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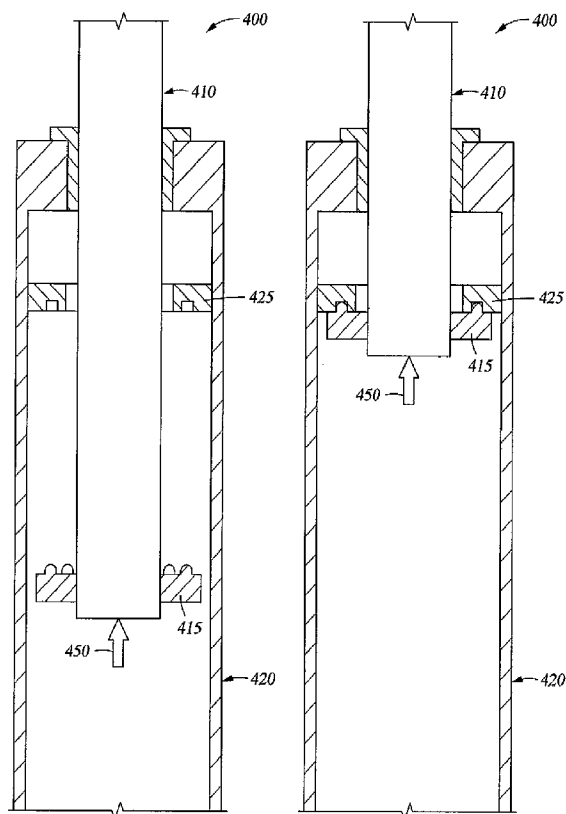


Fig. 4A

Fig. 4B

(57) Abstract: The present invention is generally directed to seating surfaces, with the seat freely rotating whenever a user is seated but locking and fixing the rotational position of the seating surface whenever the user stands. Embodiments typically may use gas lift cylinders, biased to provide an upward locking force. When the user sits, the weight on the seating surface deactivates the rotational lock and allows free rotation.

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PRESSURE ACTIVATED GAS LIFT ROTATIONAL STOP AND RELEASE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is related to and claims benefit under 35 USC §119 to U.S. Provisional Patent Application No. 60/942,958 filed on June 8, 2007 and entitled "Pressure Activated Gas Lift Rotational Stop and Release," which is assigned to the Assignee of the present application and hereby incorporated by reference as if reproduced in its entirety.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not applicable.

REFERENCE TO A MICROFICHE APPENDIX

[0003] Not applicable.

FIELD OF THE INVENTION

[0004] Disclosed embodiments relate generally to pressure activated rotation/non-rotation, and more specifically to chairs or other elements with a gas lift cylinder and to mechanisms that allow for rotation when pressure activated, while preventing rotation when the pressure is removed.

BACKGROUND

[0005] Oftentimes, chairs, stools, and other seating surfaces utilize gas lift cylinders to provide for height adjustment and/or to provide a slight cushioning or give effect as a person first sits down upon the seating surface. Conventional gas lift mechanisms are well known in the industry and widely used in the marketplace. With chairs using one or more conventional gas lift cylinders, as a person exits the chair (stands), the chair may rotate out of position (since the chair is free to rotate). For example, if a person is rotating the chair as they stand, the chair will tend

to continue to rotate after the person exits the chair. Then, the person might have to manually rotate the chair back into position (or else walk around the chair) in order to sit down again (since the chair would not be facing in the direction that the person exited it). This could potentially be quite annoying or inefficient if the person regularly stands and sits (moving from a seated position, to a standing position, and back again, repeatedly), especially if the person also tends to rotate in the chair as they stand. Indeed, free rotation of seating in a boating application could prove a safety hazard. Thus, the present application presents chairs that allow free rotation while a person is seated, but that fix the chair's rotational position whenever the person stands.

SUMMARY

[0006] The present invention is typically used in seating applications, providing pressure activated/deactivated rotational stop and release. This allows a chair to rotate freely in one instance, for example when a person is seated in the chair (providing pressure/downward or unlocking force), while restricting the chair's rotation (for example, fixing or locking the chair's rotational position) in another instance, for example when a person stands up, exiting the chair (so that there is no pressure). The person's seated weight serves to activate free rotation (deactivating the rotational stop/restraint/damper). When the seated weight is removed, a rotational stop/restraint/damper is activated, restricting rotational motion and/or the fixing rotational position of the chair.

[0007] In one aspect, the present disclosure is directed to a device comprising an upward force means (such as a gas lift/gas spring/mechanical spring, for example), an inner cylinder, and an outer cylinder (which has a diameter greater than that of the inner cylinder for the majority of its length). It should be understood that the term "cylinder" is used broadly here (and is not intended to limit) to indicate any longitudinal member/element. By way of example, "cylinder" may include elements that have conical, flared, and/or tapered portions. Persons skilled in the art field will understand these and other variants based on the present disclosure, and their equivalents, all of which are included within the scope of this disclosure. The inner cylinder and the outer cylinder are telescopically coupled together, so that the cylinders are operable to slide (lengthwise) with respect to one another (but may not completely separate). A portion of the inner cylinder overlaps radially with a portion of the outer cylinder. This overlap prevents the

cylinders from completely separating, and allows the rotational position of the cylinders to be fixed (rotational motion to be restricted) in certain circumstances (even though in other instances, they may rotate freely). The upward force means is operable to press the overlapping portions of the cylinders together (into contact), and will act to bring the overlapping portions into contact unless opposed by a sufficient downward force (such as the seated weight of a person). In other words, the upward force means is biased to press the overlapping portions together. The overlapping portions of the cylinders are operable to resist rotation (of the cylinders with respect to one another) when pressed together (into contact).

[0008] Generally, the upward force acts on one of the cylinders (typically the cylinder that is in the upper position). When used in seating applications, a seating surface would typically be attached to one of the cylinders (the one experiencing the upward force). Then, if a person sits on the seating surface, their weight would generate a downward force which, if sufficient, will move the cylinders so that their overlapping portions are not in contact (allowing free rotation). If there is no (or insufficient) downward force (which might occur if there is no seated person or if a seated person stands), however, the overlapping portions of the two cylinders would be forced into contact by the upward force means, and would then serve to resist/restrict rotational motion (preventing rotation of one cylinder with respect to the other cylinder).

[0009] In one embodiment, at least one of the overlapping portions is a ring. By way of example, the inner cylinder could have a ring attached to its outer surface (circumferentially), the outer cylinder could have a ring attached to its inner surface (circumferentially), and the outer diameter of the ring for the inner cylinder would be greater than the inner diameter of the ring for the outer cylinder (so that the rings overlap). Alternatively, at least one of the overlapping portions could be either a flared or tapered end. So for example, the inner cylinder could have a flared bottom (having an outer diameter greater than that for the main body of the inner cylinder), and the outer cylinder could have a ring having an inner diameter less than the outer diameter of the flared bottom of the inner cylinder. Regardless, the overlapping portions may each comprise a frictional face (such that they resist rotation when pressed together via friction). Alternatively, by way of example, the overlapping portions may each comprise teeth oriented so that they would mesh and mechanically resist rotation when the overlapping portions are pressed together.

[0010] In another aspect, the present disclosure is directed to a device comprising two telescopically coupled longitudinal elements (such as cylinders), and a means to restrict rotation of one longitudinal element with respect to the other longitudinal element, wherein the means to restrict rotation is operable to be deactivated by a downward (seating/unlocking) force and the means to rotation is operable to substantially restrict rotation of one longitudinal element with respect to the other unless deactivated. The device may further comprise a seating surface (when the device is used in a seating application) operable to provide the downward/locking force (by weight of a seated user), wherein the downward force would deactivate the means to restrict rotation when sufficient weight is applied to the seating surface (typically by a user sitting in the chair). In an embodiment, the means to restrict rotation comprises overlapping radial elements (with at least one overlapping radial element being associated with, mounted to, or part of each longitudinal element), and an upward or locking force means (such as a gas lift/gas spring/mechanical spring, for example) biased so as to be operable to press the overlapping radial elements together into contact. The rotational position typically may be fixed at substantially any rotational position of one longitudinal element with respect to the other longitudinal element.

[0011] In another aspect, the present disclosure is directed to a device comprising an upper cylinder; a lower cylinder; a gas lift upward force means; and a seating surface affixed atop the upper cylinder; wherein the upper cylinder and the lower cylinder are telescopically coupled; the upper cylinder comprises a ring fixed to its exterior surface; the lower cylinder comprises a ring fixed to its interior surface; the ring of the upper cylinder is located below the ring of the lower cylinder; the ring of the upper cylinder overlaps radially with the ring of the lower cylinder; the gas lift upward force means acts on the upper cylinder; and when in contact, the ring of the upper cylinder interacts with the ring of the lower cylinder to restrict rotation of the upper cylinder with respect to the lower cylinder. Typically the gas lift force means is biased to bring the ring of the upper cylinder in contact with the ring of the lower cylinder. In an embodiment, each of the rings comprises teeth, and the teeth of the rings are operable to mesh to prevent rotation, locking the rotational position of the upper cylinder with respect to the lower cylinder. In an alternative embodiment, each of the rings comprises a frictional surface, and the rings are operable to restrict rotation of the upper cylinder with respect to the lower cylinder so long as insufficient

downward force is applied to the upper cylinder. Typically, the upper cylinder is operable to lock in substantially any rotational position with respect to the lower cylinder when the rings interact. And often the upper cylinder is free to rotate with respect to the lower cylinder whenever sufficient weight is placed on the seating surface to overcome the upward force provided by the gas lift means, separating the ring of the upper cylinder from the ring of the lower cylinder.

[0012] When the downward force (generally provided by the weight of a seated user) is greater than the upward force (provided by the upward force means) and/or overcomes the upward force means, the overlapping radial elements are forced apart so that they are not in contact, and the longitudinal elements may rotate freely with respect to each other. On the other hand, when the upward force (from the upward force means) is greater than the downward force (or when there is no downward force applied), the overlapping radial elements are pressed together in contact, and the rotational motion of the longitudinal elements is restricted. Thus, the downward force serves to deactivate the means to restrict rotation. So in a seating application, when a person is seated (providing a downward force sufficient to overcome the upward force means with their weight), the chair may freely rotate; but when the person stands (removing the downward force, so that the upward force means is insufficiently opposed, the rotational position of the chair would be fixed and/or rotation would be restricted or limited.

[0013] The overlapping radial elements may each comprise a friction face, so that the frictional force created when the overlapping radial elements are pressed together may restrict rotation. As an alternative example, the overlapping radial elements may each comprise teeth operable to mesh together to mechanically restrict rotation when the overlapping radial elements are pressed together. Additionally, the overlapping radial elements may each optionally be a ring mounted to one of the longitudinal elements and/or a portion of the longitudinal element with a diameter different than the main portion of the longitudinal element (such as a portion that flares out or tapers/necks in).

[0014] Typically, the upward and downward forces are applied to whichever cylinder (longitudinal member or element) is the upper cylinder (since this is the cylinder to which the seating surface (downward force) would be applied/affixed). The upper cylinder may be either the inner or the outer cylinder, depending upon the specific configuration. Regardless, the

overlapping radial element of the upper cylinder is generally located below/beneath the overlapping radial element of the lower cylinder. This configuration allows the upward force means to bias the overlapping radial elements of the two cylinders together (into contact), so that absent a downward force (such as applied by a seated person), the overlapping radial elements would restrict rotation. On the other hand, if a downward force sufficient to overcome the biased upward force is applied (such as by a person sitting in the chair), then the overlapping rotational elements would separate, allowing free rotation.

[0015] In this manner, the present devices may provide hands-free locking and unlocking of the rotational position of the chair (since no separate mechanism is needed to operate the means to restrict rotation). Additionally, these devices may allow for adjustment of the amount of extension of the upper longitudinal element from the lower longitudinal element (height of the seat), and the free rotation and/or rotational restriction is operable regardless of the amount of extension/compression. In other words, regardless of the height of the seat or the amount of cushioned compression caused by the weight of a seated user, the chair may allow free rotation when the user is seated and may lock the rotational position of the chair when the user stands.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] For a more complete understanding of the present disclosure, and for further details and advantages thereof, reference is now made to the accompanying drawings, wherein:

[0017] FIG. 1A is a cross section drawing illustrating an embodiment of a gas lift cylinder mechanism that utilizes a frictional ring and a tapered cylinder to provide free rotational movement when a person is seated, compressing the tapered cylinder so that it is not in contact with the frictional (rubberized) ring;

[0018] FIG. 1B is a cross section drawing illustrating the embodiment of FIG. 1A without the force of a seated person, such that the tapered cylinder is forced up into contact with the fixed frictional (rubberized) ring, preventing and/or inhibiting rotation;

[0019] FIG. 2A is a cross section drawing illustrating an embodiment of a gas lift cylinder mechanism that utilizes frictional rings (with one ring mounted on each cylinder) to provide free rotational movement when a person is seated, compressing the upper cylinder so that its frictional ring is not in contact with the frictional (rubberized) ring of the other cylinder;

[0020] FIG. 2B is a cross section drawing illustrating the embodiment of FIG. 2A without the force of a seated person, such that the upper cylinder is forced up so that its frictional ring comes into contact with the fixed frictional (rubberized) ring of the other cylinder, preventing and/or inhibiting rotation;

[0021] FIG. 3A is a cross section drawing illustrating an embodiment of a gas lift cylinder mechanism that utilizes rings with meshing teeth (with one ring mounted on each cylinder) to provide free rotational movement when a person is seated, compressing the upper cylinder so that its toothed ring is not in contact with the toothed ring of the other cylinder;

[0022] FIG. 3B is a cross section drawing illustrating the embodiment of FIG. 3A without the force of a seated person, such that the toothed ring of the upper cylinder is forced up into contact with the fixed toothed ring of the other cylinder, preventing and/or inhibiting rotation;

[0023] FIG. 4A is a cross section drawing illustrating an embodiment of a gas lift cylinder mechanism that utilizes rings with meshing gear-like teeth (with one ring mounted on each cylinder) to provide free rotational movement when a person is seated, compressing the upper cylinder so that its toothed ring is not in contact with the toothed ring of the other cylinder;

[0024] FIG. 4B is a cross section drawing illustrating the embodiment of FIG. 4A without the force of a seated person, such that the gear-like toothed ring of the upper cylinder is forced up into contact with the fixed gear-like toothed ring of the other cylinder, preventing and/or inhibiting rotation;

[0025] FIG. 5A is a cross section drawing illustrating an embodiment of a gas lift cylinder mechanism that utilizes a fixed ring with inner teeth and a tapered cylinder which has meshing teeth along at least a portion of its exterior to provide free rotational movement when a person is seated, compressing the tapered cylinder so that its toothed surface is not in contact with the toothed ring;

[0026] FIG. 5B is a cross section drawing illustrating the embodiment of FIG. 5A without the force of a seated person, such that the toothed surface of the tapered cylinder is forced up into contact with the fixed toothed ring, preventing and/or inhibiting rotation;

[0027] FIGs. 6A and 6B illustrate via cross section drawings the two positions for an embodiment of a gas lift cylinder mechanism using a fixed ring frictional surface and a tapered

cylinder end, with FIG. 6A showing the device in position allowing free rotation and FIG. 6B showing the device in position for restricting rotational movement; and

[0028] FIGs. 7A and 7B illustrate via cross section drawings the two positions for an embodiment of a gas lift cylinder mechanism using a flared cylinder end and a tapered cylinder end, with FIG. 7A showing the device in position allowing free rotation and FIG. 7B showing the device in position for restricting rotational movement.

DETAILED DESCRIPTION OF THE INVENTION

[0029] Disclosed embodiments provide a gas lift cylinder (or some other spring-type mechanism operable to affect extension/compression/height) operable to freely rotate when pressure/force is applied in compression (as when a person sits on a seating surface atop such a gas lift cylinder, providing a downward or unlocking force), and operable to fix/lock rotational position when the pressure or force is removed (as when a seated person stands). Thus, disclosed embodiments provide for a chair with a gas lift cylinder (allowing for height adjustment, an amount of cushioning give as a person sits, etc) that freely rotates when a person is seated, but which locks the rotational position of the chair (or resists changes to the rotational position of the chair) whenever vacant (such as when no seated person is atop the seating surface of the chair). For convenience, the term “lock” or “fix” may be used herein to describe any rotational resistance (in which changes to the rotational position of a chair are resisted/restricted/retarded/stopped).

[0030] Disclosed embodiments typically employ telescopically coupled longitudinal elements (often cylinders which are operable to adjust height and/or compress in a cushioning motion during seating) and some means to restrict rotation. The means to restrict rotation typically employs overlapping radial elements associated with each longitudinal element, which when pressed into contact interact to restrict rotation. Additionally, the means to restrict rotation typically employs a locking force means (which could for example be an upward force means or a gas lift upward force means). The means for restricting rotation typically acts as a clutch for engaging and releasing the rotational position lock. In other words, it may serve as a releasable locking mechanism. The overlapping radial elements are biased towards a locked position, with overlapping radial elements in contact. The downward force provided by a user's weight on the

seating surface (located atop the telescopically coupled longitudinal elements typically) then may deactivate the rotational lock by separating the overlapping radial elements to allow free rotation (so long as the weight of the user is sufficient to overcome the upward locking force). This allows hands-free locking and unlocking of rotation (when a user sits or stands, for example). It also allows for the chair to lock in substantially any rotational position, depending on its rotational position when the user stands.

[0031] While specific examples set forth below relate to chairs, it should be understood that this disclosure is not limited to seating applications. Rather, the invention of the present disclosure may be used in place of a conventional gas lift cylinder/spring support mechanism any time that there is a desire to have free rotation in one instance, and to have the rotational position fixed in another instance. By way of example, a pressure activated gas lift rotational stop and release mechanism could be used for an adjustable table/desk having a rotatable writing surface. Persons skilled in the art field will understand these and other embodiments based on the disclosure herein, and their equivalents, all of which are included within the scope of this disclosure.

[0032] Additionally, while the specific examples below relate to gas lift cylinders, the scope of the present invention is not so limited. For example, a pressure activated gas lift rotational stop and release mechanism could employ a mechanical spring-type mechanism (with the spring providing the upward force for adjusting seat height). Persons skilled in the art field will understand these and other embodiments based on the disclosure herein, and their equivalents, all of which are included within the scope of this disclosure.

[0033] **FIGURES 1A and 1B** illustrate the operation of an exemplary pressure activated gas lift rotational stop and release mechanism 100. In FIGURE 1A, the gas lift mechanism 100 comprises two cylinders and an upward force means 150 (gas lift/gas spring/mechanical spring, for example). The upper cylinder 110 of FIGURE 1A has a bottom portion 113 which flares outward as it extends away from the main portion 117 of the upper cylinder 110. Thus, the diameter of the bottom portion 113 of the upper cylinder 110 tapers down as it meets the diameter of the main portion 117 of the upper cylinder. Accordingly, in FIGURE 1A, the bottom portion 113 of the upper cylinder 110 is conical, the main portion 117 of the upper cylinder 110 is cylindrical, and the smallest diameter of the bottom portion 113 is about the same diameter as

the main portion 117 of the upper cylinder. In the example of FIGURE 1A, the bottom portion 113 of the upper cylinder 110 may optionally have its exterior surface (circumference) coated with frictional material (in order to improve the effectiveness of the lock when surfaces contact).

[0034] The lower cylinder 120 of FIGURE 1A includes a ring 125 of frictional material (generally with a sufficiently high coefficient of friction so that frictional forces may lock the rotational position of the two cylinders whenever the force of a seated person's weight is removed) fixedly attached to the inner circumference of the lower cylinder 120. In the example of FIGURE 1A, the ring 125 is a rubberized bushing mounted inside the lower cylinder 120. It should be understood, however, that individual frictional stops positioned about the inner circumference of the lower cylinder 120 could be used as an alternative example in place of a continuous ring 125.

[0035] In FIGURE 1A, the upper cylinder 110 is partially located within the lower cylinder 120. More specifically, in the example of FIGURE 1A, the bottom portion 113 of the upper cylinder 110 is slidably located within the top of the lower cylinder 120 (so that they are telescopically coupled and capable of sliding with respect to each other). The frictional ring 125 is located above the section of the bottom portion 113 that has an outer diameter greater than the inner diameter of the frictional ring 125. In FIGURE 1A, the frictional ring 125 is located in proximity to the top of the lower cylinder, and extends inwardly sufficiently to reduce the inner diameter of the lower cylinder 120 so that the bottom portion 113 of the upper cylinder 110 cannot be completely removed from the lower cylinder 120. In other words, the frictional ring 125 and the bottom portion 113 overlap radially. The upper cylinder 110 may slidably move within the lower cylinder 120 (at least until its upward motion is stopped by the frictional ring 125 contacting the lower portion 113), since the upper cylinder's main portion 117 has an outer diameter that is smaller than the inner diameter of the frictional ring, providing clearance. As shown in FIGURE 1A, the frictional ring 125 will not contact the bottom portion 113 of the upper cylinder 110 when the bottom portion is inserted sufficiently far down into the lower cylinder 120 (since the bottom portion 113 would taper to have an outside diameter smaller than the inner diameter of the frictional ring 125). On the other hand, as the upper cylinder 110 moves upward (as shown in FIGURE 1B), the bottom portion 113 of the upper cylinder will

contact the frictional ring 125, with the friction forces serving to restrict rotation of the upper cylinder 110 with respect to the lower cylinder 120 (locking the rotational position).

[0036] FIGURE 1A illustrates the operation of gas lift 100 when a person is seated on the seating surface (not shown, but located atop the upper cylinder 110). FIGURE 1B, on the other hand, illustrates the operation of gas lift 100 when there is no weight upon the upper cylinder 110 (as when a seated person stands, leaving the seat empty). In FIGURE 1A, the weight of the seated person forces the upper cylinder 110 down within the lower cylinder 120 sufficiently so that the frictional ring 125 does not contact the exterior surface of the bottom portion 113 of the upper cylinder. Thus, while the person is seated, the upper cylinder 110 may rotate with respect to the lower cylinder 120 (allowing the seat of the chair to rotate freely). In the example of FIGURE 1A, the force of a seated person weighing between 100 and 320 pounds will provide sufficient pressure/downward force to release the frictional lock, allowing the chair to freely rotate. As the seated person stands, the upward force provided by the gas lift cylinder/spring mechanism would no longer be opposed by the downward force of the person's weight. Thus, the upward force provided by the gas lift cylinder/spring mechanism would push the upper cylinder upward until it contacts the frictional ring 125. This position may be seen in FIGURE 1B, where the flared bottom portion 113 of the upper cylinder 110 contacts the frictional ring 125. The frictional force between the ring 125 and the exterior of the bottom portion 113 of the upper cylinder 110 acts to resist rotation (based on the effective coefficient of friction and the amount of the upward force), effectively locking the chair in its rotational position as the person stands.

[0037] So in the example shown in FIGURES 1A and 1B, when a person is seated (atop the upper cylinder 110, providing a downward force on the upper cylinder 110) the chair is free to rotate, but when the seat is unoccupied, the rotational position of the chair is fixed/locked (with the friction forces acting to resist rotational changes from the position of the chair as the person stood). It should be readily understood that while FIGURES 1A and 1B provide an effective example of a pressure activated gas lift rotational stop and release mechanism, alternative configurations exist and are included within this disclosure. Additionally, rather than utilizing a frictional locking mechanism, a mechanical locking/coupling mechanism (such as meshing teeth) could be used. As illustrated in FIGURES 5A and 5B, the ring 525 could include teeth 528 on

its inner circumference, and the bottom portion 513 could have teeth 515 on its outer surface that would mesh with the teeth 528 of the ring 525 (located on the inner surface of the lower cylinder 520). So as the seated person stood, the teeth 528 of the ring 525 would securely mesh with the teeth 515 of the bottom portion 513. Alternatively, **Figures 6A and 6B** show a related embodiment in which the outer (lower) cylinder tapers to a smaller diameter as it nears its top and approaches the inner (upper) cylinder, with a ring 625 mounted to the exterior of the inner (upper) cylinder. Additionally, **FIGURES 7A and 7B** show a related embodiment in which the outer (lower) cylinder tapers to a small diameter as it approaches the inner (upper) cylinder, while the inner (upper) cylinder flares to a larger diameter as it approaches the outer (lower) cylinder. These and other variants are included within the scope of this disclosure.

[0038] FIGURES 2A and 2B illustrate the operation of an alternative exemplary pressure activated gas lift rotational stop and release mechanism 200. In **FIGURE 2A**, the gas lift mechanism 200 comprises two cylinders and a gas lift/gas spring/mechanical spring (providing an upward force on the upper cylinder 210). The upper cylinder 210 of **FIGURE 2A** includes a first ring 215 of frictional material fixedly attached to the outer surface (circumference) of the upper cylinder 210. The lower cylinder 220 of **FIGURE 2A** includes a second ring 225 of frictional material (generally with a sufficiently high coefficient of friction on the face that may contact the first ring 215 so that frictional forces may lock the rotational position of the two cylinders whenever the force of a seated person's weight is removed) fixedly attached to the inner circumference of the lower cylinder 220. In the example of **FIGURE 2A**, both rings 215 and 225 are rubberized bushings mounted inside the lower cylinder 220.

[0039] In **FIGURE 2A**, the upper cylinder 210 is partially located within the lower cylinder 220. More specifically, in the example of **FIGURE 2A**, the bottom of the upper cylinder 210 is slidably located within the top of the lower cylinder 220, with the ring 215 of the upper cylinder located below the ring 225 of the lower cylinder 220. In other words, the upper cylinder 210 is telescopically coupled to the lower cylinder 220. In **FIGURE 2A**, the frictional ring 225 is typically located in proximity to the top of the lower cylinder, and has an inner diameter that is less than the outer diameter of ring 215 (while the ring 215 is typically located in proximity to the bottom of the upper cylinder). Thus, ring 225 may serve as a stop that prevents the upper cylinder 210 from completely exiting the lower cylinder 220. In other words, the rings 215 and

225 overlap radially. The upper cylinder 210 may slidably move (telescopically) within the lower cylinder 220. As shown in FIGURE 2A, ring 225 of the lower cylinder 220 will not contact ring 215 of the upper cylinder 210 when the upper cylinder 210 is inserted sufficiently far down into the lower cylinder 220 (as when a downward force separates the rings). On the other hand, as the upper cylinder 210 moves upward (as shown in FIGURE 2B), ring 215 of the upper cylinder 210 will contact the frictional ring 225 of the lower cylinder 220, with the friction forces serving to restrict rotation of the upper cylinder 210 with respect to the lower cylinder 220 (locking the rotational position).

[0040] FIGURE 2A illustrates the operation of gas lift 200 when a person is seated on the seating surface (not shown, but located atop the upper cylinder 210). FIGURE 2B, on the other hand, illustrates the operation of gas lift 200 when there is no weight (downward force) upon the upper cylinder 210 (as when a seated person stands, leaving the seat empty). In FIGURE 2A, the weight of the seated person forces the upper cylinder 210 down within the lower cylinder 220 sufficiently so that the frictional ring 225 does not contact ring 215 of the upper cylinder 210. Thus, while the person is seated, the upper cylinder 210 may rotate freely with respect to the lower cylinder 220 (allowing the seat of the chair to rotate freely). In the example of FIGURE 2A, the force of a seated person weighing between 100 and 320 pounds will provide sufficient pressure/downward force to release the frictional lock, allowing the chair to freely rotate (although any suitable weight could be used for activation/deactivation). As the seated person stands, the upward force provided by the gas lift cylinder/spring mechanism would no longer be opposed by the downward force of the person's weight. Thus, the upward force provided by the gas lift cylinder/spring mechanism would push the upper cylinder 210 upward until its ring 215 contacts the frictional ring 225 of the lower cylinder 220. This position may be seen in FIGURE 2B, where the two frictional rings 215 and 225 are pressed together by the upward force. The frictional force between the faces of the two rings 215 and 225 acts to resist rotation (based on the effective coefficient of friction and the amount of the upward force), effectively locking the chair in its rotational position as the person stands. Depending on the amount of frictional force, the mechanism 200 may completely lock rotational movement or merely dampen rotational movement.

[0041] So in the example shown in FIGURES 2A and 2B, when a person is seated (atop the upper cylinder 210, providing a downward force on the upper cylinder 210) the chair is free to rotate, but when the seat is unoccupied, the rotational position of the chair is fixed/locked (with the friction forces acting to resist rotational changes from the position of the chair as the person stood). It should be readily understood that while FIGURES 2A and 2B provide an effective example of a pressure activated gas lift rotational stop and release mechanism, alternative configurations exist and are included within this disclosure. By way of example, the upper and lower cylinders of FIGURE 2A could be inverted (essentially flipping FIGURES 2A and 2B so that top is bottom, and bottom is top). These and other variants are included within the scope of this disclosure.

[0042] FIGURES 3A and 3B illustrate the operation of another alternative exemplary pressure activated gas lift rotational stop and release mechanism 300. In FIGURE 3A, the gas lift mechanism 300 comprises two cylinders and an upward or locking force/lift means. The upper cylinder 310 of FIGURE 3A includes a first toothed ring 315 (with teeth 318 located on the upper/top surface of the ring 315) fixedly attached to the outer surface (circumference) of the upper cylinder 310. The lower cylinder 320 of FIGURE 3A includes a second toothed ring 325 (with teeth 328 located on the underside/lower/bottom surface of ring 325 that may mesh with the teeth atop ring 315 in order to lock the rotational position of the two cylinders whenever the force of a seated person's weight is removed) fixedly attached to the inner circumference of the lower cylinder 320.

[0043] In FIGURE 3A, the upper cylinder 310 is partially located within the lower cylinder 320. More specifically, in the example of FIGURE 3A, the bottom of the upper cylinder 310 is slidably located within the top of the lower cylinder 320, with the ring 315 of the upper cylinder located below the ring 325 of the lower cylinder 320. In FIGURE 3A, ring 325 is typically located in proximity to the top of the lower cylinder 320, and has an inner diameter that is less than the outer diameter of ring 315. Thus, ring 325 may serve as a stop that prevents the upper cylinder 310 from completely exiting the lower cylinder 320. In other words, rings 315 and 325 overlap radially. The upper cylinder 310 may slidably move within the lower cylinder 320. As shown in FIGURE 3A, ring 325 of the lower cylinder 320 will not contact ring 315 of the upper cylinder 310 when the upper cylinder 310 is inserted sufficiently far down into the lower

cylinder 320 (due to a downward force, for example). On the other hand, as the upper cylinder 310 moves upward (as shown in FIGURE 3B), ring 315 of the upper cylinder 310 will contact ring 325 of the lower cylinder 320, with the meshing/interlocking teeth of rings 315 and 325 serving to restrict rotation of the upper cylinder 310 with respect to the lower cylinder 320 (mechanically locking the rotational position).

[0044] FIGURE 3A illustrates the operation of gas lift 300 when a person is seated on the seating surface (not shown, but located atop the upper cylinder 310). FIGURE 3B, on the other hand, illustrates the operation of gas lift 300 when there is no weight (downward force) upon the upper cylinder 310 (as when a seated person stands, leaving the seat empty). In FIGURE 3A, the weight of the seated person forces the upper cylinder 310 down within the lower cylinder 320 sufficiently so that ring 325 does not contact ring 315 of the upper cylinder 310. Thus, while the person is seated, the upper cylinder 310 may rotate freely with respect to the lower cylinder 320 (allowing the seat of the chair to rotate freely). In the example of FIGURE 3A, the force of a seated person weighing within the normal statistical range of the population (for example between 100 and 300 lbs) will provide sufficient pressure/downward force to separate rings 315 and 325 (so that the teeth no longer mesh), allowing the chair to freely rotate.

[0045] As the seated person stands, the upward force provided by the gas lift cylinder/spring mechanism would no longer be opposed by the downward force of the person's weight. Thus, the upward force provided by the gas lift cylinder/spring mechanism would push the upper cylinder 310 upward until its ring 315 contacts ring 325 of the lower cylinder 320. This position may be seen in FIGURE 3B, where the two rings 215 and 225 are pressed together by the upward force, with meshing teeth 318 and 328. The meshing of the teeth 318 and 328 on the two rings 215 and 225 acts to mechanically resist rotation (since the teeth mesh in a way that prevents rotational movement of the cylinders), effectively locking the chair in its rotational position as the person stands.

[0046] So in the example shown in FIGURES 3A and 3B, when a person is seated (atop the upper cylinder 310, providing a downward force on the upper cylinder 310) the chair is free to rotate, but when the seat is unoccupied, the rotational position of the chair is fixed/locked (with the teeth 318 and 328 mechanically locking the rotational position of the cylinders, thereby acting to resist rotational changes from the position of the chair as the person stood). It should

be readily understood that while FIGURES 3A and 3B provide an effective example of a pressure activated gas lift rotational stop and release mechanism, alternative configurations exist and are included within this disclosure. By way of example, the upper and lower cylinders of FIGURE 3A could be inverted (essentially flipping FIGURES 3A and 3B so that top is bottom, and bottom is top). **FIGURES 4A and 4B** illustrate a similar embodiment, in which the teeth 415 and 425 are larger and/or more gear-like. Additionally, the teeth could be somewhat rounded, in order to help ensure a secure, locking fit even if originally not precisely aligned. In another alternative, the teeth might not mesh tightly, but rather allow some degree of play (while still restricting major rotational movement). These and other variants are included within the scope of this disclosure.

[0047] The upward force is generally selected so that it may be overcome by the weight of normal users (allowing free rotation of the chair whenever a user is seated). In an embodiment, the gas lift upward force means provides from about 80 N to about 340 N of upward force. Additionally, the stroke of the gas lift cylinder for one embodiment is about 135 mm (although this can be variable, depending on design needs). And typically, the body of each cylinder (such as the upper and lower cylinders, for example) would be substantially smooth, free of teeth, ridges, or grooves (with any such rotation restricting elements being limited to a ring or a localized portion of the cylinder as described in the examples above).

[0048] The figures discussed above provide examples of various mechanisms, systems, and techniques for providing pressure activated rotation/nonrotation in gas lift (and/or spring) seating systems. These illustrations are merely exemplary, disclosing frictional and/or mechanical coupling (with teeth, for instance) locking mechanisms that may restrict, restrain, dampen, fix, or lock rotational position/movement (whenever the pressure/force of a seated person is removed). The scope of the present disclosure extends beyond the specific examples set forth above, capturing the full range of the inventive concept (and including all equivalents).

[0049] While various embodiments in accordance with the principles disclosed herein have been shown and described above, modifications thereof may be made by one skilled in the art based on the disclosure herein without departing from the spirit and the teachings of the disclosure. The embodiments described herein are representative only and are not intended to be limiting. Many variations, combinations, and modifications are possible and are within the scope

of the disclosure. Accordingly, the scope of protection is not limited by the description set out above, but is defined by the claims which follow, that scope including all equivalents of the subject matter of the claims. Furthermore, any advantages and features described above may relate to specific embodiments, but shall not limit the application of such issued claims to processes and structures accomplishing any or all of the above advantages or having any or all of the above features.

[0050] Additionally, the section headings used herein are provided for consistency with the suggestions under 37 C.F.R. 1.77 or to otherwise provide organizational cues. These headings shall not limit or characterize the invention(s) set out in any claims that may issue from this disclosure. Specifically and by way of example, although the headings refer to a “Field of the Invention,” the claims should not be limited by the language chosen under this heading to describe the so-called field. Further, a description of a technology in the “Background” is not to be construed as an admission that certain technology is prior art to any invention(s) in this disclosure. Neither is the “Summary” to be considered as a limiting characterization of the invention(s) set forth in issued claims. Furthermore, any reference in this disclosure to “invention” in the singular should not be used to argue that there is only a single point of novelty in this disclosure. Multiple inventions may be set forth according to the limitations of the multiple claims issuing from this disclosure, and such claims accordingly define the invention(s), and their equivalents, that are protected thereby. The term “comprising” as used herein is to be construed broadly to mean including but not limited to, and in accordance with its typical usage in the patent context, is indicative of inclusion rather than limitation (such that other elements may also be present). In all instances, the scope of the claims shall be considered on their own merits in light of this disclosure, but should not be constrained by the headings set forth herein.

CLAIMS

What is claimed is:

1. A device comprising:
 - an upper cylinder;
 - a lower cylinder;
 - a gas lift upward force means; and
 - a seating surface affixed atop the upper cylinder;wherein:
 - the upper cylinder and the lower cylinder are telescopically coupled;
 - the upper cylinder comprises a ring fixed to its exterior surface;
 - the lower cylinder comprises a ring fixed to its interior surface;
 - the ring of the upper cylinder is located below the ring of the lower cylinder;
 - the ring of the upper cylinder overlaps radially with the ring of the lower cylinder;
 - the gas lift upward force means acts on the upper cylinder; and
 - when in contact, the ring of the upper cylinder interacts with the ring of the lower cylinder to restrict rotation of the upper cylinder with respect to the lower cylinder.
2. A device as in claim 1 wherein the gas lift force means is biased to bring the ring of the upper cylinder in contact with the ring of the lower cylinder.
3. A device as in claim 2 wherein each of the rings comprises teeth, and the teeth of the rings are operable to mesh to prevent rotation, locking the rotational position of the upper cylinder with respect to the lower cylinder.
4. A device as in claim 2 wherein each of the rings comprises a frictional surface, and the rings are operable to restrict rotation of the upper cylinder with respect to the lower cylinder so long as insufficient downward force is applied to the upper cylinder.

5. A device as in claim 3 wherein the upper cylinder is operable to lock in substantially any rotational position with respect to the lower cylinder when the rings interact.
6. A device as in claim 5 wherein the upper cylinder is free to rotate with respect to the lower cylinder whenever sufficient weight is placed on the seating surface to overcome the upward force provided by the gas lift means, separating the ring of the upper cylinder from the ring of the lower cylinder.
7. A device comprising an upper cylinder and a lower cylinder, wherein the upper cylinder is telescopically coupled to the lower cylinder in such a way as to be operable to allow free rotation of the upper cylinder with respect to the lower cylinder if there is sufficient downward force on the upper cylinder, and to resist rotation of the upper cylinder with respect to the lower cylinder if insufficient downward force is applied to the upper cylinder.
8. A device as in claim 7 wherein the resistance to rotation of the upper cylinder with respect to the lower cylinder is operable to substantially lock the rotational position of the upper cylinder with respect to the lower cylinder, and wherein the upper cylinder is operable to lock in substantially any rotational position.
9. A device as in claim 7 further comprising a seating surface, wherein the upper cylinder rotates freely with respect to the lower cylinder when a user's weight is placed on the seating surface, and wherein the upper cylinder is operable to lock rotational position with respect to the lower cylinder when the user's weight is removed from the seating surface, providing hands-free locking and unlocking of rotational position.
10. A device as in claim 7 further comprising an upward force means; wherein:
 - the upper cylinder comprises a ring;
 - the lower cylinder comprises a ring;
 - the ring of the upper cylinder overlaps radially with the ring of the lower cylinder; and
 - the upward force means acts on the upper cylinder.

11. A device as in claim 10 wherein the rings each comprise a frictional surface, and the rings are operable to restrict rotation of the upper cylinder with respect to the lower cylinder so long as insufficient downward force is applied to the upper cylinder to overcome the upward force.
12. A device as in claim 10 wherein the rings each comprise teeth, and the teeth of the rings are operable to mesh to prevent rotation.
13. A device comprising:
 - two telescopically coupled longitudinal elements; and
 - a means to restrict rotation of one longitudinal element with respect to the other longitudinal element substantially at any rotational position;
 - wherein the means to restrict rotation is operable to be deactivated by an unlocking force acting on the longitudinal axis of one of the longitudinal elements, allowing free rotation of one longitudinal element with respect to the other longitudinal element; and
 - wherein the means to restrict rotation is operable to substantially restrict rotation of one longitudinal element with respect to the other longitudinal element unless deactivated.
14. A device as in claim 13 further comprising a seating surface, wherein the weight of a user sitting on the seating surface provides the unlocking force, providing hands-free locking and unlocking of the rotational position of the longitudinal elements.
15. A device as in claim 13 wherein the means to restrict rotation comprises:
 - overlapping radial elements, at least one overlapping radial element associated with each longitudinal element; and
 - a locking force means biased to press the overlapping radial elements into contact together.
16. A device as in claim 15 wherein:

when the unlocking force is greater than the locking force, the overlapping radial elements do not contact, and the longitudinal elements may rotate freely with respect to each other; and

when the locking force is greater than the unlocking force, the overlapping radial elements are in contact, and the rotational motion of the longitudinal elements is substantially restricted.

17. A device as in claim 16 wherein rotational motion is restricted by substantially fixing the rotational position of one longitudinal element with respect to the other longitudinal element, and wherein the rotational position is operable to be fixed at substantially any rotational position of one longitudinal element with respect to the other longitudinal element.

18. A device as in claim 15, wherein each overlapping radial element comprises a friction face.

19. A device as in claim 15, wherein each overlapping radial element comprises teeth that mesh when the overlapping radial elements are pressed into contact with one another.

20. A device as in claim 17 wherein the amount of extension of the telescopically coupled longitudinal elements is subject to adjustment, and the free rotation and restriction of rotational motion of the longitudinal elements is operable regardless of extension.

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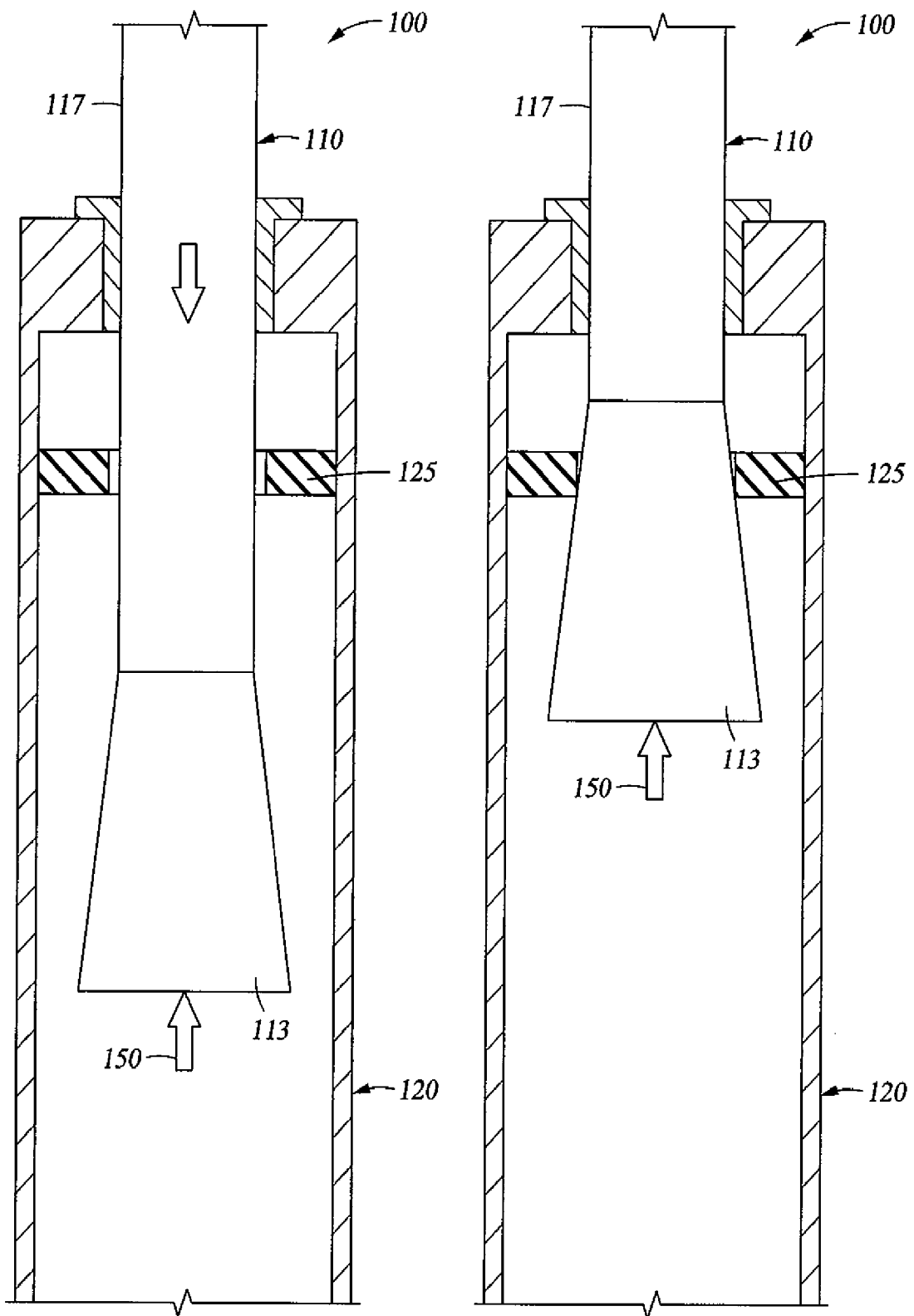


Fig. 1A

Fig. 1B

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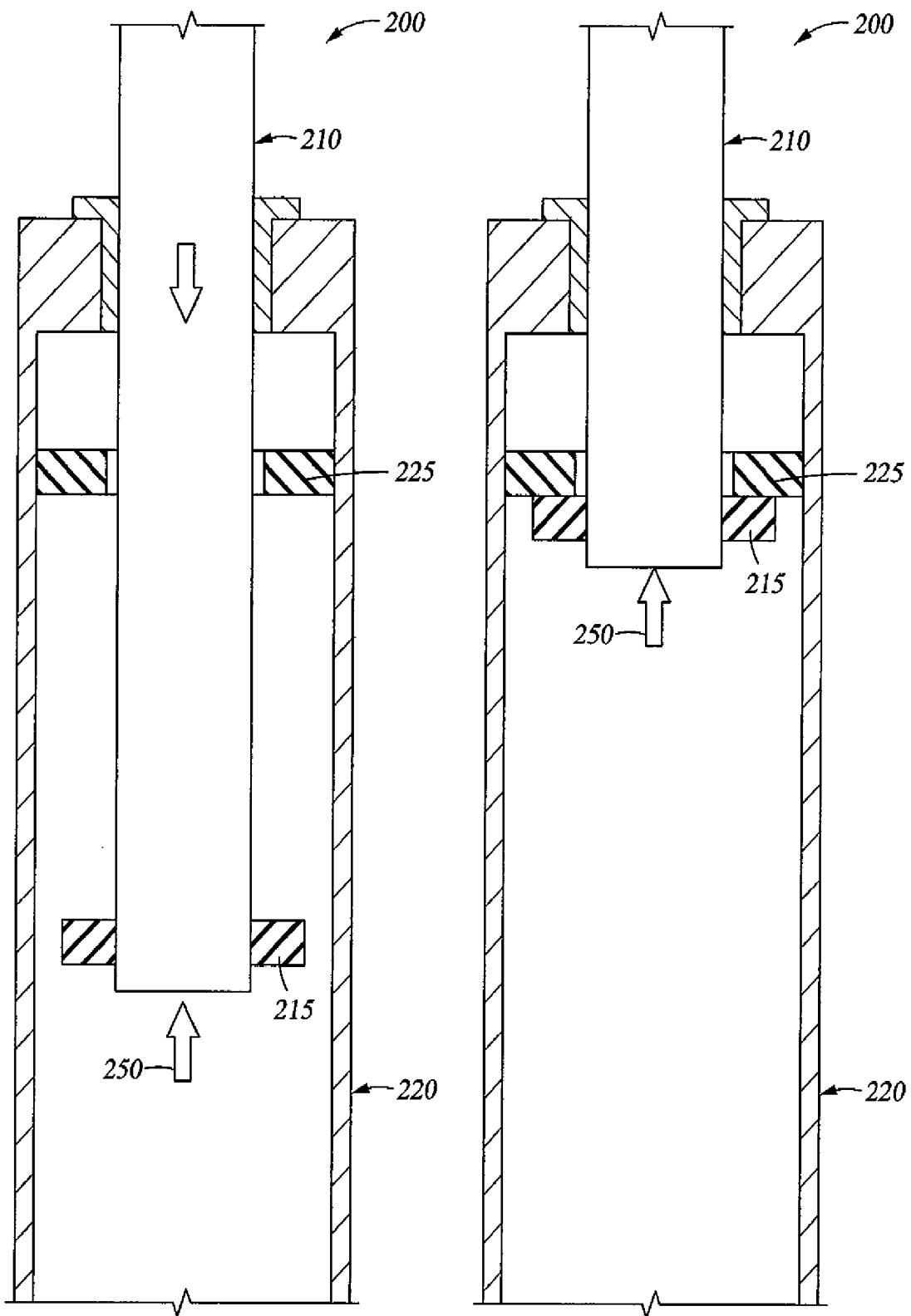


Fig. 2A

Fig. 2B

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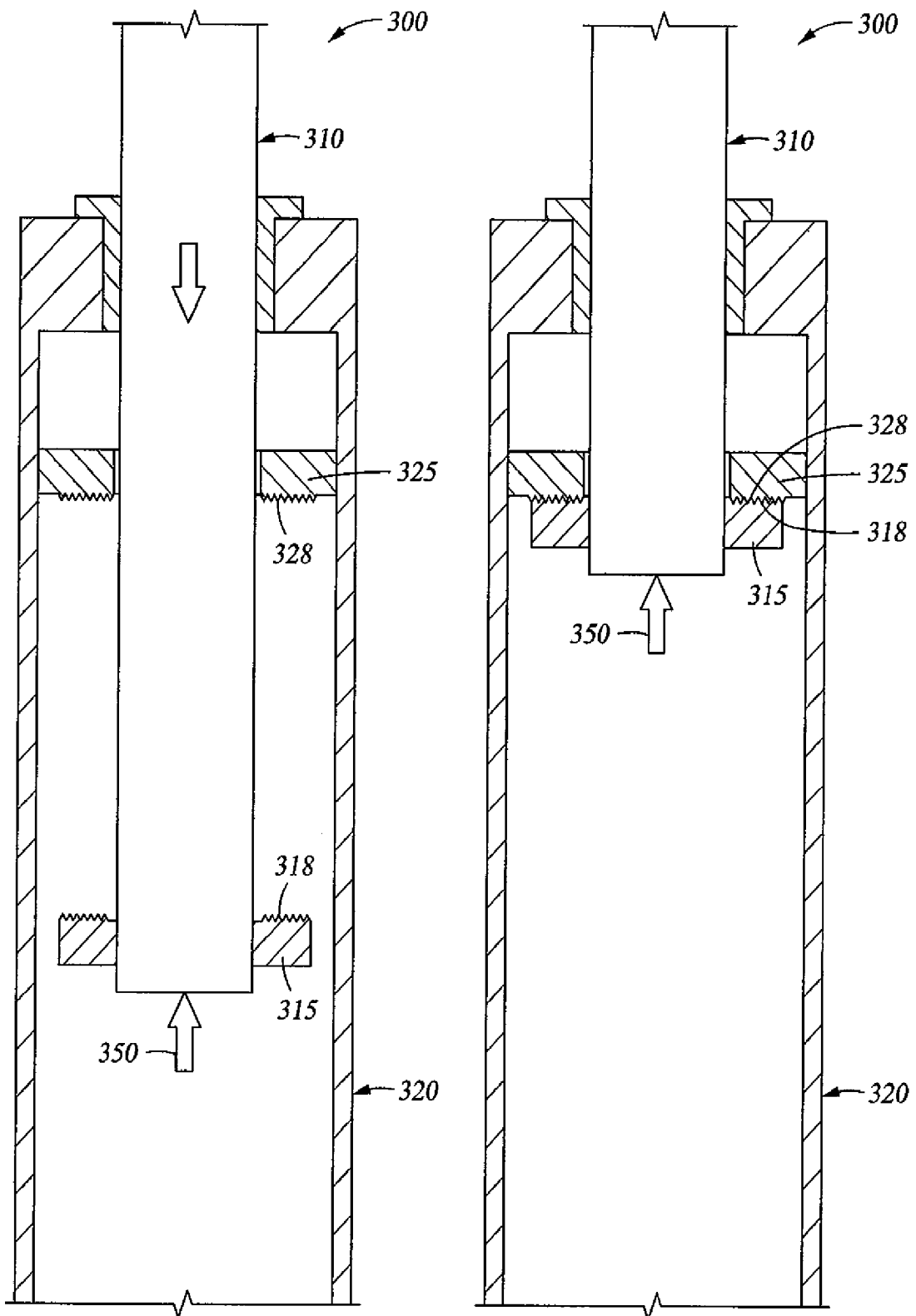


Fig. 3A

Fig. 3B

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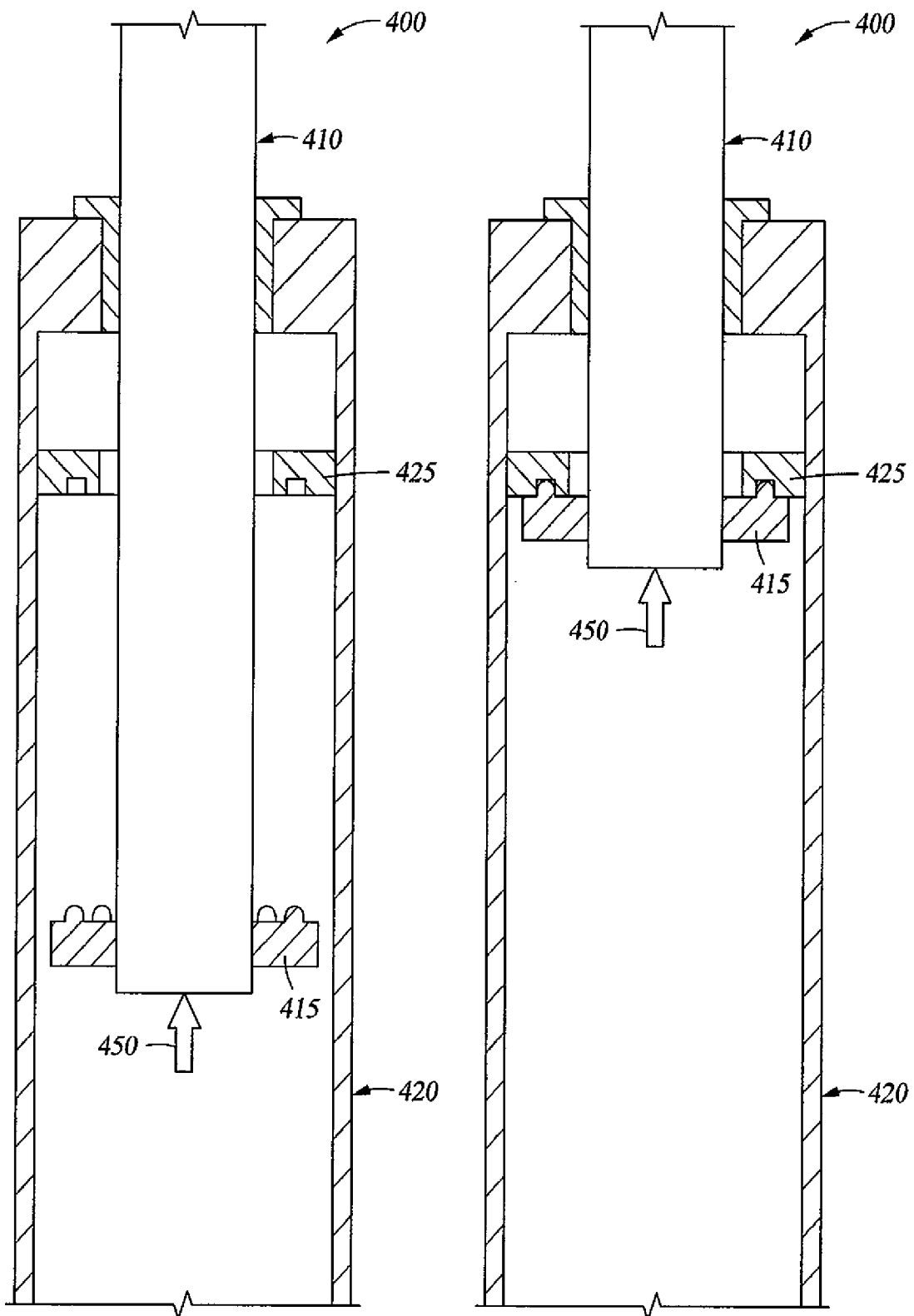


Fig. 4A

Fig. 4B

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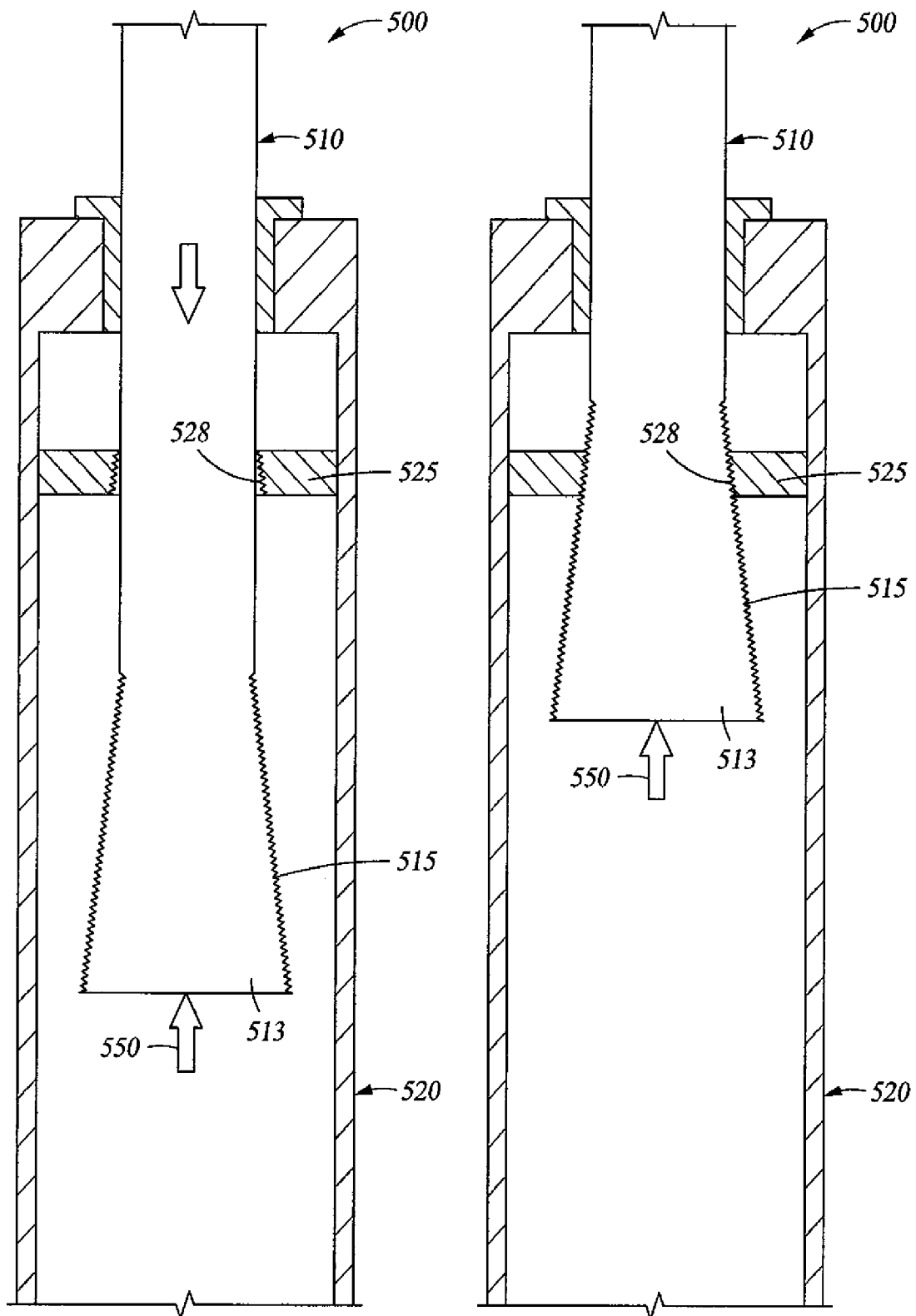


Fig. 5A

Fig. 5B

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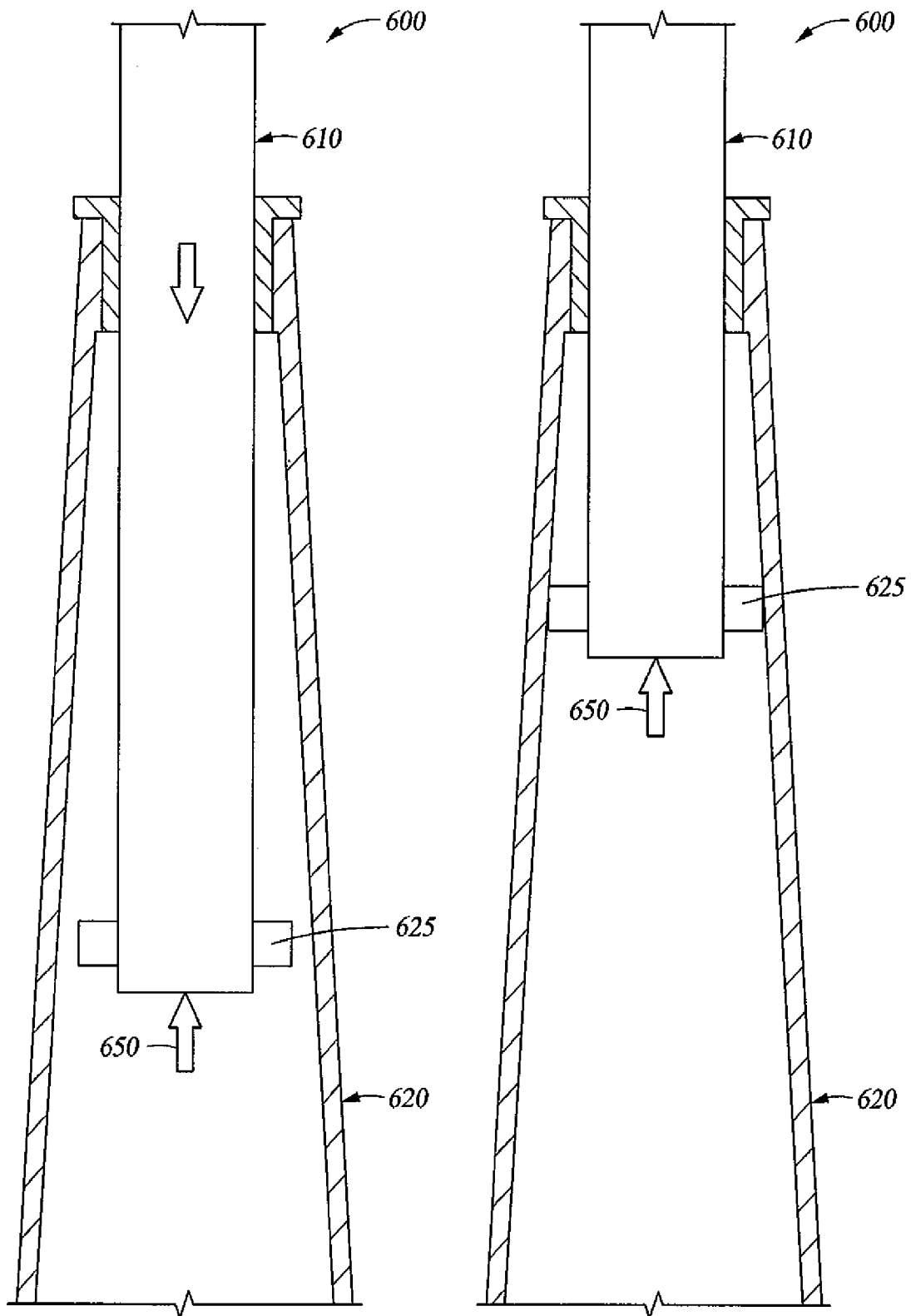


Fig. 6A

Fig. 6B

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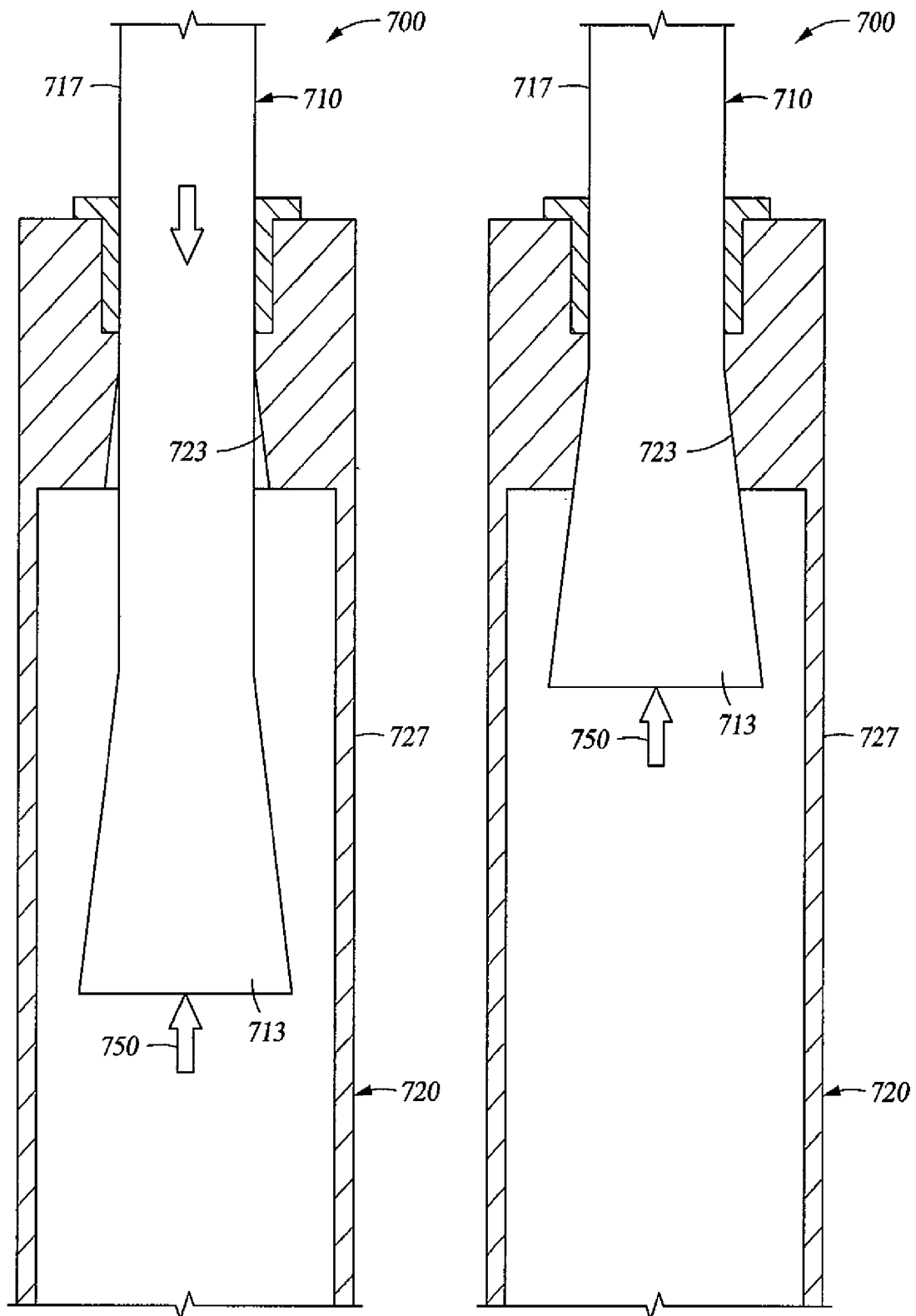


Fig. 7A

Fig. 7B

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/066191

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A47C 3/18 (2008.04)

USPC - 297/344.22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - A47C 3/18 (2008.04)

USPC - 297/344.12, 344.22, 344.25

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatBase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,297,849 A (CHANCELLOR) 29 March 1994 (29.03.1994) entire document	1-13, 15, 18-19
A	US 6,279,864 B1 (CARNAHAN et al) 28 August 2001 (28.08.2001) entire document	1-20
A	US 2006/0214081 A1 (FANG) 28 September 2006 (28.09.2006) entire document	1-20
A	GB 554,784 (LUNDQUIST) 19 July 1943 (19.07.1943) entire document	1-20
A	US 5,634,537 A (THORN) 03 June 1997 (03.06.1997) entire document	1-20

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

16 September 2008

Date of mailing of the international search report

22 SEP 2008

Name and mailing address of the ISA/US

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