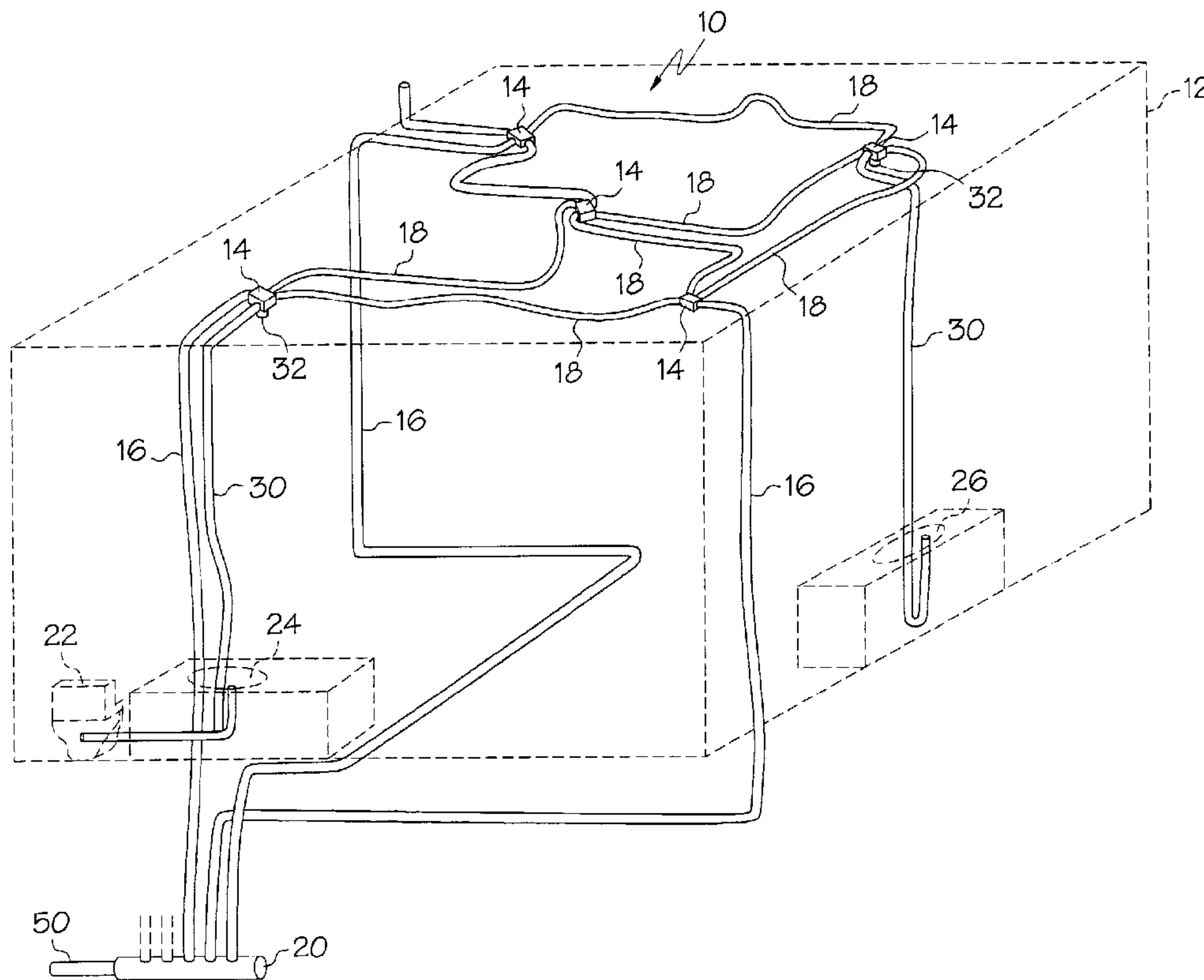




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(54) Titre : RESEAU INTEGRE DE DISTRIBUTION D'EAU NON STAGNANTE A ALIMENTATION PARALLELE POUR  
EAU DOMESTIQUE ET EXTINCTEURS  
(54) Title: PARALLEL-FED NONSTAGNANT INTEGRATED WATER DISTRIBUTION NETWORK FOR DOMESTIC  
WATER AND FIRE SPRINKLER APPLICATION



(57) **Abrégé/Abstract:**

An integrated water distribution network supplies the requirements of both domestic and fire sprinkler water fixtures in a dwelling structure. The network includes a plurality of multiport fittings which are interconnected together with flexible conduits. A

(57) **Abrégé(suite)/Abstract(continued):**

conventional fire sprinkler is also coupled to the multiport fittings. The network is supplied water by a plurality of water supply lines which originate at a manifold. Individual water fixtures are connected to the distribution system through flexible lines. During use of a water fixture, water flow through essentially the entire system is established. The distribution system can thus be characterized as a "nonstagnant" water network.

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**ABSTRACT**

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An integrated water distribution network supplies the requirements of both domestic and fire sprinkler water fixtures in a dwelling structure. The network includes a plurality of multiport fittings which are interconnected together with flexible conduits. A conventional fire sprinkler is also coupled to the multiport fittings. The network is supplied water by a plurality of water supply lines which originate at a manifold. Individual water fixtures are connected to the distribution system through flexible lines. During use of a water fixture, water flow through essentially the entire system is established. The distribution system can thus be characterized as a "nonstagnant" water network.

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**PARALLEL-FED NONSTAGNANT INTEGRATED WATER DISTRIBUTION NETWORK**  
**FOR DOMESTIC WATER AND FIRE SPRINKLER APPLICATION**

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This invention generally relates to an integrated domestic water system and interior fire sprinkler system. More particularly it relates to an integrated residential domestic water and fire sprinkler system.

10

**BACKGROUND**

15

Dedicated sprinkler systems which are connected to large diameter water supply mains are known in the prior art. These water sprinkler systems may be characterized as "stagnant" water systems, in that the water flows within the system only when a sprinkler head is activated.

20

Also well known in the art are residential domestic water distribution systems for supplying water to a variety of plumbing fixtures within a dwelling. For a variety of reasons

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(codes, regulations, etc.) domestic water systems cannot be "stagnant", that is, water contained within the system must be capable of flowing under normal operating conditions. As a result of this requirement for "nonstagnant" flow systems, for  
5 typical building applications the fire sprinkler distribution system and the domestic water distribution system are two independent and separate systems. An obvious limitation in having a separate domestic water distribution network and fire  
10 sprinkler network is that each system must have their own conduits, supports, fittings, drains, valves, etc. This duplicity of system components is both uneconomical (additional materials, labour, etc.) and environmentally disadvantageous (additional water requirements). To a large extent the expense caused by the duplicity of system  
15 components required by separate independent water distribution networks has limited the acceptance of fire sprinkler networks to commercial or multiuse residential applications. A further limitation of present fire sprinkler systems is that they require regular inspections of system operability as it is  
20 critical that water under pressure be supplied to the various sprinkler assemblies. Typically this requires that the occupant occasionally inspect and verify valves, gauges, etc. for operability.

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It would be desirable and advantageous to implement a fire  
sprinkler system which would be cost-effective so as to find  
acceptance in the residential building industry. It would also  
be desirable to have such a sprinkler system which would  
5 incorporate the domestic water distribution network into the  
fire sprinkler distribution network. At the same time, and  
most importantly, the combined system would be a "nonstagnant"  
system to meet the approval of industry. By incorporating or  
integrating the sprinkler network with the domestic water  
10 network according to the present invention, a water flow is  
established throughout generally the entire network each time  
a plumbing fixture is accessed. It would also be desirable  
that the combined system be "self-checking" to verify fire  
sprinkler system operability. As a result, the integrated  
15 water distribution system according to the present invention  
is a "nonstagnant" water flow system which can meet the  
requirements of various plumbing codes and regulations. The  
use of the plurality of multiport fitting each having a  
plurality of external nipples permits the use of small  
20 flexible conduit which facilitates assembly and installation.

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### SUMMARY OF THE INVENTION

The present invention is directed to an integrated water distribution system for supplying a building's domestic water needs and fire sprinkler systems requirements without the duplicity of having separate water distribution networks. Importantly, a nonstagnant water distribution system can provide water requirements for both domestic use and fire sprinkler use. One aspect of the present invention provides a multiport fitting for overhead securement and for use with a heat sensitive sprinkler head for a fire sprinkler system. Another aspect of the present invention provides a "self-checking" fire sprinkler system with which the occupant can easily verify sprinkler operability by accessing a plumbing fixture for use, as pressurized water at any fixture within the network ensures pressurized water at all the fire sprinklers. Yet another aspect of the present invention provides a mounting assembly for securing the multiport fitting in its overhead position.

The integrated water distribution network includes a plurality of multiport fittings, each fitting being interconnected using

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flexible plastic conduit with at least one other fitting. Each fitting has a plurality of water conduits each leading to a plurality of exterior nipples upon which the flexible plastic conduit may be secured. Each water conduit, when connected as described herein, allows fluid communication with integrated network. There is thus a nonstagnant sprinkler water distribution and domestic water distribution integrated network having sprinkler head positions and domestic water plumbing fixture positions as would be provided by a separate and independent sprinkler network and an independent domestic water distribution network.

**DESCRIPTION OF THE DRAWINGS:**

While the invention is claimed in the concluding portions hereof, preferred embodiments are provided in the accompanying detailed description which may be best understood in conjunction with the accompanying diagrams where like parts in each of the several diagrams are labeled with like numbers, and where:

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FIG. 1 is a perspective view of an integrated water distribution network according to the present invention;

5 FIG. 2 is a perspective view of the water distribution network under a use condition;

FIG. 3 is another perspective view of the water distribution network under a use condition;

10 FIG. 4 is yet another perspective view of the water distribution network under a use condition;

FIG. 5 is a top plan view of a multiport fitting according to the present invention; and

15 FIG. 6 is a cross-sectional view of the multiport fitting of FIG. 5, taken along line 6 -6.

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**DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS:**

An integrated water distribution system 10 for a building 12, such as a residential structure, is illustrated in FIGS. 1-4.

5 The system 10 includes a plurality of multiport fittings 14 interconnected with a plurality of flexible plastic conduit 16, 18. The conduits include risers or water supply lines 16 which emanate from a supply manifold 20 which is connected to the house main 50 and runners 18 which traverse between the

10 various multiport fittings 14 and plumbing fixtures 22,24,26. Plumbing fixtures 22,24,26 are individually served by a routed flexible plastic conduit 30 and may include a water closet 22, tub, vanity sink 24, or kitchen sink 26. Fire sprinkler heads 32 are coupled to each multiport fitting 14. Additional

15 plumbing connections or attachments such as valves, piping, expansion tanks, pipe fittings (elbows, tees, etc.) are all well known in the art of plumbing. Likewise, unidirectional flow valves and temperature activated sprinkler heads are also well known in the art of sprinkler system design and

20 installation. These additional components, which may be needed to fully implement a functional water distribution system according to the present invention, are well known to those

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skilled in the art and are not shown in the exemplary environment of FIGS. 1-4.

The construction of one embodiment of the multiport fitting 14 will be described with reference to FIGS. 5 and 6. Multiport sprinkler fitting 14 includes a body 34 having an interior cavity 36 and a plurality of through-bores or ports 38. The interior cavity 36 includes a threaded surface 39 for threadedly receiving and securing a conventional sprinkler head 32. In this manner, sprinkler heads 32 may be occasionally removed for maintenance or service. It is intended that a variety of different sprinkler heads 32 may be used to implement the system 10 of the present invention. Selection of the specific sprinkler head 32 will be apparent to one skilled in the art. Each multiport fitting 14 includes a plurality of ports 38, each port 38 having an external nipple portion 40. Nipple portions 40 are relatively smooth bored and include an external profile (ribbing) 42 for engaging the flexible conduit 16, 18 as will be described hereinafter. Each multiport fitting 14 is provided a support or hanging device 44 for attaching the multiport fitting 14 to a support member within the ceiling (or walls) of the structure 12 in which the system 10 is used. The support

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device 44 may include a flange 46 having apertures 48 through which fasteners 50 are used to secure the multiport fitting 14 to the structure 12. The multiport fitting 14 may include a hexagonal-shaped body 34 having a plurality of radiating nipple portions 40 which are offset to one side of the body 34. A flange 46 may be used to secure the multiport fitting 14 to a structural member (joist, wall, etc.) of the building 12 as illustrated in FIG. 5.

Referring again to FIG. 1, the integrated water distribution system 10 includes a plurality of interconnected multiport fittings 14. Each multiport fitting 14 is secured by an installer adjacent the ceiling with the support device 18. The multiport fittings 14 are interconnected through flexible conduits 16, 18 which may be cut to length at the site during the installation process and which are flexible so as to allow the conduits 16, 18 to be manipulated by the installer around obstacles, etc. The connection between the multiport fitting 14 and the conduits 16, 18 are press-type or "slip" connections, where the conduits 16, 18 are expanded by manually pressing the conduits 16, 18 onto the nipples 40 of the multiport fitting 14. This connection approach of the flexible conduits 16, 18 with the multiport fittings 14 is

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inherently more time efficient than many other mechanical connections, especially those of rigid pipings. A securement ring (not shown) may be utilized to secure the conduit 16, 18 to the nipple 40 of the multiport fitting 14.

5 The network 10 includes a plurality of feeder lines or water supply lines 16 which originate from a supply manifold 20, which is shown beneath the structure 12, though only for illustrative purposes. The manifold 20 in turn is connected to the house main 50 in conventional manner. The number of feeder  
10 lines 16 is determined through analysis of the water flow and pressure requirements of the system 10 as is appreciated by one skilled in the art. The feeder lines 16 are illustrated as being directly connected to the multiport fittings 14. However, the feeder lines 16 may alternatively be connected  
15 along the length of a conduit 18 (such as through a tee fitting), if desired. A particularly novel aspect of the present invention is that a plurality of feeder lines 16, each connected to the manifold 20, are used to supply the network of multiport fittings 14. In this manner and as described  
20 below in operation, a "nonstagnant" water distribution system 10 is implemented. The plumbing fixtures of the systems are illustrated as a water closet 22, a vanity sink 24, and a kitchen sink 26.

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Operation of the system 10 according to the present invention may now be described with reference to FIGS. 2-4, where a system 10 providing a distribution network for the domestic water needs and fire sprinkler requirements is illustrated. This system 10 provides a nonstagnant water distribution system for supplying requirements for both the domestic and fire sprinkler water fixture by establishing water flow within essentially the entire system 10 during occupant use of a plumbing fixture 22,24,26. Referring particularly to FIG. 2, the integrated water distribution network 10 illustrates the system flow during use of the kitchen sink 26. Water requirements for the sink 26 are provided by the entire network 10 through its associated multiport fittings 14, as illustrated by the flow arrows. In this manner, the water within the system 10 and between the multiport fittings 14 is in motion. While the flow rates of individual conduits 16, 18 may not be equal (and may be in directions other than as illustrated) there is some flow of water in the conduits 16, 18 between all of the multiport fittings during sink 26 use.

Furthermore, it is appreciated that water flows through each feeder conduit 16 from the manifold 20 during sink use (though

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the flow rates may not be equal). As a result, a nonstagnant flow system 10 is established.

5 Similarly, FIG. 3 illustrates the system 10 during occupant use of the water closet 22. The flow arrows again depict the direction of water flow within the conduits 18 between the multiport fitting 14 and in the supply lines 16. The exact flow rate and direction of flow within a particular conduit 16, 18 may be determined with additional information, if  
10 necessary. Importantly, FIG. 3 again illustrates that the water within the conduits 16,18 is nonstagnant (in motion) during use of the Water closet 22.

FIG. 4 illustrates an additional benefit of invention  
15 according to the present invention. A water sprinkler 32 is illustrated as having been activated. Water flow requirements for the sprinkler 32 are provided by the plurality of conduits 18 leading to the associated multiport fitting 14. In this manner, rather than a single large diameter conduit supplying  
20 water, a plurality of small diameter conduits 18 together supply the sprinkler 32. The water supply for the fire sprinklers 32, which typically is plumbed using a single large diameter piping, is now provided by a plurality of smaller

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flexible conduits 16,18.

5 An important benefit provided by the present invention is a  
"self-checking" fire sprinkler system 10 which allows the  
occupant to verify the fire sprinkler system 10 operability by  
simply using one of the variety of plumbing fixtures 22,24,26.  
10 In this regard, the occupant is ensured that pressurized water  
is available to the various fire sprinklers 32 if water is  
output from any plumbing fixture 22,26,28 upon occupant  
demand.

15 The present invention and many of its attendant advantages  
will be understood from the foregoing description and it will  
be apparent that various changes may be made in the form,  
construction and arrangement of the parts thereof including  
the network design without departing from the spirit and scope  
of the invention or sacrificing all of its material  
advantages, the form hereinbefore described being merely a  
20 preferred or exemplary embodiment thereof.

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**CLAIMS:**

5 I claim:

1. An integrated water distribution system for supplying both domestic water and fire sprinkler water requirements of a structure, said system comprising:

10 a plurality of multiport fittings being adapted to be secured within the structure, each of said plurality of multiport fittings having a plurality of ports, each of said plurality of multiport fittings capable of being  
15 fluidly coupled to a fire sprinkler assembly;

20 a plurality of flexible conduit interconnecting said plurality of multiport fittings through said plurality of ports, said plurality of flexible conduit establishing a network, and each of said plurality of flexible conduit within said network being capable of carrying a water flow;

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a plurality of plumbing fixtures, each being fluidly connected to the network through a fixture conduit, wherein upon occupant use of any one or more of said plumbing fixtures, said water flow through each of said flexible conduits interconnecting said plurality of multiport fittings is substantially non-stagnant; and

a water supply line, fluidly coupled to the network, for supplying the system with water relating to the occupant use.

2. An integrated water distribution system according to claim 1, further comprising a plurality of water supply lines, and a water supply manifold, wherein the plurality of water supply lines originate at said water supply manifold.

3. An integrated water distribution system according to claim 1, further comprising one said fire sprinkler assembly threadedly secured to an associated multiport

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fitting.

4. An integrated water distribution system according to  
5 claim 1, wherein at least one of the plurality of  
multiport fittings includes at least three ports.
5. An integrated water distribution system according to  
10 claim 4, wherein at least one of the plurality of  
multiport fitting includes four ports.
6. An integrated water distribution system for both domestic  
15 water and fire sprinkler water requirements of a  
structure, said system comprising:
- a plurality of multiport fittings being adapted to be  
secured within the structure, each of said plurality of  
20 multiport fittings having at least three ports, each of  
said plurality of multiport fittings being fluidly  
coupled to an associated fire sprinkler assembly;

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a plurality of water-carrying conduit fluidly  
interconnecting said plurality of multiport fittings;

a plumbing fixture conduit fluidly coupled to the system,  
5 wherein upon occupant use of a plumbing fixture  
associated with said plumbing fixture conduit an amount  
of water flows through substantially each of said  
plurality of water-carrying conduits; and

10 a water supply line for supplying the system with water  
relating to the occupant use of the plumbing fixture.

7. An integrated water distribution system according to  
15 claim 6, wherein each multiport fitting is provided an  
attachment device for securing an associated multiport  
fitting upon the structure.

20 8. An integrated water distribution system according to  
claim 7, wherein the attachment devices include an offset  
flange having an aperture.

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9. An integrated water distribution system according to claim 6, further comprising a plurality of the water supply lines for supplying the system with water.

5

10. An integrated water distribution system according to claim 9, further comprising a water supply manifold, and the plurality of the water supply lines originates from said water supply manifold.

10

11. An integrated water distribution system according to claim 6, wherein the plurality of water-carrying conduit is plastic conduit.

15

12. An integrated water distribution system according to claim 6, wherein at least one of the fire sprinkler assemblies is threadedly secured to an associated multipoint fitting.

20

13. An integrated water distribution system according to

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claim 12, wherein the associated multiport fitting includes four ports.

5        14. An integrated water distribution system according to claim 6, wherein the plumbing fixture conduit is fluidly coupled to the system through one of the ports of one of the multiport fittings.

10       15. An integrated water distribution system according to claim 6, wherein the water supply line is fluidly coupled to the system through one of the ports of one of the multiport fittings.

15       16. An integrated water distribution system for both domestic water and fire sprinkler water requirements of a structure, said system comprising:

20       a plurality of multiport fittings being adapted to be secured within the structure, each multiport fitting being fluidly coupled to a fire sprinkler assembly;

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a plurality of water-carrying conduit fluidly interconnecting said plurality of multiport fittings through at least two ports of each multiport fitting;

5 a plumbing fixture conduit fluidly coupled to the system, wherein upon occupant use of a plumbing fixture associated with said plumbing fixture conduit an amount of water flows through substantially each of said plurality of water-carrying conduits; and

10 a water supply line for supplying the system with an amount of water related to the occupant use of the plumbing fixture.

15 17. An integrated water distribution system according to claim 16, wherein the water supply line is fluidly coupled to the system at one of the ports of one of the multiport fittings.

20 18. An integrated water distribution system according to claim 16, further comprising a plurality of water supply

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lines for supplying the system with the amount of water related to the occupant use of the plumbing fixture.

5       19. An integrated water distribution system according to claim 16, wherein the plumbing fixture conduit is coupled to the system at one of the ports of one of the multiport fittings.

10

20. An integrated water distribution system according to claim 16, wherein each multiport fitting is provided an attachment device for securing an associated multiport fitting upon the structure.

15

21. An integrated water distribution system according to claim 20, wherein the attachment device includes an offset flange having an aperture through which a fastener  
20       may be used to secure the multiport fitting upon the structure.

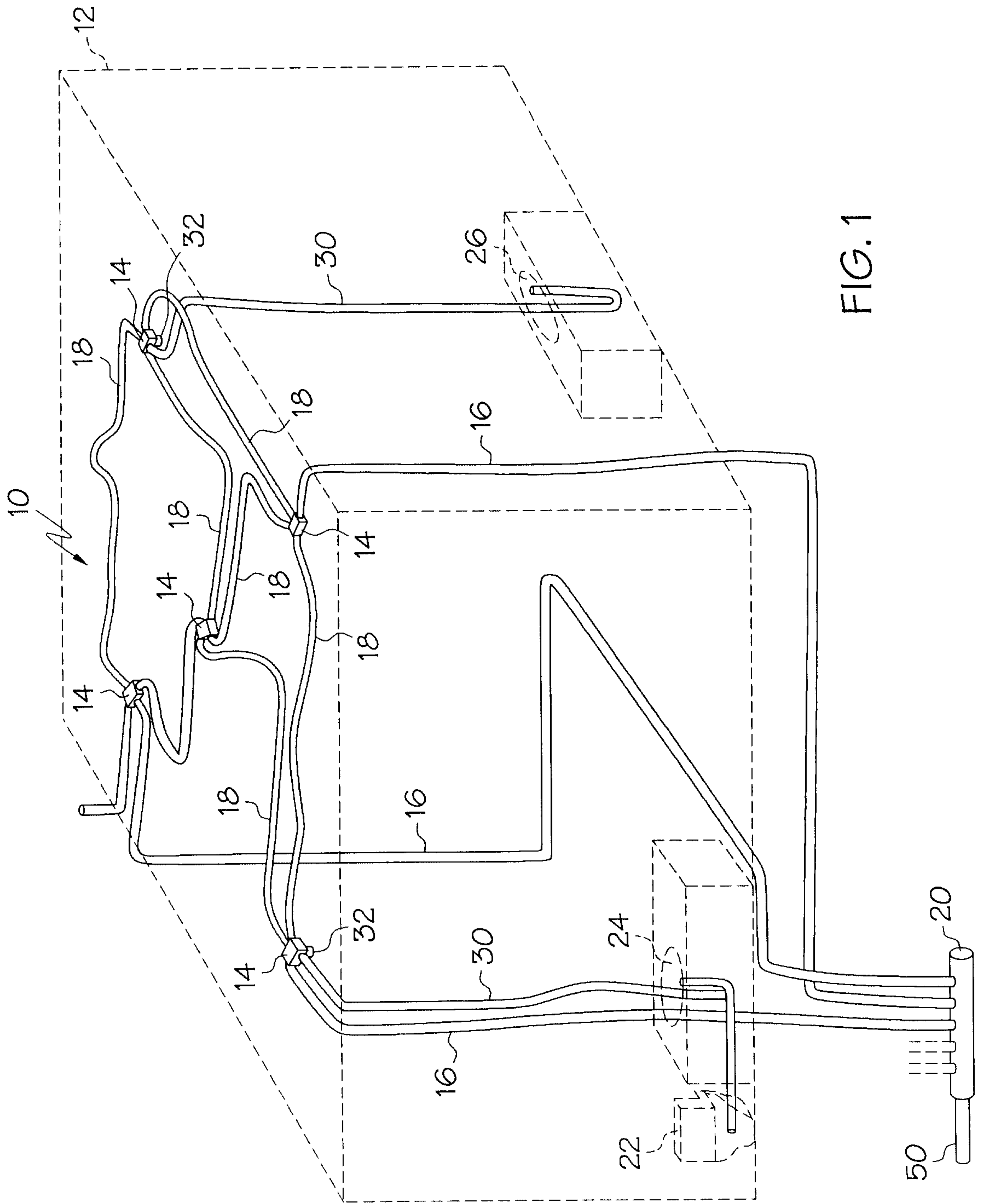


FIG. 1

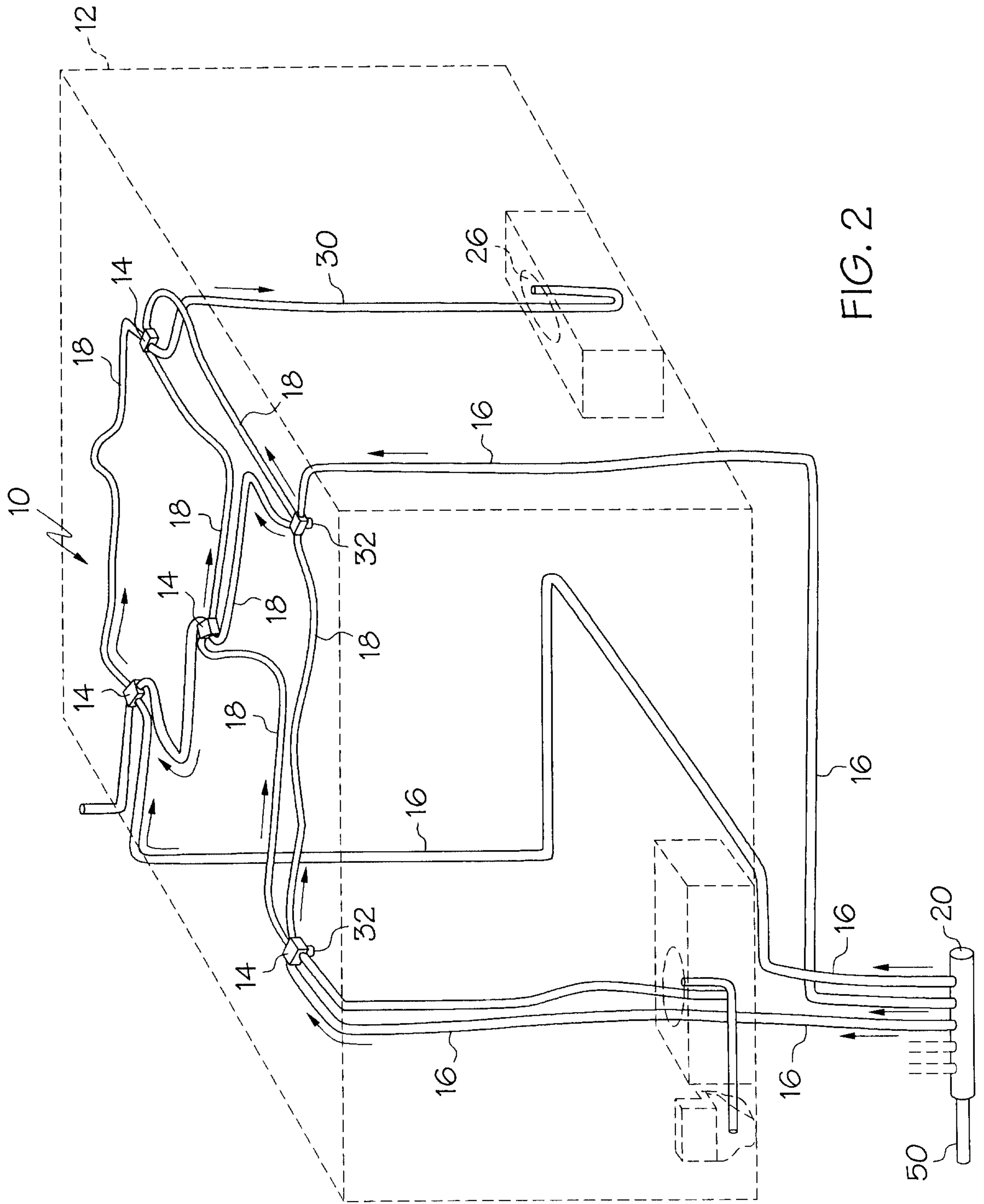


FIG. 2

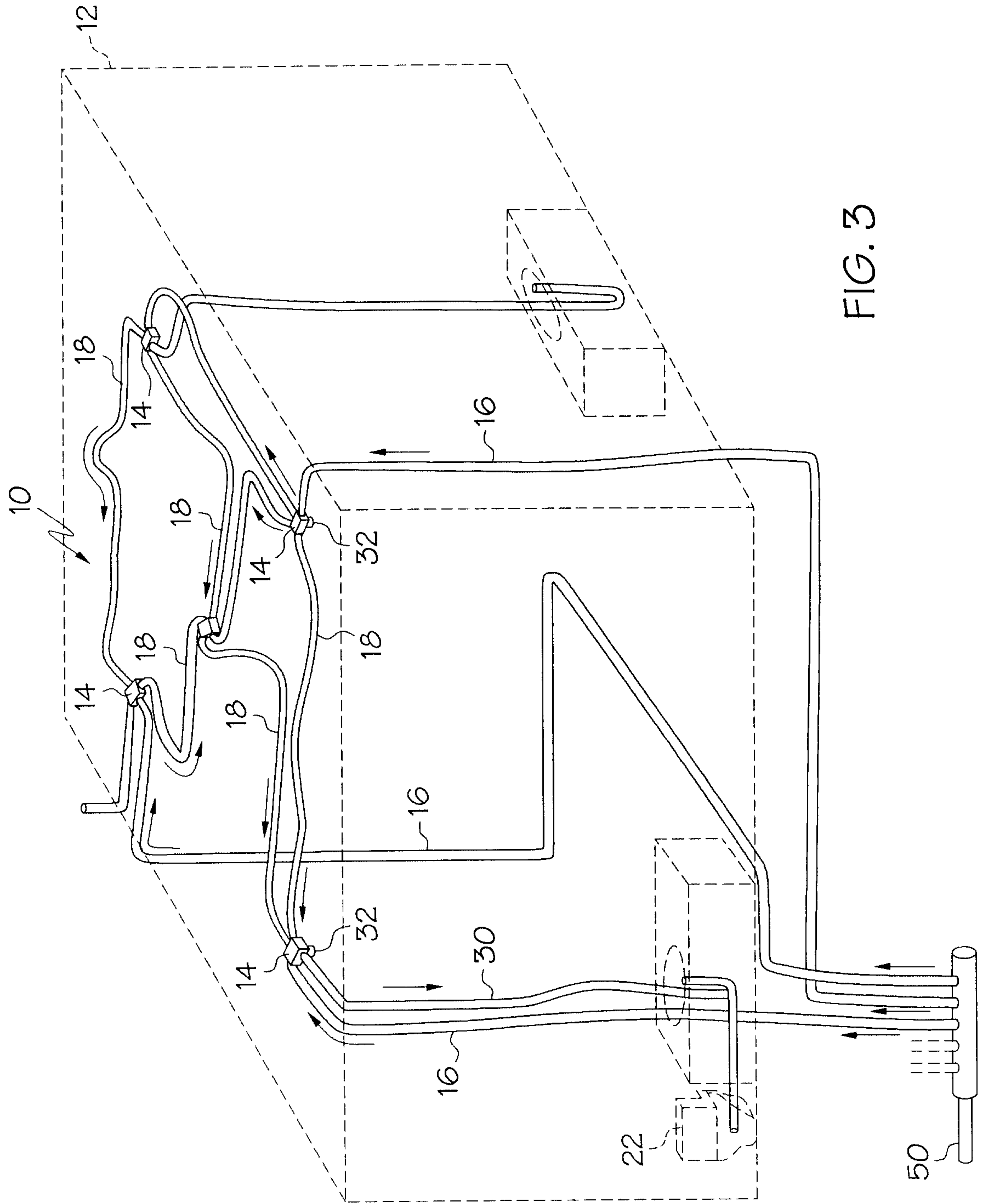


FIG. 3

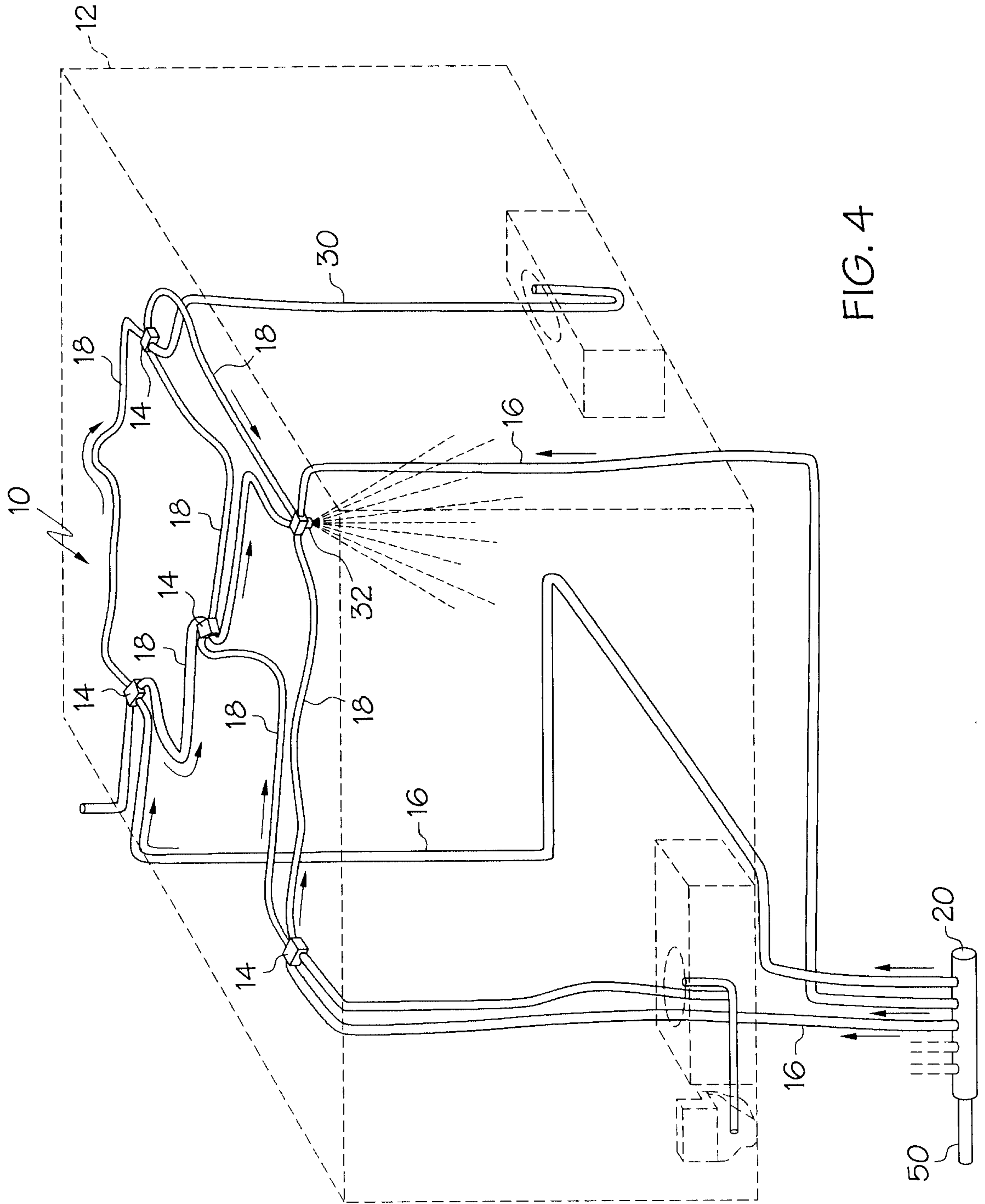


FIG. 4

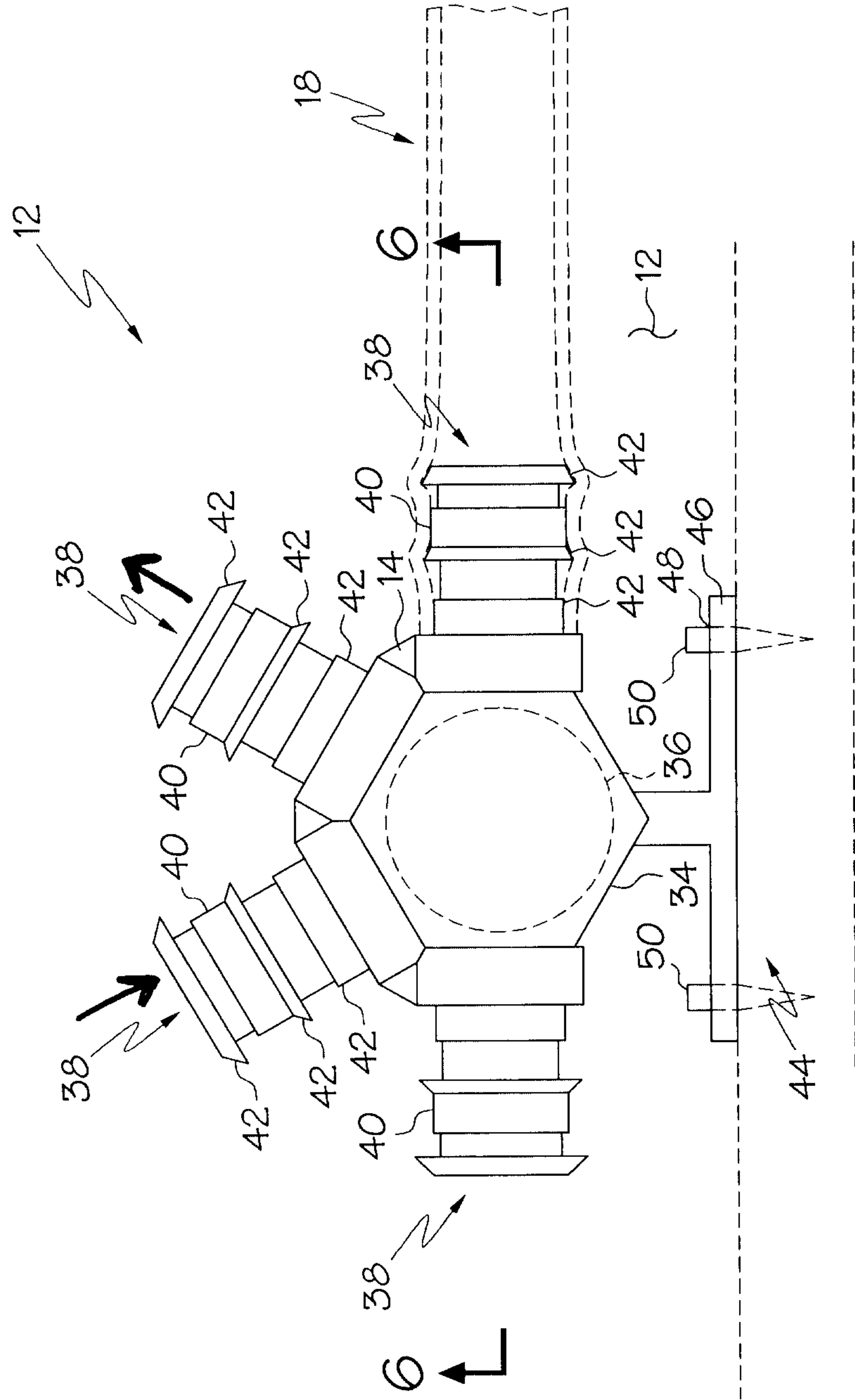


FIG. 5

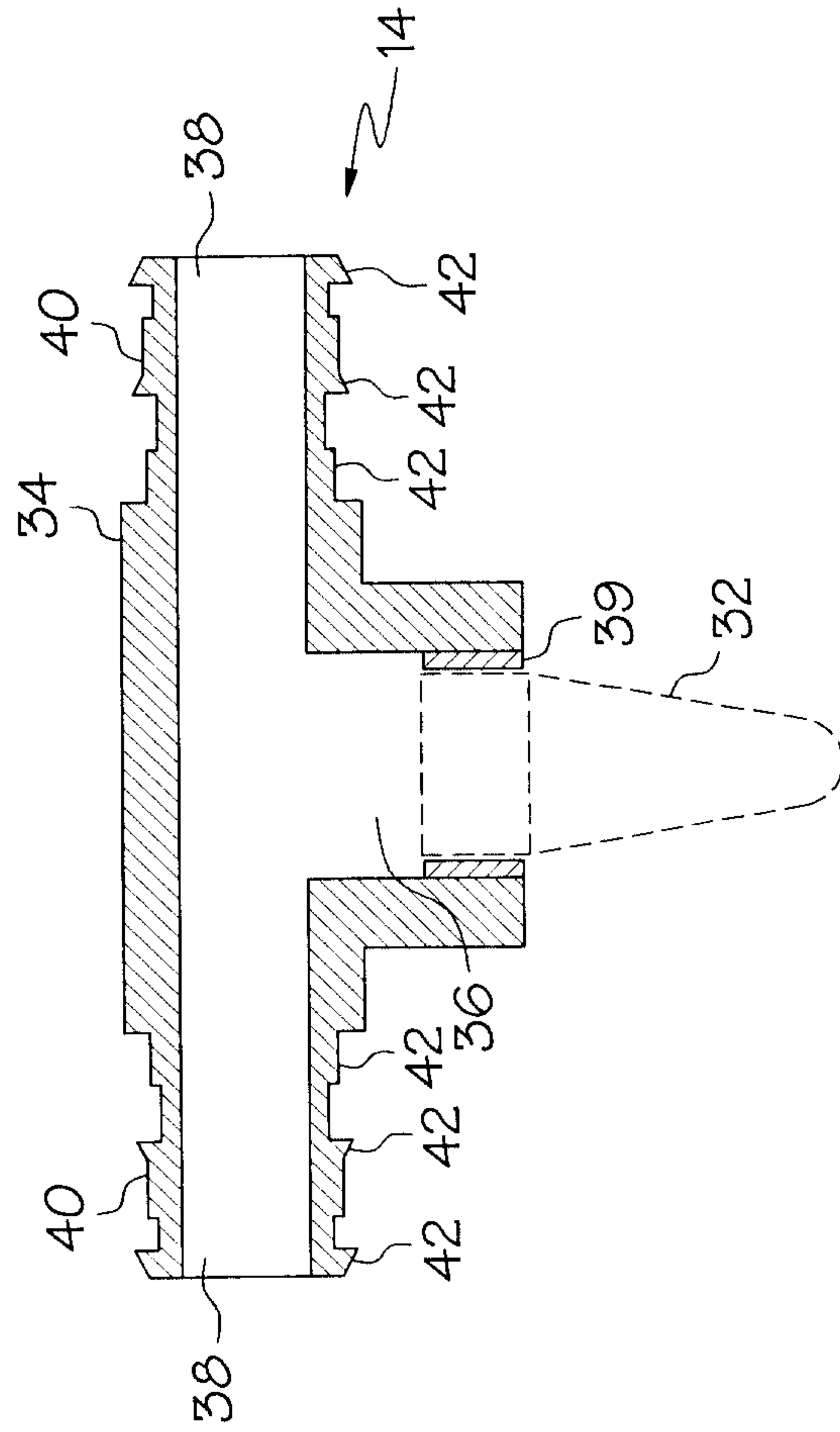


FIG. 6

