May 11, 1943. H. C. KRONE ET AL 2,319,068

SWING JOINT CONNECTIONS FOR LIQUID LOADING CONDUIT SYSTEMS

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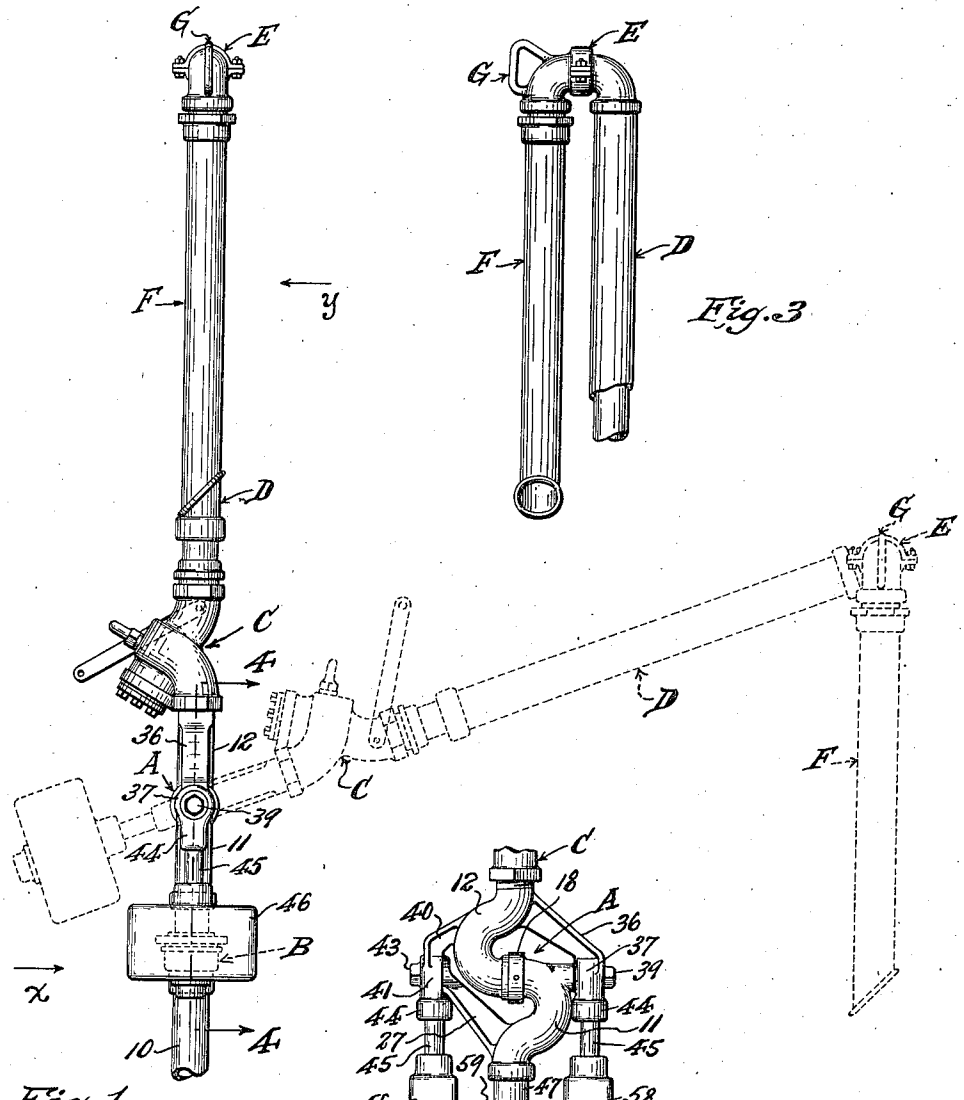


Fig. 1

Fig. 3

Fig. 2

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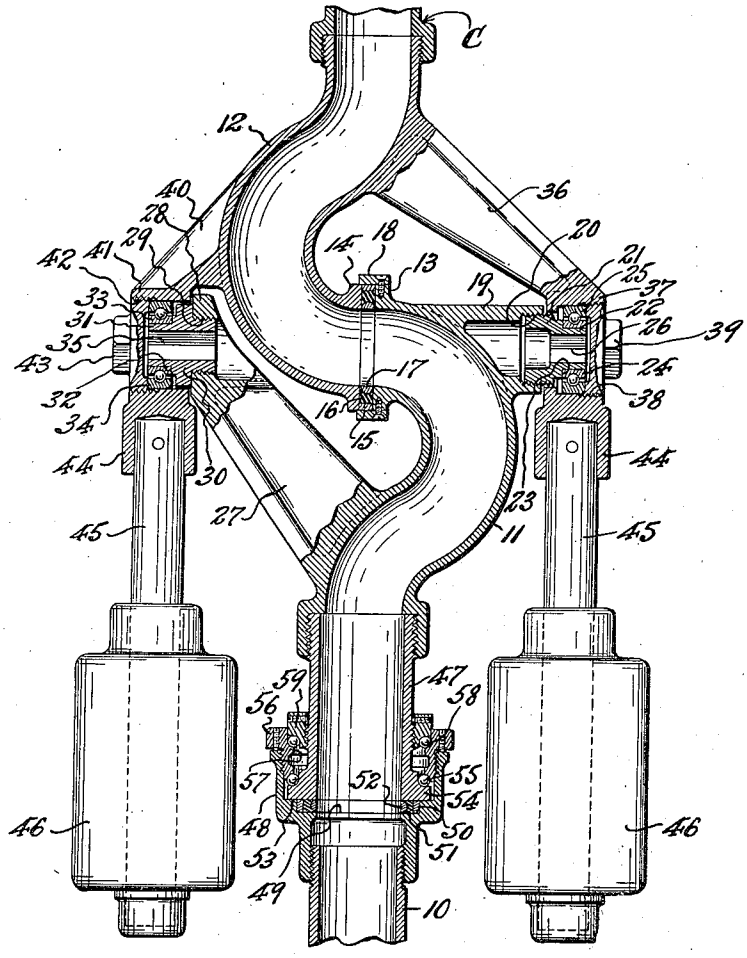


Fig. 4

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SWING JOINT CONNECTION FOR LIQUID LOADING CONDUIT SYSTEMS

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5 Claims. (Cl. 285—96.8)

This invention relates to improvements in loading conduit systems for delivering liquids from supply sources, by either gravity or pump pressure, into containers, and especially for loading oil, gasoline and other liquids into tank trucks, railroad tank cars or other containers in which such liquids are transported or shipped; and the invention has reference, more particularly, to improved universal swing connections, including counterbalanced vertical swing joint means, whereby the loading arm or discharge means of the system may be raised and lowered and angularly adjusted to quickly and easily dispose the same in and out of service position.

This invention has for an object to provide for general use, and more especially for use in loading conduit systems, a novel construction of universal swing connection including means for swing about a vertical axis and means for swing about a horizontal axis, the latter means having novel counterbalancing elements.

This invention has for another object to provide an improved counterbalanced swing joint, whereby one end portion thereof is automatically but yieldably disposed in a selected initial position.

This invention has for a further object to provide swing joint connections including anti-leak packing means between moving parts thereof.

The invention has for a still further object to provide an improved counterbalanced swing joint having anti-leak packing means between moving parts thereof, and means for relatively adjusting said moving parts for operative engagement with the anti-leak packing means.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which:

Fig. 1 is an elevational view of a loading conduit system including the novel swing connections according to this invention; Fig. 2 is a fragmentary elevational view of the swing connections of said system, viewed in the direction of the arrow *x* in Fig. 1; and Fig. 3 is a fragmentary elevational view of the discharge end of the loading conduit system, viewed in the direction of the arrow *y* in Fig. 1.

Fig. 4 is a vertical longitudinal sectional view of the swing connections of the loading conduit system, taken on line 4—4 in Fig. 1, but drawn on a substantially enlarged scale.

Similar characters of reference are employed in the hereinabove described views, to indicate corresponding parts.

In the drawings, the reference character 10 indicates a stand pipe of loading conduit means which leads from a supply source of liquid to be delivered, as e. g. from a storage tank (not shown) for gasoline, oil or other liquid. The liquid may be delivered to and through the stand pipe 10 by gravity or by pump pressure according to the type of tank and its location relative to the stand pipe.

Connected to communicate with the stand pipe 10, so as to receive flow therethrough of liquid to be delivered, is an articulated loading conduit system comprising, a counter-balanced swing joint A, the receiving end of which is connected to said standpipe 10 by a swivel joint B, and to the discharge end of which swing joint is connected any suitable design of control or loading valve C. From the loading valve C extends a telescopically extensible delivery pipe arm D to the outer end of which is connected, by a suitable articulating joint E, a drop or discharge pipe member F. The counterbalanced swing joint A is adapted to permit the delivery pipe arm D to swing up and down in vertical plane about a horizontal axis, while the swivel joint B permits the swing joint A and delivery pipe arm D to swing in horizontal plane about a vertical axis, thus permitting universal movement of said delivery pipe arm D. Swing joint A and the parts extending therefrom are counterbalanced by weight for upswing to an upstanding or other desirably raised out of service position, as shown by full line representation of these parts in Fig. 1, while nevertheless being yieldable to down-swinging movement to a service position, as shown by broken line representation thereof in Fig. 1. The articulating joint connection E between the delivery pipe arm D and the drop or discharge pipe member F, allows the latter to fold parallel or otherwise relative to the former when the former is up-swung to out of service position, as shown by full lines in Figs. 1 and 2, but to assume, under gravity, a perpendicular position when the delivery pipe arm D is down swung to service position, as shown by broken lines in Figs. 1 and 2. To facilitate manipulation of the delivery pipe arm D, a suitable hand grip means G is provided, preferably in connection with the articulating joint E by which said delivery pipe arm D and drop or discharge pipe member F are connected. Owing to the universal swinging movement to which the delivery pipe arm D may be subjected, and to the extensibility of said delivery

pipe arm, there is no necessity for meticulous care to be exercised in spotting a tank truck, railroad tank car or other container in position to be filled, since the drop or discharge pipe member F may be readily and quickly adjusted to and brought into position to enter the filling opening of the tank truck, railroad tank car or other container to be filled.

The main factor providing for universal swinging movements of the delivery pipe arm D resides in the novel counterbalanced swing joint A as mounted in swiveling connection to the stand pipe 10 by the swivel joint B, and it is improvement of these elements of the loading conduit system which it is the principal object of the instant invention to provide. To this end, and according to this invention, the novel swing joint structure comprises reversely curved tubular intake and outlet joint members 11 and 12, having their outer ends in alignment with the longitudinal axis of the joint structure as a whole, and their opposed inner ends in alignment with the horizontal axis of the joint structure as a whole. The opposed inner ends of said joint members 11 and 12 are respectively provided with annular terminal flanges 13 and 14, between the opposed faces of which is engaged anti-leak packing means. Said packing means comprises an, preferably metallic, external carrier ring 15 to support a compressible annular packing seal body 16 of suitable composition. Preferably said seal body 16 is provided in its inner circumferential face with an annular channel of concave cross-sectional shape to form tapered marginal wings on each side thereof; said wings, when subjected to pressure of liquid flowing through the joint structure, being adapted to be respectively flexed toward and firmly pressed against the respective contiguous faces of the terminal flanges 13 and 14 with auxiliary sealing effect. Cooperating with said seal body 16, and lodged within the channel thereof, is a, preferably metallic, internal seal ring 17. To hold the anti-leak packing means, thus provided, against displacement from its operative assembled relation to and between the opposed terminal flanges 13 and 14 of the joint members 11 and 12, an annular retaining collar 18 is affixed to the external periphery of one terminal flange, e. g. the terminal flange 13, whereby to surround or embrace and hold the external carrier ring 15 of said anti-leak packing means in position.

In the swing joint structure as shown, the joint member 11 is the stationary joint member and the joint member 12 is the movable joint member.

Extending directly from one side of the stationary joint member 11, adjacent to its inner end portion and in alignment with the horizontal axis of the joint structure as a whole, is a trunnion support 19, having an internally screw-threaded opening 20. Supported by its externally screw-threaded butt, which is screwed into said opening 20 of the trunnion support 18, is an outwardly projecting trunnion member 21. Said trunnion member 21 is provided with an outer end portion 22 of reduced diameter, which is limited at its inner end by a stop shoulder 23. Mounted on said trunnion end portion 22, and stopped against the stop shoulder 23, is the inner race ring 24 of a ball-bearing, or like anti-friction bearing means, having an outer race ring 25. Said trunnion member 21 is provided with an axial opening 26 of square or other polygonal cross-sectional shape, which is adapted to receive a correspondingly shaped wrench means, whereby said trunnion member 21 and the anti-friction bearing carried thereby may be assembled with and suitably adjusted relative to the trunnion support 19. Offset by a carrying bracket arm 27 which extends outwardly and upwardly from the opposite side of the stationary joint member 11, adjacent to its lower end portion, is a second trunnion support 28 disposed in alignment with the horizontal axis of the joint structure as a whole. Said trunnion support 28 is also provided with an internally screw-threaded opening 29. Supported by its externally screw-threaded butt, which is screwed into the trunnion support opening 29, is an outwardly projecting trunnion member 30. Said trunnion member 30 is also provided with an outer end portion 31 of reduced diameter limited at its inner end by a stop shoulder 32. Mounted on said trunnion end portion 31, and stopped against the stop shoulder 32, is the inner race ring 33 of a ball-bearing, or like anti-friction bearing means, having an outer race ring 34. Said trunnion member 30 is also provided with an axial opening 35 of square or other polygonal cross-sectional shape, which is adapted to receive a correspondingly shaped wrench means, whereby said trunnion member 30 and the anti-frictional bearing means carried thereby may be assembled with and suitably adjusted relative to the trunnion support 28.

Offset by a carrying bracket arm 36, which extends outwardly and downwardly from one side of the movable joint member 12, is a hub member 37 having an opening 38 to receive the outer race ring 25 of the anti-friction bearing means of the trunnion member 21. The outer part of said hub member opening 38 is internally screw-threaded, and screwed thereinto is an adjusting nut 39 arranged to thrustingly bear against the outer race ring 25 of said anti-friction bearing means carried by the trunnion member 21. In like manner, offset by a carrying bracket arm 40, which extends from the opposite side of said movable joint member 12, is a second hub member 41 having an opening 42 to receive the outer race ring 34 of the anti-friction bearing means of the trunnion member 30. The outer part of said hub member opening 42 is internally screw-threaded, and screwed thereinto is an adjusting nut 43 arranged to thrustingly bear against the outer race ring 34 of said anti-friction means carried by the trunnion member 30.

It will be obvious that the trunnion and hub connections, thus aligned with the horizontal axis of the swing joint structure as a whole, establish a pivotal support for the movable joint member 12, whereby the same may swing in vertical plane about such horizontal axis relative to the stationary joint member 11, and so that the inner end portion of the former turns upon and relative to the inner end portion of the latter and to the interposed anti-leak packing.

In order to obtain compression of the seal body 16 of the interposed anti-leak packing, whereby to assure a tight leak-proof joint between the inner end portions of the movable and stationary joint members, it is merely necessary to back off the adjusting nut 43 and turn in the adjusting nut 39, whereby to exert an inward thrust upon the trunnion structure of the stationary joint member 11 and an opposite or outward thrust upon the hub structure of the movable joint member 12, with the result that the inner ends of said joint members are urged

one toward the other, with suitable compression effect upon the interposed seal body 16; whereafter the adjusting nut 43 is screwed home so as to stabilize such condition.

Extending from each hub member 37 and 41, in a direction parallel to the longitudinal axis of the swing joint structure as a whole, are socketed elements 44 in which are affixed the ends of extending carrier arms 45. Mounted on said carrier arms 45, preferably in a manner so that the same may be affixed thereto in a desired balancing position thereon, are counter-balance weights 46, which, under gravity, function to swing and yieldably hold the movable joint member 12 in a normal longitudinally aligned relation to the stationary joint member 11.

The lower or receiving end of the stationary joint member is provided with a swivel joint means for so connecting the swing joint structure to a stand pipe or other liquid supply conduit as to permit said swing joint structure to be revolved about its longitudinal axis, thus providing for universal movement of liquid discharge means connected with the movable joint member 12 for extension therefrom. As shown, this swivel joint means comprises a male member 47 affixed to the end of the stationary joint member 11 of the swing joint structure, as e. g. by the cooperating screwthreaded coupling connection shown, and a female member 48 affixed to the stand pipe 10, as e. g. by the cooperating screw-threaded coupling connection shown. Said female member 48 is provided within its bottom portion with an annular packing seat 49, in which is situated an anti-leak packing means, similar to that hereinabove described as incorporated in the swing joint structure, and comprising an external carrier ring 50, a compressible seal body 51 and an internal seal ring 52. The packing, as thus supported within the female member 48 is opposed to the end face 53 of the male member 47 as entered in the latter. Anti-friction bearing means is provided between the male member 47 and the female member 48 of said swivel joint means, and, in preferred form and arrangement comprises, an annular flange 54 at the lower end of said male member formed to provide a ball-race to support a lower set of ball-bearings 55. Threaded into the upper end of said female member 48 is a bushing 56, formed at its lower end to provide a ball race in opposition to the ball-race of the male member flange 54, whereby to operatively engage said lower set of ball-bearings 55. Said bushing 56 is provided intermediate its upper and lower ends with an internal annular flange 57, formed to provide a supporting ball-race for an upper set of ball-bearings 58. Threaded onto the male member 47 is an external collar 59, formed at its lower end to provide a ball race in opposition to the supporting ball race of the bushing flange 57, whereby to operatively engage said upper set of ball-bearings 58. By screwing the bushing 56 down into said female member 48, a thrust is exerted through the interposed ball-bearings 55, upon the male member 47, whereby to urge the end face 53 of the latter against the anti-leak packing, with compressive effect upon the seal body 51 of the latter, so as to obtain a tight leak-proof joint between the male and female members 47 and 48 of the swivel joint means. Since the anti-friction bearing means of said swivel joint means comprises spaced ball-bearing sets, it will be obvious that a free swiveling action of the movable or rotatable male member 47 relative to the stationary female member 48, without canting or binding is assured.

It will be understood, that in conduit systems in connection with which ability to revolve about a vertical or longitudinal axis is not required, but only swing in vertical plane about a horizontal axis, the swivel joint means connecting the swing joint structure to the supply or stand-pipe 10 may be omitted.

While the swing joint structure per se has been described in connection and for use with liquid loading conduit systems, it will be understood that the same is adapted for use in a pipe or conduit system of any other kind or for any other purpose in connection with which it is desired to arrange for swinging movement of one part of the system relative to another part thereof.

It will be understood that various changes could be made in the construction and arrangement of the various parts and elements of the swing joint structure above described without departing from the spirit of this invention within the scope of the appended claims. It is therefore intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. Swing joint means for conduit pipe comprising, a pair of reversely curved tubular joint members having their outer ends in longitudinal alignment and their inner ends cooperatively opposed and aligned on a transverse axis, one said joint member having oppositely extending trunnion means axially aligned along said transverse axis, the other said joint member having hub members extended from opposite sides thereof in offset relation thereto and likewise aligned along said transverse axis to receive said trunnion means of said first mentioned joint member, and means to provide a leak-proof joint between the cooperating opposed inner ends of said joint members.

2. Swing joint means for conduit pipe comprising, a pair of reversely curved tubular joint members having their outer ends in longitudinal alignment and their inner ends cooperatively opposed and aligned on a transverse axis, one said joint member having oppositely extending trunnion means axially aligned along said transverse axis, the other said joint member having hub members extended from opposite sides thereof in offset relation thereto and likewise aligned along said transverse axis to receive said trunnion means of said first mentioned joint member, means to provide a leak-proof joint between the cooperating opposed inner ends of said joint members, and a longitudinally aligned swivel joint means connected with the outer end of one of said joint members, whereby the swing joint formed by said joint members may, as a whole, be revolved about the longitudinal axis thereof.

3. Swing joint means for conduit pipe comprising, a pair of reversely curved tubular joint members having their outer ends in longitudinal alignment and their inner ends cooperatively opposed and aligned on a transverse axis, one said joint member having oppositely extending trunnion means axially aligned along said transverse axis, the other said joint member having hub members extended from opposite sides thereof in offset relation thereto and likewise aligned along said transverse axis to receive said trunnion means of said first mentioned joint member, means including a compressible seal ring body

adapted to provide a leak-proof joint between the cooperating opposed inner ends of said joint members, and means cooperative with each associated trunnion means and hub member for relatively adjusting said joint members whereby to compress the seal ring body between said opposed inner ends of the latter.

4. Swing joint means for conduit pipe comprising, a pair of reversely curved joint members having their outer ends in longitudinal alignment and their inner ends opposed and aligned on a transverse axis, one of said joint members constituting a stationary joint member and the other a movable joint member, said stationary joint member having oppositely extending trunnion means axially aligned along said transverse axis, said movable joint member having hub members extended from opposite sides thereof in offset relation thereto and likewise aligned along said transverse axis to receive said trunnion means of said stationary joint member, means to provide a leak-proof joint between the opposed inner ends of said joint members, said hub members having carrier arms angularly extending therefrom relative to said transverse axis, and counterbalance weights mounted on said carrier arms adapted to yieldably hold said movable joint member in a selected normal initial position relative to said stationary joint member.

5. Swing joint means for conduit pipe comprising, a pair of reversely curved joint members having their outer ends in longitudinal alignment and their inner ends opposed and aligned on a transverse axis, one of said joint members constituting a stationary joint member and the other a movable joint member, said stationary joint member having oppositely extending trunnion means axially aligned along said transverse axis, said movable joint member having hub members extended from opposite sides thereof in offset relation thereto and likewise aligned along said transverse axis to receive said trunnion means of said stationary member, means including a compressible seal ring body adapted to provide a leak-proof joint between the cooperating opposed inner ends of said joint members, means cooperative with each associated trunnion means and hub member for relatively adjusting said joint members whereby to compress the seal ring body between said opposed inner ends of the latter, said hub members having carrier arms angularly extending therefrom relative to said transverse axis, and counterbalance weights mounted on said carrier arms adapted to yieldably hold said movable joint member in a selected normal initial position relative to said stationary joint member.

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