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- (73) Patenthaver: **KRAUSZ INDUSTRIES LTD., 6 Hapatish Street, 6655906 Tel Aviv, Israel**
- (72) Opfinder: **Chiproot, Avi, 12 Hairis Street, 4427814 Kfar-Saba, Israel**
- (74) Fuldmægtig i Danmark: **Dennemeyer & Associates S.A, P.O. Box 700425, DE-81304 Munich, Tyskland**
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DESCRIPTION

Description

FIELD OF THE INVENTION

[0001] The present invention relates generally to pipe couplings, and particularly to an anti-corrosion pipe system with adjustable length.

BACKGROUND OF THE INVENTION

[0002] Pipes made of metal, such as cast iron, ductile iron or steel alloys, which are laid in the ground near sources of direct electrical current, such as near electrical railways, are prone to corrosion problems caused by stray current. The stray current can reach the buried pipes, entering at one point along the pipe path and exiting at a different point spaced longitudinally from the entry point. At the point of entry of the stray current, a partial cathodic reaction takes place; at the exit point, an anodic partial reaction occurs. The result is corrosion of metal all along the longitudinal path between entry and exit. The problem is particularly great in water pipes.

[0003] Anti-corrosion coatings have been used on pipes to help prevent or reduce corrosion. In some cases, seals that provide electrical resistance have been used between pipe sections to limit the length of the longitudinal path. However, in any case, the pipe sections must be welded or otherwise connected on site, and this work often involves guesswork and rework which causes time delays and increases labor costs.

[0004] US 1 983 228 A discloses means for opposing loss of metal by electrolytic corrosion of the bolts and nuts of pipe joints which comprise metallic extensions longer than the exposed portions of the bolts and nuts and housing and covering the bolts and nuts and providing surface exposure by which current leaves the joints instead of leaving from the surface of the bolts and nuts.

[0005] EP 2 392 845 A1 discloses an annular sealing material sealing a pipe joint between a socket and a spigot. The sealing material includes a bulb part which is composed of a first bulb, a second bulb located closer to the inner side of the socket than the first bulb, and a narrow part present between the first and second bulbs. The first bulb is pressed against the inner circumferential surface of the socket. The second bulb is pressed against the outer peripheral surface of the spigot. The second bulb is inclined towards the pipe center from the

first bulb in a natural state before it is provided between the socket and the spigot. The inner diameter of the second bulb is smaller than the outer diameter of the spigot in the natural state. The second bulb is extensible in the pipe diameter direction due to elastic deformation of the narrow part.

SUMMARY OF THE INVENTION

[0006] The present invention seeks to provide an anti-corrosion pipe system with adjustable length, as is described more in detail hereinbelow.

[0007] There is thus provided in accordance with an embodiment of the present invention a pipe system including a first pipe section and a second pipe section arranged, and together defining a total length, along a longitudinal axis, the first and second pipe sections being movable with respect to each other so as to shorten the total length in a contracted orientation or to lengthen the total length in an elongate, extended orientation, and a fixation member that clamps a portion of the second pipe section to a portion of the first pipe section at both the contracted orientation and the elongate, extended orientation, the fixation member including an insulator which is electrically insulating and passes no electrical current between the first and second pipe sections.

[0008] In accordance with the present invention the first and second pipe sections are telescopic with each other.

[0009] In accordance with an embodiment of the present invention the first and second pipe sections further include one or more axial fixation members, which may be electrically insulating or have an electrically insulating portion. In accordance with an embodiment of the present invention the one or more axial fixation members include a bar or rod secured to lugs, which extend from the first and second pipe sections, respectively, and the insulator includes an electrically insulating bushing that sits in each of the lugs.

[0010] In accordance with the present invention the fixation member is an annular fixation member including a grip ring that clamps against an electrically insulating sleeve wrapped around an outer contour of the first pipe section, wherein the grip ring does not pierce the sleeve. (The electrically insulating sleeve is the insulator.)

[0011] In accordance with an embodiment of the present invention at least one of the outer ends of the first and second pipe sections respectively, includes a pipe connection, and the pipe connection includes an annular seal plus a grip ring.

[0012] In accordance with an embodiment of the present invention the first and second pipe sections are coated with an anti-corrosion coating.

[0013] In accordance with an embodiment of the present invention at least one of the first and

second pipe sections includes a cathodic protection outlet.

[0014] In accordance with an embodiment of the present invention at least one of the first and second pipe sections includes a lifting ear.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The present invention will be understood and appreciated more fully from the following detailed description, taken in conjunction with the drawing in which:

Fig. 1 is a simplified pictorial illustration of an adjustable-length anti-corrosion pipe system in an elongate, extended orientation, and including grip rings at both ends of the pipe system;

Fig. 2 is a side view of the pipe system;

Fig. 3 is a sectional, side view of the pipe system;

Fig. 4 is a side view of the pipe system, in a contracted, shortened orientation;

Fig. 5 is a top view of the pipe system, in the contracted orientation;

Figs. 6, 7 and 8 are simplified pictorial, side-view and sectional illustrations, respectively, of an adjustable-length anti-corrosion pipe system, constructed and operative in accordance with another non-limiting embodiment of the present invention, and including a grip ring at one end of the pipe system and a flange at the opposite end; and

Fig. 9 is a simplified pictorial illustration of an adjustable-length anti-corrosion pipe system, constructed and operative in accordance with a non-limiting embodiment of the present invention, and including flanges at both ends of the pipe system.

DETAILED DESCRIPTION OF EMBODIMENTS

[0016] Reference is now made to Figs. 1-5, which illustrate an adjustable-length anti-corrosion pipe system 10.

[0017] The anti-corrosion pipe system 10 includes a first pipe section 12 that is arranged to slide in and out of a second pipe section 14. In other words, the first and second pipe sections 12 and 14 are telescopic with each other.

[0018] In the embodiment of Fig. 1, an outer end 16 of first pipe section 12 is equipped with a pipe connection 18 for receiving therein a pipe (not shown; such as another pipe in a water piping system). The pipe connection 18 is provided with an annular seal 19 plus a grip ring 20

for sealing the pipe which is inserted into the pipe connection 18. The annular seal 19, which may be made of a natural or artificial elastomeric material, may include one or more layers nested in each other. In this manner, one of the nested seals can be removed to accommodate sealing against pipes of different diameters. Annular seal 19 may be located axially inwards of the grip ring 20; alternatively annular seal 19 may be located axially outwards of the grip ring 20.

[0019] One or more of the layers of annular seal 19 may include an outer portion folded over an inner portion so as to define an inner space between and bounded by the inner and outer portions. The inner space is in fluid communication with a fluid flowing in the pipe. The fluid enters the inner space and applies pressure therein to increase tightening of the seal.

[0020] Grip ring 20 includes wedge-shaped grip elements 22 that are radially spaced from one another about a ring member, such as springs that connect adjacent grip rings with one another. The grip elements 22 are formed with teeth that face inwards towards the center of the grip ring 20. One or more tightening elements 24 (e.g., bolts and nuts or other tightenable fasteners) pass through clamp members 26 of pipe connection 18. The tightening elements 24, when tightened in a direction transverse to the axial length of the pipe, press both the annular seal 19 and the grip ring 20 against the surface of the pipe. Annular seal 19 is radially squeezed and sealingly clamped against the outside surface of the pipe when tightening elements 24 fasten and tighten clamp members 26 towards each other. The teeth of the wedge-shaped grip elements 22 are forced into the outside surface of the pipe when tightening elements 24 fasten and tighten clamp members 26 towards each other.

[0021] The clamp members 26 may be formed at ends of a continuous, partial ring; alternatively, as shown, the ring is not continuous but rather is formed of two sections clamped together opposite to the clamp members 26 by fasteners 28 that pass through lugs 30.

[0022] In the embodiment of Fig. 1, an outer end 32 of second pipe section 14 is also equipped with the same type of pipe connection 18 for receiving therein a pipe (not shown; such as another pipe in a water piping system).

[0023] Accordingly, the first pipe section 12 and second pipe section 14 are arranged, and together define a total length, along a longitudinal axis 15, and first and second pipe sections 12 and 14 are movable with respect to each other so as to shorten or lengthen the total length.

[0024] The telescoping first and second pipe sections 12 and 14 are easily adjusted on site in the field to a desired length. They are then fixed at the desired length by two different fixation members. First, an annular fixation member 42 clamps a portion of second pipe section 14 to a portion of first pipe section 12. The annular fixation member 42 may include annular seal 19 described above.

[0025] Second, one or more axial fixation members 34 (e.g., a rod or bar) are secured to lugs 36 and 38 extending from first and second pipe sections 12 and 14, respectively. The axial

fixation member 34 may be secured to lugs 36 and 38 by means of nuts 39 (which tighten against the lug) and an electrically insulating bushing (insulator) 40 (such as a plastic bushing) that sits in each of lugs 36 and 38. The electrically insulating bushing 40 ensures no electrical current is passed between first and second pipe sections 12 and 14. Alternatively or additionally, the axial fixation members 34 may be electrically insulating or have an electrically insulating portion.

[0026] The first and second pipe sections 12 and 14 may be made of ductile iron, cast iron, steel alloy and other metals. The first and second pipe sections 12 and 14 may each be coated with an anti-corrosion coating against the effects of stray current, such as but not limited to, a fusion bonded epoxy coating, a polyurethane coating or others. In addition, first and/or second pipe sections 12 and 14 may include a cathodic protection outlet 44, such as but not limited to, a threaded lug (e.g., 1/4-20 UNC), to which sacrificial corrosion elements may be attached (the sacrificial corrosion elements corrode instead of the pipes, due to galvanic corrosion) or to which electrical conductors may be attached.

[0027] Either or both of first and second pipe sections 12 and 14 may include a lifting ear 46.

[0028] Figs. 1-3 show the adjustable-length anti-corrosion pipe system 10 in an elongate, extended orientation. Figs. 4-5 show the adjustable-length anti-corrosion pipe system 10 in a contracted orientation.

[0029] Reference is now made to Figs. 6-8, which illustrate an adjustable-length anti-corrosion pipe system 50, constructed and operative in accordance with a non-limiting embodiment of the present invention. Pipe system 50 is similar to pipe system 10, with like elements being designated by like numerals. Pipe system 50 differs from pipe system 10 in that there are no axial fixation members. Instead, an annular fixation member 52 is used to achieve electrical insulation between first and second pipe sections 12 and 14. The annular fixation member 52 does not only include annular seal 19, but instead includes pipe connection 18, which as before, is provided with annular seal 19 plus grip ring 20. The annular fixation member 52 tightens grip ring 20 against an electrically insulating sleeve 53 (also referred to as insulator 53) wrapped around the outer contour of first pipe section 12. The electrically insulating sleeve 53 may be made of an elastomeric material. The teeth of grip ring 20 bite into sleeve 53, but do not pierce sleeve 53, and thus do not contact the metal pipe 12. The tightening of annular fixation member 52 against sleeve 53 achieves electrical insulation between first and second pipe sections 12 and 14.

[0030] Another difference from pipe system 10 is that in pipe system 50 the outer end of second pipe section 14 is provided with a flange 54 instead of a pipe connection.

[0031] Reference is now made to Fig. 9, which illustrates an adjustable-length anti-corrosion pipe system 60, constructed and operative in accordance with another non-limiting embodiment of the present invention. Pipe system 60 is similar to pipe system 50, with like elements being designated by like numerals. Pipe system 60 differs from pipe system 50 in

that the outer ends of both first and second pipe sections 12 and 14 are provided with flanges 54.

REFERENCES CITED IN THE DESCRIPTION

Cited references

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US1983228A [0004]
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ELEKTRISK ISOLERET RØRSYSTEM MED JUSTERBAR LÆNGDE**PATENTKRAV**

1. Rørsystem (10), som omfatter:

en første rørsektion (12) og en anden rørsektion (14), som er anbragt og sammen definerer en samlet længde, langs en langsgående akse (15), og ovennævnte første og anden rørsektion (12, 14) er bevægelige i forhold til hinanden for at forkorte den samlede længde i en koncentreret retning eller for at forlænge den samlede længde i en udstrakt, udvidet retning; og

en fikseringsdel (34, 52), der klemmer en andel af ovennævnte anden rørsektion (14) til en andel af ovennævnte første rørsektion (12) ved både den koncentrerede retning og den udstrakte, udvidede retning, og ovennævnte fikseringsdel (34, 52) omfatter en isolator (34, 40, 53) som er elektrisk isolerende og ikke overfører elektrisk strøm mellem ovennævnte første og anden rørsektion (12, 14), hvor ovennævnte første og anden rørsektion (12, 14) er teleskopiske med hinanden, kendetegnet ved,

at ovennævnte fikseringsdel (52) omfatter en ringformet fikseringsdel (52), som omfatter en gribering (20), der klemmer mod en elektrisk isolerende kappe (53), som er omviklet en ydre kontur af ovennævnte første rørsektion (12), hvor ovennævnte gribering (20) ikke perforerer ovennævnte kappe (53).

2. Rørsystem (10) ifølge krav 1, hvor ovennævnte fikseringsdel (34) omfatter en eller flere aksiale fikseringsdele (34).

3. Rørsystem (10) ifølge krav 2, hvor ovennævnte ene eller flere aksiale fikseringsdele (34) omfatter en elektrisk isolerende andel.

4. Rørsystem (10) ifølge krav 2, hvor ovennævnte ene eller flere aksiale fikseringsdele (34) er fastgjort til flapper (36, 38), som strækker sig henholdsvis fra ovennævnte første og anden rørsektion (12, 14), og ovennævnte isolator (40) omfatter en elektrisk isolerende bøsning (40), der sidder i hver af ovennævnte flapper (36, 38).

5. Rørsystem (10) ifølge krav 1, hvor mindst en af de ydre ender (16, 32) på henholdsvis ovennævnte første og anden rørsektion (12, 14) omfatter en rørforbindelse

(18), og ovennævnte rørforbindelse (18) omfatter en ringformet forsegling (19) plus en gribering (20).

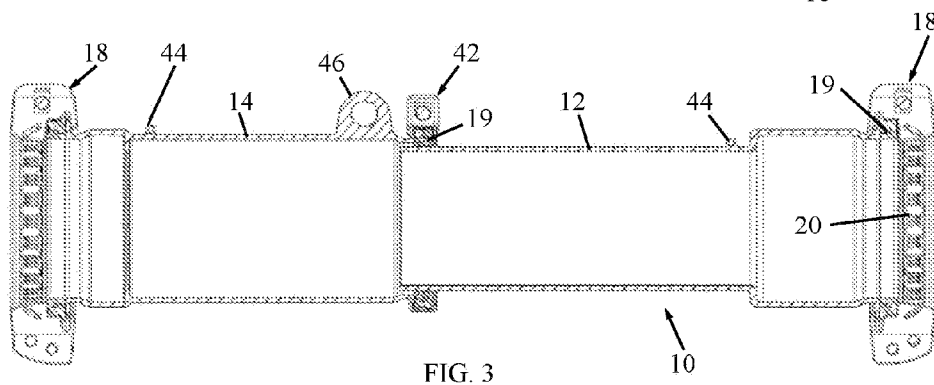
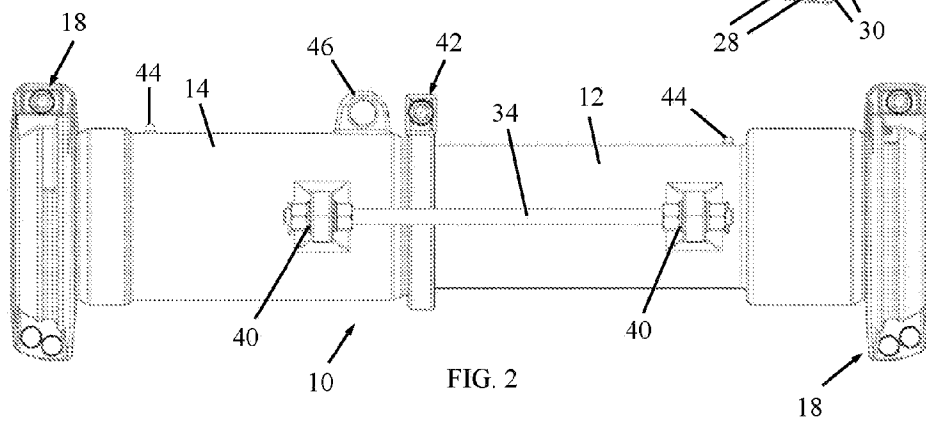
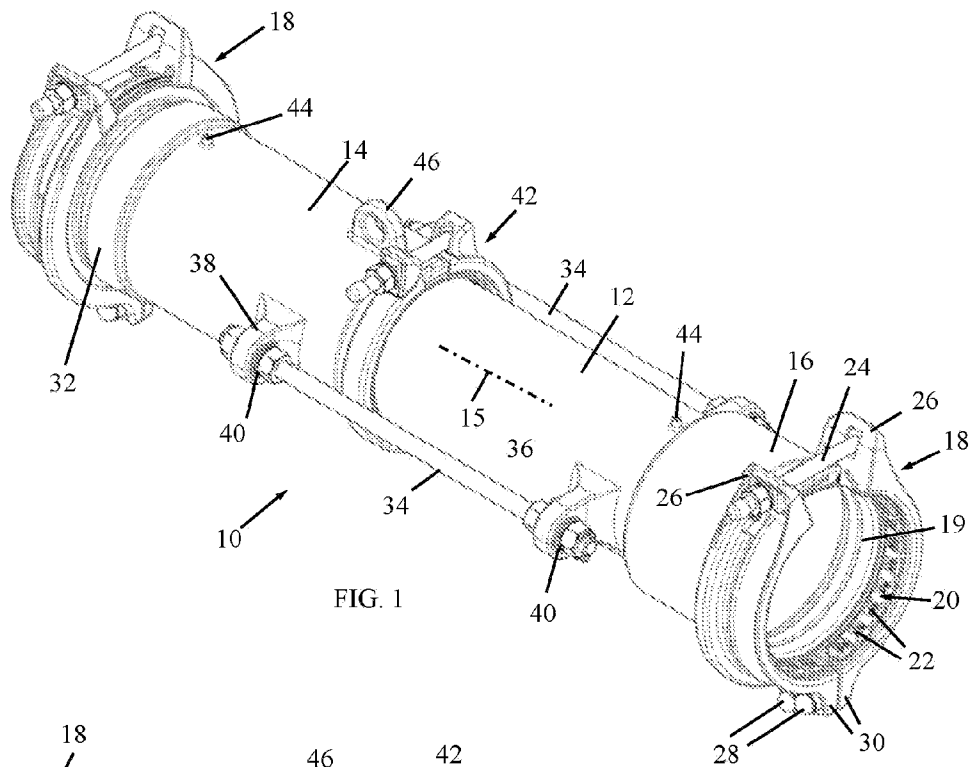
6. Rørsystem (10) ifølge krav 1, hvor ovennævnte første og anden rørsektion (12, 14) er beklædt med en rustbeskyttende beklædning.

7. Rørsystem (10) ifølge krav 1, hvor mindst en af ovennævnte første og anden rørsektion (12, 14) omfatter et katodisk beskyttelsesudtag (44).

8. Rørsystem (10) ifølge krav 1, hvor mindst en af ovennævnte første og anden rørsektion (12, 14) omfatter en løftehank (46).

DRAWINGS

Drawing



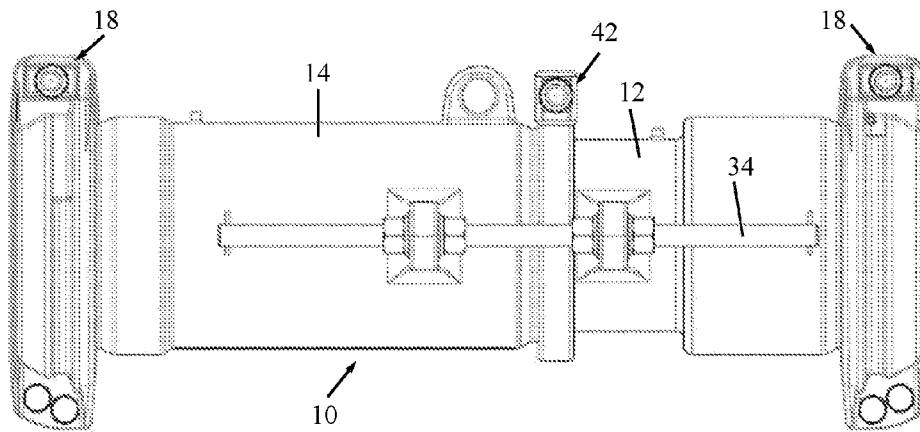


FIG. 4

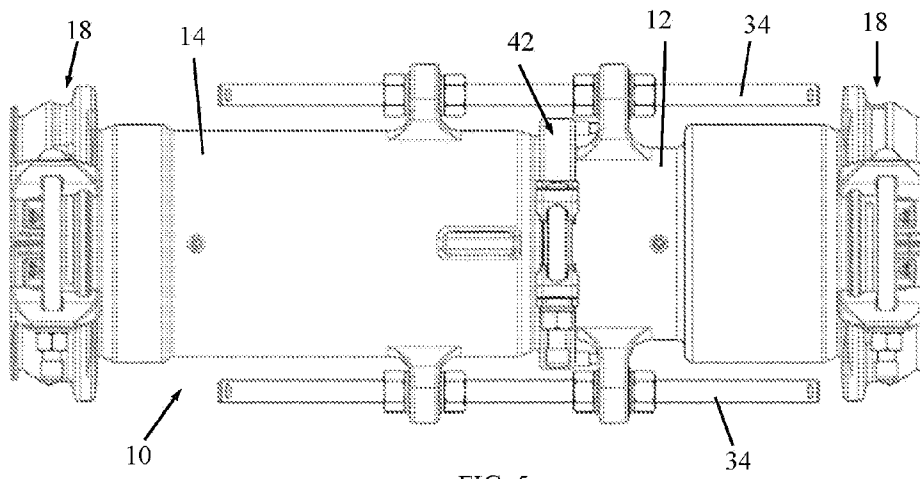
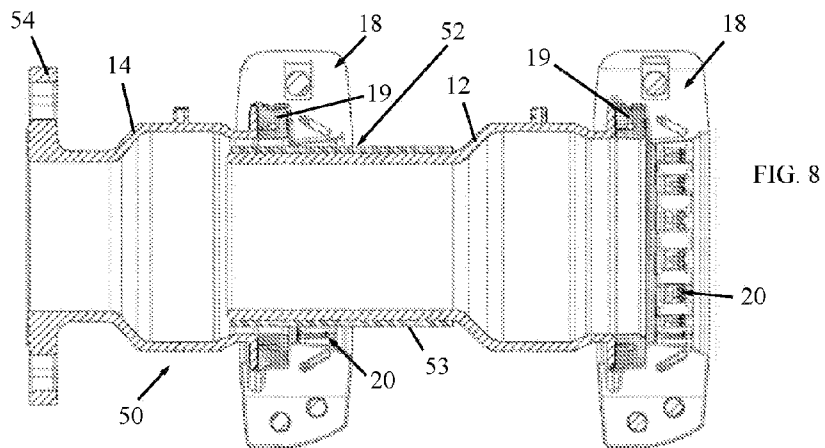
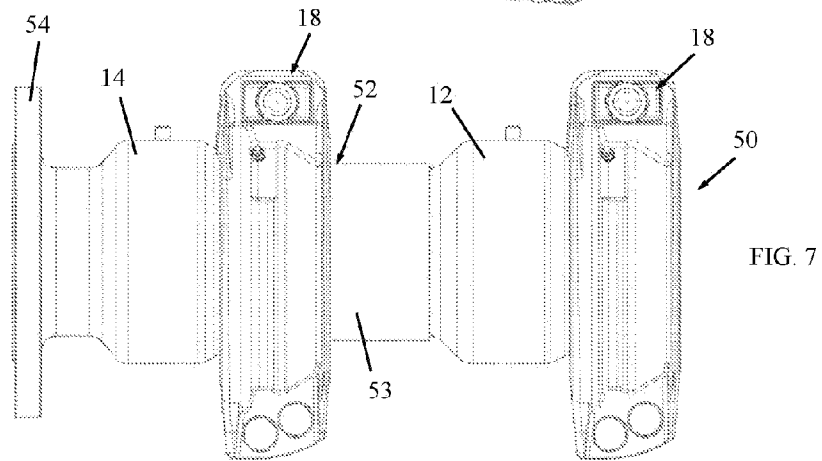
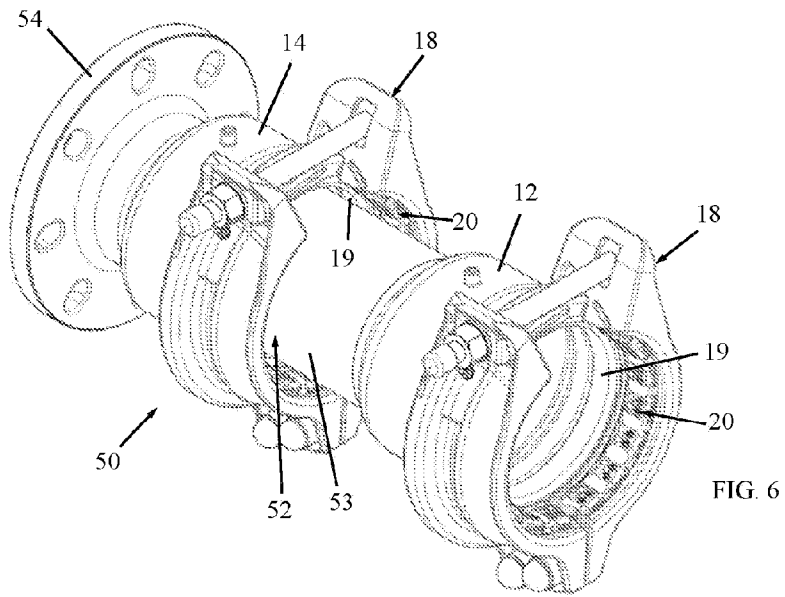


FIG. 5



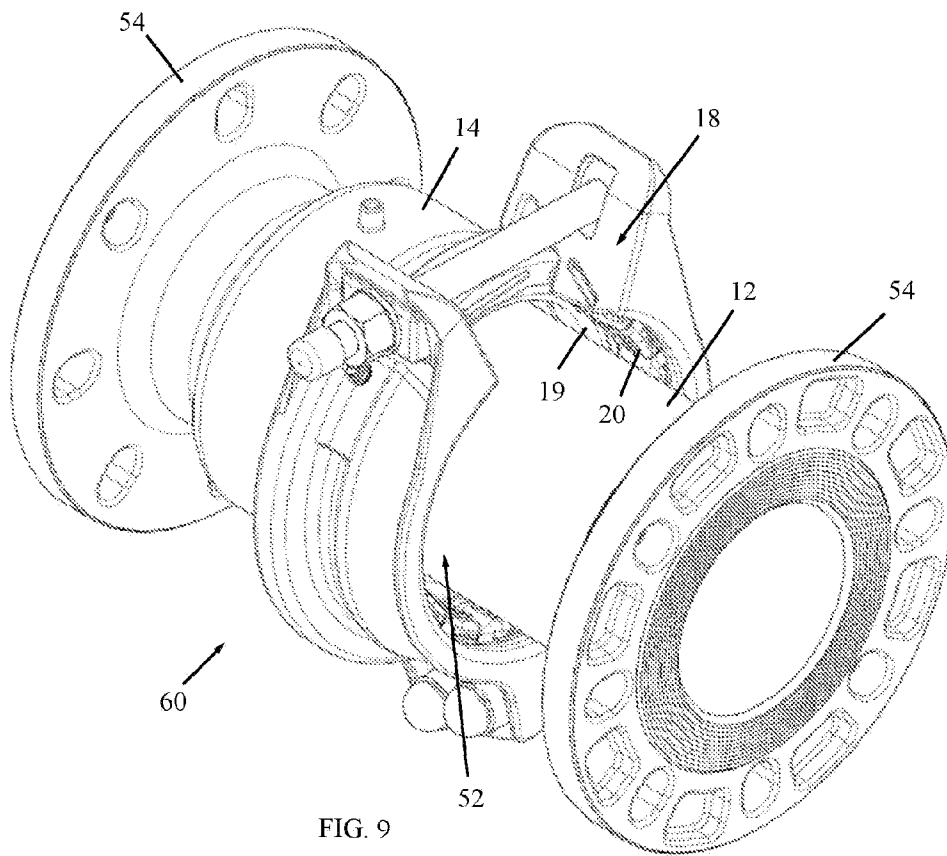


FIG. 9