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(54) **METHOD AND APPARATUS FOR CLEANING AND TREATING TUBULAR GOODS**

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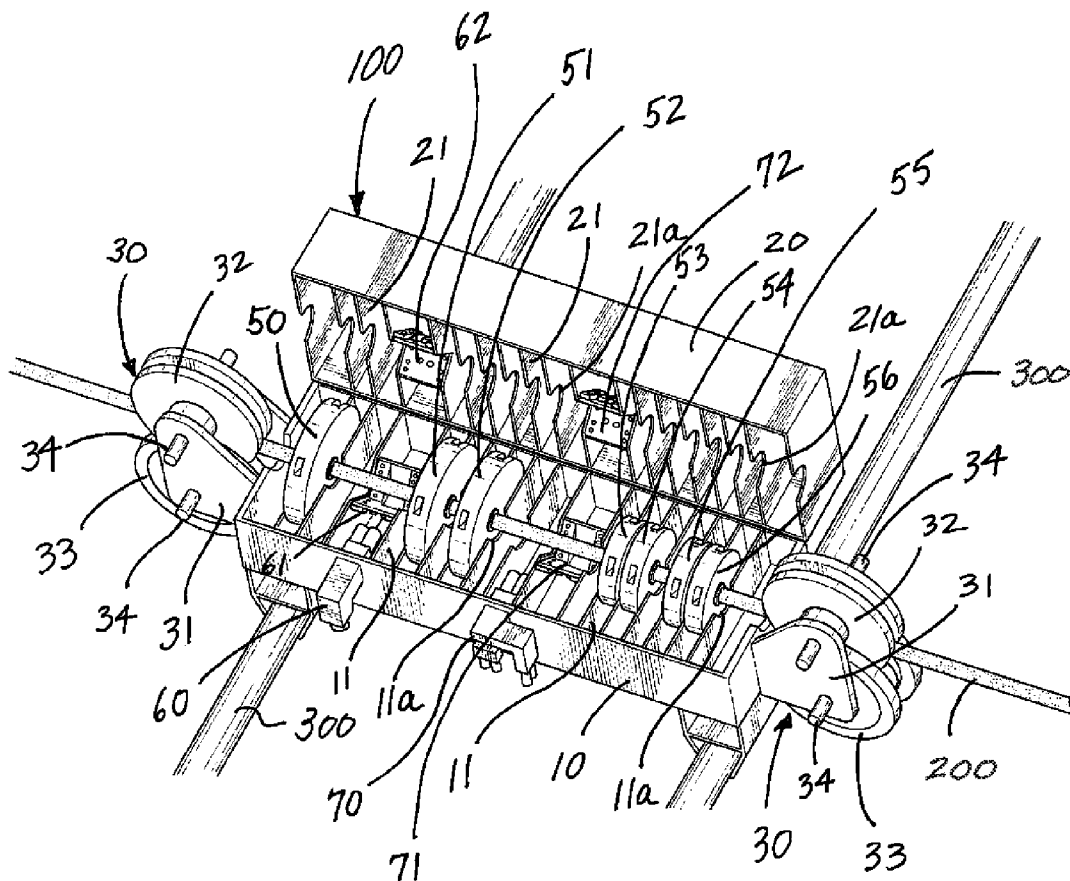
(57) **ABSTRACT**

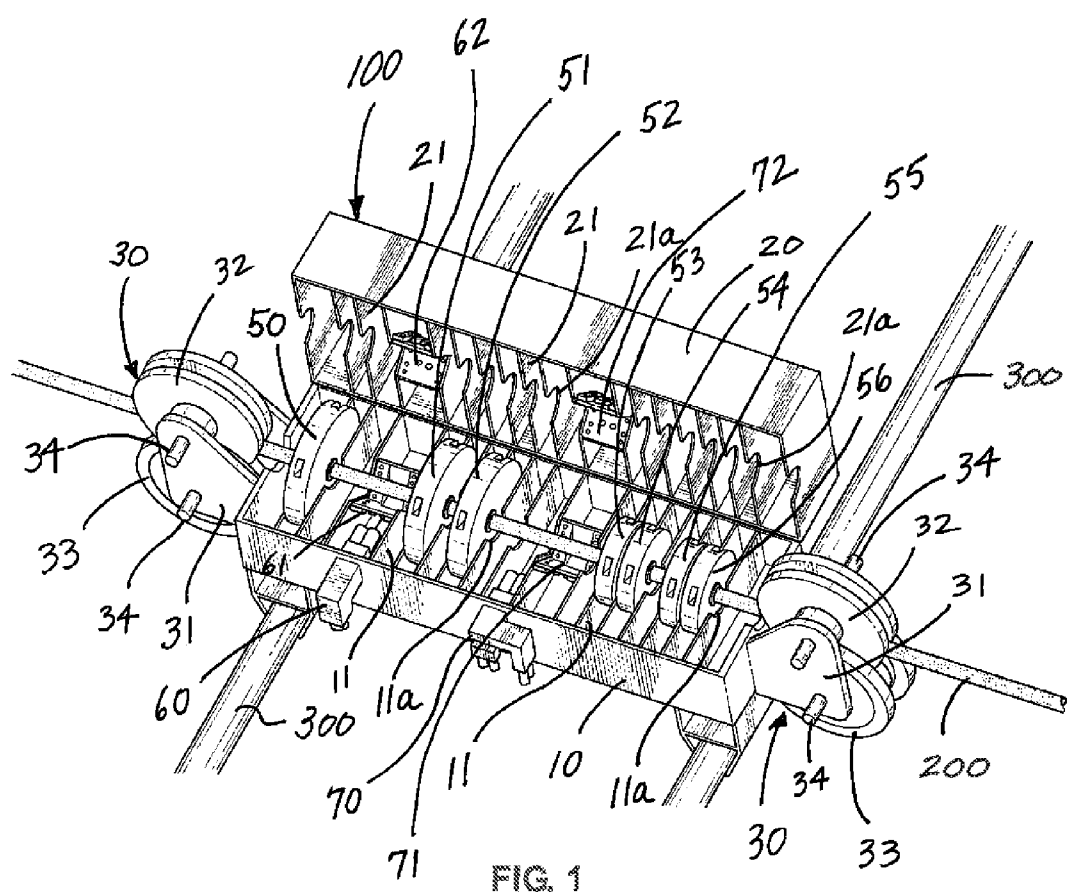
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A method and apparatus for cleaning, treating and inspecting tubular goods including, without limitation, continuous tubing. Tubing is fed through a box-like housing having an inner chamber. As the tubing proceeds through the housing, the exterior surface of the tubing passes through an initial squeegee wiper to remove moisture, debris and environmental contaminants. Thereafter, the external surface of the pipe is washed using a high pressure liquid spray followed by another wiper squeegee and gas (typically air) dry station. After the pipe is sufficiently dry, liquid rust inhibitor and/or other treating fluid can be applied to the outer surface of the pipe before the pipe exits the housing.

**Related U.S. Application Data**

(60) Provisional application No. 61/707,780, filed on Sep. 28, 2012.





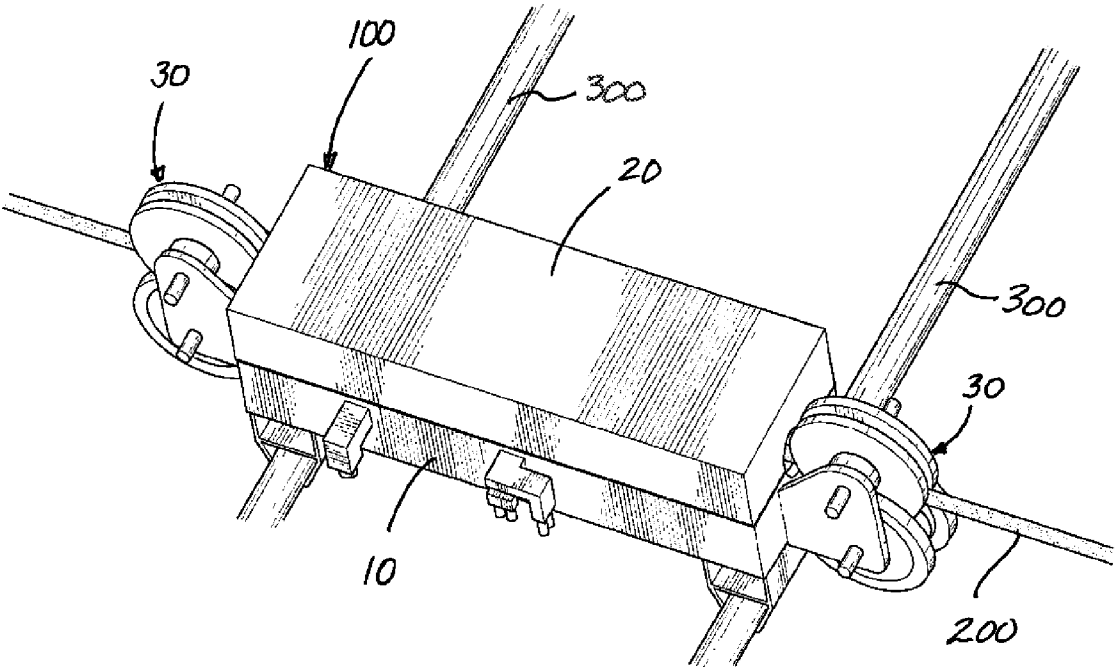


FIG. 2

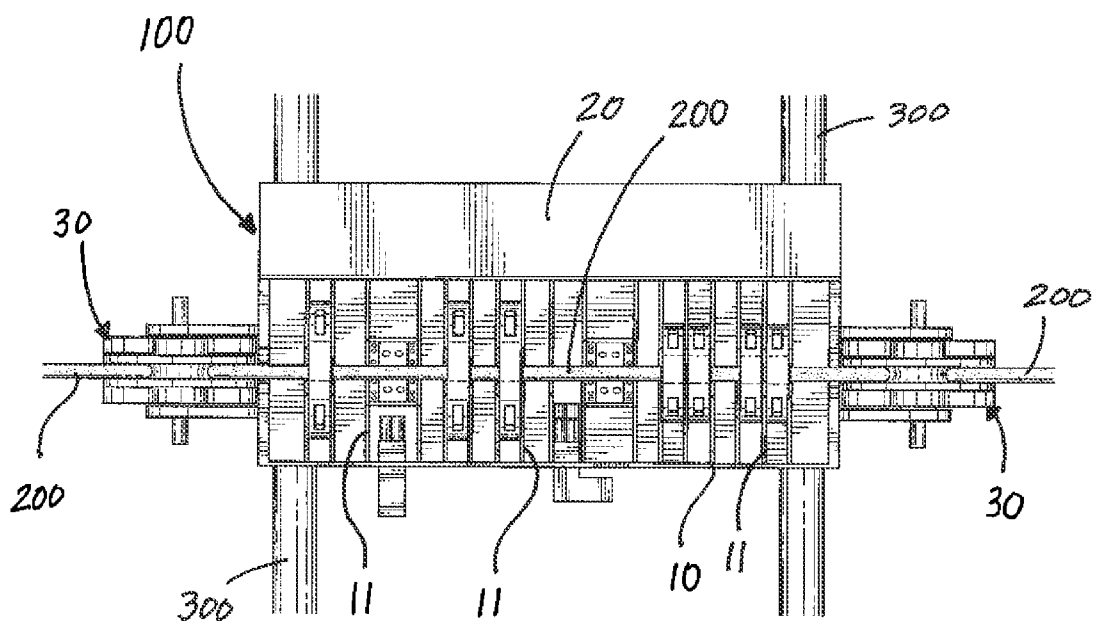


FIG. 3

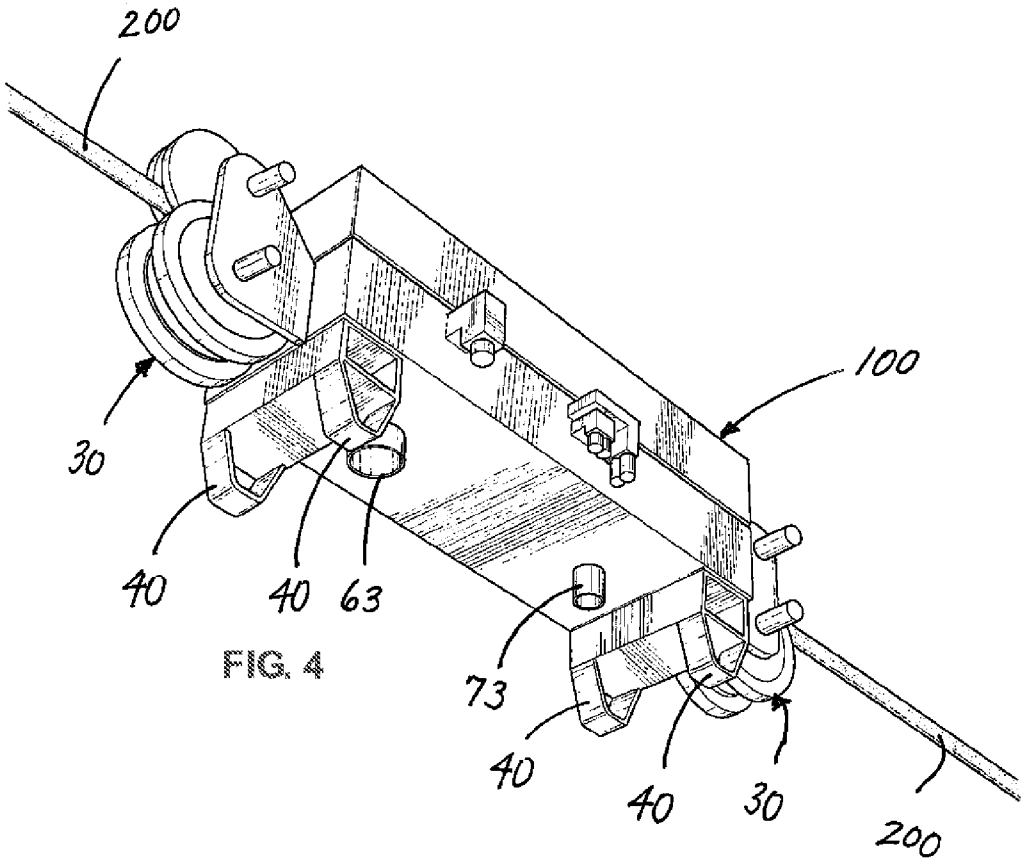


FIG. 4

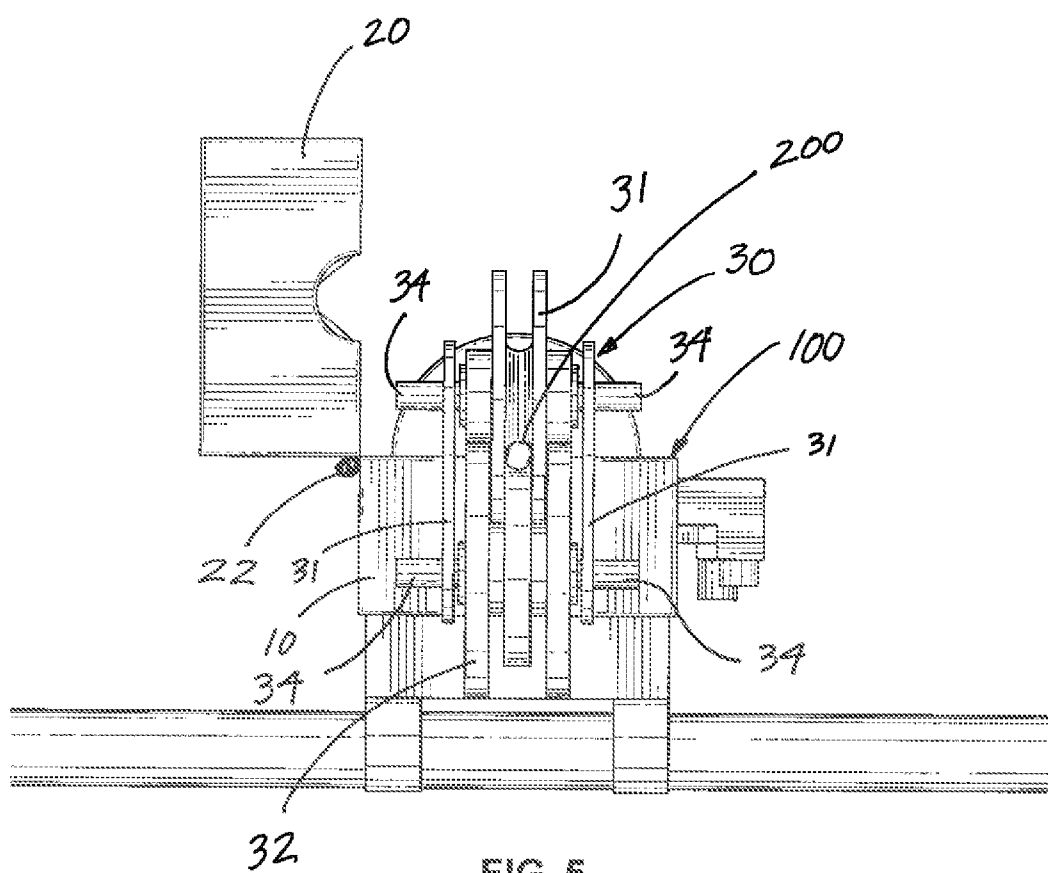


FIG. 5

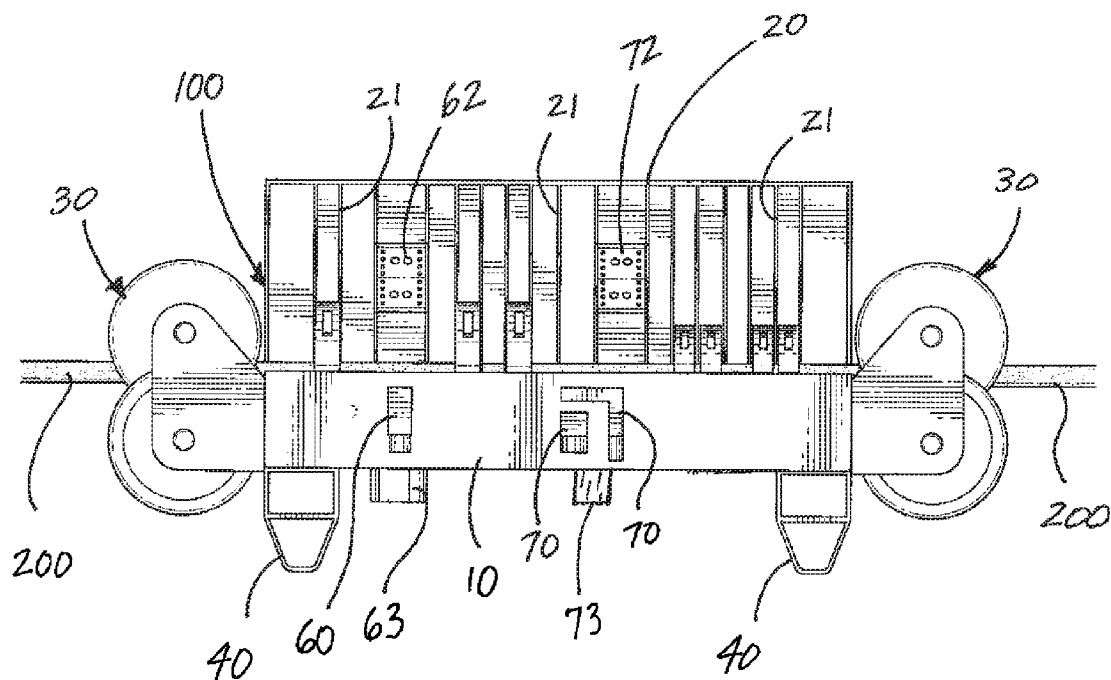


FIG. 6

**METHOD AND APPARATUS FOR CLEANING AND TREATING TUBULAR GOODS**

**CROSS REFERENCES TO RELATED APPLICATION**

**[0001]** PRIORITY OF U.S. PROVISIONAL PATENT APPLICATION SER. NO. 61/707,780, FILED SEP. 28, 2012, INCORPORATED HEREIN BY REFERENCE, IS HEREBY CLAIMED.

**STATEMENTS AS TO THE RIGHTS TO THE INVENTION MADE UNDER FEDERALLY SPONSORED RESEARCH AND DEVELOPMENT**

**[0002]** NONE

**BACKGROUND OF THE INVENTION**

**[0003]** 1. Field of the Invention

**[0004]** The present invention pertains to a method and apparatus for cleaning, treating and inspecting tubulars including, without limitation, continuous tubing strings.

**[0005]** 2. Brief Description of the Prior Art

**[0006]** It is customary to clean and treat the outer surface of tubular goods (including, without limitation, continuous, spooled or coiled tubing) after service. Such cleaning and treating is typically performed to protect the integrity of the tubing and to prolong the tubing's potential service life. Such cleaning and treating is typically performed while tubing is being re-spooled after being retrieved from a well, or when tubing is transferred from one spool to another.

**[0007]** Current techniques to enable such cleaning and treatment include passing the tubing over a stationary, manually-operated "wand" as the tubing is being re-spooled after service. Such conventional cleaning and treating techniques are time consuming and labor intensive, do not facilitate easy and efficient inspection of the pipe, and often produce less than optimal results.

**[0008]** Thus, there is a need for an improved method and apparatus for cleaning, treating and inspecting tubular goods, including continuous tubing. The apparatus should be self-contained, and easy to install and use.

**SUMMARY OF THE INVENTION**

**[0009]** The present invention comprises a method and apparatus for cleaning, treating and inspecting tubular goods including, without limitation, continuous tubing. In a preferred embodiment, the present invention comprises a closeable box disposed in a stationary position around the outer surface of continuous tubing, typically as such tubing is being re-spooled after service.

**[0010]** The present invention is not tied to any particular arrangement of reel out and spool up configuration. During re-spooling operations, continuous tubing can be retrieved from a wellbore and re-installed on a large spool or reel. In other circumstances, it can be advantages to transfer continuous tubing from one reel to another; during such re-spooling operations, spools are typically situated approximately 10-15 feet apart.

**[0011]** In a preferred embodiment, the box-like housing of the present invention is installed at a desired location prior to continuous tubing being spooled on a reel. Such continuous tubing passes through said box-like housing, typically at a speed of about 100 feet per minute. The housing can be beneficially disposed on a frame assembly between such

spools so that the tubing can easily pass through the housing as the tubing moves from one spool to the other (or when being re-spooled after being retrieved from a downhole well-bore).

**[0012]** In a preferred embodiment, as continuous tubing passes through the box-like housing of the present invention, the tubing encounters the following processes deployed in sequence within said housing:

**[0013]** Wipers or Squeegees: The tubing first encounters rubber wiper squeegees in the box, which wipe and dry the external surface of the tubing. Such squeegees are selected and disposed to be a snug fit around the tubing, so that substantially all of the environmental moisture and dirt is removed from the tubing immediately prior to high pressure washing.

**[0014]** High Pressure Water Wash: The tubing next passes through V-shaped collars providing high pressure water jets directed toward the tubing. The water can be beneficially supplemented or replaced by other liquids.

**[0015]** Tight Fit Wipers: The tubing is then dried by passing it through tight-fit (typically rubber) pipe wipers. Such wipers beneficially remove substantially all of the external surface moisture on the tubing following the high pressure washing operation.

**[0016]** Blow Dry: The tubing is then completely dried by subjecting it to an air-driven blow dry. In another embodiment, the air dry is supplemented with or substituted for nitrogen dry. The tubing is substantially dry as it passes immediately to receive a coating of rust inhibitor, the next operation.

**[0017]** Rust Inhibitor Coat: The tubing next receives a coat of rust inhibitor. In a preferred embodiment, the tubing first passes over and through a rust inhibitor coating spray delivered by a liquid mist; and then over and through an industrial sponge into which the inhibitor treatment has been pumped, allowing the inhibitor to be further wiped onto the tubing.

**[0018]** Loose-Fitting Wipers: The tubing finally passes over loose-fitting rubber and sponge fabric wipers, configured to remove excess rust inhibitor that may be dripping or running off the tubing, but leaving inhibitor still smeared over the outer surface of the tubing.

**[0019]** It will be appreciated that inventive housing allows tubing to be very dry after the blow dry stage. The tubing then receives rust inhibitor or other treating agent immediately, before any oxidation or other corrosion has had any chance to affect the outside surface of the tubing. This feature of the inventive coil tubing box is a significant improvement over conventional pipe cleaning and treating methods, where separate operations of washing, drying and rust-inhibiting are significantly longer apart in time, and not done as effectively.

**[0020]** The advantages supplied by the inventive coil tubing box thus include that (1) it is self-contained and modular, (2) cleaning operations are more effective, and (3) the life of the tubing is extended because rust inhibitor coating or other beneficial treating agent is applied immediately after the pipe is dried, when it can be most effective.

**[0021]** Accessories may also be provided for the inventive housing of the present invention. For example, fork lift pads may be specially designed to assist moving such coil tubing box.

**[0022]** An arrangement of cables, pulleys, turnbuckles and/or extensible rods may also be designed to hold the box-like housing of the present invention firmly in place in an operational position. In this way, precautions can be taken so that



the box does not move while tubing is passing through said box-like housing, also ensuring that such tubing passes as naturally as possible through the box-like housing (i.e. not placed under displacement, transverse loading or bending stress as it is fed in and out of the box). Pulley configurations may be designed to allow the housing to use its own weight to keep it centered and oriented at the correct position between the spools.

[0023] In another embodiment, an arrangement of compensating springs may be used with cables, pulleys and turnbuckles to keep the box-like housing at an optimum location between the coil tubing spools to avoid any bending, shear or torsional stresses being placed on tubing as it passes through the housing. In this configuration, said box-like housing is suspended and “floats” between the spools as the coil tubing passes from spool to spool and through the housing. The cables and pulleys allow the housing to be suspended and move vertically relative to the spools, so as to allow compensating springs, responsive to sensors, to find and set the housing at the “neutral point” of suspension, at which the tubing is under no bending, shear or torsional forces as it passes through the housing.

[0024] It will be appreciated that the inventive coil tubing box has many possible operational environments, and this disclosure is not limited to any particular one. For example, the housing could be deployed in a warehouse or shop, or in the field at or near a land well or a corresponding offshore drilling structure, or other remote location.

[0025] It is to be observed that jointed pipe can be fed through a variant of the housing of the present invention rather than continuous tubing. In such alternative embodiments, the pipe could move or the housing could be caused to move relative so such pipe, or both. The high pressure water wash operation could be substituted for other treatments. Additional or fewer operations could be incorporated into the self-contained box of the present invention.

#### BRIEF DESCRIPTION OF DRAWINGS/FIGURES

[0026] The foregoing summary, as well as any detailed description of the preferred embodiments, is better understood when read in conjunction with the drawings and figures contained herein. For the purpose of illustrating the invention, the drawings and figures show certain preferred embodiments. It is understood, however, that the invention is not limited to the specific methods and devices disclosed in such drawings or figures.

[0027] FIG. 1 depicts an overhead perspective view of the cleaning and treating assembly of the present invention with an open configuration.

[0028] FIG. 2 depicts an overhead perspective view of the cleaning and treating assembly of the present invention in a closed configuration.

[0029] FIG. 3 depicts an overhead view of the cleaning and treating assembly of the present invention with an open configuration.

[0030] FIG. 4 depicts a bottom perspective view of the cleaning and treating assembly of the present invention in a closed configuration.

[0031] FIG. 5 depicts an end view of the cleaning and treating assembly of the present invention with an open configuration.

[0032] FIG. 6 depicts front view of the cleaning and treating assembly of the present invention with an open configuration.

#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0033] FIG. 1 depicts an overhead perspective view of a cleaning and treating assembly 100 of the present invention. In a preferred embodiment, said cleaning and treating assembly 100 comprises a box-like housing having an upper housing lid 20 hingedly connected to lower housing base 10. Said upper housing lid 20 and lower housing base cooperate to form an inner chamber or void space within said box-like housing. An inlet is provided in one side of said housing, and is in substantial linear alignment with an outlet on the opposite side of said housing. As depicted in FIG. 1, said upper housing lid 20 is shown in an open configuration.

[0034] In a preferred embodiment, an arrangement of cables, pulleys, turnbuckles and/or extensible rods may be designed to hold cleaning and treating assembly 100 of the present invention firmly in place in an operational position. As depicted in FIG. 1, cleaning and treating assembly 100 is slideably mounted on substantially parallel mounting rails 300. Still referring to FIG. 1, a length of continuous tubing 200 passes through cleaning and treating assembly 100; said continuous tubing 200 is oriented substantially parallel to the longitudinal axis of cleaning and treating assembly 100, and substantially perpendicular to mounting rails 300.

[0035] It is to be observed that cleaning and treating assembly 100 remains substantially stationary while tubing 200 passes through the box-like housing of the present invention. As such, tubing 200 passes as naturally as possible through cleaning and treating assembly 100 (i.e. such tubing 200 not placed under displacement, transverse loading or bending stress as it is fed in and out of box-like housing). Pulley configurations may be designed to allow cleaning and treating assembly 100 to use its own weight to keep it centered and oriented at a desired operating position.

[0036] If desired, an arrangement of compensating springs may be used with cables, pulleys and/or turnbuckles to maintain positioning of cleaning and treating assembly 100 of the present invention at an optimum or preferred location (such as, for example, between coiled tubing spools) in order to avoid any bending, shear or torsional stresses being placed on the tubing. In this manner, the modular and self-contained cleaning and treating assembly 100 can be suspended in order to “float” as coiled tubing passes through the housing of the present invention. Such cables and pulleys allow the housing to be suspended and move vertically, so as to allow compensating springs, responsive to sensors, to find and set the apparatus at a “neutral point” of suspension, at which the tubing is under no bending, shear or torsional forces as it passes through the housing.

[0037] Still referring to FIG. 1, lateral pipe alignment guide assemblies 30 are disposed at both ends of box-like housing of cleaning and treating assembly 100. In a preferred embodiment, said alignment guide assemblies 30 comprise mounting bracket 31, upper guide wheel 32 and lower guide wheel 33. Said upper and lower guide wheels are rotatably mounted to mounting brackets 31 using transverse axles 34. Said lateral pipe alignment guide assemblies 300 act to align and direct pipe 200 entering and exiting box-like housing of cleaning and treating assembly 100.

[0038] A plurality of substantially parallel lower baffle walls 11 are disposed within housing base member 10. Similarly, a plurality of substantially parallel upper baffle walls 21 are disposed within housing lid member 20. In a preferred embodiment, said upper baffles walls 21 and lower baffle

walls 11 are substantially planar divider members that substantially aligned with each other and have aligned notches 21a and 11a, respectively, for accommodating continuous tubing 200. When said lid housing lid member 20 is closed, said upper and lower baffle walls cooperate to form a plurality of substantially parallel walls defining substantially parallel and distinct chambers that are oriented substantially perpendicular to the longitudinal axis (and direction of travel) of continuous tubing 200.

[0039] Still referring to FIG. 1, wafer-shaped squeegee wiper elements 50, 51 and 52 can be disposed within certain desired chambers formed by opposing upper baffle walls 21 and lower baffle walls 11. In a preferred embodiment, said squeegee wiper elements are constructed of rubber or other elastomeric material, or other material exhibiting desired pipe wiping characteristics. Similarly, wafer-shaped applicator elements 53, 54, 55 and 56 are likewise disposed within certain desired chambers formed by opposing upper baffle walls 21 and lower baffle walls 11. In a preferred embodiment, said applicator elements are constructed of sponge material, or other material exhibiting desired fluid application characteristics.

[0040] Substantially V-shaped lower member 61 is mounted within a chamber formed in lower housing base 10, while an opposing substantially V-shaped upper member 62 is mounted within an aligned chamber formed in housing lid 20. Inlet port fitting 60 is mounted in proximity to said V-shaped lower member 61 and provides a fluid inlet into the space formed between said opposing V-shaped members 61 and 62 when housing lid 20 and housing base 10 are in a closed position. In a preferred embodiment, at least one wash nozzle is provided within said chamber; said nozzle is beneficially directed at the space formed between said upper and lower V-shaped members 61 and 62, and is in fluid communication with inlet port fitting 60.

[0041] Similarly, substantially V-shaped lower member 71 is mounted within a chamber formed in lower housing base 10, while an opposing substantially V-shaped upper member 72 is mounted within an aligned chamber formed in housing lid 20. Inlet port fitting 70 is mounted in proximity to said V-shaped lower member 71 and provides a fluid inlet into the space formed between said opposing V-shaped members 71 and 72. In a preferred embodiment, at least one gas jet is provided within said chamber; said jet is beneficially directed at the space formed between said upper and lower V-shaped members 71 and 72, and is in fluid communication with inlet port fitting 70.

[0042] FIG. 2 depicts an overhead perspective view of cleaning and treating assembly 100 of the present invention in a closed configuration. As depicted in FIG. 2, housing lid 20 is closed on housing base 10, thereby enclosing components disposed within the internal space defined by the box-like housing of the present invention. If desired, a gasket or elastomeric material can be provided around the rim of housing lid 20, housing base 10, or both, in order to facilitate a fluid pressure seal at the junction between said members. Further, conventional latching means, well known to those skilled in the art, can be provided to secure said housing lid 20 and housing base 10 in a closed position when desired.

[0043] Cleaning and treating assembly 100 is slideably mounted on substantially parallel mounting rails 300. A length of continuous tubing 200 passes through cleaning and treating assembly 100, and is oriented substantially parallel to the longitudinal axis of cleaning and treating assembly 100,

and substantially perpendicular to mounting rails 300. Still referring to FIG. 2, lateral pipe alignment guide assemblies 30 are disposed at both ends of box-like housing of cleaning and treating assembly 100.

[0044] FIG. 3 depicts an overhead view of cleaning and treating assembly 100 of the present invention with housing lid member 20 in an open configuration. Cleaning and treating assembly 100 is slideably mounted on substantially parallel mounting rails 300. A length of continuous tubing 200 passes through cleaning and treating assembly 100, while lateral pipe alignment guide assemblies 30 are disposed at both ends of the box-like housing of cleaning and treating assembly 100. A plurality of substantially parallel lower baffle walls 11 are disposed within housing base member 10 and are oriented substantially perpendicular to the direction of travel of continuous tubing 200. Although not visible in FIG. 3, a plurality of substantially parallel upper baffle walls 21 are likewise disposed within housing lid member 20.

[0045] FIG. 4 depicts a bottom perspective view of cleaning and treating assembly 100 of the present invention in a closed configuration. A length of continuous tubing 200 passes through box-like housing of cleaning and treating assembly 100. Said tubing 200 is oriented substantially parallel to the longitudinal axis of cleaning and treating assembly 100, with lateral pipe alignment guide assemblies 30 disposed at both ends of said box-like housing of assembly 100. A length of continuous tubing 200 passes through cleaning and treating assembly 100. Mounting rails 300 are not shown in FIG. 4 for clarity purposes; however, it is to be observed that said mounting rails 300 can be slideably received within lower mounting brackets 40. In a preferred embodiment, cleaning and treating assembly 100 is movable along the length of said mounting rails 300 (not depicted in FIG. 4).

[0046] Still referring to FIG. 4, in a preferred embodiment, drain port 63 is provided through the bottom surface of housing base member 10. Said drain port 63 permits the drainage and recovery of fluids (gases or liquids), additives and wash debris recovered from the chamber formed by opposing V-shaped members 61 and 62. Similarly, drain port 73 is provided through the bottom surface of housing base member 10 to permit drainage and recovery of fluids (gases or liquids), additives and wash debris recovered from the chamber formed by opposing V-shaped members 71 and 72. Although said drain ports 63 and 73 can be open to the surrounding environment, in most cases one or both of said drain ports are equipped with a hose (not pictured in FIG. 4) to permit collection and/or recovery of drained materials for subsequent disposal or re-use.

[0047] FIG. 5 depicts an end view of cleaning and treating assembly 100 of the present invention. Lower housing base 10 is slideably mounted on mounting rails 300. Upper housing lid 20 is mounted to said lower housing base using hinge member 22; said upper housing lid member 20 is depicted in an open configuration in FIG. 5.

[0048] Lateral pipe alignment guide assemblies 30 are disposed at both ends of box-like housing of cleaning and treating assembly 100, although only one of said lateral pipe guide assemblies 30 is visible in the view depicted in FIG. 5. Said lateral pipe alignment guide assembly 30 comprises mounting brackets 31, upper guide wheel 32 and lower guide wheel 33 (both of which can be beneficially shaped with concave surfaces for accommodating the curvature of a tubular members passing between said upper and lower guide wheels). Said upper and lower guide wheels are rotatably mounted to

mounting brackets 31 using transverse axles 34. Said lateral pipe alignment guide assemblies 300 act to align and direct pipe 200 entering and exiting box-like housing of cleaning and treating assembly 100.

[0049] FIG. 6 depicts front view of cleaning and treating assembly 100 of the present invention with an open configuration. Continuous tubing 200 passes through cleaning and treating assembly 100, while lateral pipe alignment guide assemblies 30 are disposed at both ends of the box-like housing. A plurality of substantially parallel upper baffle walls 21 are disposed within housing lid member 20 and are oriented substantially perpendicular to the direction of travel of continuous tubing 200. Although not visible in FIG. 6, a plurality of substantially parallel lower baffle walls 11 are disposed within housing base member 10.

[0050] Still referring to FIG. 6, mounting rails 300 are not shown for clarity purposes; however, it is to be observed that said mounting rails 300 can be slideably received within the openings formed by lower mounting brackets 40. In a preferred embodiment, cleaning and treating assembly 100 is movable along the length of said mounting rails 300 (not depicted in FIG. 6).

[0051] Substantially V-shaped upper member 62 is mounted within a chamber formed in housing lid 20. Inlet port fitting 60 provides a fluid inlet into the space formed between said opposing V-shaped members 62 and 61 (not shown in the view depicted in FIG. 6) when housing lid 20 and housing base 10 are in a closed position. Similarly, substantially V-shaped upper member 72 is mounted within a chamber formed in housing lid 20. Inlet port fitting 70 provides a fluid inlet into the space formed between said opposing V-shaped members 72 and 71 (not shown in the view depicted in FIG. 6) when housing lid 20 and housing base 10 are in a closed position.

[0052] As noted above, drain port 63 is provided through the bottom surface of housing base member 10 to permit the drainage and recovery of fluids (gases or liquids), additives and wash debris recovered from the chamber formed by opposing V-shaped members 61 and 62. Similarly, drain port 73 is provided through the bottom surface of housing base member 10 to permit drainage and recovery of fluids (gases or liquids), additives and wash debris recovered from the chamber formed by opposing V-shaped members 71 and 72. Although said drain ports 63 and 73 can be open to the surrounding environment as depicted in FIG. 6, in most cases one or both of said drain ports are equipped with a hose or tube to permit collection and/or recovery of drained materials for subsequent disposal or re-use.

[0053] In operation, cleaning and treating assembly 100 of the present invention can be used for cleaning, treating and inspecting tubular goods including, without limitation, continuous tubing such as tubing 200. In a preferred embodiment, closeable box-like housing of cleaning and treating assembly 100 having a linearly aligned inlet and outlet is disposed at a desired stationary position around the outer surface of continuous tubing, typically as such tubing is being re-spooled after service. By way of illustration, but not limitation, it is to be observed that the present invention can be used when continuous tubing is being retrieved from a well as it is being re-spooled, or when such continuous tubing is being transferred from one spool to another.

[0054] In a preferred embodiment, as continuous tubing 200 passes through cleaning and treating assembly 100 of the present invention, said tubing 200 encounters the following

processes deployed in sequence. Initially, tubing 200 encounters wafer-shaped squeegee wiper element 50, which is disposed within a desired chamber formed by opposing upper baffles walls 21 and lower baffle walls 11 near the pipe inlet. In a preferred embodiment, said wiper element 50 has a central aperture beneficially sized to receive a length of pipe yet allowing for contact with the external surface of said pipe in order to provide a wiping action.

[0055] As the tubing strips through said wiper element 50, it wipes and dries the external surface of said tubing 200. Said wiper element 50 is beneficially selected and disposed to be a snug fit around the external surface of tubing 200, so that substantially all of the environmental moisture and dirt is removed from said tubing 200 immediately prior to high pressure washing.

[0056] After passing through wiper element 50, tubing 200 next passes through said opposing V-shaped collars providing high pressure water jets directed toward the external surface of tubing 200. Specifically, substantially V-shaped lower collar member 61 is mounted within a chamber formed in lower housing base 10, while an opposing substantially V-shaped upper collar member 62 is mounted within an aligned chamber formed in housing lid 20. Inlet port fitting 60 is mounted in proximity to said V-shaped lower member 61 and provides a fluid inlet into the space formed between said opposing V-shaped members 61 and 62. Wash water, pumped from an external reservoir or source into said space formed between V-shaped members 61 and 62, can be beneficially supplemented or replaced by other liquids such as, for example, solvent, surfactants or other beneficial cleaning solutions.

[0057] The external surface of tubing 200 is then dried by passing said tubing 200 through tight-fit (typically rubber) wafer-shaped pipe wipers 51 and 52. Such wipers 51 and 52, which can be oriented in sequence, beneficially remove substantially all of the external surface moisture on the tubing following said high pressure washing operation. As tubing 200 strips through said wiper elements 51 and 52, it wipes and dries the external surface of said tubing 200. Like wiper element 50, wiper elements 51 and 52 are beneficially selected and disposed to be a snug fit around the external surface of tubing 200 to remove substantially all of the water and/or other liquids from the high pressure washing stage.

[0058] The external surface of tubing 200 is then further dried by subjecting such tubing 200 to an air-driven blow dry. In another embodiment, the air dry is supplemented with or substituted with other gas(es), such as a nitrogen dry. Said tubing 200 passes through substantially V-shaped lower member 71 and opposing substantially V-shaped upper member 72. Inlet port fitting 70 is mounted in proximity to said V-shaped lower member 71 and provides a fluid inlet into the space formed between said opposing V-shaped members 71 and 72. Gas is pumped from an external source via inlet port fitting 70 into said chamber between opposing V-shaped members 71 and 72 and directed at the outer surface of tubing 200. In this manner, the tubing is substantially dry as it passes immediately to receive a coating of rust inhibitor, the next operation.

[0059] Tubing 200 next receives a coat of treatment solution such as, for example, rust inhibitor. In a preferred embodiment, tubing 200 first passes over and through a rust inhibitor coating spray delivered by a liquid mist or other fluid applicator; and then over and through wafer-shaped applicator elements 53 and 54, which can be industrial sponges into

which the inhibitor treatment has been infused, allowing the inhibitor material to be further wiped onto the exterior surface of tubing **200**.

**[0060]** Tubing **200** thereafter passes over loose-fitting rubber and sponge fabric wiper elements **55** and **56**, configured to remove excess rust inhibitor that may be dripping or running off the exterior surface of tubing **200**, but leaving inhibitor still smeared over the outer surface of said tubing. It will be appreciated that the external surface of tubing **200** is very dry after the blow dry. Thereafter, tubing **200** then receives the rust inhibitor immediately, before any oxidation or other corrosion has had any chance to affect the outside surface of the tubing. This feature of the inventive coil tubing box is a significant improvement over conventional pipe cleaning and treating methods, where separate and distinct operations of washing, drying and rust-inhibiting are longer in time apart, and not done as effectively.

**[0061]** Accessories may also be provided for the inventive coil tubing box. For example, fork lift pads may be specially designed to assist moving such coil tubing box. Moreover, it will be appreciated that the cleaning and treating assembly of the present invention has many possible operational environments, and this disclosure is not limited to any particular one. For example, the box could be deployed in a warehouse or shop, in the field at or near a land well or a corresponding offshore drilling structure or remote location.

**[0062]** Although the present invention is described herein primarily in connection with continuous tubing, it is to be observed that jointed pipe can be fed through a variant of the box-like housing rather than continuous tubing. In such alternative embodiments, the pipe could move or the box could be caused to move; there would advantageously be no need to rotate the pipe in such an embodiment. Additional or fewer operations could be incorporated into the self-contained apparatus of the present invention.

**[0063]** Additionally, it is to be observed that an optional pipe inspection assembly can be beneficially used in combination with the present invention. For example, a modular pipe inspection assembly can be installed downstream of the box-like housing of the present invention, and can inspect cleaned and/or treated pipe emerging from said housing.

**[0064]** Additional data acquisition sensory hardware, processors, and proprietary software can be added and/or used in connection with the present invention to serve a dual purpose.

**[0065]** One such purpose is to detect and determine the relative position of the centerline of the tubular to the centerline of the inventive enclosure of the present invention in real-time as said tubular moves through said enclosure during cleaning and treating operations. Such data can be relayed in real-time to positioning system machinery which then adapts to reposition said enclosure, vertically and horizontally as needed, via an electronic control system.

**[0066]** Another purpose of said data acquisition sensory hardware, processors and software is to detect and determine, in real-time, the centerline of the tubular, in order to rectify the relative position of the tubular as it moves through said enclosure during operations. Such data can be correlated with the detected circumferential outer diameter dimensions of the tubular and processed by pre-programmed algorithms to serve as means to inspect the surface for damages such as, but not limited to, cracks, pits, elongation, bulges, scars, and outer dimensions of the tubular as it moves through said enclosure.

**[0067]** In one embodiment, data is gathered via a combination of position rectifying and distance detection lasers mounted inside the enclosure housing onto the V-Shaped collars aimed substantially perpendicular to the tubular at key quadrant positions in sync with grayscale images gathered as slices across the tubular via ultra high speed and resolution camera and ultra high luminous lights which can be mounted externally at the outlet of the enclosure.

**[0068]** The above-described invention has a number of particular features that should preferably be employed in combination, although each is useful separately without departure from the scope of the invention. While the preferred embodiment of the present invention is shown and described herein, it will be understood that the invention may be embodied otherwise than herein specifically illustrated or described, and that certain changes in form and arrangement of parts and the specific manner of practicing the invention may be made within the underlying idea or principles of the invention.

What is claimed:

1. A method for cleaning and treating pipe comprising:
  - a) passing said pipe through an enclosed housing;
  - b) cleaning the external surface of said pipe within said housing; and
  - c) applying treating solution to said pipe within said housing.
2. The method of claim 1, further comprising drying said pipe within said housing.
3. The method of claim 1, wherein said step of cleaning said pipe comprises passing said pipe through an elastomeric wiper.
4. The method of claim 1, wherein said step of cleaning the external surface of said pipe further comprises washing said pipe with water.
5. The method of claim 2, wherein said step of drying said pipe comprises directing gas at said pipe.
6. The method of claim 5, wherein said gas comprises air.
7. The method of claim 5, wherein said gas comprises nitrogen.
8. The method of claim 1, wherein said treating solution comprises rust inhibitor.
9. An apparatus for cleaning and treating pipe comprising:
  - a) an enclosed housing having an inlet and an outlet, and defining an internal space therebetween;
  - b) a plurality of walls within said internal space of said housing defining a plurality of chambers;
  - c) a cleaning assembly for cleaning said pipe within at least one chamber;
  - d) a drying assembly for drying said pipe within at least one chamber; and
  - e) a treatment assembly for applying at least one treatment solution to said pipe within at least one chamber.
10. The apparatus of claim 9, wherein said enclosed housing further comprises:
  - a) a base; and
  - b) a lid hingably attached to said base.
11. The apparatus of claim 9, wherein said cleaning assembly comprises at least one elastomeric wiper.
12. The apparatus of claim 9, wherein said cleaning assembly comprises at least one wash nozzle for directing wash fluid at said pipe.
13. The apparatus of claim 9, wherein said drying assembly comprises at least one jet for directing at least one gas at said pipe.

**14.** The apparatus of claim **9**, wherein said treatment assembly comprises at least one sponge.

**15.** An apparatus for cleaning and treating pipe comprising:

- a) a housing base having a first end defining an inlet and a second end defining an outlet, wherein said inlet and outlet are linearly aligned;
- b) a lid hingably attached to said base;
- c) a plurality of walls disposed within said housing base, wherein said walls are oriented substantially perpendicular to said inlet and said outlet, and define a plurality of chambers;
- d) a resilient wiper having an aperture adapted to receive a length of pipe, wherein said at least one wiper is disposed within a chamber and said aperture is linearly aligned with said inlet and outlet;
- e) at least one wash nozzle disposed within at least one of said chambers;
- f) an inlet port in fluid communication with said at least one wash nozzle;
- g) at least one gas jet disposed within at least one of said chambers; and
- h) an inlet port in fluid communication with said at least one gas jet.

**16.** The apparatus of claim **15** further comprising at least one fluid applicator within a chamber between said at least one gas jet and said outlet.

**17.** The apparatus of claim **16**, wherein said at least one fluid applicator comprises at least one sponge having an aperture adapted to receive a length of pipe, wherein said aperture is linearly aligned with said inlet and outlet.

**18.** The apparatus of claim **16**, further comprising a wiper element disposed within a chamber between said fluid applicator and said outlet.

**19.** The apparatus of claim **15** further comprising:

- a) a data acquisition system for sensing and relaying real-time data regarding positioning of tubing disposed through said housing base; and
- b) a positioning system for adjusting the position of said base relative to said tubing in response to data received from said data acquisition system.

**20.** The apparatus of claim **15**, further comprising an inspection assembly for gauging the outer diameter of pipe disposed within said housing base comprising:

- a) a plurality of laser sensors directed at said pipe;
- b) at least one ultra high speed and resolution camera; and
- c) at least one amplified, ultra high luminous light device.

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