



PATENT SPECIFICATION

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Head Seal Apparatus for Dock Ramp Assembly**5 Introduction**

This invention relates to a head seal apparatus for a dock ramp assembly.

10 Dock ramp assemblies are used in facilities to allow transport vehicles to dock with the facility and also allow a ramp, alternatively known as a bridging plate, to connect an interior of the transport vehicle with an interior of the facility. In this manner, unloading of goods from the interior of the transport vehicle through at least one access door on the transport vehicle into the interior of the facility can be achieved. Or, loading of loads from the interior of the facility into the interior of the transport vehicle, can be achieved
15 in an efficient manner.

Furthermore, where the goods must be kept in a controlled environment, for example, within a particular temperature range, dock ramp assemblies are used to create a substantially continuous environmentally-controlled link, by way of a ramp, between the
20 interior of the transport vehicle and the interior of the facility. Typically the dock ramp assemblies will have a facility door to keep the facility enclosed.

The term "transport vehicle" shall be understood to encompass any type of vehicle which is used to transport goods. Typically, the transport vehicle will be an articulated
25 truck and trailer; however, it will be apparent to the person skilled in the art that vans and other types of commercial transport vehicles, such as railcars, may be used with the apparatus of the present disclosure. The transport vehicles will generally have rear access doors, which are either pivoting doors, vertical sliding doors, or, vertical rolling doors. The transport vehicles dock with the dock ramp assemblies by manoeuvring to
30 a position adjacent the dock ramp assembly so as to load or unload the goods through such access doors.

Throughout this specification, the term "dock ramp assembly" shall be understood to encompass any type of docking bay used to provide a connection or link between the
35 transport vehicle and the facility. A dock ramp assembly generally defines a docking opening having four sides. Dock ramp assemblies normally comprise a bridging plate

or ramp to connect between the interior of the facility and the docked transport vehicle. The present disclosure has been designed to work with a wide variety of transport vehicles.

5 Under normal usage, dock ramp assemblies as known from the prior art, allow a transport vehicle to dock with them to permit the loading or unloading of goods. The transport vehicle is usually reversed to a position adjacent the dock ramp assembly and a bridging plate is extended from the dock ramp assembly into the transport
10 vehicle. The dock ramp assemblies may comprise a bumper to prevent the transport vehicle from reversing into the dock ramp assembly and damaging the dock ramp assembly.

In many cases, once the transport vehicle has been reversed to a position adjacent the dock ramp assembly, it is important for a seal to be created around the transport
15 vehicle to prevent external contaminants from entering either the interior of the facility, or, the interior of the transport vehicle during the loading/unloading process. This is particularly important in food-related industries where unwanted contaminants such as rodents, insects, flies and fleas, which could become trapped in the interior of the transport vehicle, can result in an entire load of transported food being rejected by a
20 receiving customer upon the customer opening the transport vehicle and discovering the unwanted contaminants therein. In some examples known from the prior art, side seals along both sides of the transport vehicle and an upper seal over the top of the transport vehicle are formed.

25 However, as the contents of the vehicle are unloaded into the facility, or goods are loaded from the facility into the vehicle, the weight of the vehicle will vary and accordingly there will be variations in the height of the vehicle. Such height variations may cause a gap to be formed between a head seal at the upper portion of the dock ramp assembly and the top of the transport vehicle through which contaminants may
30 enter the interior of the transport vehicle and/or the interior of the facility. This is a clear disadvantage and a solution to this problem is sought as dock ramp assemblies must accommodate transport vehicles of different types and dimensions whilst at the same time minimise the possibility that contaminants can enter the facility or the transport vehicle.

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United States Patent Number US 4,262,458 (O'NEAL) discloses a complete, four-

sided inflatable seal which comprises two side seals, a head seal and a bottom seal. The seals surround a docking opening on a building and are used to create a connection between the building and a rail car, or other such similar vehicle.

5 However, not all dock ramps can benefit from docking with a railcar or vehicle whereby the height and the positioning of the transport vehicle relative to the docking opening are predetermined and preset. In many cases where the transport vehicle is a truck and trailer, the height of the rear doors on the trailer will depend on the model and the load in the trailer itself as the height of the transport vehicle will change with the weight
10 of the goods it is carrying.

This is, as mentioned above, due to the fact that transport vehicles have different dimensions, a seal which can accommodate the varying different heights of the different transport vehicles has proved difficult to design. Most transport vehicles have
15 a loading height in the range of 1 metre to 1.4 metres and the seals currently used in dock ramp assemblies known from the prior art cannot accommodate such variations in height between different transport vehicles.

It is a goal of the present disclosure to provide an apparatus that overcomes at least
20 one of the above mentioned problems.

Summary of the Invention

A head sealing apparatus for forming a seal between the top of a docking opening of a
25 facility and a roof of a transport vehicle when the transport vehicle is docked with the facility is provided. The apparatus comprises: a vertically moveable head seal configured to extend downwards over the docking opening and contact the roof of the vehicle, and a vertically moveable counterweight arrangement for balancing the load of the head seal so that the height of the head seal is adjustable to allow for variations in
30 the height of the vehicle.

The apparatus has a co-axial counterweight arrangement for balancing the load of the head seal. It will be understood that the present application is concerned with only the top or head seal portion of a docking opening. In the context of the present application
35 therefore, a 'head seal' refers to a seal for sealing the top peripheral edge of a docking opening with the roof of a vehicle reversed into the docking opening. The head seal

extends to provide a horizontal seal and is moveable in a vertical direction.

The advantage of using such a seal arrangement is that the seal is configured to be in constant contact with the roof on the transport vehicle, thus sealing a gap between the opening on the vehicle and the docking opening, and allowing for variations in the height of the vehicle relative to the docking opening.

After a transport vehicle has reversed up into a suitable docking position, a complete horizontal seal, extending between the top of the docking opening, and the access door opening on the transport vehicle, can be created. Furthermore, as contents of the vehicle are unloaded into the facility, or goods are loaded from the facility into the vehicle, by providing a counterweight balancing arrangement, the height of the head seal can be adjusted to compensate for variations in the height of the vehicle while maintaining a complete horizontal seal.

This is advantageous as it removes unwanted contaminants. It will be understood that a facility door is shut to close off the docking opening, and, a vehicle door on the transport vehicle is also shut to close off the access door opening on the transport vehicle; so that the receiving cavity is defined by the facility door, the vehicle door and the seal.

The advantage of having the upper seal vertically moveable is that transport vehicles of different heights can be accommodated whilst a complete seal can still be formed between the access door opening on the transport vehicle and the docking opening in the facility. This provides a configuration that accounts for transport vehicles of different heights and dimensions. The present disclosure provides for the head seal to be moved vertically down, into a position whereby the seal can be actuated to form a complete seal between the docking opening and the roof of a transport vehicle which is docked.

The sealed passageway between the interior of the transport vehicle and the interior of the facility prevents any external contaminants, such as rodents, insects, fleas and flies from entering either the interior of the facility or interior of the transport vehicle. This ensures that any goods which need to be transported by the transport vehicle can be kept within a controlled environment, inside the interior of the facility, which is likely to be a food production plant or a manufacturing plant, through the sealed passageway

and into the interior of the transport vehicle. This is extremely desirable for many industries, and as mentioned above, in particular the food industry where the manufacture, storage and transport of the food in a fully controlled environment is preferable from a hygienic, and, a health and safety perspective.

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The counterweight arrangement comprises first and second counterweights for balancing the weight of the head seal and configured to move relative to each other, the first counterweight configured to balance the weight of the head seal in an operable position, and the second counterweight configured to limit the upward movement of the first counterweight relative to the second counterweight.

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The apparatus further comprises a roller tube and a motorised roller tube, wherein a first cable attached to the first counterweight is further attached to and configured to be wound around the roller tube, and a second cable attached to the second counterweight is further attached to and configured to be wound around the motorised tube, the motorised roller tube and the second counterweight being configured to move the head seal between a retracted position and the operable position.

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In use, with the head seal in the retracted position, the weight of the head seal biases the first counterweight upwards against the second counterweight, the motorised roller tube is activated to wind the second counterweight in an upward direction, the first counterweight moves upward with the second counterweight, and the upward movement of the first and second counterweights causes the head seal to move downwards towards the roof of the vehicle until the first counterweight balances the weight of the head seal.

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The head seal comprises a blind member configured to be wound around the roller tube and a flexible edge portion at a distal end of the blind member, the flexible edge portion configured for forming a seal between the docking opening and the roof of the vehicle.

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Some advantages of the invention include the fact that the head seal accommodates variations in vehicle height caused by loading or unloading of a vehicle. The invention also caters for the camber of vehicle roof should the vehicle be carrying a greater weight on one side. In addition, the invention allows for a bounce of vehicle should it manoeuvre over a ramp or if a heavy weight is loaded or unloaded

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Detailed Description of Embodiments

5 The present disclosure will be more clearly understood from the following description of some embodiments thereof, given by way of example only, with reference to the accompanying drawings, in which:

10 Figure 1 is a perspective view of a head sealing apparatus in accordance with an embodiment of the present disclosure;

15 Figure 2 is a detailed view of a counterweight arrangement of the apparatus of Figure 1, including first and second counterweights, according to an embodiment of the present disclosure;

Figure 3 is a perspective view of the first and second counterweights of Figure 2, according to an embodiment of the present disclosure; and

20 Figure 4 is a side view of a dock ramp assembly in which the head sealing apparatus of the present disclosure is installed.

Figure 1 is a perspective view of a head sealing apparatus 100 in accordance with an embodiment of the present disclosure. Figure 2 is a detailed view of first and second counterweights of the apparatus 100 of Figure 1, according to an embodiment of the present disclosure. Referring to Figure 1, the head sealing apparatus 100 comprises a head seal 150 and a counterweight arrangement 160 for balancing the weight of the head seal 150. The head seal 150 comprises a blind member 152 and a flexible edge seal portion 155 at a distal end 151 of the blind 150. The apparatus 100 comprises a roller tube 140 on bearings around which the blind member 152 is configured to be wound. The blind member 152 may be configured to be wound around a main portion of the roller tube 140. The counterweight arrangement 160 comprises a first counterweight 161 configured to balance the weight of the head seal 150 in an operable position. More specifically, the first counterweight 161 may be attached to a first cable 164 for winding around the roller tube 140. The first cable 164 may be wound around an end 142 of the roller tube 140. The apparatus 100 may further comprise a motorised roller tube 145. As illustrated in Figure 1, the motorised roller

tube 145 may be disposed parallel to and adjacent to the roller tube 140. That is, the motorised roller tube 145 may be disposed separate to the roller tube 140. The motorised roller tube 145 and the roller tube 140 may be disposed one above the other in vertical alignment with the counterweight arrangement 160. That is, the motorised roller tube 145 and the roller tube 140 may be aligned in the same axis as the counterweight arrangement 160. However, the present teaching is not limited to such a configuration and other arrangements are also possible. For example, in other embodiments, the motorised roller tube 145 and the roller tube 140 may be arranged in an inner/outer co-axial tube arrangement, wherein both tubes are configured to rotate independent of each other. For example, an inner motorised roller tube may be disposed within an outer roller tube.

The motorised roller tube 145 may comprise a motor disposed therein for rotating the motorised roller tube 145. The counterweight arrangement 160 further comprises a second counterweight 163. The second counterweight 163 is configured to assist in the counterweighting of the head seal 150 and to move the head seal 150 between a retracted position and an operable position. The second counterweight 163 may be attached to a second cable 162 configured to be wound about the motorised roller tube 145. The second cable 162 may be wound around an end 142 of the motorised roller tube 145. The first and second counterweights 161 and 163 may be configured to move relative to each other. This mechanism is explained further below.

Referring to Figures 2 and 3, the first counterweight 161 may be configured in the form of a linear elongated member 161a having an edge portion 161b protruding laterally from a bottom of the elongated member 161a. In other words, the first counterweight 161 may be configured in the form of a reverse T shape when in use. The second counterweight 163 may be configured in the form of an elongated housing adapted to receive the first counterweight 161. As shown in Figures 2 and 3, the second counterweight 163 may be configured in the form of a reverse elongated U shape when in use. The second counterweight 163 may be attached to the second cable 162 at a lateral portion 163a connecting two longitudinal side portions 163b of the second counterweight 163. The first cable 164 may pass through an aperture 163c in the lateral portion 163a of the second counterweight 163. In this manner, the first counterweight 161 may be configured to slide within the second counterweight 163. The edge portion 161b of the first counterweight 161 is configured to abut the longitudinal side portions 163b of the second counterweight 163 to limit the movement

of the first counterweight 161 upward relative to the second counterweight 163. The first and second counterweights 161 and 163 may be constrained to move in a vertically oriented guide rail 167. The second counterweight 163 may be substantially the same weight as the first counterweight 161. In an embodiment, the weight of each of the first and second counterweights 161 and 163 may be about 10 kg. The flexible edge seal portion 155 of the head seal 150 may be heavier than the weight of each of the first and second counterweights 161 and 163. In an embodiment, the weight of the flexible edge seal portion 155 may be about 15 kg.

10 Referring to Figure 1, the counterweight arrangement 160 and the head seal 150 are configured to move in a substantially vertical direction opposite to each other. More specifically, the head seal 150 is configured to move in a substantially vertical direction opposite to that of the vertical movement of the counterweight arrangement 160. In other words, while the counterweight arrangement 160 is actuated upwards, the head seal 150 moves downwards. Accordingly, it can be seen that a co-axial counterweight system is provided in the vertical axis. That is, the gravitational force of the counterweight arrangement 160 balances the gravitational force of the head seal 150.

With the blind member 152 rolled up, that is, a substantial portion of the blind member 152 wound around the roller tube 140, the flexible edge seal portion 155 is at its closest to the roller tube 140. In this position, the first and second counterweights 161 and 163 are at their lowest positions and the head seal 150 is in a retracted position. With the weight of the flexible edge portion 155 being greater than that of the first counterweight 161, in this position, the weight of the flexible edge seal portion 155 biases the first counterweight 161 against the second counterweight 163 as described above. The upward movement of the first counterweight 161 is constrained by the edge portion 161b of the first counterweight 161 abutting the longitudinal side portions 163b of the second counterweight 163. When the motorised roller tube 145 is activated to wind the second counterweight 163 in an upward direction, the first counterweight 161 moves upward with the second counterweight 163. The upward movement of the first and second counterweights 161 and 163 causes the blind member 152 to unroll from the roller tube 140 and move downwards towards the roof of the vehicle. The first and second counterweights 161 and 163 continue upwards until the the first counterweight 161 alone balances the weight of the blind member 152 and the flexible edge seal portion 155. When this balance is reached, the first counterweight 161 stops moving upward, the flexible edge seal portion 155 stops moving downward, and the

second counterweight 163 may continue to move upwards until the motorised roller tube 145 is deactivated. At this balancing point, the head seal 150 is configured to adjust itself so that the flexible edge seal portion 155 is in constant contact with the roof of the vehicle when the height of the vehicle varies when loading and unloading.

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In order to retract the head seal 150, the motorised roller tube 145 can be activated to wind the blind member 152 upwards and drive the first and second counterweights 161 and 163 downwards.

10 The flexible edge seal portion 155 comprises a linear member extending horizontally along the distal end 151 of the blind member 152. It will be understood that the distal end 151 of the blind member 152 refers to the end of the head seal 150 that contacts the roof of the vehicle while in use. The flexible edge seal portion 155 may comprise sand or other suitable deformable weighting material provided in a flexible pouch. As
15 described above, in one embodiment the weight of the flexible edge seal portion 155 may be about 15 kg. For example, a pouch may be formed by folding the distal end 151 of the blind against a main portion of the blind member 152. When installed in a dock ramp assembly, the flexible edge seal portion 155 may be disposed substantially position adjacent to the top of the dock ramp assembly and moved into an in-use
20 position where the edge seal portion 155 abuts the roof of a vehicle. In this manner, a seal is provided between the roof of the vehicle and the upper portion of the docking bay. The blind member 152 may be formed of a vinyl material.

Figure 4 is a side view of a dock ramp assembly 200 in which the head sealing
25 apparatus 100 of Figure 1 is installed. Referring to Figure 4, the dock ramp assembly is indicated generally by reference numeral 200. The dock ramp assembly 200 may be retrofitted to an existing facility (not shown).

The dock ramp assembly 200 comprises a fixed framework indicated generally by
30 reference numeral 202. A forward side of the fixed framework 202 defines a docking opening indicated generally by reference numeral 204. A rearward side of the fixed framework 202 will abut against and be connected to the facility.

The docking opening 204, on the forward side, may be defined by an upper peripheral
35 edge 206, a lower peripheral edge 208 and side peripheral edges (not shown) which are adjacent to the periphery of the docking opening 204.

A facility opening (not shown) leading into the facility will be provided adjacent the rearward side of the fixed framework 202 and will be encompassed by the dock ramp assembly 200.

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For clarity, actuatable side seals which may form part of the dock ramp assembly are not shown in Figure 4. However, it will be easily understood by a person skilled in the art that an actuatable side seal may be located around the periphery of the docking opening 204. Such actuatable side seals may have a retracted, inoperable state and
10 an extended, operable state as per the head seal of the present disclosure. When in its extended, operable state, the actuatable side seals and the head sealing apparatus of the present disclosure may form a complete seal around the transport vehicle when a transport vehicle is docked with the docking opening 204. The seal may be configured to come into contact with and abut against a trailer portion of the transport vehicle so
15 as to form a sealed passageway between the interior of the transport vehicle, through the dock ramp assembly 200, into an interior of the facility.

In Figure 4, it can be seen that a transport vehicle indicated generally by reference numeral 300 is in the process of docking with the dock ramp assembly 200 by
20 reversing to a position adjacent the docking opening 204. The transport vehicle 300 may comprise an interior 302 defined by a roof 304 of the transport vehicle 300, a rearward access door 306 of the transport vehicle 300, and, an underside 308 of the transport vehicle 300.

25 In Figure 4, the head seal 150 of the sealing apparatus 100 of the present disclosure may be manoeuvred into its extended, operable state to depend from an underside of the docking opening 204 to abut against the roof 304 of the transport vehicle 300. In the extended, operable state, the flexible edge portion 155 of the head seal 150 abuts the roof 304 the transport vehicle 300 so as to form a sealed passageway, from the
30 interior 302 of the transport vehicle 300, through the docking opening 204 of the dock ramp assembly 100, to an interior of the facility (not shown). As has been described above, the head seal 150 can be adjusted vertically in this balanced operable state to compensate for variations in the height of the vehicle 300.

35 As can be seen, the creation of a vertically moveable head seal which provides a seal between the roof 304 of the transport vehicle 300 and the docking opening 204 is

highly advantageous as a sealed passageway can be formed.

Some advantages of the invention include the fact that the head seal accommodates variations in vehicle height caused by loading or unloading of a vehicle. The invention
5 also caters for the camber of vehicle roof should the vehicle be carrying a greater weight on one side. In addition, the invention allows for a bounce of vehicle should it manoeuvre over a ramp or if a heavy weight is loaded or unloaded.

It will be understood that the dock ramp assembly 200, and in particular the docking
10 opening 204, may be located within an interior of the facility. In such an embodiment, the docking opening would create an enclosed space within the confines of the facility.

The term "actuatable seal" when used in context of the preceding specification will be understood to refer to a seal which can act to transition itself between an operable
15 state and an inoperable state. It will be understood that the act could comprise inflation and deflation of a sealing bladder, mechanical extension and retraction of a sealing lip, and the like.

The terms "comprise" and "include", and any variations thereof required for
20 grammatical reasons, are to be considered as interchangeable and accorded the widest possible interpretation.

The present disclosure is not limited to the embodiments hereinbefore described which may be varied in both construction and detail.

CLAIMS

1. A head sealing apparatus for forming a seal between the top of a docking opening of a facility and a roof of a transport vehicle when the transport vehicle is docked with the facility, the apparatus comprising:
 - 5 a vertically moveable head seal configured to extend downwards over the docking opening and contact the roof of the vehicle, and
 - 10 a vertically moveable counterweight arrangement for balancing the load of the head seal so that the height of the head seal is adjustable to allow for variations in the height of the vehicle.

2. The apparatus of claim 1, wherein the counterweight arrangement comprises first and second counterweights for balancing the weight of the head seal and configured to move relative to each other, the first counterweight configured to
15 balance the weight of the head seal in an operable position, and the second counterweight configured to limit the upward movement of the first counterweight relative to the second counterweight.

3. The apparatus of claim 2, further comprising a roller tube and a motorised roller tube, wherein a first cable attached to the first counterweight is further attached to and configured to be wound around the roller tube, and a second cable attached to the second counterweight is further attached to and configured to be
20 wound around the motorised tube, the motorised roller tube and the second counterweight being configured to move the head seal between a retracted position and the operable position.

4. The apparatus of claim 3, wherein, in use, with the head seal in the retracted position, the weight of the head seal biases the first counterweight upwards against the second counterweight, the motorised roller tube is activated to wind
30 the second counterweight in an upward direction, the first counterweight moves upward with the second counterweight, and the upward movement of the first and second counterweights causes the head seal to move downwards towards the roof of the vehicle until the first counterweight balances the weight of the head seal.

- 35 5. The apparatus of claim 3, wherein the head seal comprises a blind member

configured to be wound around the roller tube and a flexible edge portion at a distal end of the blind member, the flexible edge portion configured for forming a seal between the docking opening and the roof of the vehicle

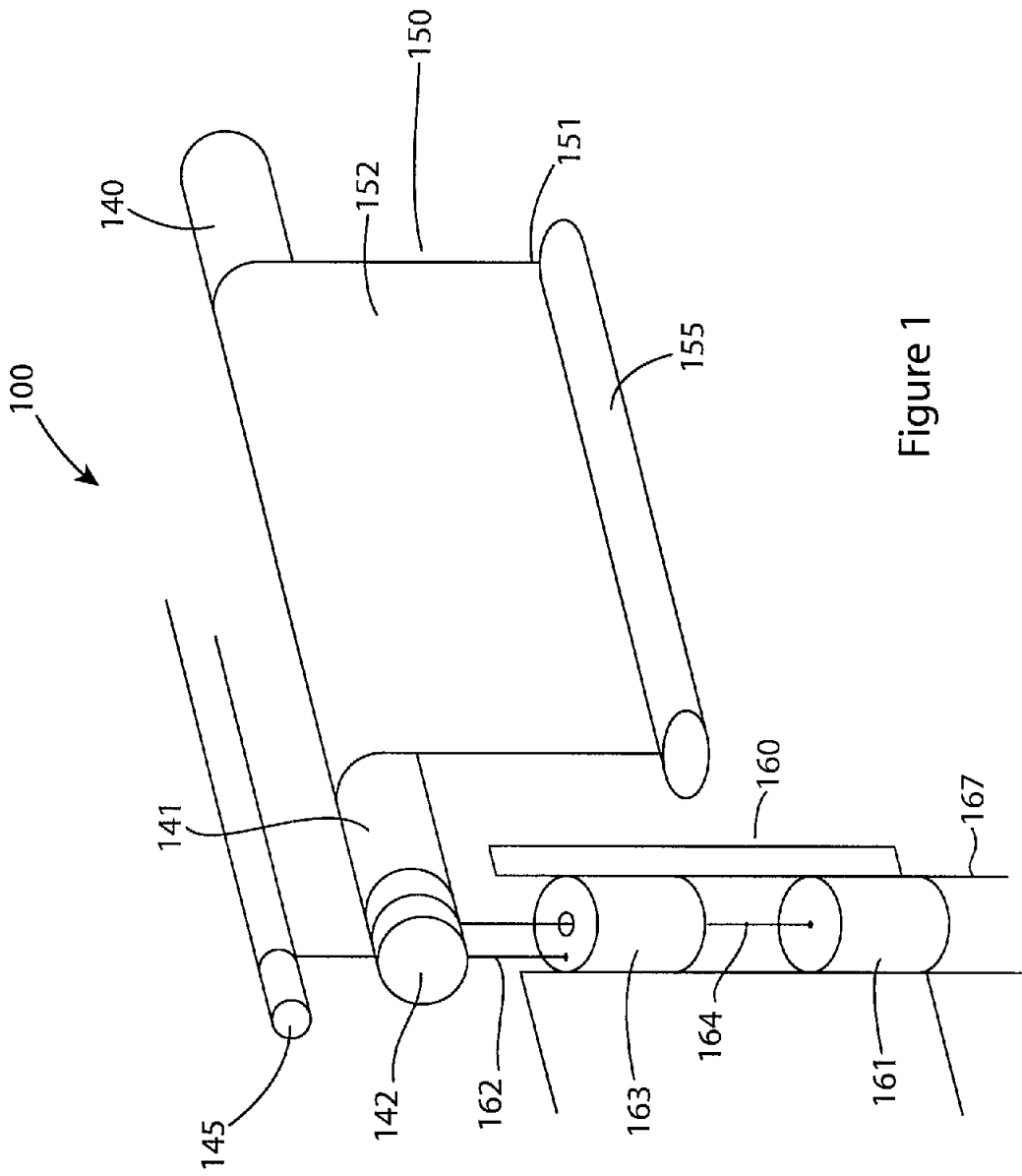


Figure 1

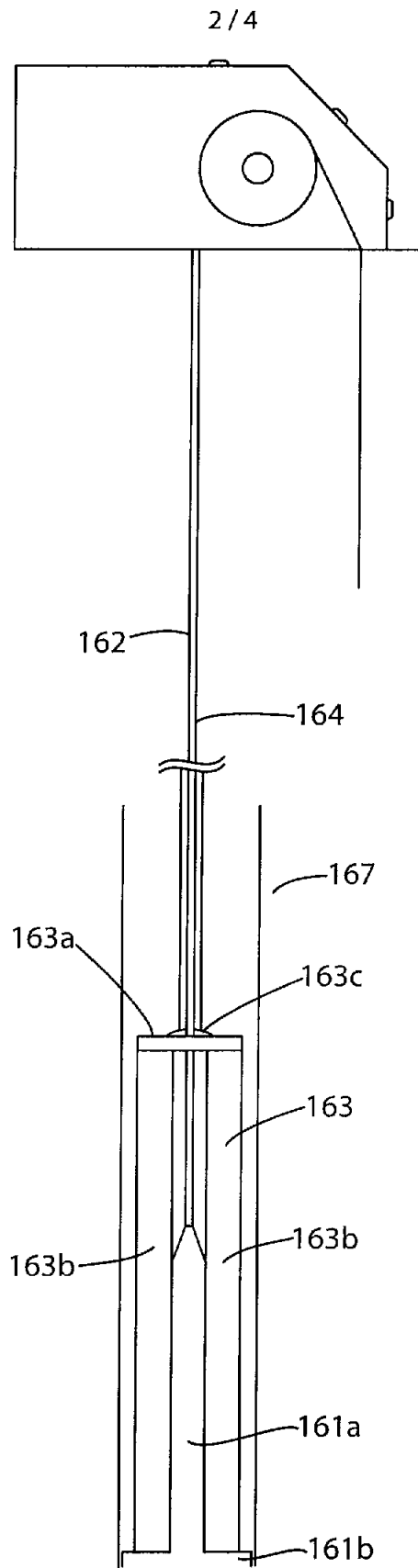


Figure 2

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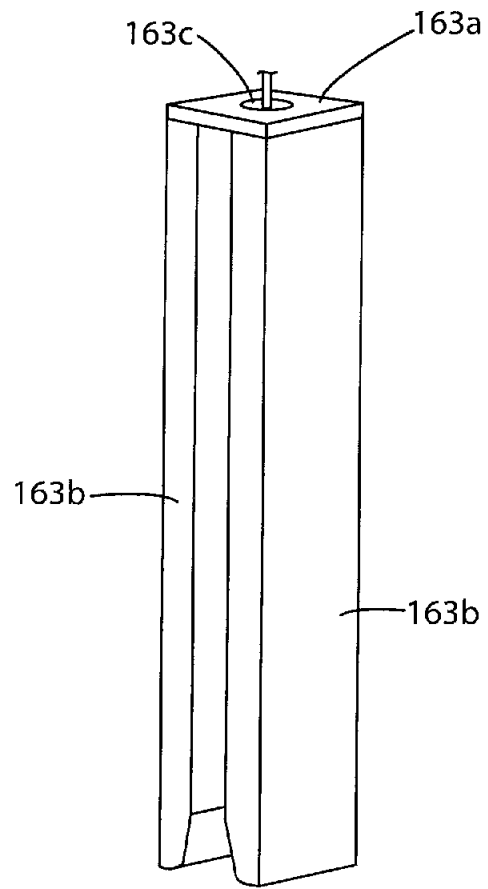
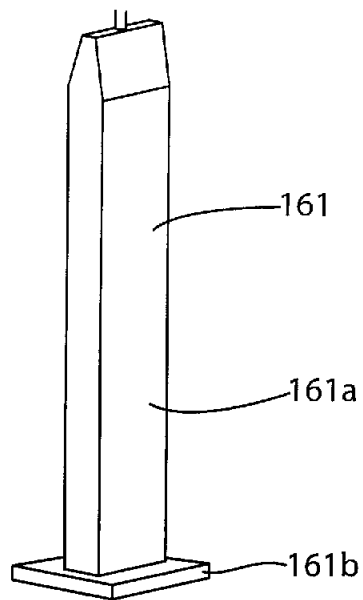


Figure 3



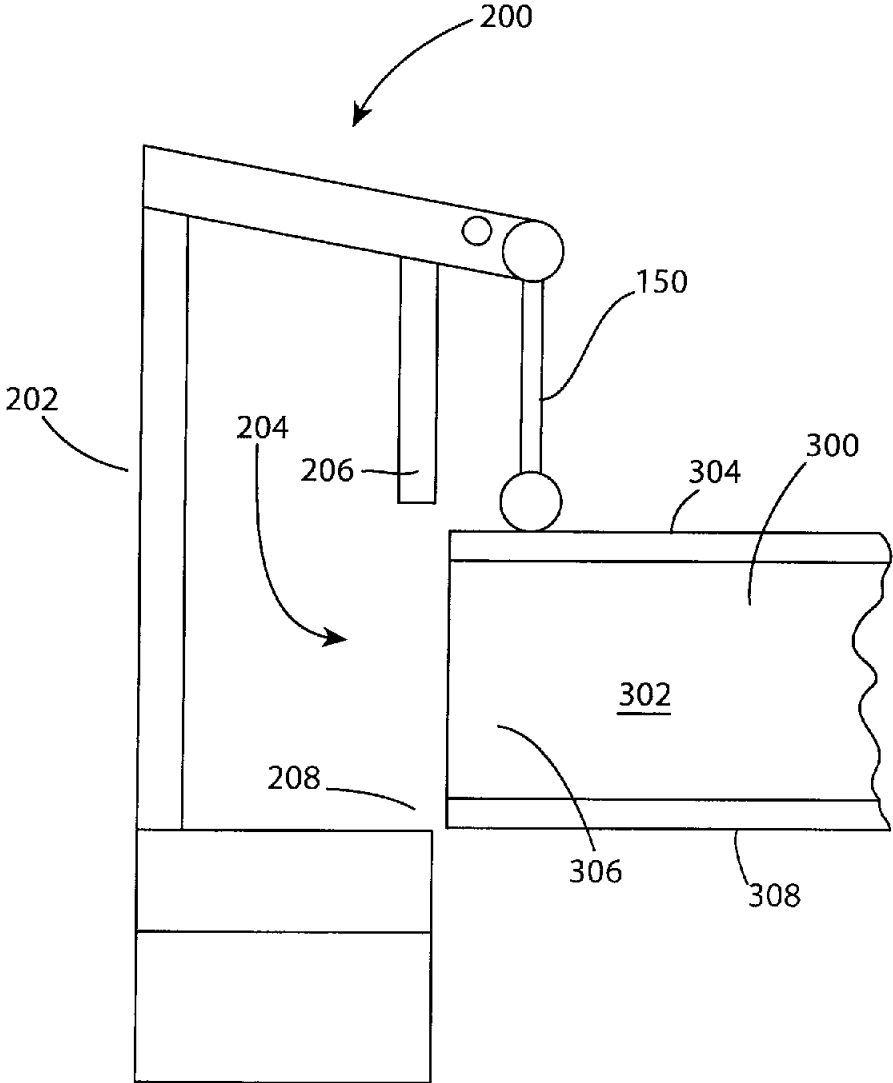


Figure 4