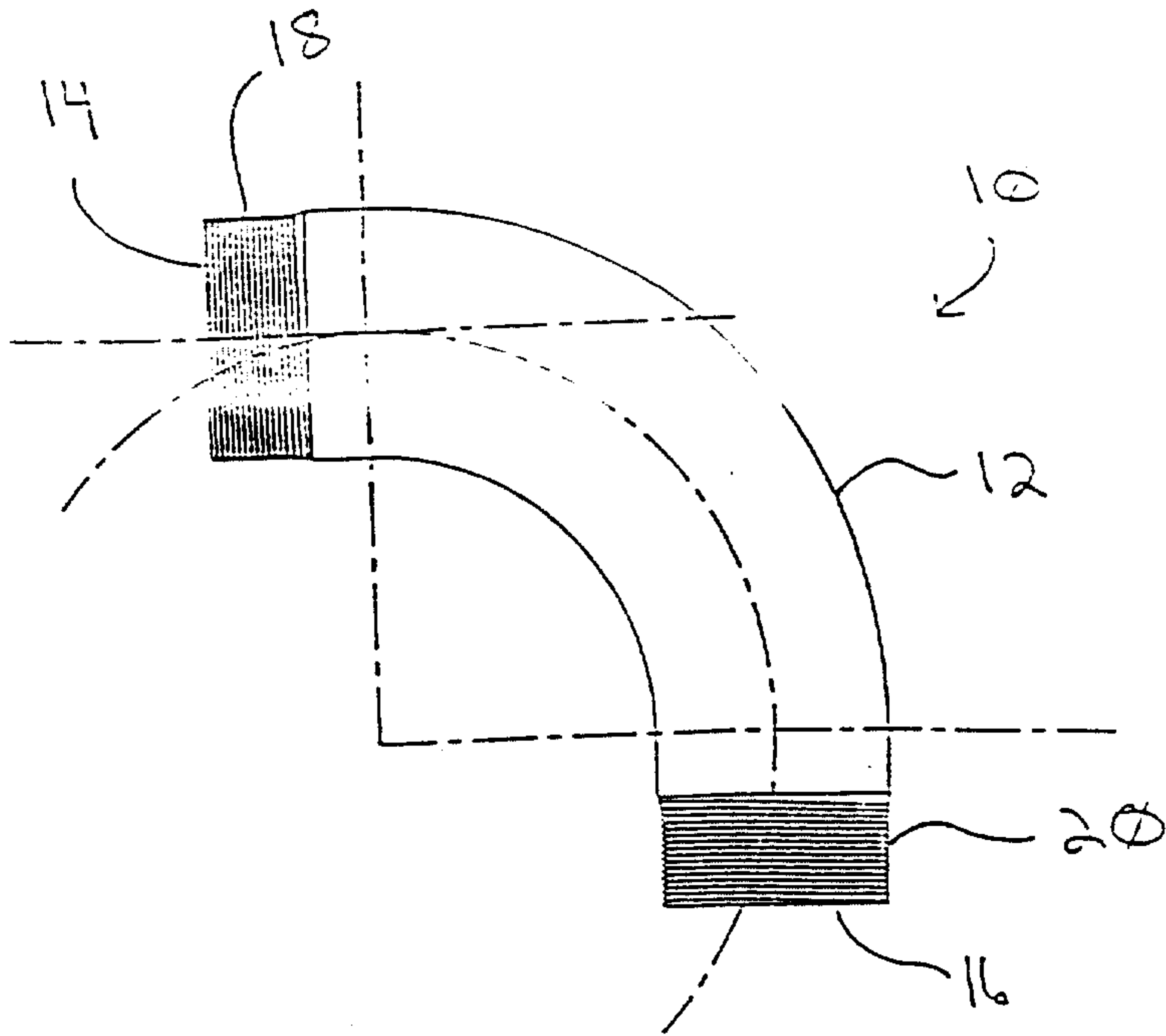


Fig. 1

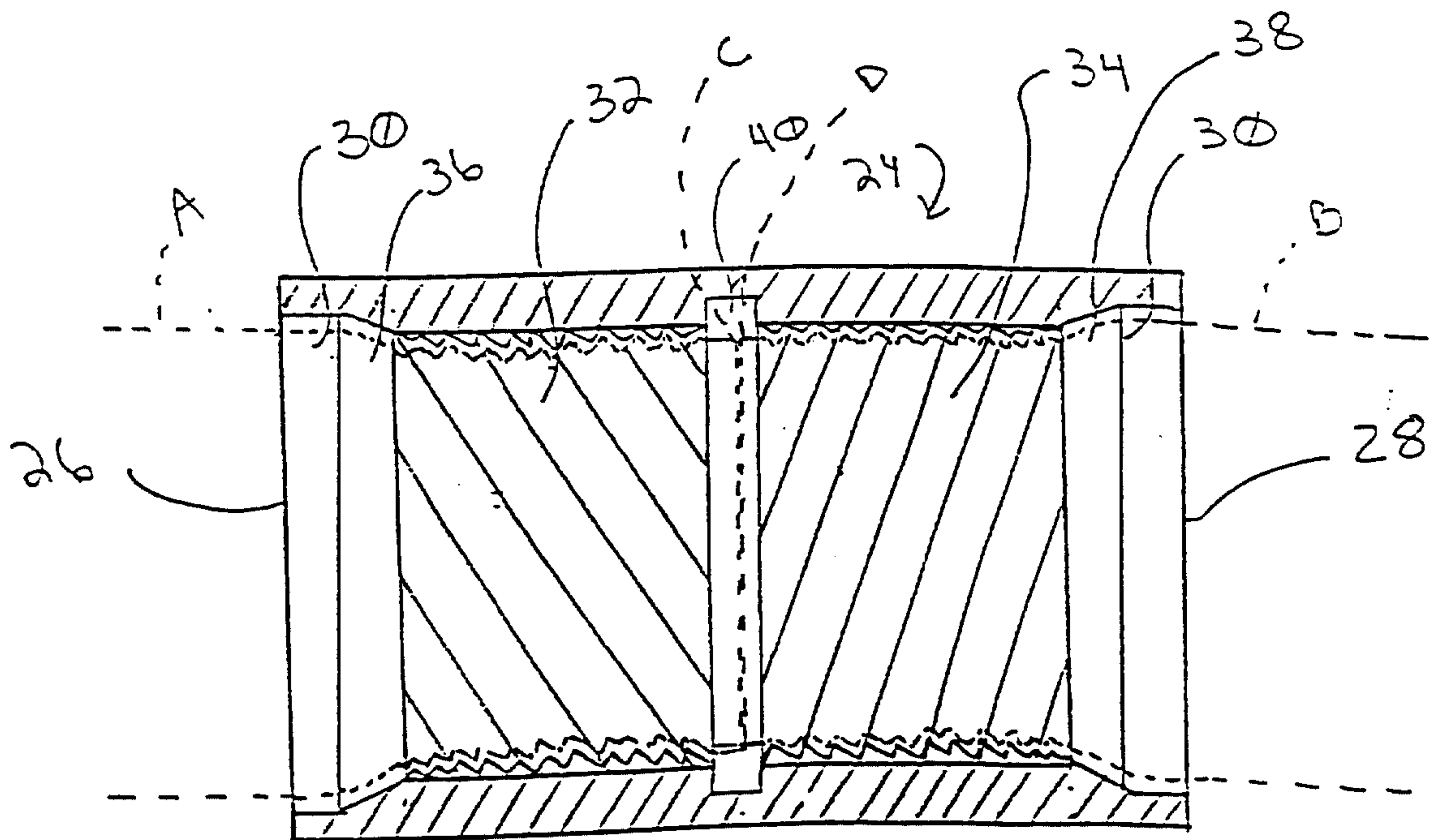


Fig. 2

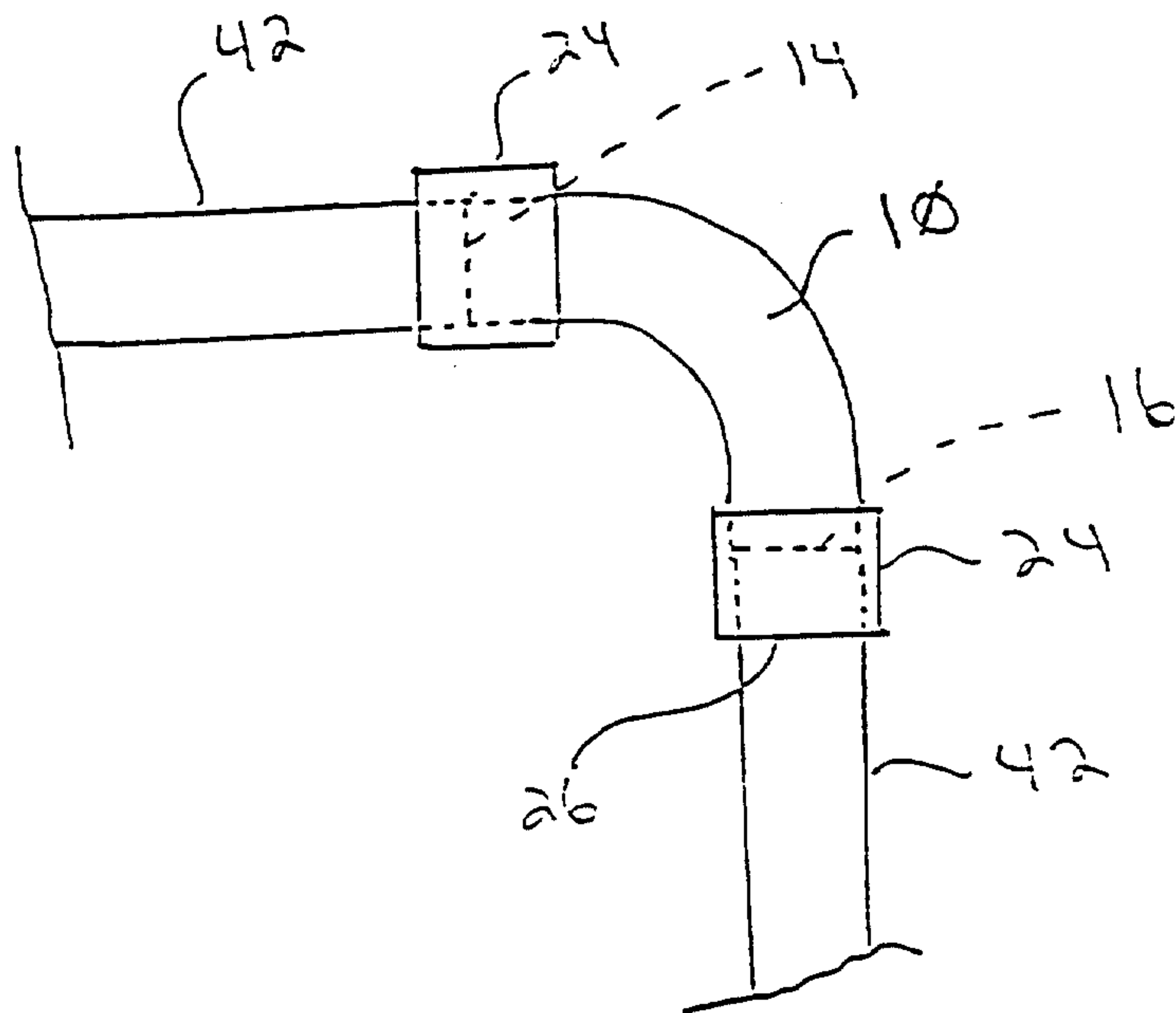


Fig. 3

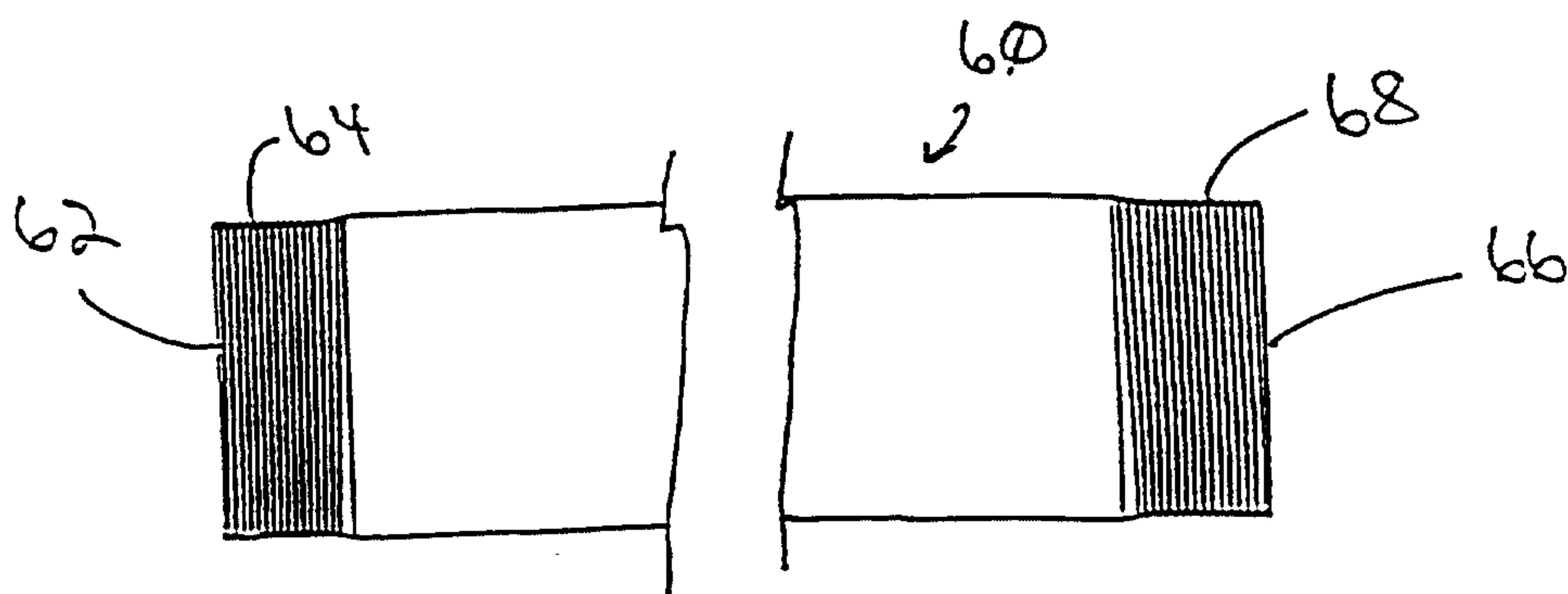


Fig. 5

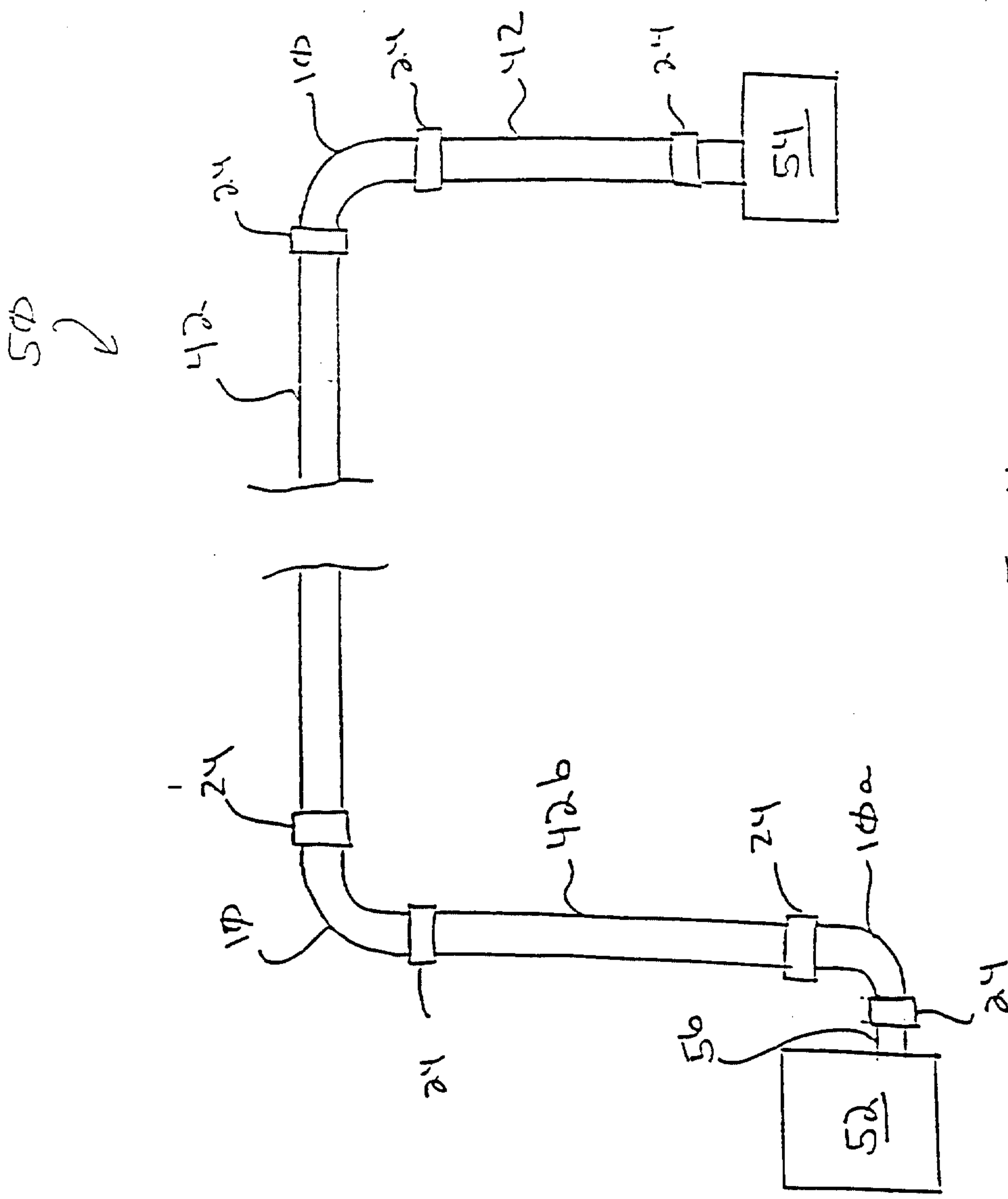


Fig. 4

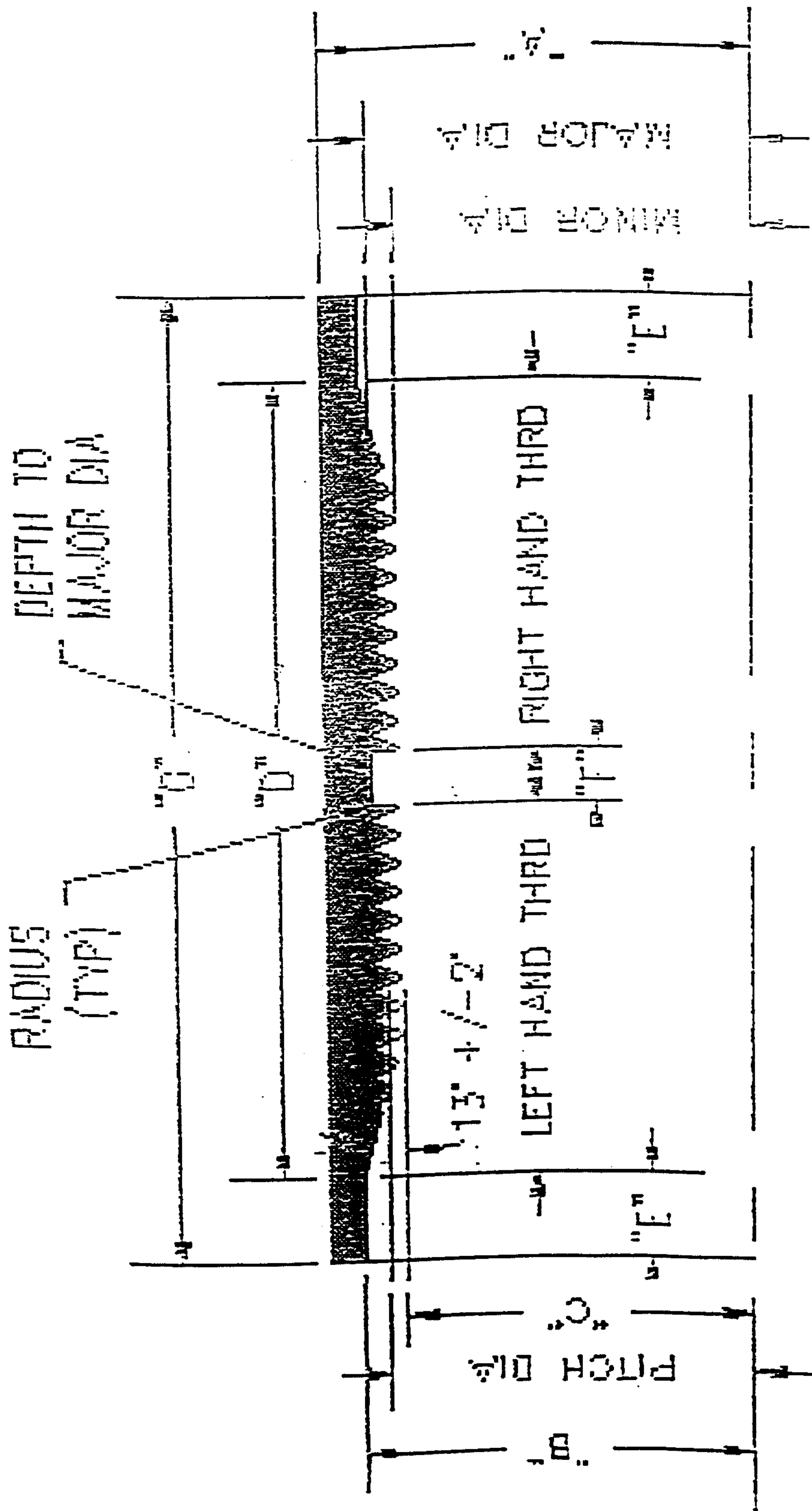


Fig. 6

