

(19) **DANMARK**



Patent- og
Varemærkestyrelsen

(12)

Oversættelse af europæisk patentskrift

(10) **DK/EP 3803162 T3**

-
- (51) Int.Cl.: **F 16 J 13/04 (2006.01)** **F 16 J 13/24 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2022-06-20**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2022-04-13**
- (86) Europæisk ansøgning nr.: **19739736.7**
- (86) Europæisk indleveringsdag: **2019-06-05**
- (87) Den europæiske ansøgnings publiceringsdag: **2021-04-14**
- (86) International ansøgning nr.: **US2019035559**
- (87) Internationalt publikationsnr.: **WO2019236691**
- (30) Prioritet: **2018-06-05 US 201862680801 P**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
- (73) Patenthaver: **TDW Delaware, Inc., 1100 Market Street, Suite 780, Wilmington, Delaware 19801, USA**
- (72) Opfinder: **MITCHELL, Joshua, 1316 South Juniper Avenue, Broken Arrow, OK 74012, USA**
KEENAN, William, 12515 East 134th Street South, Broken Arrow, OK 74011, USA
TEFFT, William, 14505 East Quail Run, Claremore, OK 74017, USA
MORTON, Joseph, Alan, 5803 East 18th Street, Tulsa, OK 74112, USA
RITCHIE, Aaron, M., 6207 East 91st Place, Tulsa, OK 74137, USA
HENDRICKS, Robert, Fulton, 3483 East 51st Place, Tulsa, OK 74135, USA
BOEHNING, Samuel, R., 1916 East 13th Street, Tulsa, OK 74104, USA
- (74) Fuldmægtig i Danmark: **Dennemeyer & Associates S.A, P.O. Box 700425, DE-81304 Munich, Tyskland**
- (54) Benævnelse: **BEHOLDERLUKNINGSANORDNING MED FEJLSIKKERT FEJLDETEKTIONSORGAN**
- (56) Fremdragne publikationer:
WO-A1-84/01354
US-A- 4 237 936
US-A1- 2005 244 226
US-A1- 2018 010 724

DESCRIPTION

[0001] This application claims priority to US 62/680,801 filed June 5, 2018.

BACKGROUND

[0002] This disclosure is in the field of pipeline and vessel closures like those used, for example, to provide access to a pig trap during launch and recovery operations.

[0003] By way of example, a pig trap includes a collar adapted to be attached to an end of a pipe, a door for opening and closing the end of the pipe, means for holding the door to the collar, and means for sealing the door to the collar when the door is held to the collar. The holding means may include segmented plates that expand inside the collar barrel or clamps that hold the door against the barrel.

[0004] US 2018/010724 describes a quick acting closure for rapid access to and sealing of a pressure vessel or pipeline utilizing clamp-ring style closures with a locking mechanism providing a safe-guard against unintentional operation and providing an element of redundancy in retaining the holding elements. An annular hub is attachable to the mating pressure vessel and can function as an access port to the interior of the pressure change. A door sized to match the mating dimensions of the hub closes access to the pressure vessel. The locking mechanism can be interlocked to a pressure alert system to ensure any differential pressure condition contained within the closure being detected prior to disengaging the locking mechanism and actuating a toggle mechanism.

[0005] US 4,237,936 to Lollis et al. provides an example of a closure that makes use of clamps. It describes a pig trap closure having a collar adapted to attach to an end of a pipe which is to receive a pig and a door pivotally connected to the collar for opening/closing the end of the pipe. Means are provided for clamping the door to the collar and sealing means are provided for preventing communication between the interior of the pipe and the atmosphere when the door is clamped to the collar. A testing valve indicates the presence of pressurized fluid in the pipe and is connected to a handle used to unclamp the door for preventing movement of the handle until after the presence of the pressurized fluid has been checked by the testing valve.

[0006] WO 84/01354 describes safety lock for a pivoted door closing an opening in a pressure vessel to prevent the door from being opened when pressure in the vessel is above a selected level. There is also a means for providing a visual indication of the existence of vessel pressure and of manually verifying the level of pressure within the vessel.

[0007] US 2005/244226 describes a manhole cover for pressure vessels, particularly to a railway car pressure vessel. The cover includes a locking mechanism which eliminates a need

for six to eight large eye bolts positioned vertically upward from the cover. The cover includes a cylindrical manhole with manhole lugs extending around an upper outer periphery of the manhole. The cover includes lugs which extend around the outer periphery of the cover. The cover mates with and closes off the manhole. Further means is provided for clamping together the manhole lugs with the cover lugs and placing the cover into a sealed position.

SUMMARY

[0008] Embodiments of a closure for a cylindrical vessel includes at least one holding means configured to move the closure into a fully closed state, the holding means having a predetermined actuation force or torque to properly close the closure, the closure including one or both of the following failsafe failure detection features:

a mechanical fuse having a predetermined load failure force below that of a load failure force of at least one component of the holding means and above that of the predetermined actuation force or torque; or

a block sized to at least partially overlap a pressure warning lock hole of the closure door when the closure is not in the fully closed state and to fully expose the pressure warning lock hole when the closure is in the fully closed state.

[0009] The holding means move between an unactuated or open position and an actuated or fully closed position. In embodiments, the holding means may include a pair of clamp rings arranged about a door of the closure so as to hold the door in a closed and sealed condition. The predetermined actuation force is above the weight of the clamp rings.

[0010] The invention, according to claim 1, provides a closure for a cylindrical vessel, the closure comprising: holding means for properly securing the closure in a fully closed state, the holding means having a predetermined actuation force; and at least one mechanical fuse including a shear pin in communication with the holding means; the shear pin having a predetermined load failure force below that of a load failure force of another component of the closure and above that of the predetermined actuation force of the holding means, the another component of the closure selected from the group consisting of a lug containing the shear pin and a pivot point of the holding means.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

FIG. 1 is an isometric view of a prior art closure with holding means properly closing the closure in a fully closed state. The holding means include a handle with a linkage connected to

clamp rings.

FIG. 2 is the prior art closure of FIG. 1, illustrating blockage or debris in a bottom portion of the closure prior to actuation of the holding means. None of the pins "P" that hold the closure together are designed as a weak link.

FIG. 3 is an isometric view of an embodiment of a closure of this disclosure including a mechanical fuse capable of preventing a failure of at least one other component of the closure when there is blockage or debris or where excessive force is required to properly close the closure.

FIG. 4 is an enlarged cross section view of the mechanical fuse of FIG. 3.

FIG. 5 is a rear isometric view of a prior art closure and illustrating a pressure warning lock. It may be possible to install the pressure warning lock without the holding means being properly closed.

FIG. 6 is a rear isometric view of an embodiment of a closure of this disclosure including a block that prevents the pressure warning lock from being inserted when the closure is not in a fully closed state. The block may be a bracket sized to at least partially cover the pressure warning lock hole when the holding means have not been fully actuated to properly close the closure. The block is illustrated to show the interference with the pressure warning lock, which cannot be inserted into the pressure warning lock hole, until the closure is fully closed and the block clears the pressure warning lock hole.

FIG. 7 is an enlarged view of the block of FIG. 6.

FIG. 8 is a rear isometric view of an embodiment of a closure of this disclosure including a ratchet-style closing mechanism and a block. The block may include an extended plate that at least partially covers the pressure warning lock hole when the closure is not yet properly closed. The plate is illustrated to show the interference with the pressure warning lock.

FIG. 9 is an enlarged view of the block of FIG. 8.

DETAILED DESCRIPTION

[0012] Embodiments of a closure include a mechanical fuse, a pressure warning lock block, or a combination of the mechanical fuse and the pressure warning lock block. The embodiments may be adapted to a closure the same or similar to that as disclosed in US 4,237,936 to Lollis et al. or US 4,515,287 to Baudoux et al., the contents of which are incorporated by reference herein.

[0013] Referring first to FIGS. 3 & 4, in embodiments of this disclosure a closure 10 includes at least one mechanical fuse 20 having a predetermined load failure force below that of a load

failure force of at least one component of holding means 30 of the closure and above that of a force to provide a predetermined actuation force or torque to overcome the holding means 30. In some embodiments the mechanical fuse 20 includes a shear pin 21 or its equivalent. The holding means 30 may include one or more clamp rings 31. A handle 33 may be connected to the clamp rings 31 by corresponding lugs 35, at least one of which includes the mechanical fuse 20.

[0014] The load failure force of the mechanical fuse 20 is above the predetermined actuation force of the holding means 30 to properly close the closure 10 into a fully closed position but below that of load failure force of another component of the holding means 30. In embodiments, the other component may be a welded component such as, but not limited to, the lugs 35. The predetermined actuation force may be a force to overcome the weight of the holding means 30. The holding means 30 may include a pair of clamp rings 31, the predetermined actuation force being above a weight of the pair of clamp rings 31.

[0015] In embodiments, the mechanical fuse 20 may be located on a top end or portion 11 of the closure 10 so as to be visible to an operator. In some embodiments, the mechanical fuse 10 may be located on the top end 11 of the closure 10 in proximity to a pressure warning lock 17. Where the holding means 30 include clamp rings 31, a common pivot point 37 (e.g. a pin or its equivalent) of the clamp rings 31 may be located toward a bottom end or portion 15 of the closure. When blockage or debris "B" in a bottom portion 15 of the closure 10 causes an increase in force to be applied to actuate the holding means 30 during closure (but still below the failure force of another component such as the common pivot point 37), the mechanical fuse 20 fails. The failed mechanical fuse 20 may be easily detectable and visible to an operator. The planned failure of the fuse 20 protects at least one other component of the closure from failing due to excessive force required to close the holding means 30.

[0016] Referring now to FIGS. 6 & 7, in embodiments of a closure 10 of this disclosure, a block 40 interferes with a pressure warning lock 17, thereby preventing insertion or installation of the lock 17 into the pressure warning lock hole 19 when the closure 10 is opened or not in a fully closed state. The block 40 may be sized so that when the closure 10 is in the fully closed state, the pressure warning lock 17 may be installed in the hole 19. The pressure warning lock 17 may include a pin 23. The holding means 30 may be actuated by a handle 33 or by a ratchet-style closing mechanism 51 of a kind known in the art. See e.g. FIGS. 8 & 9.

[0017] Referring now to FIGS. 8 & 9, in some embodiments the block 40 includes a bracket 41 connected to a linkage 37 of the holding means 30. In other embodiments, the block 40 includes at least one plate 43 that aligns the pressure warning lock 17 with the hole 19. The bracket 41 may include alignment means 39 for the pressure warning lock 17. Unlike prior art closures, the plate 43 is extended in length so that when the holding means 30 are opened or not fully closed, the plate 43 at least partially covers the pressure warning lock hole 19 and prevents the pressure warning lock 17 from being inserted into the hole 19. When the holding means 30 are fully actuated and the closure 10 is properly closed, the hole 19 is fully exposed. In some embodiments, holding means 30 includes one or more clamp rings 31.

[0018] While embodiments of the closure have been described, the closure may be modified without departing from the scope of the following claims.

REFERENCES CITED IN THE DESCRIPTION

Cited references

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US62680801B [0001]
- US2018010724A [0004]
- US4237936A [0005] [0012]
- WO8401354A [0006]
- US2005244226A [0007]
- US4515287A [0012]

**BEHOLDERLUKNINGSANORDNING MED FEJLSIKKERT
FEJLDETEKTIONSORGAN**

PATENTKRAV

1. Lukning (10) til en cylindrisk beholder, hvilken lukning omfatter:
holdeorgan (30) til korrekt sikring af lukningen i en helt lukket tilstand, hvor holdeorganet har en forudbestemt aktiveringskraft; og mindst én mekanisk sikring (20), der indbefatter en forskydningsstift (21) i forbindelse med holdeorganet; hvor forskydningsstiften (21) har en forudbestemt belastningsbrudkraft under en belastningsbrudkraft for en anden komponent af lukningen og over den forudbestemte aktiveringskrafts belastningsbrudkraft af holdeorganet, hvor den anden komponent af lukningen er valgt fra gruppen bestående af en flap (35), der indeholder forskydningsstiften og et drejepunkt (37) af holdeorganet.
2. Lukning ifølge krav 1, hvor holdeorganet indbefatter et håndtag (33).
3. Lukning ifølge krav 1, hvor holdeorganet indbefatter mindst ét par klemmeringe (31).
4. Lukning ifølge krav 3, hvor den forudbestemte aktiveringskraft er over vægten af det mindst ene par klemmeringe.
5. Lukning ifølge krav 1, der endvidere omfatter:
et trykadvarsels-låsehul (19); og
en blok (40), der er dimensioneret til i det mindste delvist at overlape trykadvarsels-låsehullet, når lukningen ikke er i den helt lukkede tilstand, og til fuldt ud at blotlægge trykadvarsels-låsehullet, når lukningen er i den helt lukkede tilstand.
6. Lukning ifølge krav 1, hvilken lukning endvidere omfatter:
et trykadvarsels-låsehul (19); og
en blok (40), der er dimensioneret til i det mindste delvist at overlape trykadvarsels-låsehullet, når lukningen ikke er i den helt lukkede tilstand, og til fuldt

ud at blotlægge trykadvarsels-låsehullet, når lukningen er i den helt lukkede tilstand.

7. Lukning ifølge krav 6, hvor blokken indbefatter et beslag (41).
8. Lukning ifølge krav 6, hvor blokken indbefatter en plade (43), der indeholder justeringsmiddel (39) til en trykadvarselslås.
9. Lukning ifølge krav 6, hvor holdeorganet indbefatter en skraldemekanisme (51).

DRAWINGS

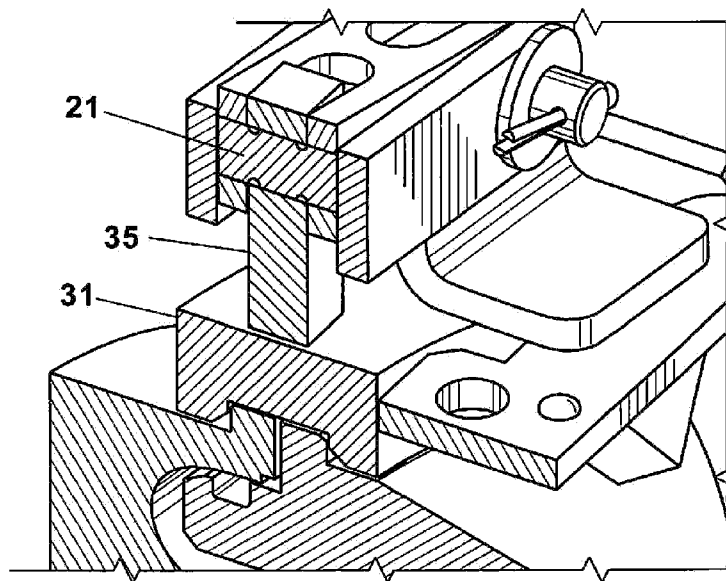
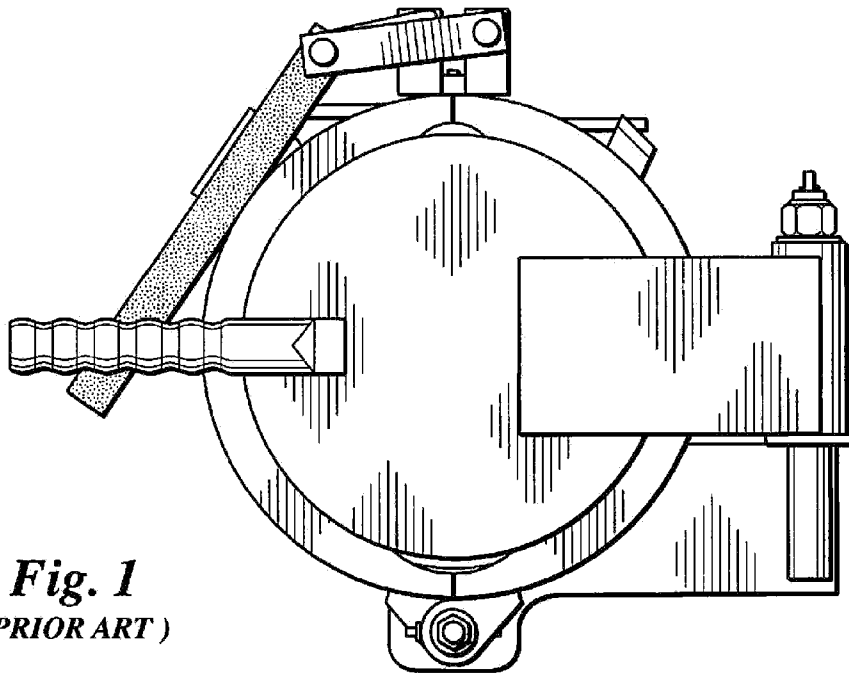


Fig. 4

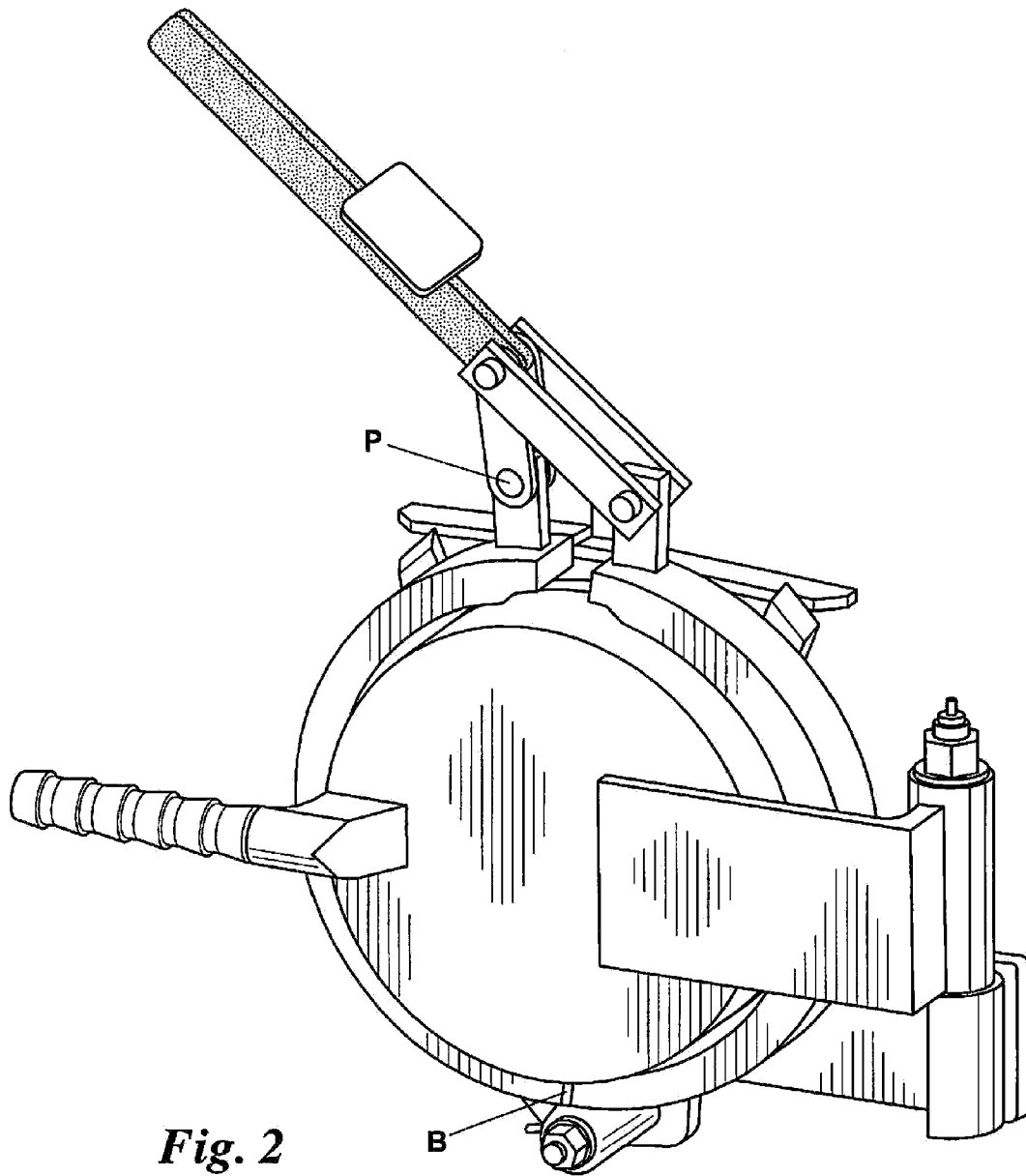
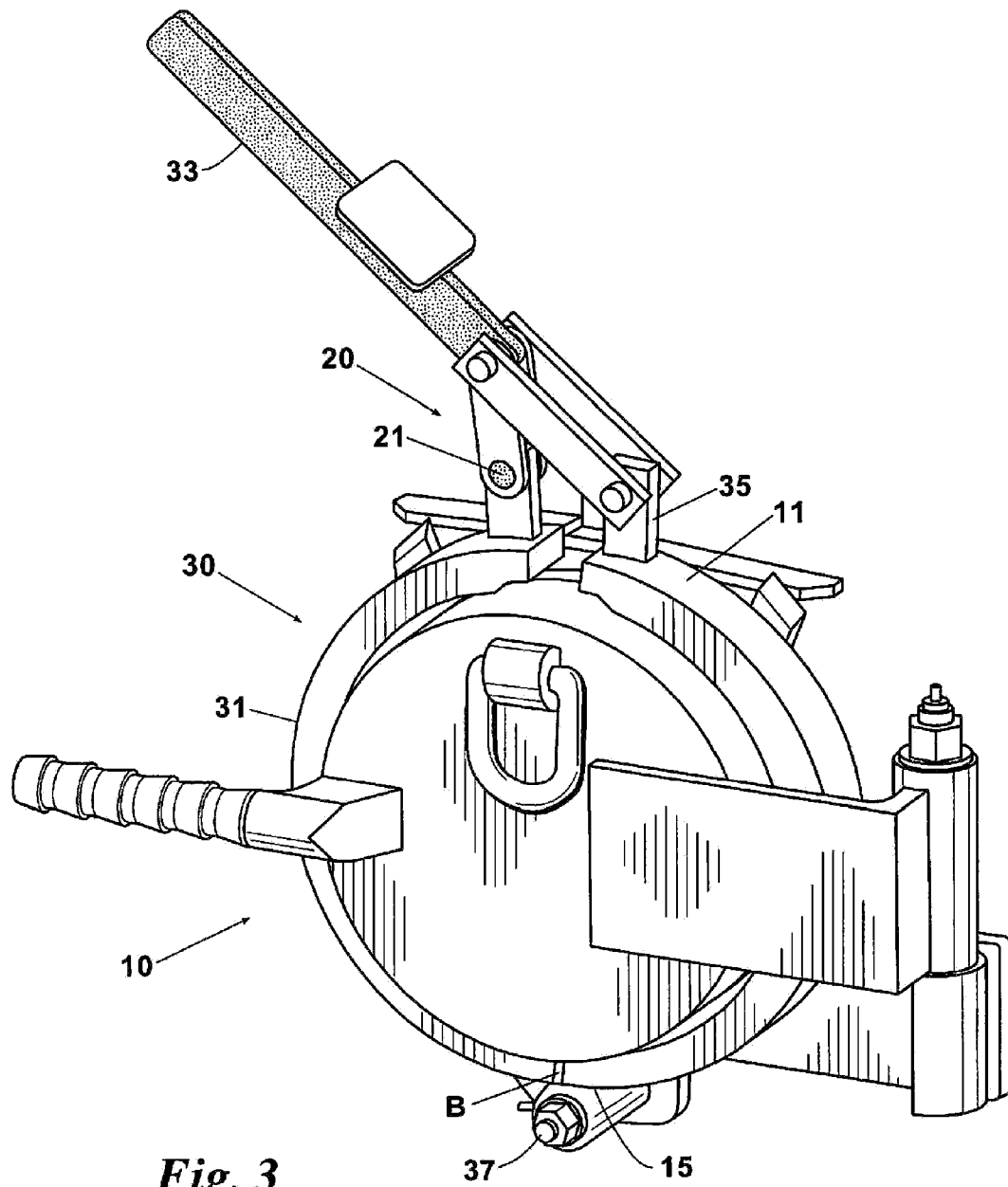


Fig. 2
(PRIOR ART)



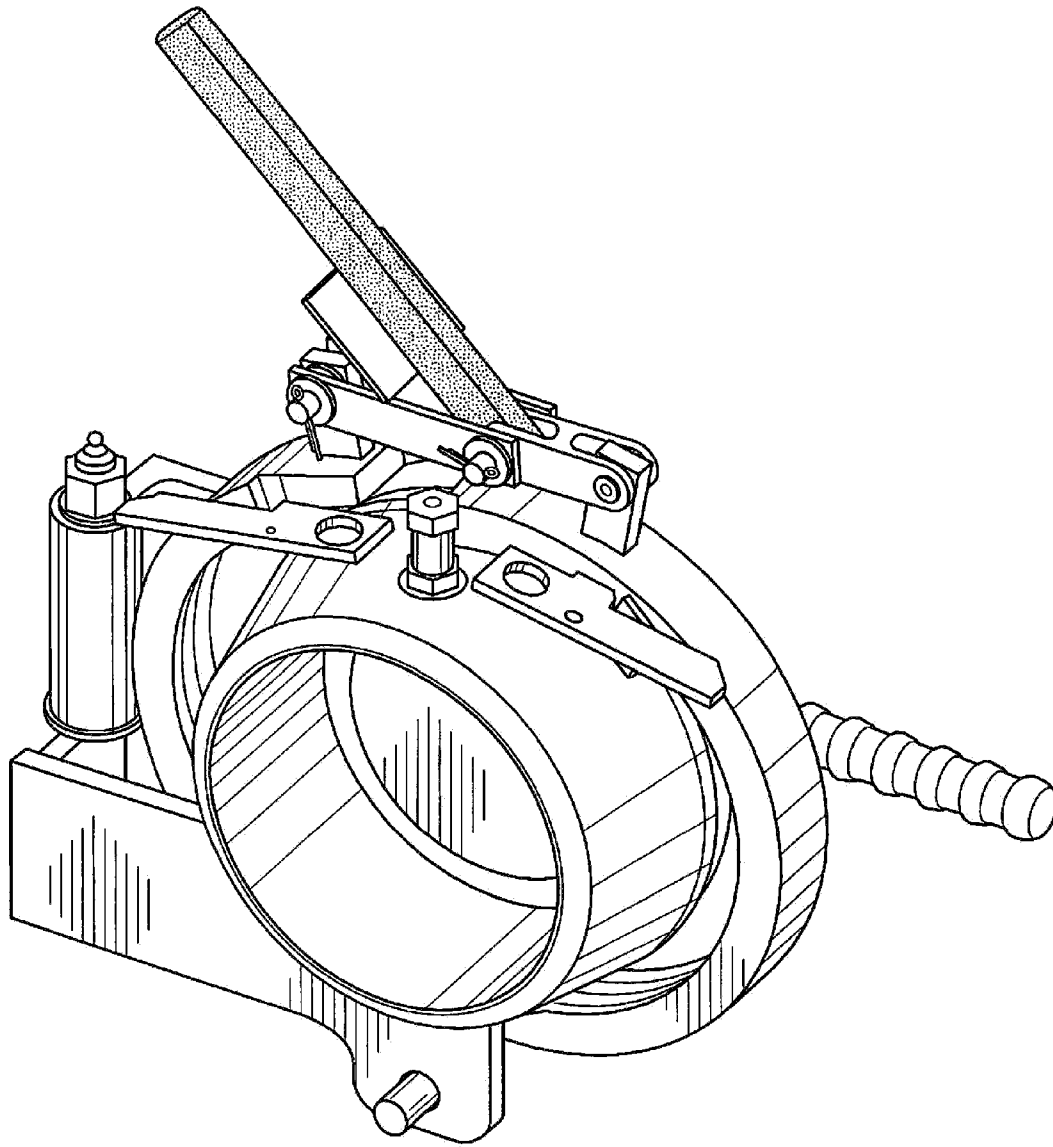


Fig. 5
(PRIOR ART)

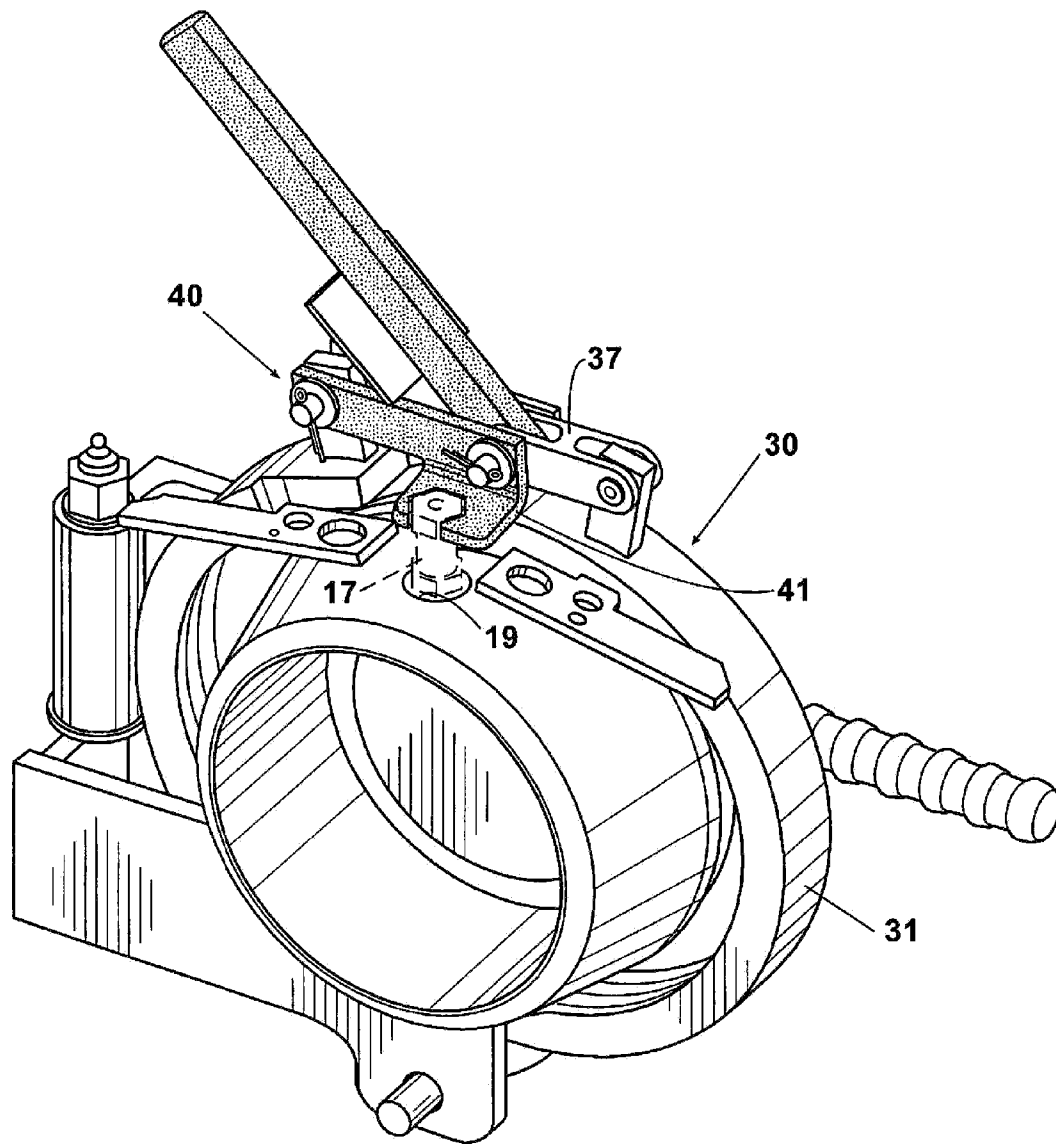


Fig. 6

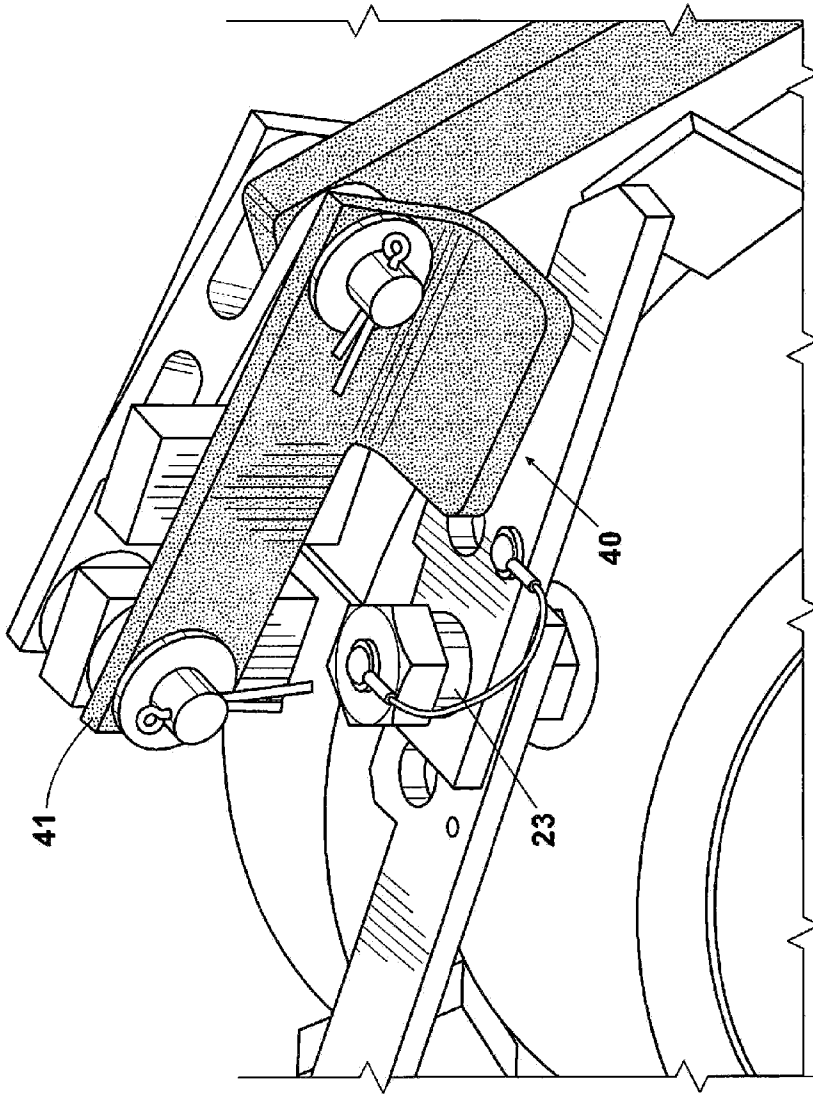


Fig. 7

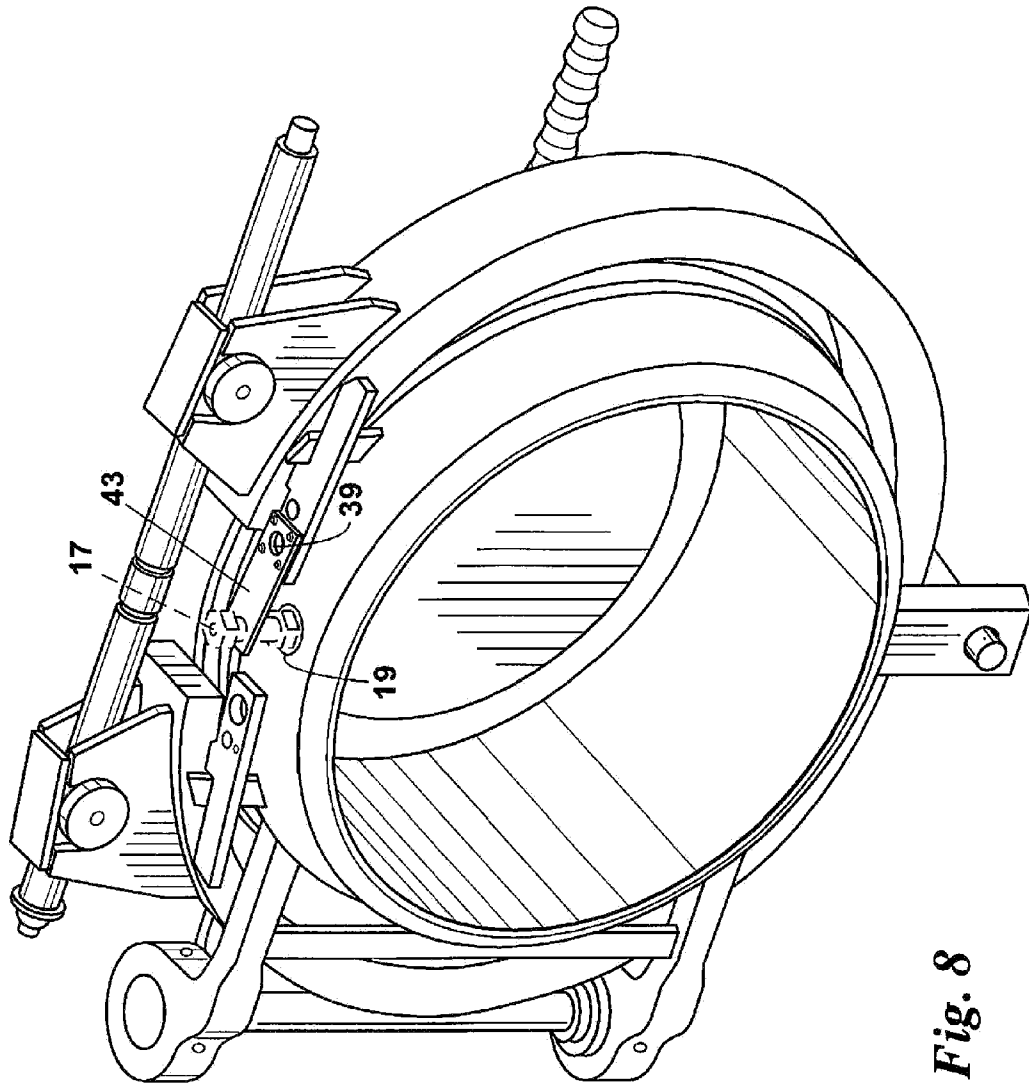


Fig. 8

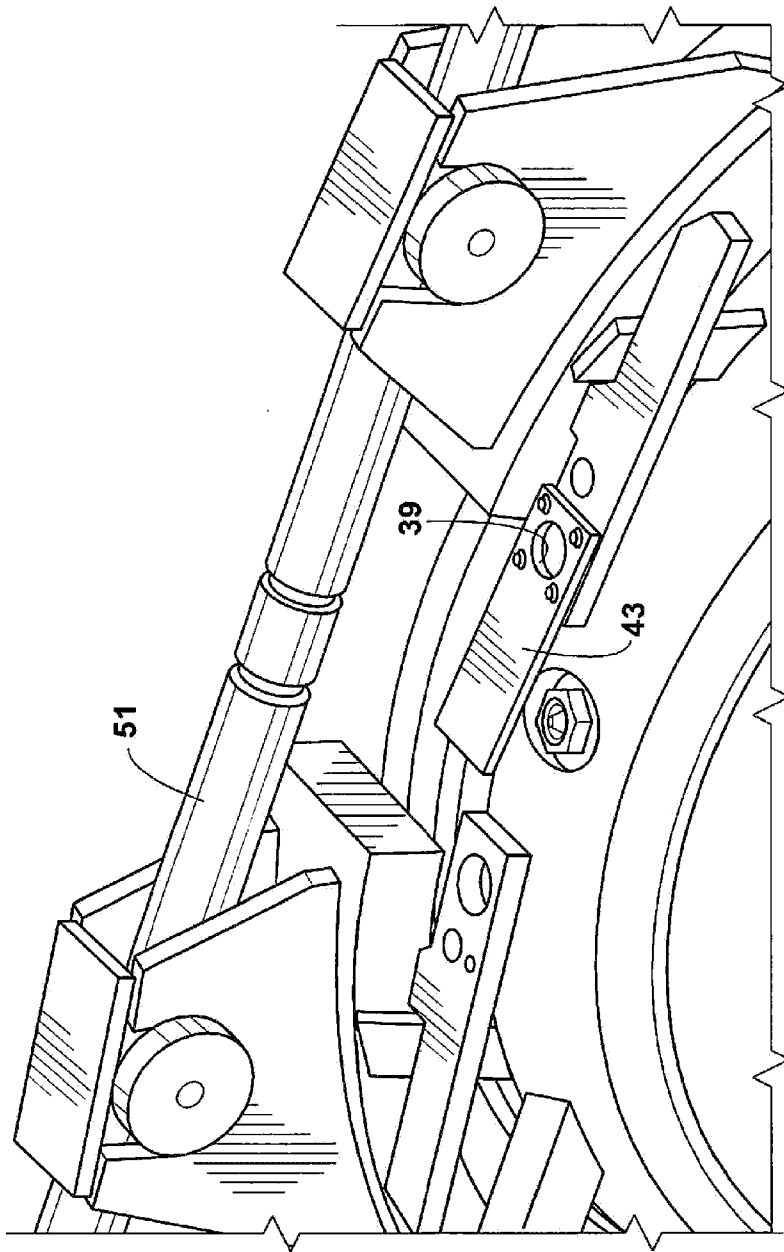


Fig. 9