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(54) **Title:** CONTAINER SECUREMENT DEVICE WITH MANUAL LOCK RELEASE

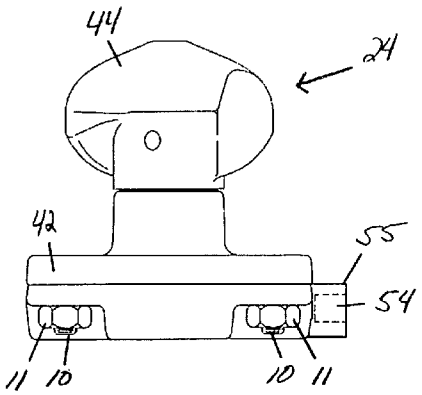

FIG. 4

(57) **Abstract:** A container securement device enables a user to secure a cargo container to a carrier deck. The device includes a base having a projecting shear block received in the lock-actuating opening of the container. A shaft-mounted head rotates between an unlocked or loading position in which the head moves through the locking opening and a locked position in which the container is secured. Automatic entry and release are provided by a spring element within the base biasing the head to the locked position but permitting movement to the unlocked position when torque is applied by engagement of the container with a cam surface on the head. A combination release-indicator enables the user to simultaneously release the spring element and provide external visual indication of the spring element release.

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CONTAINER SECUREMENT DEVICE WITH MANUAL LOCK RELEASE

BACKGROUND OF THE INVENTION

PRIOR HISTORY

This application claims the benefit of pending U.S. Patent Application No. 11/372,670, filed in the United States Patent and Trademark Office on March 10, 2006, pending U.S. Patent Application No. 11/451,282, filed in the United States Patent and Trademark Office on June 12, 2006, and International Patent Application No. PCT/US2007/023793, filed in the United States Patent and Trademark Office as the International Receiving Office on 15 November 2007.

FIELD OF THE INVENTION

The present invention relates to container securement devices and more particularly to improvements in cargo container securement devices providing automatic securement and release of a cargo container with a combination manual release mechanism and visual indicator for indicating whether the internal spring is released.

DISCUSSION OF PRIOR ART

Containerized lading has become immensely popular due to advantages such as labor savings resulting from decreased cargo handling. Modular or standardized containers may be shipped from point to point using a variety of different carriers including rail cars, trucks and ships. Such cargo containers are conventionally provided with corner castings including

locking openings used in securing the containers to the various types of vehicles upon which they are loaded.

One type of container securement device used in the past is a container pedestal including a base portion upon which a corner of the container rests, as well as vertically extending walls within which a corner of the container is captured. A latch pivotable about a horizontal axis engages a locking opening in a vertical wall of the container for holding the container down against the base while permitting automatic entry and release of the container. One example of such a container pedestal is disclosed in U.S. Patent No. 4,382,734.

Another securement device used in the past with cargo containers is a twistlock. This device includes a base upon which the container may rest together with a shear block engageable with a locking opening in the bottom, horizontal wall of the container corner casting. A locking head is manually moved from a released position in alignment with the shear block to a locked position in which the container cannot be lifted away from the base. The head is rotated manually between the locked and the unlocked positions, and automatic entry and release of the container is not possible.

The primary use of container pedestals has been on rail cars where containers are typically loaded and unloaded with a crane and automatic entry and release are important. On the other hand, twistlocks have primarily been used to secure containers to trucks where their small size and light weight is an advantage.

United States Patent No. 4626,155 ('155 Patent), which issued to Hlinsky, et al., discloses an automatic container securement device with a spring biased, cam surfaced head. The '155 Patent teaches a device for automatically securing a cargo container to a support such as a deck of a vehicle or a second container with which the first container is to be

stacked. The device includes a base having a projecting shear block received in the locking opening of the container. A head rotates between an unlocked or loading position in which the head moves through the locking opening and a locked position in which the container is secured.

Automatic entry and release are provided by a spring within the base biasing the head to the locked position but permitting movement to the unlocked position when torque is applied by engagement of the container with a cam surface on the head. Visible indication of the locked position and positive locking of the head in the locked position may be provided. For stacked containers, two aligned shear blocks and two angularly offset heads are provided and the spring may be released for manual locking of the device to one container followed by automatic locking to the second container.

It will be seen from a further review of the above-referenced patents and other prior art generally known to exist that the prior art does not teach an automatic twist lock device comprising certain means for simultaneously and through singular structure (1) releasing an internal spring element and providing external visual indication whether the internal spring has been released. Accordingly, the prior art perceives a need for such an automatic twist lock as set forth in more detail hereinafter.

SUMMARY OF THE INVENTION

Accordingly, among the objects of the present invention are to provide a cargo securement device providing the advantages of both a pedestal latch and a twistlock; to provide a device achieving automatic cargo container entry and release without the size, weight and expense of container pedestals; to provide cargo securement devices useful for

securing a container directly to a support surface of a vehicle; to provide a container cargo securement device providing automatic entry and release without projecting horizontally beyond the container; to provide a cargo securement device having means for simultaneously and structurally releasing an internal spring element and providing external indication of the release

The container securement device or twist lock in accordance with the present invention includes a base, a shaft, a head, an internal spring element, and certain combination release means for manually releasing the spring component from outside the base. The base is adapted to be secured to a support structure. The shaft is supported by the base, and is rotatable about an axis of rotation extendable through a lock-actuating opening of a container.

The head is carried by the shaft and is adapted to rotate through the lock-actuating opening under forceful contact with head-engaging portions of the opening. The head comprises an upper locking surface and a lower unlocking surface. The locking surface is preferably convexly shaped relative to the unlocking surface for effecting a dynamically forced locking engagement. The unlocking surface comprises a substantially planar contact portion for effecting a uniformly forced unlocking engagement.

The internal spring element actuably links the shaft to the base. The spring element is actuable by container-provided forces as the head-engaging portions contact the head. The head is movable through the lock-engaging opening when in an actuated, unlocked head position and is immovable through the lock-engaging opening when in a relaxed, locked head position. The combination release means thus function to enable manual and external rotation of the head intermediate the locked and unlocked rotational head positions without container provided forces.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features of my invention will become more evident from a consideration of the following brief description of patent drawings:

Figure No. 1 is a top view depiction of a state of the art container securement device showing a container locking head in a relaxed, locked rotational head position.

Figure No. 2 is a side view type depiction of the container securement device otherwise shown in Figure No. 1.

Figure No. 3 is a top view depiction of an improved container securement device according to the present invention showing a container locking head in a relaxed, locked rotational head position and a combination release mechanism-visual indicator in an engaged, retracted position thereby indicating that the device is ready for conventional operation of the device.

Figure No. 4 is a side view depiction of the container securement device otherwise shown in Figure No. 3.

Figure No. 5 is a top view depiction of the improved container securement device according to the present invention depicting (1) the release mechanism-visual indicator in an extended position for releasing the inner spring from the housing so as to enable (manual) rotation of the head and (2) a direction of rotational movement.

Figure No. 6 is a side view depiction of the container securement device otherwise shown in Figure No. 5.

Figure No. 7 is a top view depiction of the improved container securement device according to the present invention depicting (1) the release mechanism-visual indicator in an extended position for releasing the inner spring from the housing so as to enable manual

rotation of the head and (2) the head rotated so as to align the head with the shear block of the base housing.

Figure No. 8 is a side view depiction of the container securement device otherwise shown in Figure No. 7.

Figure No. 9 is an enlarged longitudinal top view depiction of a sleeve for interfacing intermediate the base housing and the release mechanism-visual indicator.

Figure No. 10 is an enlarged inside end view depiction of the sleeve otherwise depicted in Figure No. 9.

Figure No. 11 is an enlarged longitudinal side view depiction of the sleeve otherwise depicted in Figure Nos. 9 and 10.

Figure No. 12 is an enlarged outside end view depiction of the sleeve otherwise depicted in Figure Nos. 9 – 11.

Figure No. 13 is an enlarged perspective view of the inside end of the sleeve otherwise depicted in Figure Nos. 9 – 12.

Figure No. 14 is an enlarged sectional view depiction of the sleeve otherwise depicted in Figure No. 9.

Figure No. 15 is an enlarged sectional view depiction of the sleeve otherwise depicted in Figure No. 11.

Figure No. 16 is an enlarged longitudinal top view depiction of the indicator pin of the release mechanism-visual indicator.

Figure No. 17 is an enlarged inside end view depiction of the indicator pin otherwise depicted in Figure No. 16.

Figure No. 18 is an enlarged longitudinal side view depiction of the indicator pin otherwise depicted in Figure Nos. 16 and 17.

Figure No. 19 is an enlarged outside end view depiction of the indicator pin otherwise depicted in Figure Nos. 16 – 18.

Figure No. 20 is an enlarged longitudinal side view of a compression coil type spring element of the release mechanism-visual indicator.

Figure No. 21 is an enlarged longitudinal side view of a retainer pin of the release mechanism-visual indicator.

Figure No. 22 is a cross sectional bottom view depiction of a state of the art base housing with through hole for receiving a spring setting pin or fastener.

Figure No. 23 is a sectional view of the base housing depicted in Figure No. 22.

Figure No. 24 is a bottom view depiction of an improved base-housing according to the present invention showing a relatively larger dimensioned and boss-shielded through hole as compared to the through hole shown in Figure No. 22.

Figure No. 25 is a sectional view of the base housing depicted in Figure No. 24.

Figure No. 26 is an enlarged exploded side view depiction of the release mechanism-visual indicator showing the indicator pin being received inside the sleeve and the compression coil being installed onto the end of the indicator pin.

Figure No. 27 is an enlarged exploded side view depiction of the release mechanism-visual indicator subassembly being installed into the base housing.

Figure No. 28 is a top view depiction of the base housing and the release mechanism-visual indicator subassembly with the subassembly being installed into the base housing.

Figure No. 29 is a top view depiction of the base housing and release mechanism-visual indicator subassembly in assembled relation with a tool being inserted into the end of the visual indicator to aid with alignment of the subassembly so that retainer pins can be installed.

Figure No. 30 is a front view depiction of the base housing and release mechanism-visual indicator subassembly in assembled relation showing retainer pins being aligned with holes in the base housing.

Figure No. 31 is a front view depiction of the base housing and release mechanism-visual indicator subassembly in assembled relation showing retainer pins installed into the holes in the base housing.

Figure No. 32 is a top view depiction of the base housing and release mechanism-visual indicator subassembly in assembled relation depicting force being applied in a direction that compresses the internal spring and allows the knob of the indicator pin to be pushed into the base housing.

Figure No. 33 is an enlarged side sectional view depiction of the structures otherwise illustrated in Figure No. 32.

Figure No. 34 is an enlarged side sectional view depiction of the indicator pin having been pushed in and rotated 90 degrees, the tabs of the indicator pin being shown seated into the pockets of the sleeve ready to receive the torsion spring of the device.

Figure No. 35 is a bottom view depiction of a state of the art torsion spring element with through hole for receiving a spring setting pin or fastener.

Figure No. 36 is a bottom view depiction of a state of the art base housing with spring setting pin or fastener installed through the through hole of the base housing.

Figure No. 37 is a bottom view depiction of an improved torsion spring with a longer arm (relative to the spring shown in Figure No. 35) and tab.

Figure No. 38 is a bottom view depiction of an improved base housing with release mechanism-visual indicator subassembly in assembled relation for receiving the torsion spring otherwise depicted in Figure No. 37.

Figure No. 39 is a bottom view depiction of the structures depicted in Figure Nos. 35 and 36 in assembled relation, the setting pin being received in the through hole, thereby fixing the spring by preventing rotation.

Figure No. 40 is a bottom view depiction of the structures depicted in Figure Nos. 37 and 38 in assembled relation, the indicator pin being received in a through hole of the improved torsion spring.

Figure No. 41 is a bottom view depiction of the structures shown in Figure No. 40 with the release mechanism-visual indicator being released and extended, the torsion spring being rotated in an undesired (counter-clockwise) direction, the bent tab on the end of the spring contacting a first internal boss of the lower housing thereby preventing further rotation in the undesired direction.

Figure No. 42 is a bottom view depiction of the structures otherwise depicted in Figure No. 40 with the release mechanism-visual indicator being released and extended, the torsion spring being rotated in a desired (clockwise) direction, the bent tab on the end of the spring contacting a second internal boss of the lower housing thereby preventing excess rotation in the desired direction.

Figure No. 43 is a fragmentary perspective view of a support surface and a cargo container to be supported by container securement devices of the present invention

Figure No. 44 is an enlarged fragmentary, bottom perspective view of a container outfitted with a head-actuating opening.

Figure No. 45 is an enlarged side plan view of the container securement device otherwise depicted in Figure No. 2.

Figure No. 46 is an enlarged side view of a container securement device with certain parts of the head and the base housing removed to show the internal shaft and spring element.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, the preferred embodiment of the present invention concerns a container securement device or twist lock 24 for securing an ISO type container 22 to a support structure 20 such as a carrier deck, which carrier deck is designed to haul ISO type containers. A generic ISO type container 22 is illustrated and referenced adjacent a support structure 20 in Figure No. 43.

Notably, the International Organization for Standardization (ISO) is an international standard-setting body composed of representatives from national standards bodies. The organization produces world-wide industrial and commercial standards, the so-called ISO standards. A standardized ISO type container (also known as an "isotainer") can be loaded on support structures 20 of container ships, railroad cars, and trucks.

There are five common standard lengths of an ISO container, namely, 20 ft (6.1 m), 40 ft (12.2 m), 45 ft (13.7 m), 48 ft (14.6 m) and 53 ft (16.2 m). US domestic standard containers are generally 48 ft and 53 ft. Container capacity (of ships, ports, etc) is measured in twenty-foot equivalent units (TEU, or sometimes teu). A twenty-foot equivalent unit is a measure of

containerized cargo capacity equal to one standard 20 ft (length) × 8 ft (width) × 8.5 ft (height) container.

In metric units this is 6.10 m (length) × 2.44 m (width) × 2.59 m (height), or approximately 39 m^3. Most containers today are of the 40-ft variety and thus are 2 TEU. Forty-five ft containers are also designated 2 TEU. Two TEU are referred to as one forty-foot equivalent unit (FEU). These two terms of measurement are used interchangeably. So-called "high cube" containers have a height of 9.5 ft (2.9 m), while half-height containers, used for heavy loads, have a height of 4.25 ft (1.3 m).

Of structural importance to the present invention is the fact that standard ISO type containers comprise a lock-actuating opening as generally illustrated and referenced at 32 in Figure No. 44. From an inspection of Figure No. 43, it may be readily understood that the corners of a container 22 may each comprise a corner casting 28 having a downwardly (or upwardly) facing horizontal wall 30 in which is formed the noncircular lock-actuating opening 32. The lock-actuating openings 32 are engageable by the securement devices 24 to achieve securement and automatic entry and release of the containers 22.

As will be seen from an inspection of Figure No. 44, the lock-actuating opening 32 is of a generally elongated or rectangular shape having a major axis generally parallel to the longest dimension of the container 22. Each lock-actuating opening 32 is defined by a perimeter including two relatively long side walls or head-engaging portions 34, which head-engaging portions 34 are joined by two somewhat rounded relatively short end walls 36.

The head-engaging portions 34 and the end walls 36 of the lock-actuating openings 32 extend between the external and internal surfaces of the horizontal wall 30 of a corner casting

28. In order to effect securement of a container 22, the lock-actuating openings 32 should preferably comprise substantially parallel, opposing head-engaging portions 34.

In Figure No. 43, it may be seen that a planar form a support structure 20 is illustrated upon which cargo containers 22 are to be secured by twist locks or securement devices 24 constructed in accordance with the principles of the present invention. Support structure 20 may, for example, be the deck or floor of a rail car or other transport vehicle.

When each container 22 is lowered onto support structure 20, the securement devices or twist locks 24 automatically secure the containers 22 in place. The principles of the present invention are applicable to devices for securing various types of containers to various types of supports. In the illustrated embodiments of the invention, the containers 22 are of a standard and modular type.

As earlier noted, the present specification claims the benefit of earlier filed patent applications in the United States Patent and Trademark Office. The specifications and drawings thereof may be considered hereby incorporated by reference thereto insofar as certain common matter between the devices of the earlier filed applications extends to the subject matter contained in this specification.

The earlier filed applications from which this application claims a benefit are U.S. Patent Application No. 11/372,670, filed in the United States Patent and Trademark Office on March 10, 2006; U.S. Patent Application No. 11/451,282, filed in the United States Patent and Trademark Office on June 12, 2006; and International Patent Application No. PCT/US2007/023793, filed in the United States Patent and Trademark Office as an International Receiving Office on 15 November 2007.

The securement device or twist lock 24 according to the present invention is generally illustrated and referenced in Figure Nos. 3 – 8. Certain prior or state of the art devices 124 are generally depicted in Figure Nos. 1, 2, and 45 for comparative purposes. Securement device or twist lock 24 preferably comprises a base or housing 42, and a head 44. It is contemplated that head 44 is substantially identical to the specified heads of the earlier filed applications and thus rotatable between a locked head position and an unlocked head position to effect selective securement or release of a cargo container 22. Figure Nos. 1 – 6 generally depict the head 44 in a relaxed, locked head position.

In the illustrated arrangement, each securement device or twist lock 24 is adapted to be attached or secured to the support structure 20 by welding or fastening the base 42 to the support structure 20. Preferably, one securement device 24 is positioned in alignment with each of the four lower corner castings 28 of a container 22 as generally depicted in Figure No. 43.

Base 42 preferably comprises upper and lower housing portions, and certain spring end-fixing means. The spring end-fixing means may preferably be defined by a combination release mechanism-visual indicator subassembly 70 and an indicator-receiving tunnel or through-hole 56, which receiving tunnel or through hole 56 is formed in lower housing portion as generally depicted in Figure Nos. 24 , 25, 27, and 28.

It may be seen from a comparative inspection of Figure Nos. 22 and 23 versus Figure Nos. 24 and 25 that the state of the art through-holes 156 are generally smaller in diameter than through holes 56. Though the diameter of holes 56 is not necessarily of critical importance to the essence of the invention, it is here being noted that the through holes 56 are

of somewhat different design as compared to through holes 156 so as to allow for receipt of alternative, improved structure.

The upper and lower housing portions and are preferably secured together by suitable fasteners such as bolt down mechanisms and/or assemblies. For example, certain bolts 10, and certain cooperative bolt-locking nuts 11 are illustrated and referenced in Figure Nos. 2, 4, 6, 8, and 45. The lower housing portion preferably defines an internal spring-receiving chamber or cavity 58 as generally depicted and referenced in Figure Nos. 24, 25, 27 – 29, 32, 33, 34, and 38. From a comparative inspection of the noted figures versus Figure Nos. 22, 23, and 36, it may be seen that the cavity 58 essentially differs from the state of the art cavities 158 in that cavity 58 comprises two spaced and integrally formed, internal bosses.

A first internal boss 59 relatively more distant from hole 56 functions as a torsion spring stop to prevent the twist head 44 from rotating in an/the undesired direction as generally and comparatively depicted in Figure Nos. 40 versus Figure No. 41. A second internal boss 57 concentric or coaxial with through hole 56 functions (1) as a torsion spring stop to prevent the twist head 44 from rotating too far or over-rotating in the desired direction, and (2) as an external shield to structure passing through the through hole 56 as generally and comparatively depicted in Figure Nos. 40 versus Figure No. 42. A torsional spring element 46 is illustrated and referenced in Figure Nos. 37, 40, 41, and 42.

An external boss 55 is added to the lower housing so as to provide external means for shielding and/or protecting the subassembly 70. Figure Nos. 3 and 4, for example, depict the visual indicator 54 retracted into the boss 55 with the end face of the visual indicator 54 substantially flush with the end of the boss 55. Figure Nos. 5 and 6 depict the visual indicator 54 in an extended (spring-releasing) position with the twist head 44 starting to be rotated

manually. Figure Nos. 7 and 8 depict the visual indicator 54 in an extended position and the twist head 44 rotated manually so as to align the twist head 44 with the shear block 60 of the housing 42.

The centerline 100 in Figure Nos. 3 and 5 illustrates the normal alignment of the relaxed or locked position of the twist head 44. The arrow 101 in Figure No. 5 illustrates the (desired) direction that the twist head 44 is allowed to rotate. The combination release mechanism-visual indicator of the improved invention provides external (relative to the housing 42) visual identification when the device 24 is ready for use or when the internal compression spring 72 pushes the indicator 54 out from the housing boss 55 which simultaneously releases the internal torsion spring 46 to allow the manual rotation of the head 44. Figure Nos. 3 and 4 depict the device 24 with the indicator 54 in the engaged position for normal use of the device for automatic engagement and removal of containers 22.

Notably, the upper housing portion preferably comprises a projecting shear block 60. It is contemplated that shear block 60 preferably comprises a shape similar to, but slightly smaller than, the lock-actuating opening 32. With the container 22 secured in the locked position, the shear block 60 is received in lock-actuating opening 32 to prevent movement of container 22 in any horizontal direction.

In other words, the base 42 comprises a shear block 60 having a shape that is cooperable with the lock-actuating opening 32. Thereby, the shear block 60 may be received in the lock-actuating opening 32 when the container 22 is secured for preventing lateral container movement relative to the base 42. It is thus contemplated that the shear block 60 effectively functions to enhance container securement.

A shaft 62 is preferably journalled for rotation in an opening defined at the center of shear block 60. An exemplary shaft 62 is depicted in Figure No. 46, although the housing 42 has been removed for purposes of clarity. The applications from which this application claims the benefit for more fully describe the shaft 62, and the reader is there directed for further specifications.

Shaft 62 essentially comprises a head-receiving end and a spring-receiving end. The spring-receiving end extends into the spring-receiving cavity 58. Head 44 is received by the head-receiving end and is preferably attached thereto by means of a groove pin (as at 64 in Figure No. 46) or key so that shaft 62 and head 44 may rotate as a unit. In this regard, it is contemplated that the head 44 could conceivably be integrally formed with the shaft 62 so as to form a unitary structure. Wear and tear, however, dictate that a separate shaft 62 and head 44 be structurally preferred since parts do require periodic replacement given applicable load conditions.

Within chamber 58, shaft 62 includes an enlarged hub portion. A select spring element, as may be preferably defined by a torsional spiral type spring element 46 is connected between the hub 66 and the base 42 in order to resiliently hold the shaft 62 and head 44 in the locked rotational head position. It should be noted that spring-receiving end or hub 66 may comprises a chamfered spring-actuable transverse cross-section and/or a spring-actuable groove as further specified in the applications from which this application claims the benefit.

In accordance with features of the present invention, the securement device 24 preferably comprises a select spring element 46 for biasing or actuating the head 44 to the locked rotational head position. The select spring element 46 is received in the spring-

receiving cavity 58 and actuable intermediate the spring-receiving end or hub 66 and certain spring end-fixing means as may be preferably defined by the combination release mechanism-visual indicator subassembly 70 of the present invention.

The subassembly 70 is generally depicted in assembled form in Figure Nos. 27 and 28. The subassembly 70 is cooperable with the spring element 46 and key or tool-operable for providing a visual indication external to the housing 42 of whether the spring element 46 is released or fixed. The subassembly 70 preferably comprises a (corrosion resistant) sleeve 73 as variously depicted in Figure Nos. 9 – 15; a (corrosion resistant) indicator pin 71 as variously depicted in Figure Nos. 16 – 19; a compression spring 72 depicted in Figure No. 20; and one or more retainer pins 74 as depicted in Figure No. 21. A second end of the pin 71 provides the visual indicator 54 previously referenced.

A first end of the pin 71 may be inserted through a hole or aperture 59 of the spring element 46 thereby fixing the spring element relative to the base housing 42. The pin 71 becomes disengaged from the spring element 46 and the spring element 72 forces/translates the pin 71 from a first pin position as generally depicted in Figure Nos. 34 to a second pin position as generally depicted in Figure No. 33. When in the second pin position, the visual indicator 54 or second end of the pin is extended from the boss 55 for visually indicating whether the spring element 46 is released relative to the base or housing 42 so as to allow the manual rotation of the twist head 44.

To achieve these functions, the sleeve 73 is received in the through hole 56 and flush with the side of the housing 42. It is contemplated that the sleeve 73 may be preferably secured in place by mechanical means such as cooperative structural arrangement of retainer

pins 74, pin holes 84 formed in the housing 42, and pin grooves 85 formed in the sleeve 73, or by way of a tack weld.

The pin 71 comprises first and second pin ends, which first pin end may oriented internally to the cavity 58 and which second pin end functions as the visual indicator 54. The indicator spring 72 is installed or received inner radially to the sleeve 73 and the pin is installed or received inner radially to the spring 72. The sleeve 73 comprises tab-receiving pockets as at 80. Indicator pin tabs 81 seat in these pockets 80 when the pin 71 engages the torsion spring element 46. The pin tabs 81 seat in pockets 82, however, when the pin 71 is released from engagement with the spring element 46.

The second end of the pin 71 or visual indicator 54 may preferably comprise key or tool cooperative structure. As generally illustrated throughout, the visual indicator comprises a hex-shaped pocket 91 for receiving a hex-shaped end of an Allen key or similar other tool 90. Conceivably, any cooperative geometric arrangement (including male indicator structure cooperative with female tool structure) may well suffice to provide key-enabled operation of the subassembly 70. Preferably, however, the indicator 54 comprises female structure so that the indicator itself functions to protect or shield the key-enabling feature.

The select spring element 46 serves as a torsion spring biasing head 44 continually to its locked position. The spring force or spring constant is chosen to cooperate with the cam outer surface of head 44 to provide a desired entry and exit force encountered when the container 22 is lowered onto or lifted off of support structure 20. The spring force or constant may be varied by selection of the configuration and characteristics of materials of the spring body.

The head 44 and the cam outer surface is generally symmetrical about its axis of rotation and the axis of shaft 62. In the spring-relaxed, locked rotational head position, head 44 is not aligned with lock-actuating opening 32, and container 22 is secured in position because head 44 overlies portions of the corner casting horizontal wall 30. By interaction of the outer cam surface and the perimeter of the lock-actuating opening 32, the head 44 can be rotated (via spring-actuation) to an unlocked or loading rotational head position during the action of which the head 44 can move relative to the container 22 through the lock-actuating opening 32.

The outer cam surface preferably comprises an upper locking or loading surface 48A; and a lower unlocking or unloading surface 48B. The upper locking or loading surface 48A is directed generally away from base 42, and the lower unlocking or unloading surface 48B directed generally toward the base 42. The upper and lower surfaces 48A and 48B are shaped to interact with the perimeter of the lock-actuating opening 32 as the head 44 moves into or out of the corner casting 28.

It will thus be understood that the container securement system of the present invention preferably comprises a base 42; a shaft 62; a head 44; a (spiral type torsional) spring element 46, and certain visual-indicating means, as described in more detail hereinafter. The base 42 is adapted to be secured to a support 20. The shaft 62 is supported by the base 42 and rotatable about an axis of rotation extendable through the lock-actuating opening 32 of a container 22. The shaft comprises a head-receiving end and a spring-receiving end.

The head is carried by the head-receiving end of the shaft 62 and is adapted to rotate through the lock-actuating opening 32 under forceful contact with the head-engaging portions 34. The head comprises an upper locking surface as at 48A and a lower unlocking surface as

at 48B. The locking surface 48A is convexly shaped relative to the unlocking surface 48B for effecting a dynamically forced locking engagement. The unlocking surface 48B comprises a substantially planar contact portion for effecting a substantially statically forced unlocking engagement.

The spring element 46 comprises a central shaft interface as at 67 for interfacing with the spring-receiving end or hub 66 of the shaft 62. The spring element 46 is actuable via the spring-receiving end by container-provided forces as the head-engaging portions 34 contact the head 44. The head 44 is thereby movable through the lock-engaging opening 32 when in an actuated, unlocked, rotational head position and is immovable through the lock-engaging opening 32 when in a relaxed, locked rotational head position. The locked rotational head position thus prevents head movement through the lock-actuating opening 32 for selectively securing the container 22 to the support 20.

While the above description contains much specificity, this specificity should not be construed as limitations on the scope of the invention, but rather as an exemplification of the invention. For example, as is described hereinabove, it is contemplated that the present invention essentially discloses a container securement device or twist lock for securing a container to a support, which container has a lock-actuating opening.

The container securement device or twist lock may be said to essentially comprise a base, a shaft, a head, and a spring element. The base is adapted to be secured to the support. The shaft is rotatably supported by the base. The head is carried by the shaft and adapted to rotate through the lock-actuating opening under forceful contact therewith.

The spring element links the shaft and base and is actuable by container-provided forces as the lock-actuating opening contacts the head. The head is thereby movable through

the lock-actuating opening when in an actuated, unlocked head position and is immovable through the lock-actuating opening when in a relaxed, locked head position.

Further certain key-operable combination release means are incorporated for simultaneously releasing the spring element from the base and visually indicating whether the spring element is released. These means may be preferably defined by the subassembly 70 and associated structures previously described hereinabove. Said means enable manual and external rotation of the head intermediate the locked and unlocked rotational head positions, for example, in the event of a requirement for emergency release.

The container securement device may preferably comprise spring-based means for actuably extending the visual indicator 54 away from the base thereby simultaneously releasing the spring component and providing extended visual-indicating structure. The spring-based means are essentially (a) actuable for (i) retracting the visual indicator and (ii) linking the internal spring element to the base, and (b) relaxable for (i) extending the visual indicator and (ii) releasing the element from the base.

Stated another way, the twist lock may be said to essentially comprise a base adapted to be secured to the support; a head adapted to be twist-secured to the container; a shaft assembly having a spring element and a shaft for spring-linking the base to the head; and certain combination means for simultaneously releasing the spring element from the base and visually indicating whether said spring element is released. The combination means essentially enable manual rotation of the head intermediate locked and unlocked head positions.

Certain methodology for releasing a twist lock is further contemplated and believed supported by the foregoing specifications. For example, the method may be said to comprise

the simultaneous, key-enabled steps of: translating a pin away from a spring element housed within a base; releasing a first end of said pin from engagement with the spring element; extending a second end of said pin away from the base; and providing visual indication via the extended second end that the spring element is released from the first end.

Accordingly, although the invention has been described by reference to a preferred embodiment, and certain methodology it is not intended that the novel device and method of use be limited thereby, but that modifications thereof are intended to be included as falling within the broad scope and spirit of the foregoing disclosure, the following claims and the appended drawings.

I claim:

1. A container securement device for securing a container to a support, the container having a lock-actuating opening, the container securement device comprising:

a base adapted to be secured to the support;

a rotatable shaft supported by the base;

a head carried by the shaft and adapted to rotate through the lock-actuating opening under forceful contact therewith;

a spring element, the spring element linking the shaft and base and thereby being actuable by container-provided forces as the lock-actuating opening contacts the head, the head thereby being movable through the lock-actuating opening when in an actuated, unlocked head position and being immovable through the lock-actuating opening when in a relaxed, locked head position; and

release-engagement means for manually releasing-engaging the spring element from the base, said means enabling manual and external rotation of the head intermediate the locked and unlocked head positions.

2. The container securement device of claim 1 wherein said release-engagement means provide visual-indicating means for externally and visually indicating whether the spring element is released or engaged.

3. The container securement device of claim 1 wherein the base comprises external means for shielding said visual-indicating means.

4. The container securement device of claim 1 wherein said release-engagement means are key operable.

5. The container securement device of claim 1 comprising spring-based means for actuably extending a visual indicator away from the base thereby simultaneously releasing the spring component and providing extended visual-indicating structure.

6. The container securement device of claim 5 wherein said spring-based means are (a) actuable for (i) retracting the visual indicator and (ii) linking the spring element to the base, and (b) relaxable for (i) extending the visual indicator and (ii) releasing the spring element from the base.

7. A twist lock for securing a container to a support, the twist lock comprising:

a base adapted to be secured to the support;

a head adapted to be twist-secured to the container;

a shaft assembly for spring-linking the base to the head, the shaft assembly comprising a spring element and a shaft; and

combination means for simultaneously releasing-engaging the spring element and visually indicating whether said spring element is released-engaged, said combination means enabling rotation of the head intermediate locked and unlocked head positions.

8. The twist lock of claim 7 wherein said combination means internally releases the spring element from the base and visually indicates external to the base whether said spring element is released-engaged.

9. The twist lock of claim 7 comprising shielding means for externally shielding the combination means.

10. The twist lock of claim 7 comprising spring-based means for actuating the combination means.

11. The twist lock of claim 7 wherein said combination means are key-operable.

12. A twist lock for securing a container to a support, the twist lock comprising:

a base adapted to be secured to the support;

a head adapted to be twist-secured to the container;

a spring element for spring-linking the base to the head; and

combination means for simultaneously releasing-engaging the spring element and visually indicating whether said spring element is released-engaged, said combination means enabling rotation of the head intermediate locked and unlocked head positions.

13. The twist lock of claim 12 wherein said combination means releases-engages the spring element and provides indication whether said spring element is released-engaged.

14. The twist lock of claim 12 comprising shielding means for externally shielding the combination means.

15. The twist lock of claim 12 wherein said combination means are key-operable.

16. A method of releasing a twist lock so as to unlock a container from a support, the method comprising the steps of:

a. translating a pin away from a spring element housed within a base;

b. releasing a first end of said pin from engagement with the spring element;

c. extending a second end of said pin away from the base; and

d. providing visual indication via the extended second end that the spring element is released from the first end.

17. The method of claim 16 wherein steps (a) – (d) are key enabled.

18. The method of claim 16 wherein steps (a) – (d) are simultaneous.

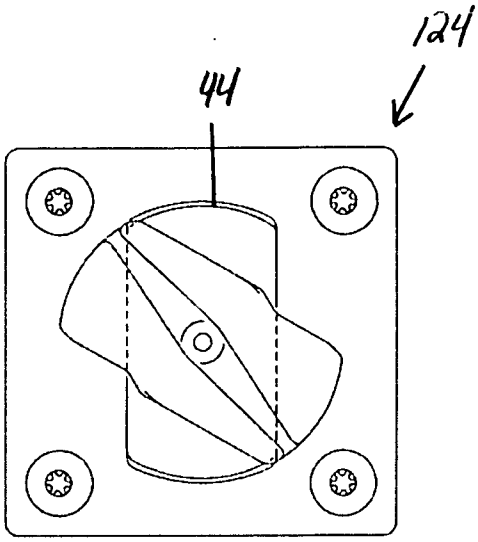


FIG. 1

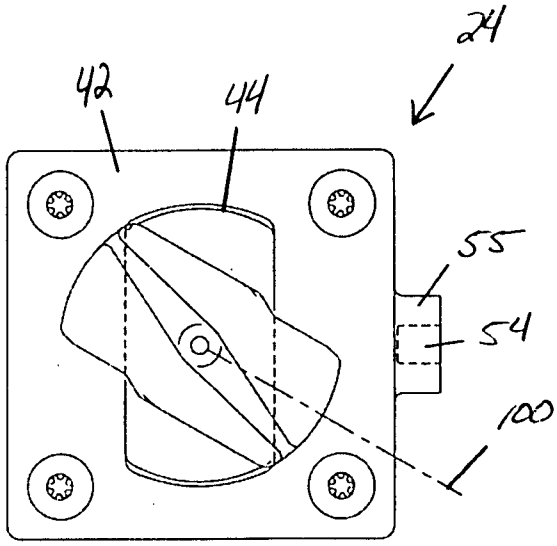


FIG. 3

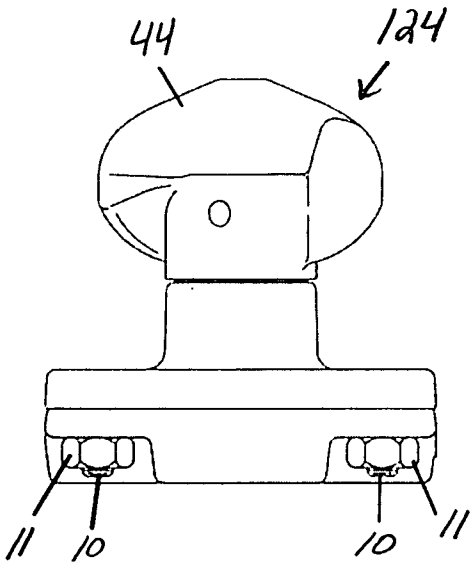


FIG. 2

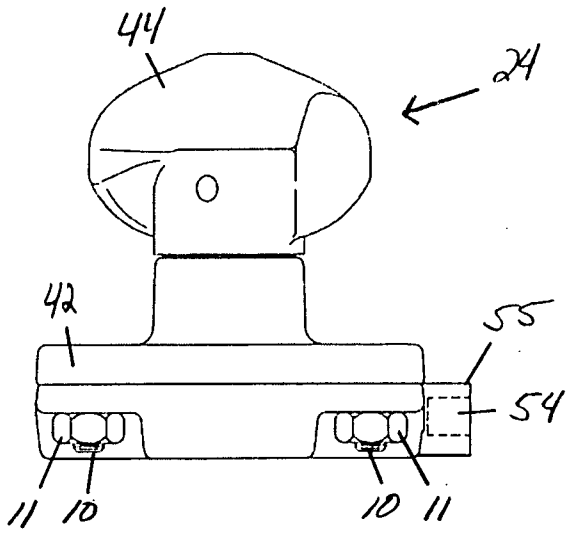


FIG. 4

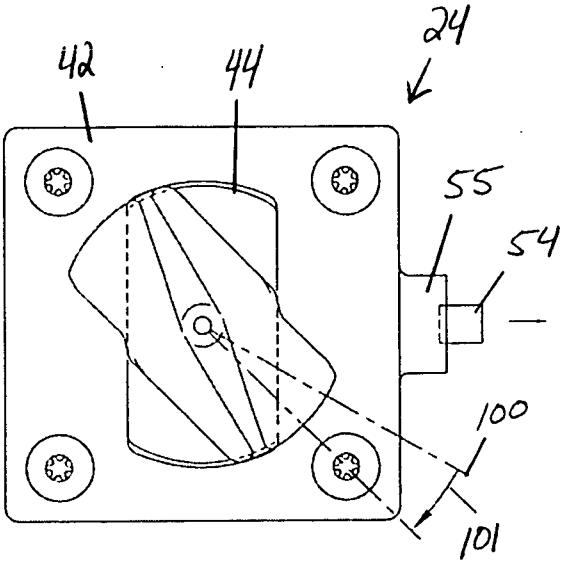


FIG. 5

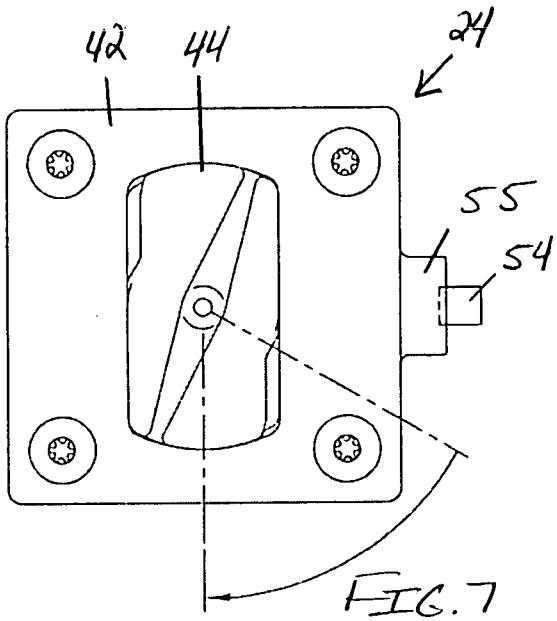


FIG. 7

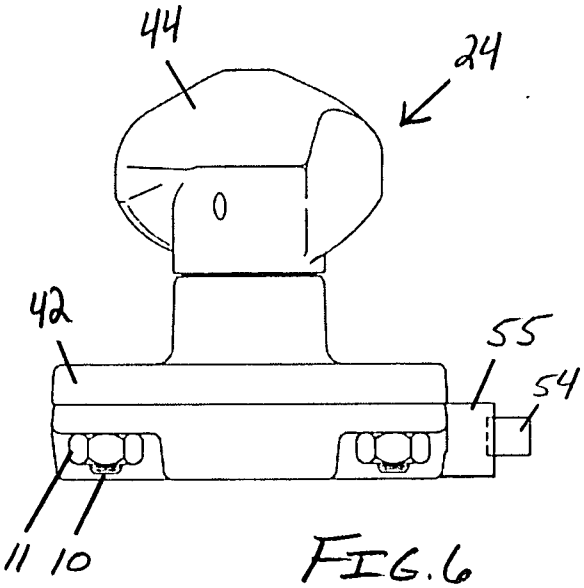


FIG. 6

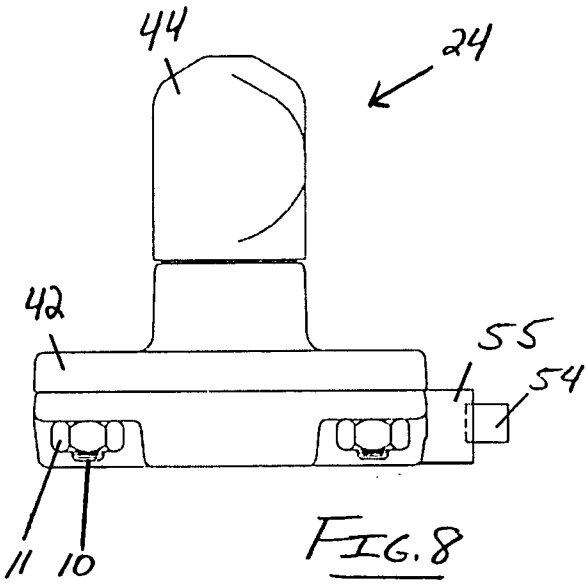


FIG. 8

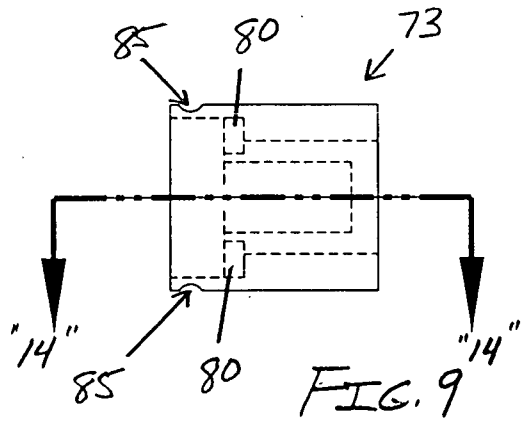


FIG. 9

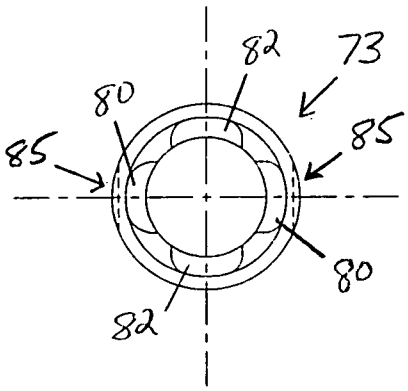


FIG. 10

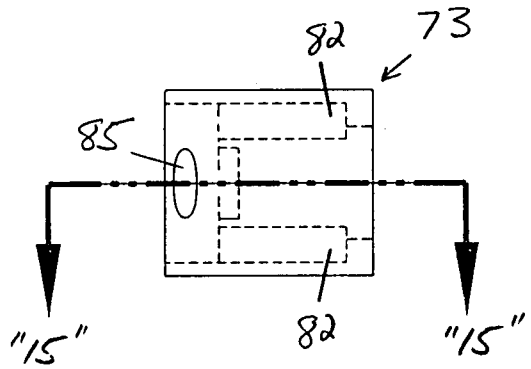


FIG. 11

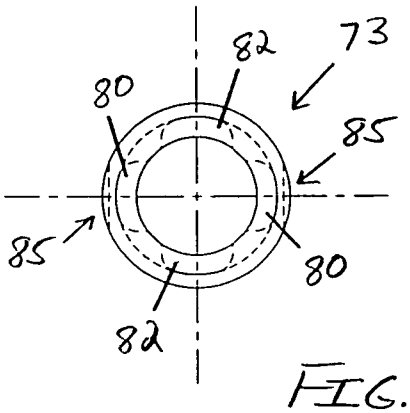


FIG. 12

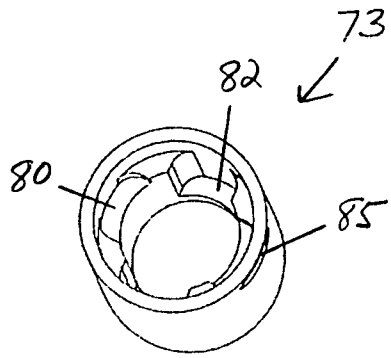
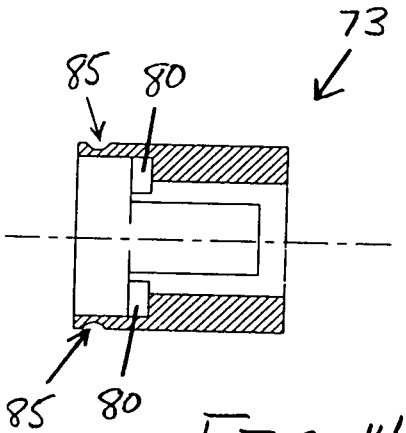


FIG. 13



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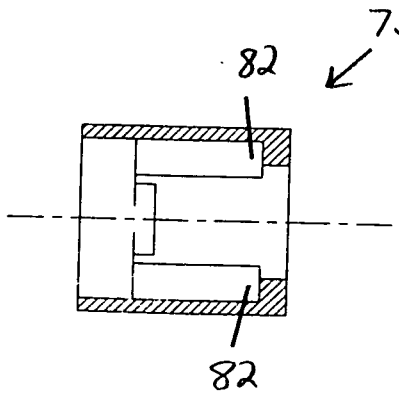

FIG. 15

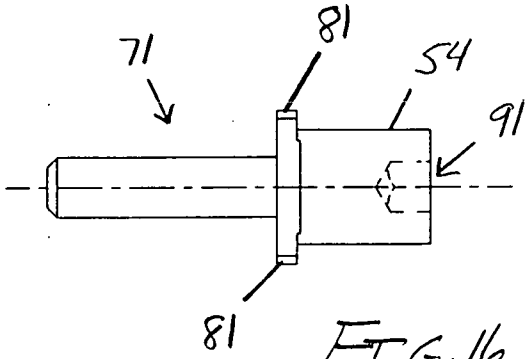

FIG. 16

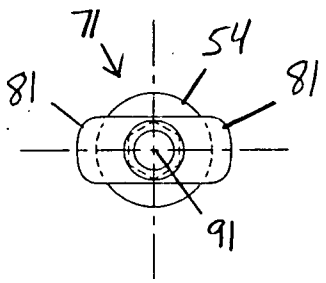

FIG. 17

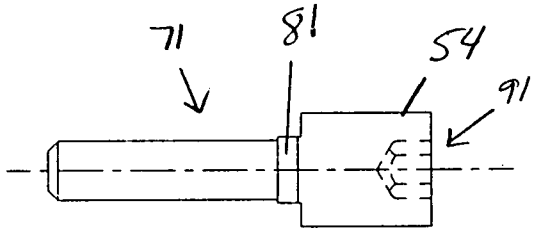

FIG. 18

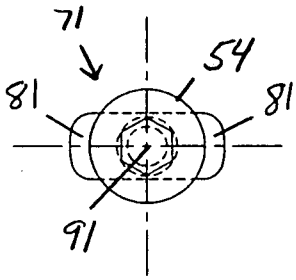

FIG. 19

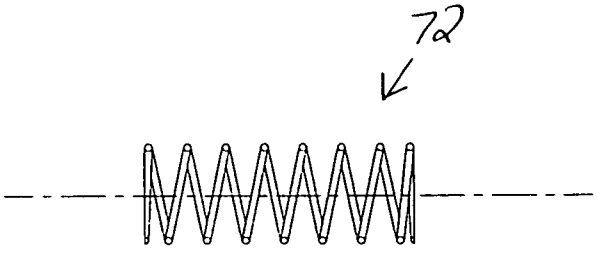

FIG. 20

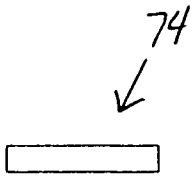

FIG. 21

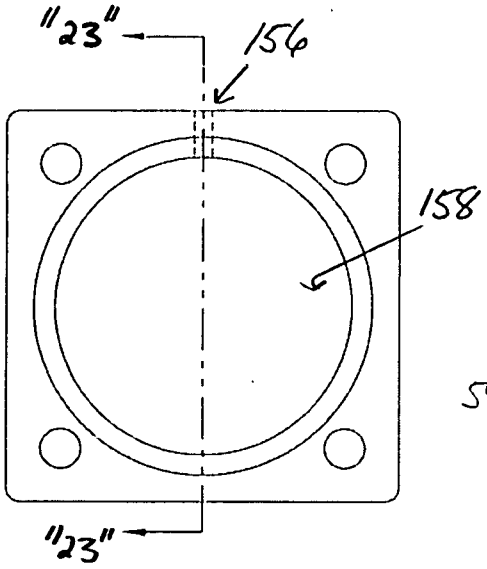

FIG. 22

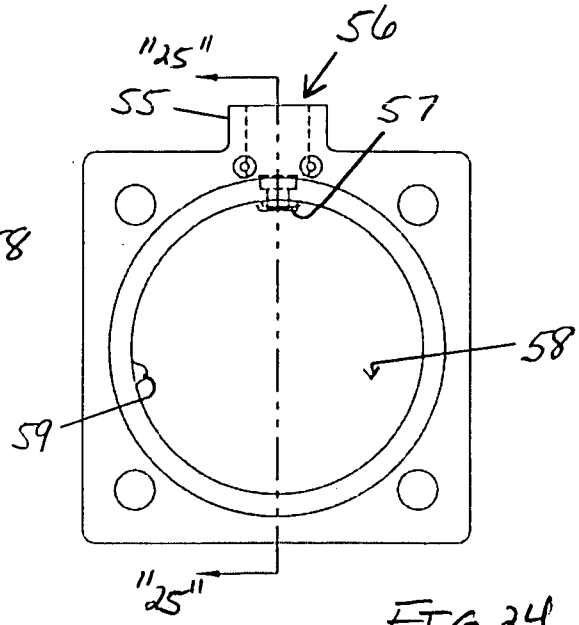

FIG. 24

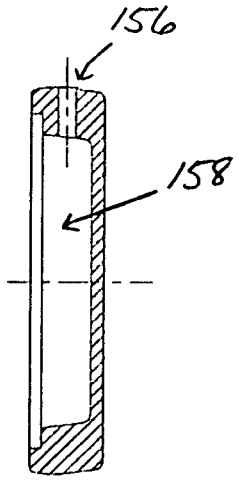

FIG. 23

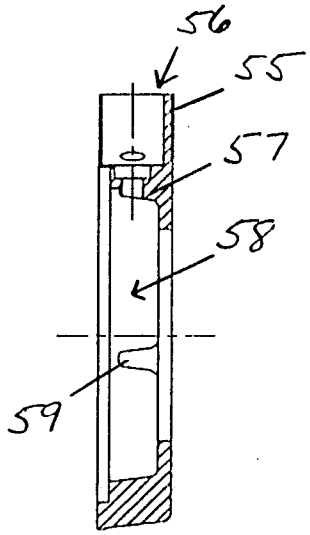

FIG. 25

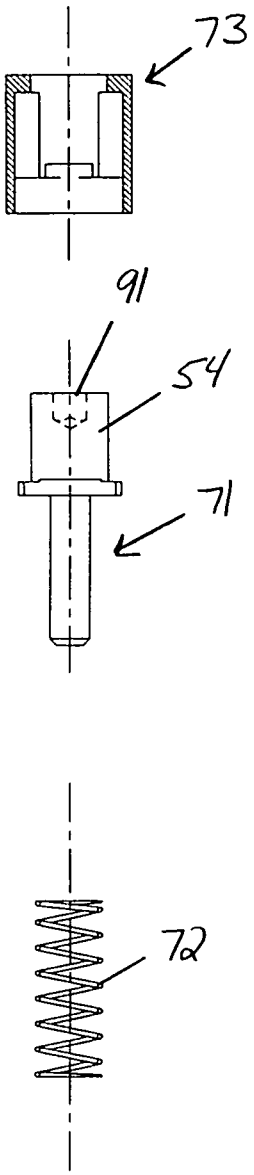

FIG. 26

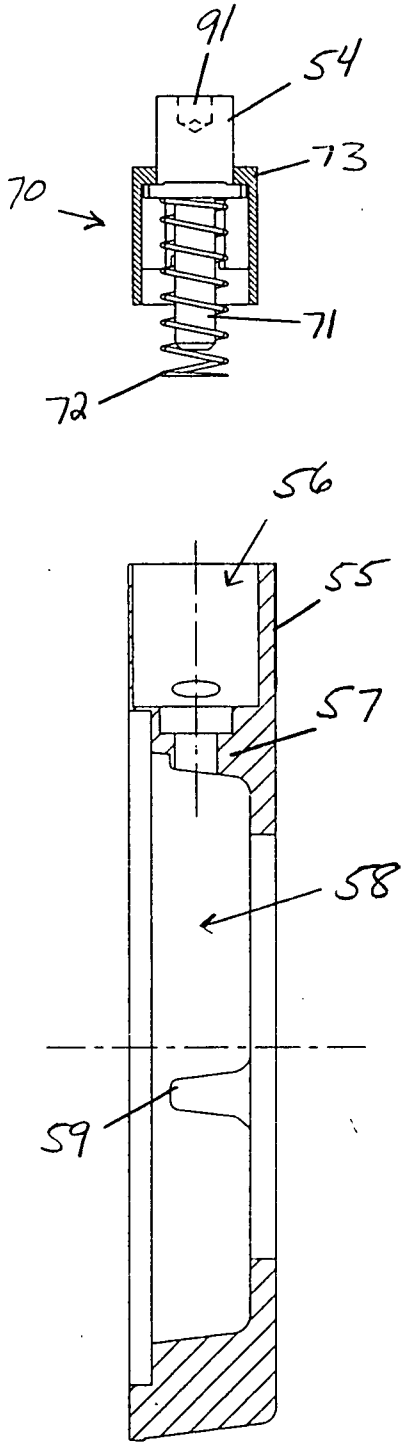

FIG. 27

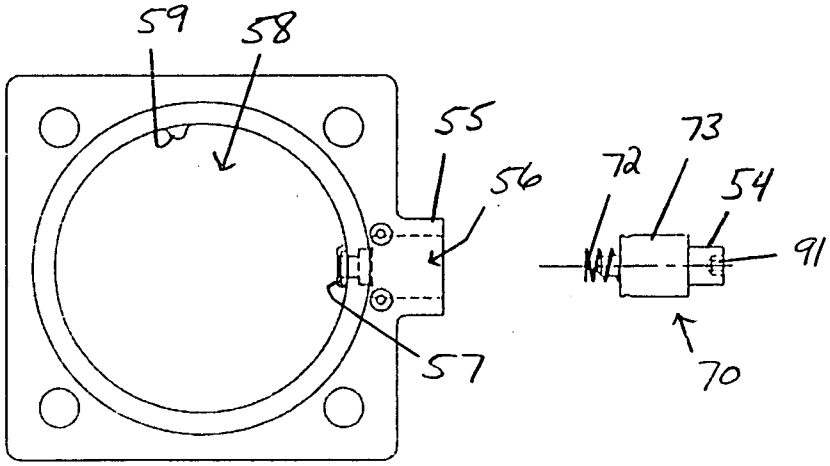

FIG. 28

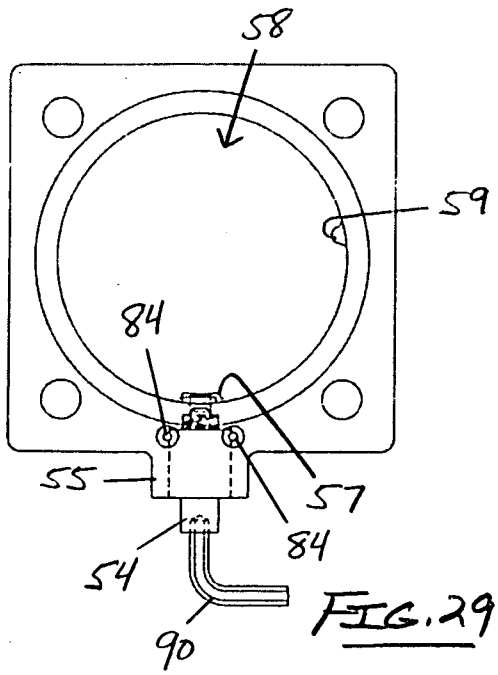

FIG. 29

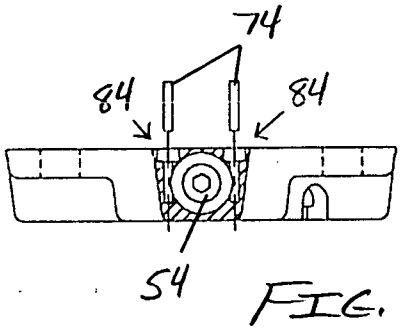

FIG. 30

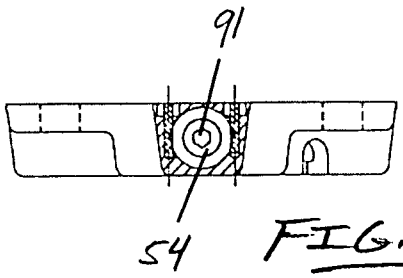

FIG. 31

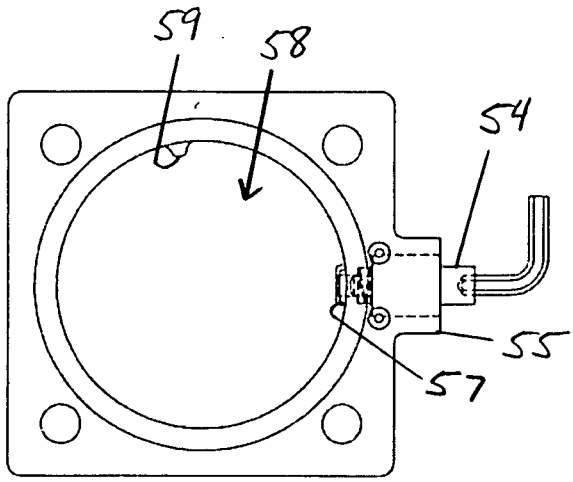

FIG. 32

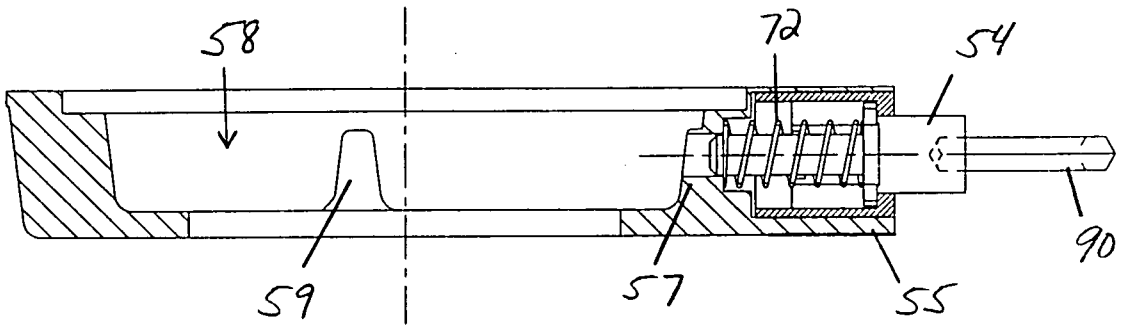

FIG. 33

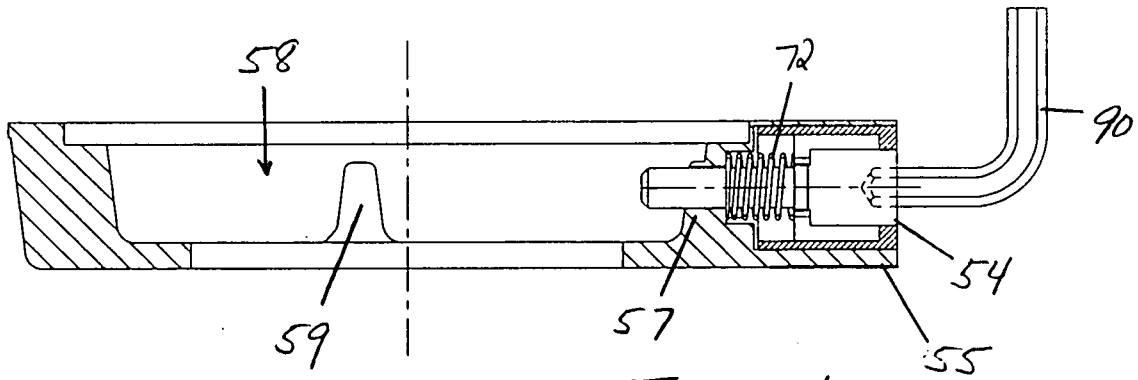

FIG. 34

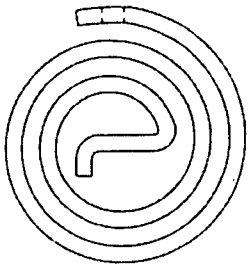

FIG. 35

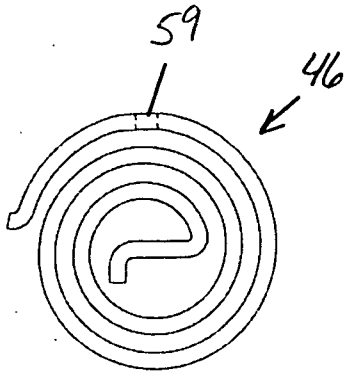

FIG. 37

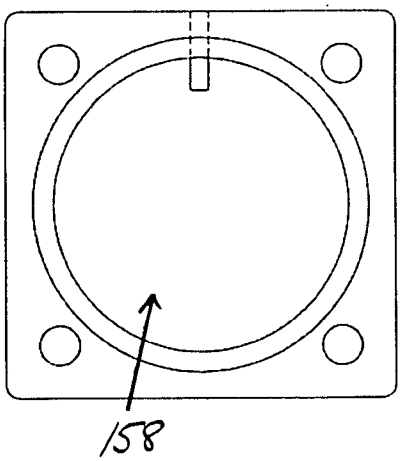

FIG. 36

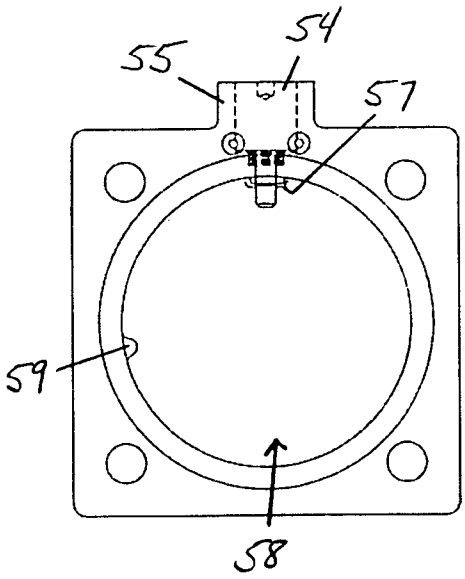

FIG. 38

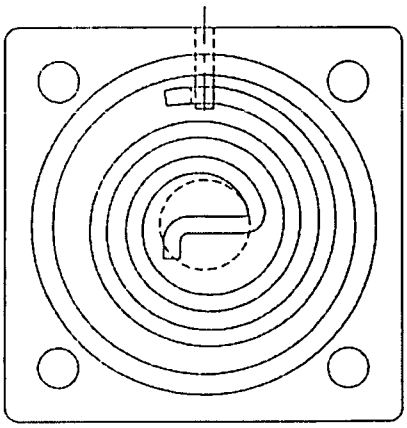

FIG. 39

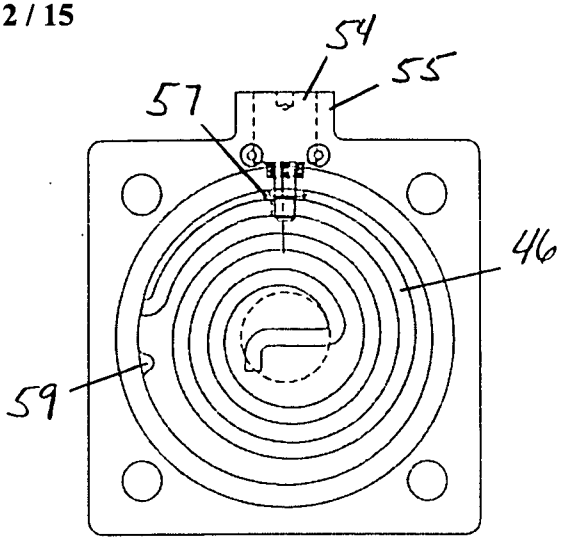

FIG. 40

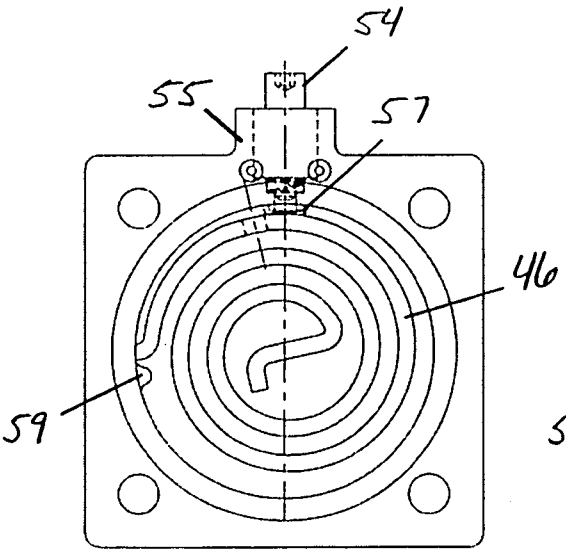

FIG. 41

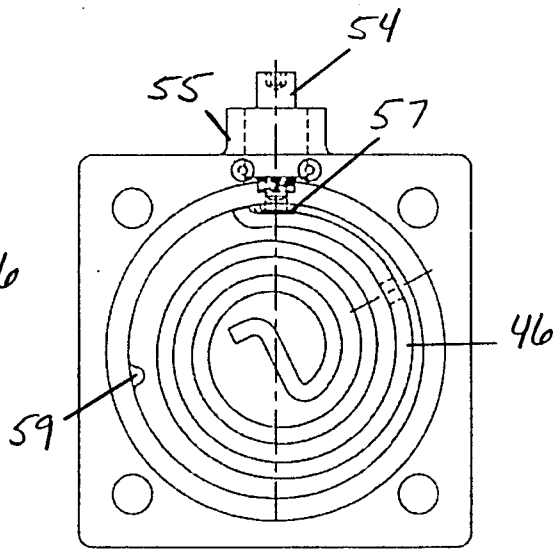

FIG. 42

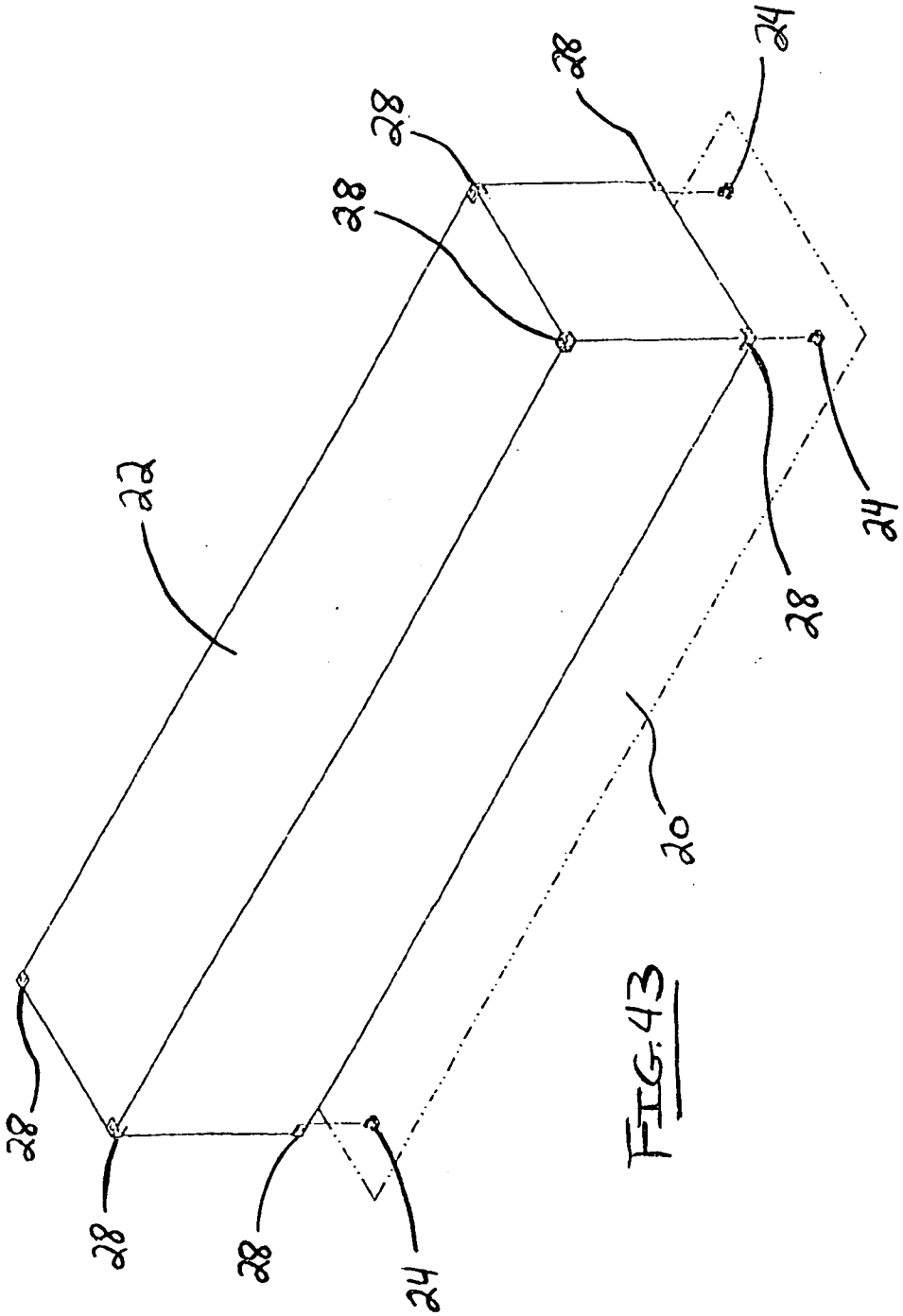

FIG. 43

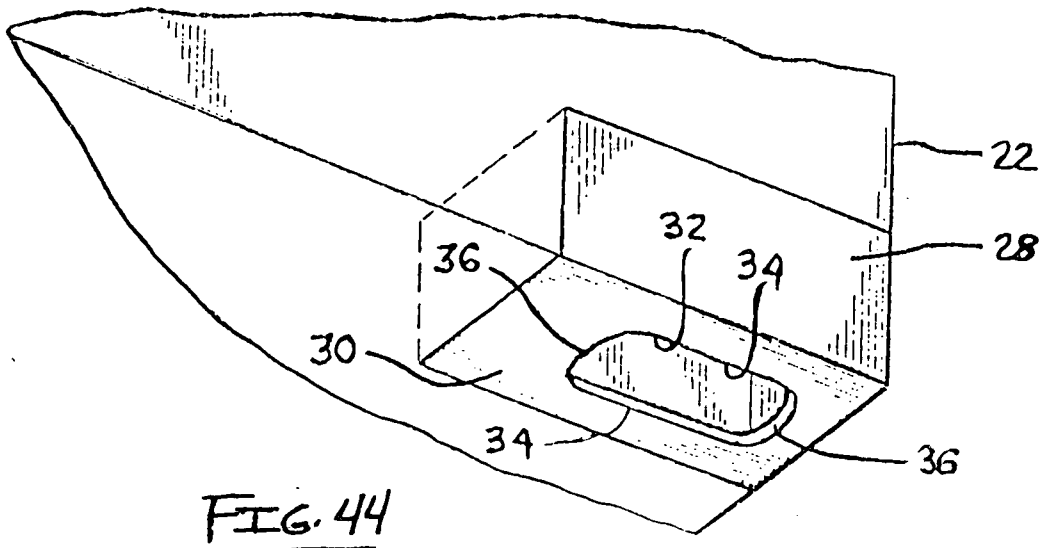

FIG. 44

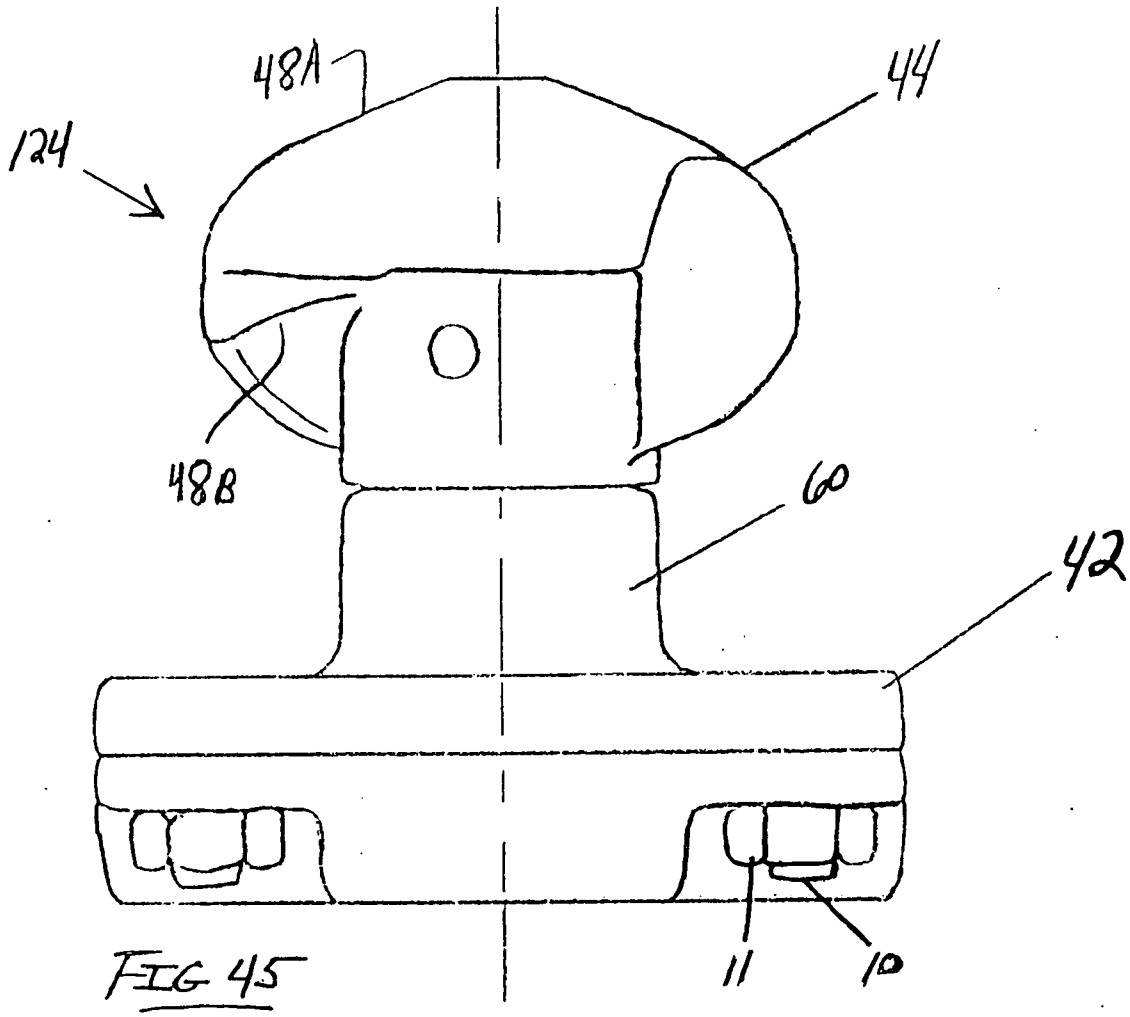

FIG 45

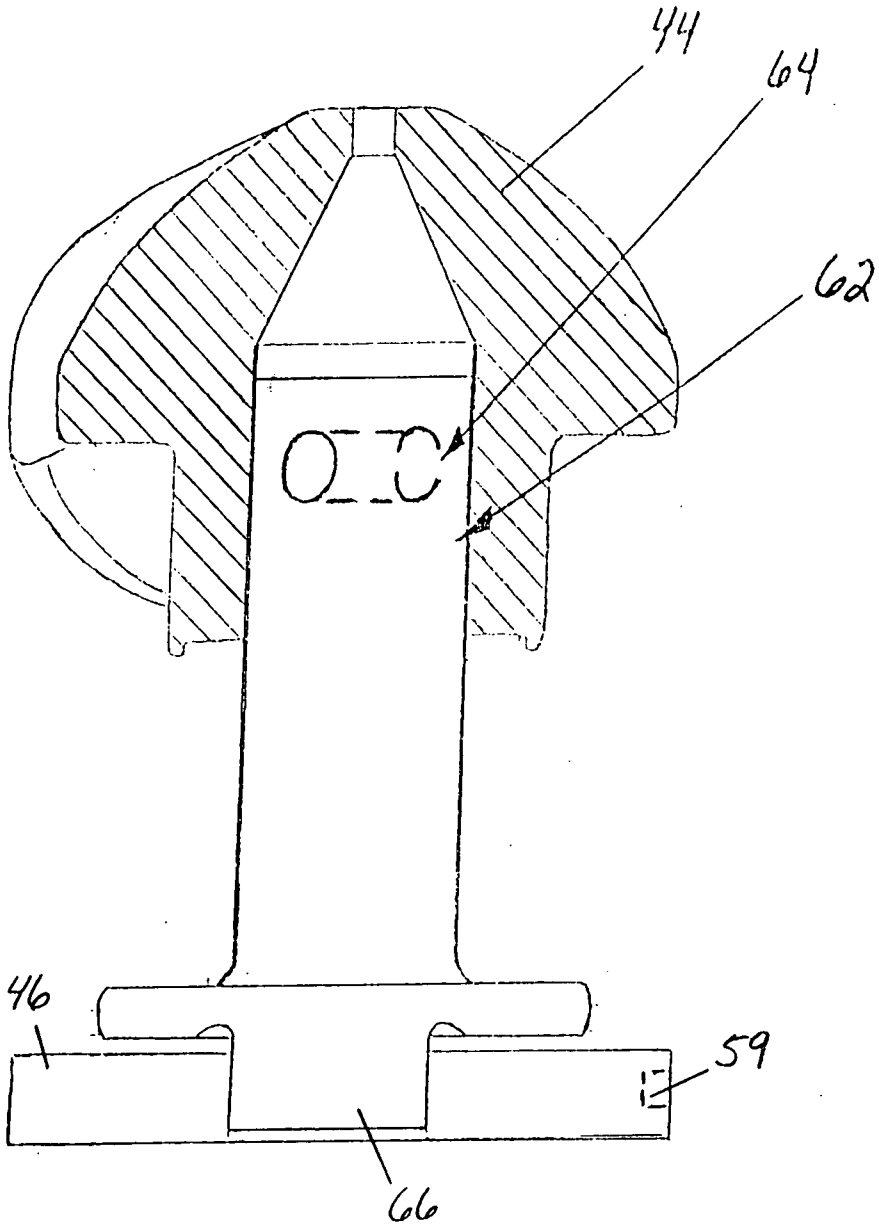

FIG. 4b

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 08/06686

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - B60P 1/64 (2008.04)
USPC - 410/82
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): B60P 1/64 (2008.04)
USPC: 410/82

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
IPC(8): B60P 1/64 (2008.04) - see keyword below
USPC: 24/287; 220/1.5; 410/69, 77, 80, 82, 83, 84 - see keyword below

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST(USPT,PGPB,EPAB,JPAB); DialogPRO(Engineering); Google Scholar
Search Terms Used: Cargo, storage, ISO, isotainer, container, securement, twist, lock, coupling, indicator, spring, release, visual, visible, manual, external, rotate, key

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 4,626,155 A (Hlinsky et al.) 2 December 1986 (02.12.1986) entire document especially Fig. 12, Fig. 13, Fig. 14, col 6, ln 45-68, col 7 ln 1-21	1-3, 5-10, 12-14, 16 and 18 ---------- 4, 11, 15, 17
Y	US 6,164,862 A (Takaguchi) 26 December 2000 (26.12.2000), col 5, ln 54-61	4, 11, 15, 17

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

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
27 August 2008 (27.08.2008)	08 SEP 2008

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