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Piegza

[11] **3,888,045**

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[54] **CONSTRUCTION FOR MOUNTING A DOOR OF A PIT MOUNTED PRESSURE VESSEL**

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[52] **U.S. Cl.** ..... **49/255;** 49/280; 49/334; 49/340; 214/18 R

[51] **Int. Cl.** **E05f 7/02**

[58] **Field of Search** 49/255, 256, 333, 334, 49/338–340, 344, 280; 109/70, 69, 87; 214/17–18.2

[56] **References Cited**

UNITED STATES PATENTS

2,865,629	12/1958	Henkel	49/280 X
2,927,787	3/1960	Maher	49/338 X
3,125,232	3/1964	Brinkman et al.	49/68 X
3,346,992	10/1967	Lodge	49/255
3,820,282	6/1974	Kornylak	49/255

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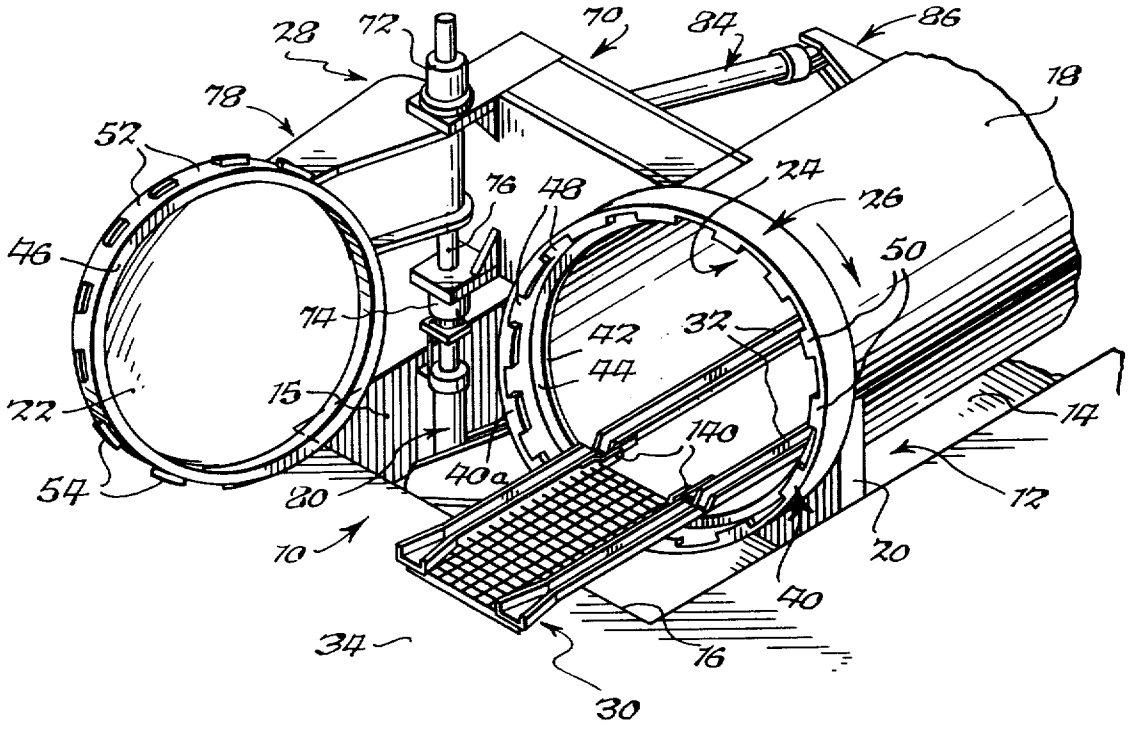
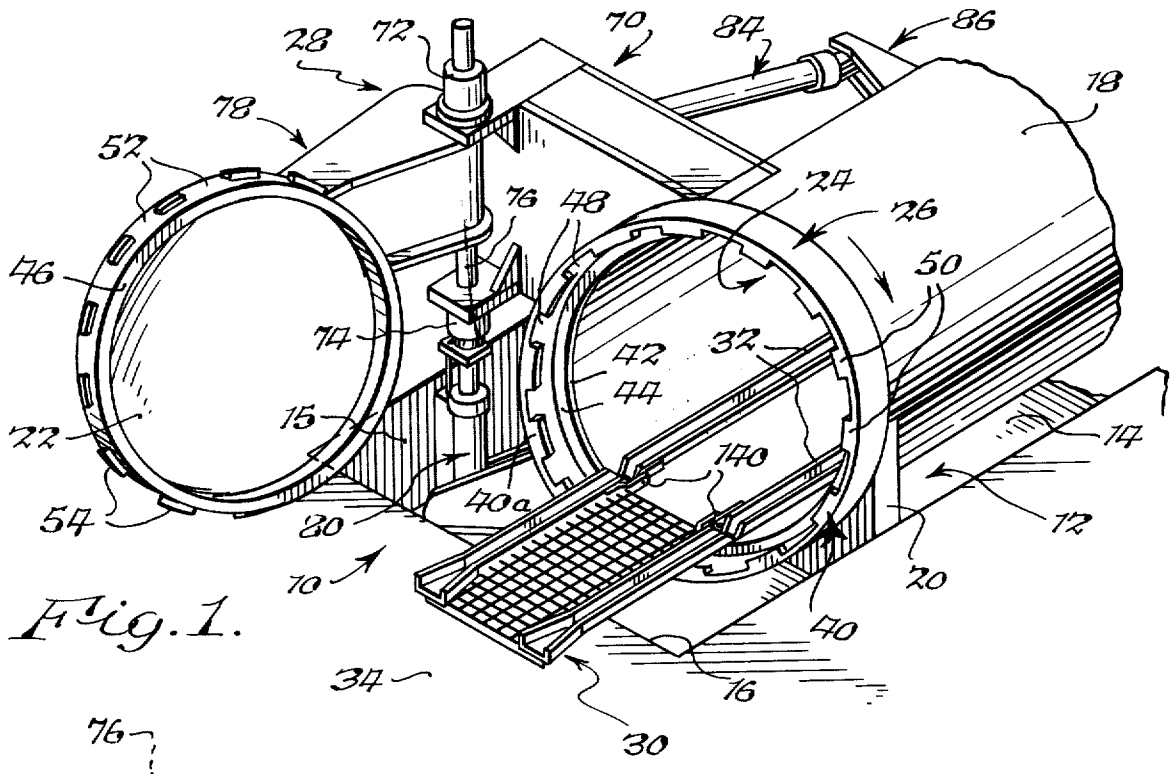
Attorney, Agent, or Firm—Bean & Bean

[57] **ABSTRACT**

A hinge arrangement is provided for supporting the door of a pit mounted pressure vessel for vertically reciprocating and horizontally swinging opening-closing movements, whereby to minimize the "bridging" distance between the vessel and the front of the pit.

11 Claims, 5 Drawing Figures

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40a
140
80
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16
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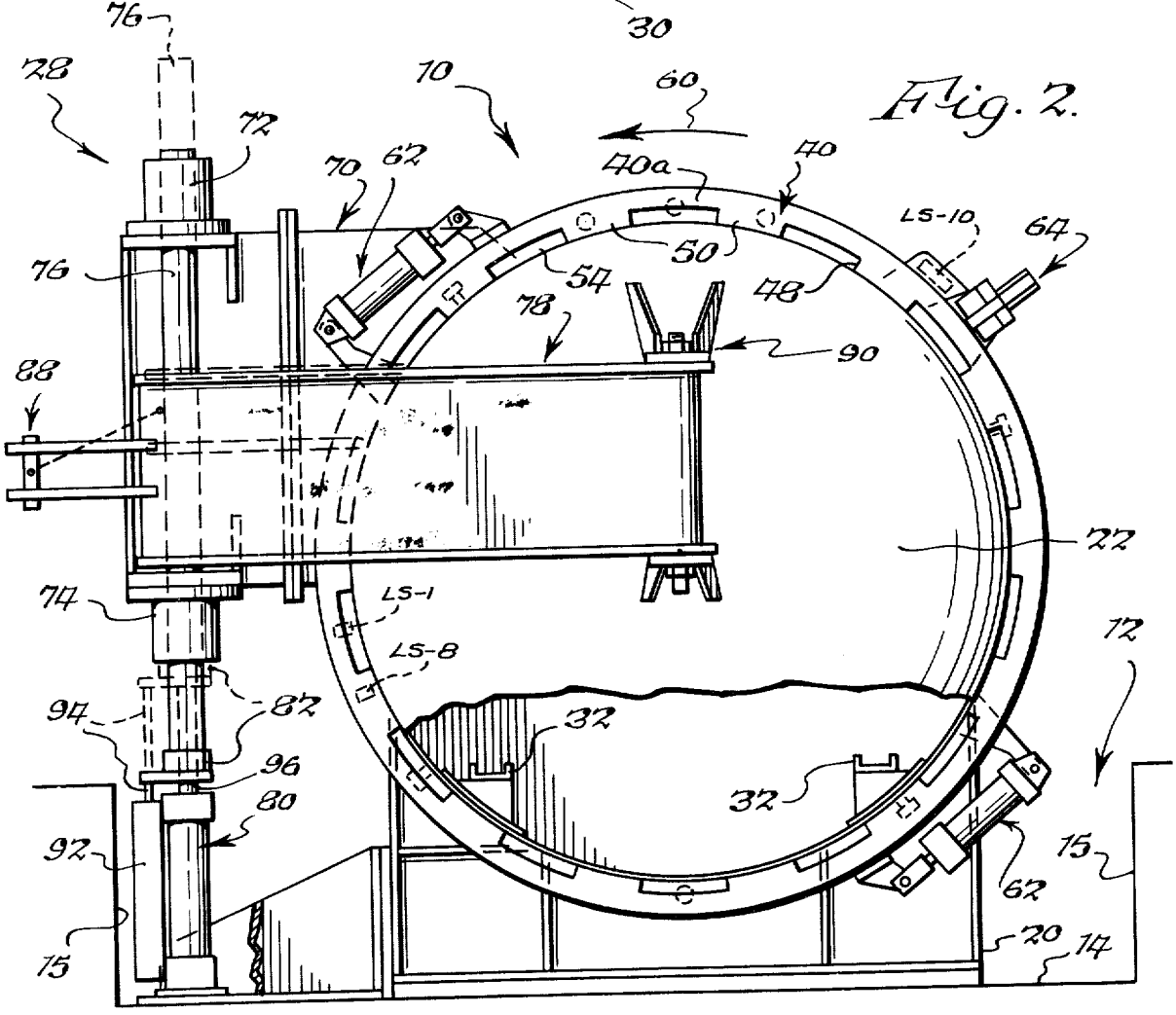
Fig. 1.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88
22
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LS-1
LS-8
72
94
82
32
96
32
80
92
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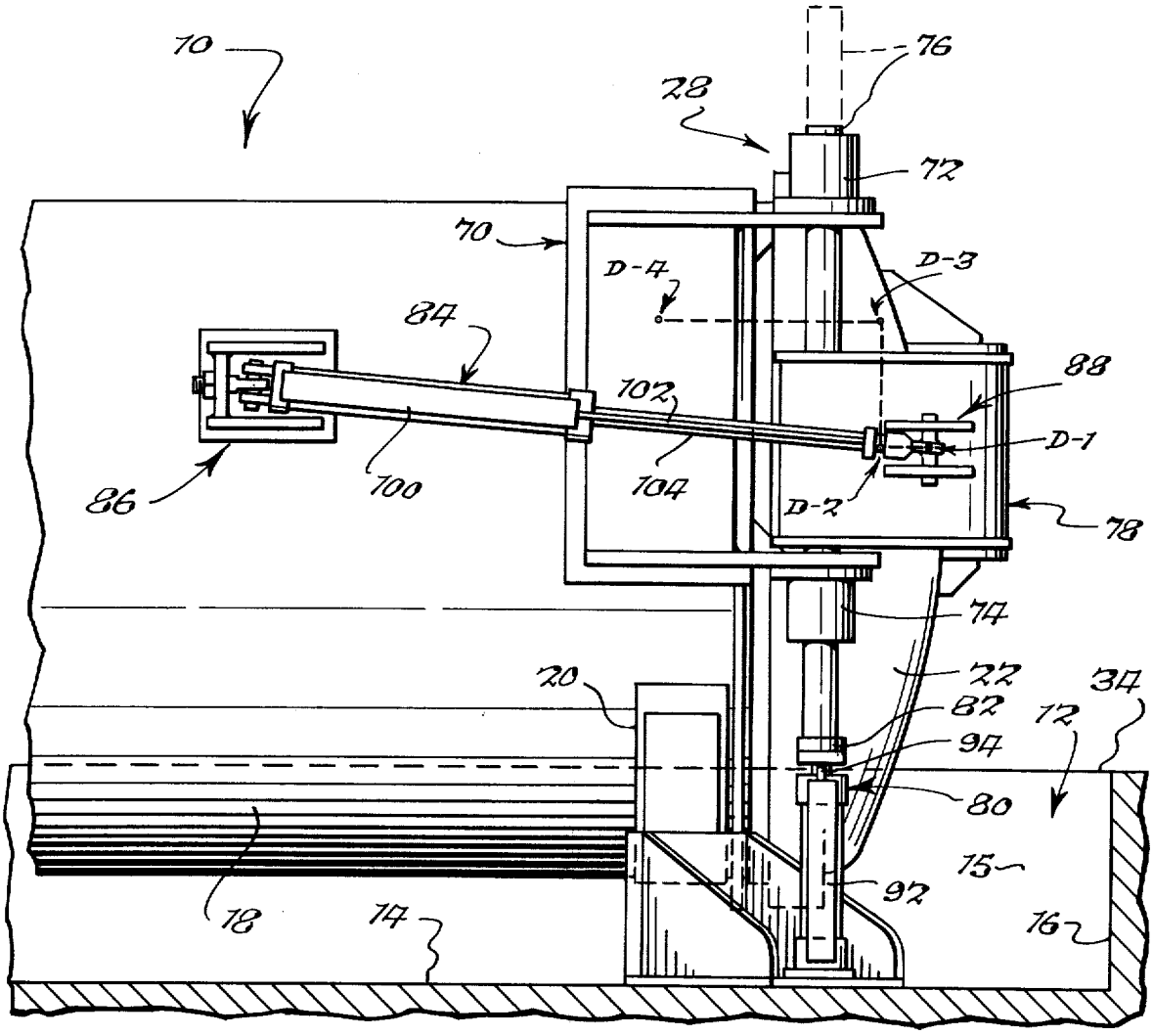
20
14

Fig. 2.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D-1
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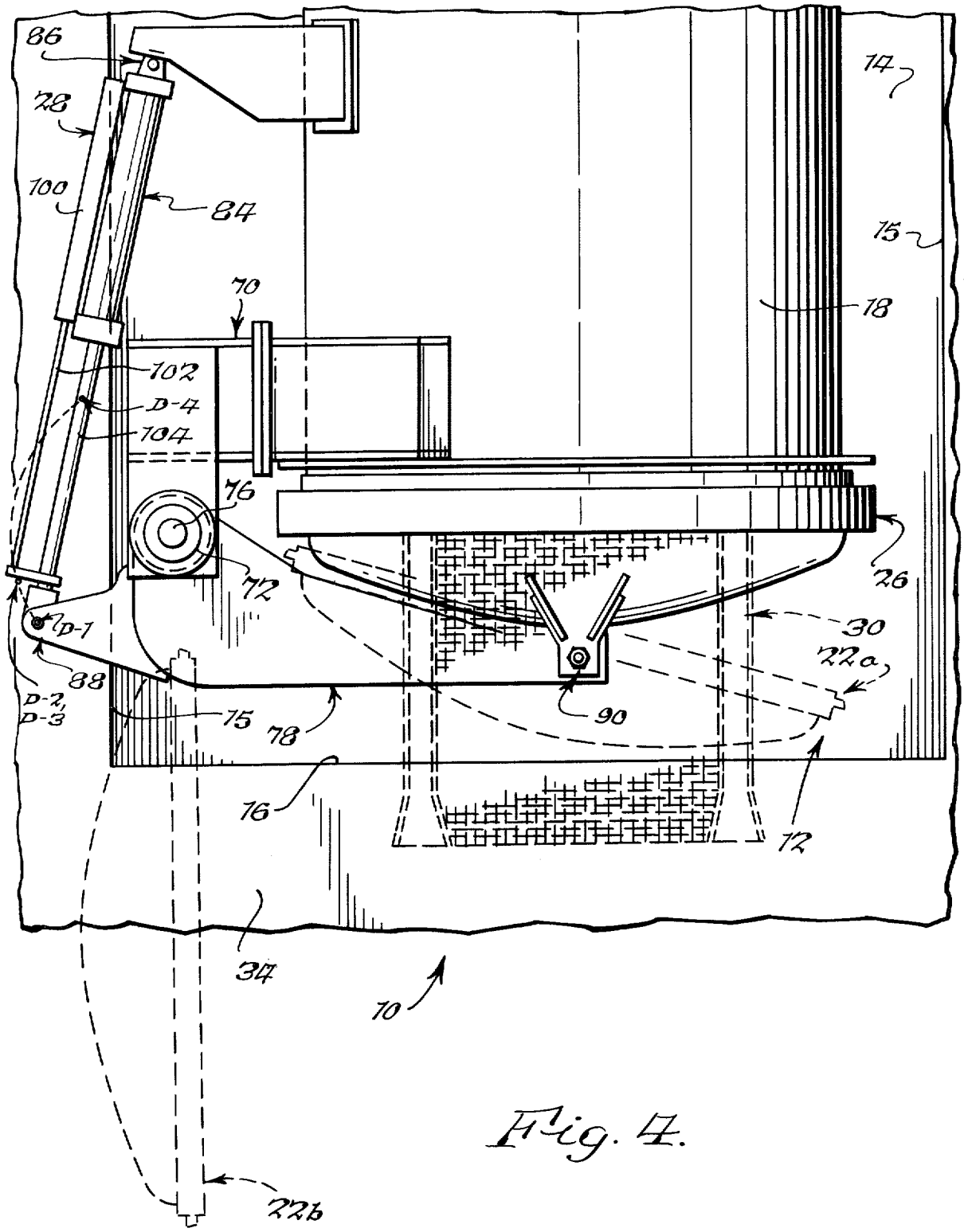
Fig. 3.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18
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102
D-4
104
76
72
26
D-1
30
22a
88
D-2,
D-3
75
78
90
16
72
34
10
22b

Fig. 4.

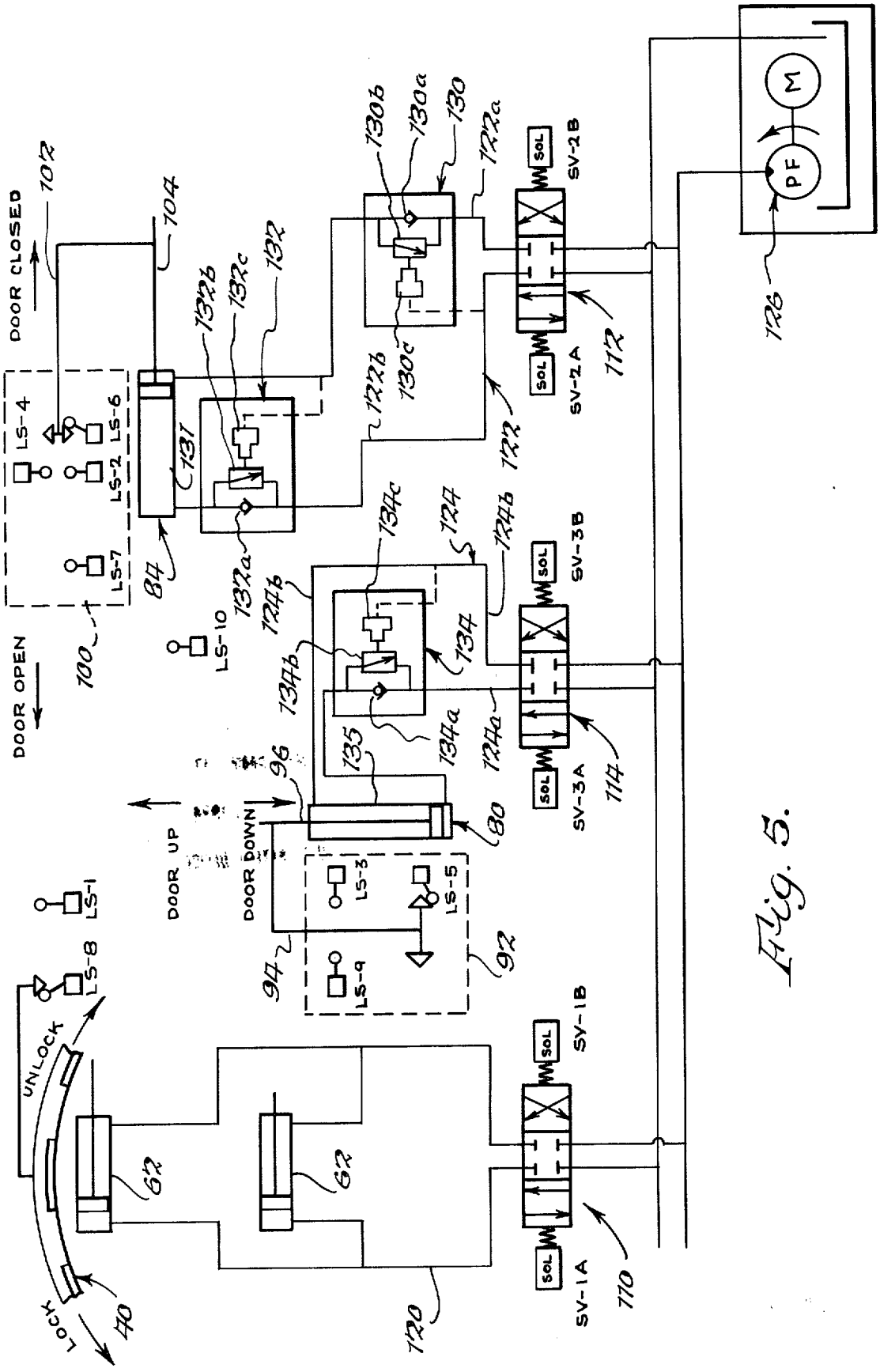
DOOR CLOSED
DOOR OPEN
DOOR UP
DOOR DOWN
LOCK
UNLOCK
LS-1
LS-2
LS-3
LS-4
LS-5
LS-6
LS-7
LS-8
LS-9
LS-10
SV-1A
SV-1B
SV-2A
SV-2B
SV-3A
SV-3B
SOL
PF
M
40
62
84
92
96
97
100
102
104
110
112
114
120
122a
122b
122c
124
124a
124b
126
130
130a
130b
130c
131
132
132a
132b
132c
134
134a
134b
134c
135

Fig. 5.

CONSTRUCTION FOR MOUNTING A DOOR OF A PIT MOUNTED PRESSURE VESSEL

BACKGROUND OF THE INVENTION

It is conventional to mount a horizontally disposed pressure vessel within a pit of a depth sufficient to permit a dolly or other material carrier to be rolled horizontally into the vessel over a removable bridge when the vessel door is in open position.

Most installations employ vessels having conventional horizontally swinging doors and thus require the front wall of the pit to be spaced from the front of the vessel through a distance approximating the diameter of the door in order to permit the latter to be swung into a fully open position. The disadvantages of this type of installation is that the bridge, which must have a length sufficient to bridge between the vessel and the floor in front of the pit, is necessarily heavy and cumbersome to position and remove when the vessel door is opened and closed.

The "bridging" distance between the vessel and the front of the pit and thus the length of the bridge may be minimized by employing a vessel door supported for vertical swinging or reciprocating movements. However, this type of construction is expensive, ofttimes creates a serious head room problem and may present a serious safety problem.

SUMMARY OF THE INVENTION

The present invention relates to a hinge arrangement for supporting the door of a pit mounted pressure vessel for both vertically reciprocating and horizontally swinging opening-closing movements in order to minimize the bridging distance between the vessel and the front wall of the pit without creating a safety hazard when the door is in open position.

More specifically, the present hinge construction features a door mounting bearing shaft which is rotatably and slideably supported by a pair of vertically spaced vessel wall mounted bearings; a non-rotatable lift control cylinder which is connected to the lower end of the bearing shaft by a rotatable thrust bearing for effecting vertical reciprocating movements of the bearing shaft and door; and a swing control cylinder, which is end connected to the door and vessel wall for universal movement and is operable to effect horizontal swinging movements of the door about the axis of the bearing shaft. The door may be opened by first operating the swing control cylinder to swing the door sufficiently to clear the door-vessel locking arrangement, by then operating the lift control cylinder to lift the door sufficiently to clear the floor in front of the pit, and finally by again operating the swing control cylinder to swing the door into its fully open position. The savings in "bridging" distance between the vessel and the floor in front of the pit achieved by employing the present hinge construction permits the bridge to be formed as a permanent part of the pressure vessel and be of sufficiently light weight to permit it to be manually pivoted between stored and "bridging" positions when the vessel door is in open position. As by way of example, pressure vessels employing the present invention and having door diameters of 5½ feet, 9 feet and 15 feet would require bridges having lengths of approximately 1½ feet, 2 feet and 3 feet, respectively.

DRAWINGS

The nature and mode of operation of the present invention will now be more fully described in the following detailed description taken with the accompanying drawings wherein:

FIG. **1** is a perspective view of a pit mounted pressure vessel employing the present hinge construction with the vessel door shown in open position.

FIG. **2** is a front elevational view showing the door in closed position;

FIG. **3** is a side elevational view showing the door in closed position;

FIG. **4** is a top plan view showing the door in closed position, as well as various stages of opening; and

FIG. **5** is a diagrammatic view of the control system employed in the present invention.

DETAILED DESCRIPTION

In FIGS. **1–4** of the drawings, a pressure vessel modified in accordance with the present invention is designated as **10** and shown as being partially received within a pit **12** having bottom, side and front walls **14**, 15 and **16**, respectively. Vessel **10** generally includes a horizontally disposed, generally cylindrical shell **18**, which may be suitably supported on pit bottom wall **14**, as by a stand **20**; a door **22** for normally closing shell access opening **24**; a door locking mechanism **26**; a door mounting and operating mechanism **28**; and a bridge device **30** adapted to removably bridge the space or distance between a shell interior mounted material support, such as tracks **32**, and the floor surface **34** in front of pit front wall **16**. As in conventional vessel installations of this type, the depth of pit **12** is sufficient to permit a dolly or other material carrier, not shown, to be rolled horizontally from floor **34** across bridge device **30** and onto tracks **32**.

Door locking mechanism **26** is preferably of the type disclosed for example in U.S. Pat. No. 3,488,883, wherein a locking ring **40** of essentially U-shaped cross section is mounted for rotation about an axis extending coaxially of shell **18** and in straddling association with an annularly extending flange **42**, which bounds access opening **24** and defines a radially extending annular surface **44** against which a corresponding radially extending annular surface **46** of door **22** is adapted to seat in a pressure fluid sealed relationship when the door is locked in closed position. A forwardly facing leg portion **40***a* of locking ring **40** is provided with a plurality of circumferentially spaced through slot openings **48**, which define intermediate portions **50** having tapered wedge elements, not shown, fixed to their relatively inwardly disposed surfaces. In a like fashion door **22** is provided with a plurality of circumferentially spaced through slot openings **52**, which define intermediate portions **54** on which are mounted wedge elements, not shown. It will be understood that when door **22** is moved into a closed position in the manner to be described, intermediate portions **54** are adapted to pass through locking ring slot openings **48** to place surfaces **44** and **46** in juxtaposition with the surfaces of the wedge elements being disposed in a facing, circumferentially spaced relationship. Thereafter, when the locking ring is rotated in the direction indicated by arrow **60** into its locked position illustrated in FIG. **2**, as by operation of one or more fluid cylinders **62**, the surfaces of the wedge elements cooperate to force the

door into tight fluid pressure sealing relationship with flange **42.** A suitable safety interlock or latch device **64,** such as that disclosed in my copending application Ser. No. 312,186, filed Dec. 4, 1972, may be used to releasably retain locking ring **40** in its locked position.

The pressure vessel of the present invention departs from conventional pit mounted pressure vessels of which I am aware in the novel construction of door mounting and operating mechanism **28,** which serves to substantially reduce the spacing between the front end of shell **18** and pit front wall **16** necessary to accommodate for opening movements of door **22.** More specifically, mechanism **28** comprises a shell side wall mounted or first hinge part **70,** which serves to mount vertically aligned upper and lower sleeve bearing devices **72** and **74;** a vertically extending bearing shaft **76,** which is rotatably and slideably supported by sleeve bearings **72** and **74;** a door mounting or second hinge part **78,** which has one end thereof suitably keyed for movement with bearing shaft **76** and has an opposite end fixed to door **22;** a nonrotatable pit mounted lift control cylinder **80,** which is movably connected or coupled to the lower end of bearing shaft **76** by a rotatable thrust bearing **82;** and a swing control cylinder **84,** which is opposite end connected to the wall of shell **18** and second hinge part **78** as by suitable universal couplings **86** and **88,** respectively. Alternatively, lift control cylinder **80** may be directly connected to the second hinge part, and coupling **88** may be directly connected to the bearing shaft.

Preferably, second hinge **78** would be coupled to door **22** via a third hinge part and adjustable bearing mechanism **90** of the type described in above mentioned U.S. Pat. No. 3,488,883. By this construction, door **22** is carried by shaft **76** for horizontal swinging movements under the control of swing control cylinder **84** and for vertical reciprocating movements under the control of lift control cylinder **80.**

To facilitate understanding of the mode of operation of mechanism **28,** specific reference is made to FIGS. **3** and **4,** wherein **D-1, D-2, D-3** and **D-4** designate the positions assumed by universal coupling **88** when door **22** is in its fully closed, first intermediate, second intermediate and fully open positions, respectively.

Cylinders **80** and **84** are part of a control system including electrical and fluid circuits shown in part in FIG. **5.** This system includes lift control cylinder limit switches **LS-3, LS-5** and **LS-9,** which are arranged within control box **92** for cooperation with an operator **94** fixed for vertical movements with piston rod **96** of control cylinder **80;** microswitches **LS-2, LS-4, LS-6** and **LS-7,** which are arranged within control box **100** and cooperate with operator **102** fixed for movement with piston rod **104** of swing control cylinder **84;** shell wall mounted microswitches **LS-1** and **LS-8,** which are responsive to movements of locking ring **40** into its locked and unlocked conditions, respectively; and microswitch **LS-10,** which is located on safety interlock **64** and responsive to the condition thereof. These microswitches serve to control pairs of solenoids **SV-1A** and **SV-1B, SV-2A** and **SV-2B,** and **SV-3A** and **SV-3B,** which control the condition of valves **110, 112** and **114,** which in turn serve to connect locking ring control circuit **120,** swing cylinder control circuit **122** and lift cylinder control circuit **124,** respectively, with a source of fluid under pressure, such as pump **126.**

Again referring to FIg. **5,** it will be seen that swing cylinder control circuit **122** includes a first counterbalance valve **130,** which is arranged in conduit **122*a*** connected into the front end of the cylinder portion **131** of cylinder **84** to apply fluid for the purpose of driving piston **104** towards a contracted or door open condition and a second counterbalance valve **132,** which is arranged in conduit **122*b*** connected into the rear end of cylinder portion **131** to apply fluid for the purpose of driving piston **104** towards door closed condition; valves **130** and **132** including check valves **130*a*** and **132*a*,** bypass valves **130*b*** and **132*b*,** and bypass valve controllers **130*c*** and **132*c*,** which are arranged in flow communication with and responsive only to the presence of pump pressure in conduits **122*b*** and **122*a*,** respectively. Also, it will be seen that lift cylinder control circuit **124** includes a third counterbalance valve **134,** which is arranged in conduit **124*a*** connected into the lower end of the cylinder portion **135** of cylinder **80** to apply fluid for the purpose of driving piston **96** towards an extended or door elevated position; valve **134** including a check valve **134*a*,** a bypass valve **134*b*,** and a bypass valve controller **134*c*,** which is arranged in flow communication with conduit **124*b*** connected into the upper end of cylinder portion **135.** It will be understood that the check valves of valves **130, 132** and **134** serve to prevent exhausting of fluid from cylinders **80** and **84** through their associated conduits until positive operating or pump pressure is applied to their associated bypass valve controllers. By this arrangement piston **104** of swing cylinder **84** is releasably locked against both door opening and closing movements whenever control valve **112** is in its closed or inoperative condition illustrated in FIG. **5.** In a like manner, piston **96** of lift cylinder **80** is releasably locked against door lowering movement until control valve **114** is operated to connect conduit **124*b*** to pump **126.** This is a particularly desirable feature of the present invention in that it affords precise control of intended vertically reciprocating and horizontal swinging opening and closing movements of door **22** in the manner to be described, as well as serving to prevent uncontrolled and potentially dangerous movements of the door in the event of a failure in the control system.

To facilitate understanding of the mode of operation of the present invention, it will be assumed that door **22** is in its fully closed condition, i.e., coupling **88** is in its **D-1** position, locking ring **40** is in its locked condition and safety interlock **64** is operable to prevent unlocking rotations of the locking ring. Thus, lift control cylinder **80** is in its fully retracted position, which is sensed by switch **LS-5** and swing control cylinder **84** is in its fully extended position, which is sensed by switch **LS-6.** Preferably, safety interlock switch **LS-10** is arranged in series circuit with a switch, not shown responsive to the pressure within shell **18,** such as to require that vessel pressure be essentially zero and the safety interlock to be in a locking ring releasing condition before the solenoid operators of any of valves **110, 112** and **114** can be energized.

Now assuming that the pressure within the vessel has been reduced to zero and safety interlock **64** has been manually opened, unlocking movements of locking ring **40** and subsequent opening movements of door **22** may be automatically controlled, if desired, by simply depressing an "open" push button type switch, not shown, of an electrical control circuit, also not shown,

in which the previously described solenoids and microswitches are suitably arranged. The operation of this electrical control circuit is such that when the "open" push button switch is depressed, solenoid SV-1A is operated to open valve **110** to effect extension of cylinders **62** and resultant rotation of locking ring **40** into its unlocked condition, which is sensed by switch LS-1. The closing of switch LS-1 serves to deenergize solenoid SV-1A and to energize solenoid SV-2B, which serves to operate valve **112**, whereby to place cylinder **84** in flow communication with pump **126** via valve **130** to effect contraction of cylinder **84** until operator **102** engages switches LS-2 and LS-4 at which point solenoid SV-2B is deenergized. During this initial contraction of cylinder **84**, coupling **88** is moved from its D-1 position into its D-2 position and door **22** is swung horizontally about the axis of shaft **76** from its fully closed position into its first intermediate position, shown in phantom line as **22***a* in FIG. **4**. The extent of horizontal swinging movement of door **22** is chiefly determined by the requirement that it fully clear or be removed from within the confines of locking ring **40**, whereas the required spacing between the front of shell **18** and pit front wall **16** is determined by both the extent of this initial horizontal swinging momvement of the door and its diameter.

Further, upon operation of switches LS-2 and LS-4, solenoid SV-3A is energized to operate valve **114** and place cylinder **80** in flow communication with pump **126** via valve **134**, whereby to extend piston **96** and elevate bearing shaft **76** until operator **94** engages switches LS-3 and LS-9 at which point solenoid SV-3A is deenergized. During extension of cylinder **80**, coupling **88** is moved from its D-2 position into its D-3 position and door **22** is moved vertically from its first intermediate position into its second intermediate position. The extent of vertical movement of door **22** is determined by the requirement that it be moved vertically from within the confines of the pit, so that it will fully clear floor surface **34** during its subsequent opening movement to be described. During extension of cylinder **80**, piston rod **104** is locked in its intermediate or partially contracted position described above by operation of valves **130** and **132**, such that coupling **88** moves vertically along an arc about the center of coupling **86**, as indicated in FIG. **3**. Although door **22** is subject to a back and forth horizontal swinging movement during this vertical movement of coupling **88**, the extent thereof is so slight in view of the geometry of mechanism **28**, as to produce a negligible increase in the required distance between shell **18** and pit front wall **16**.

Further, upon operation of switches LS-3 and LS-9, solenoid SV-2B is again energized to effect continued contraction of cylinder **84** until operator **102** engages switch LS-7 at which point solenoid SV-2B is deenergized. During this final contraction of cylinder **84**, coupling **88** is moved horizontally from its D-3 position into its D-4 position and door **22** is again swung horizontally about the axis of shaft **76** from its second intermediate position into its fully open position designated as 22b in FIG. **4**. The extent of horizontal swinging movement of door **22** is this time determined by the requirement that it be opened sufficiently to afford desired access to the interior of shell **18**. Also, during and upon completion of this final contraction of cylinder **84**, piston rod **96** of cylinder **80** is locked in its extended position by operation of valve **134**, and when contraction of cylinder **84** is completed its piston rod is locked in its fully contracted position by operation of valves **130** and **132**.

When desired, door **22** may be automatically returned to its fully closed position and locking ring **40** then returned to its locked position by depressing a "close" push button type switch, not shown, provided in the electrical control circuit. During the door closing and locking operation, the above described movements of door **22** and coupling **88** are merely reversed, but in this instance solenoids SV-1B, SV-2A and SV-3B are energized to control operation of valves **110**, **112** and **114**.

As indicated above the required spacing or distance between the front end of shell **18** and pit front wall **16** is chiefly determined by the extent of horizontal swinging movement of the door required to clear locking ring **40**, i.e., remove the door from within the confines of the locking ring. However, this spacing is also to a degree proportional to the diameter of door **22**. As for instance, with the present construction, the length of bridge **30** required to span between tracks **32** and floor **34** will be approximately 1½ feet, 2 feet and 3 feet for doors having diameters of 5½ feet, 9 feet and 15 feet, respectively. This is, however, a substantial reduction in the length of bridge **30**, as compared to conventional pressure vessel installations, and thus permits the bridge to be of a relatively light weight and inexpensive construction. Also, this short bridge length, as compared to door diameter, permits the bridge to be hingedly connected to the forward ends of tracks **32**, as by hinge pins **140** shown only in FIG. **1**, whereby to permit the bridge to be folded upwardly for storage within the front of the pressure vessel when it is in use and then be manually lowered into the operative position shown in FIG. **1** after door **22** has been opened and it is desired to insert or remove material from the vessel.

I claim:

1. A door mounting mechanism for use with a horizontally disposed pressure vessel of the type having a shell defining access opening closeable by said door and a rotatable locking ring mechanism for releasably locking said door in access opening closed position, said shell being mounted within a pit of a depth sufficient to permit a material carrier to be moved essentially horizontally into and out of said shell when said door is in an open position over a bridge removably positioned to bridge between said shell and a floor surface in front of said pit, said mounting mechanism serving to mount said door for both vertical reciprocating and horizontal swinging opening-closing movements between open and closed positions, whereby the "bridging" distance between said shell and said floor surface is less than that required to accommodate solely for horizontally directed swinging movements of said door between said positions, and said mounting mechanism comprising:

a vertically extending bearing shaft;

a first hinge part for mounting said bearing shaft for both horizontally directed rotary and vertically directed reciprocating movements;

a second hinge part having one end thereof affixed to said bearing shaft for movement therewith and an opposite end thereof connected to said door;

a lift control cylinder for imparting vertical reciprocating movements to said bearing shaft, whereby to effect vertical reciprocating movements of said door;

a swing control cylinder for imparting rotary movements to said bearing shaft; whereby to effect horizontal swinging movements of said door; and

circuit means for sequentially controlling operation of said lift and swing control cylinders, whereby in succession to swing said door horizontally from closed position sufficiently to clear said locking ring mechanism, to lift said door vertically sufficiently to clear said floor surface and to swing said door horizontally into said open position.

2. A mechanism according to claim **1**, wherein said circuit means includes means for releasably locking said lift control cylinder in all door lifting positions thereof.

3. A mechanism according to claim **2**, wherein said circuit means includes means for releasably locking said swing control cylinder in all conditions thereof.

4. A mechanism according to claim **1**, wherein said lift control cylinder includes a vertically extending piston rod having its upper end supportingly coupled to a lower end of said bearing shaft by a rotatable thrust bearing; and said circuit means includes conduits connected into lower and upper ends of said lift control cylinder, valve means for selectively connecting said conduits to a source of fluid under pressure whereby to extend and retract said piston rod to lift and lower said bearing shaft, respectively, and means for releasably locking said piston rod in all extended positions thereof until operation of said valve means to place said source of fluid under pressure in communication with said upper end of said cylinder, said locking means including a check valve arranged in the conduit connected in said lower end of said cylinder for permitting passage of fluid therethrough only in a direction towards said lower end of said cylinder, a bypass valve connected into said conduit across said check valve and a control for opening said bypass valve only in response to the operation of said valve means placing said upper end of said cylinder in communication with said source through the other of said conduits.

5. A mechanism according to claim **1**, wherein said circuit means includes conduits connected into opposite ends of said swing control cylinder, valve means for selectively connecting said conduits to a source of fluid under pressure whereby to retract and extend said swing control cylinder to effect horizontal swinging movement of said door, and additional valve means in each of said conduits for permitting flow of fluid from an associated end of said lift control cylinder only upon operation of said valve means to connect an opposite end of said cylinder to said source of fluid under pressure.

6. A pressure vessel comprising in combination:

a pressure vessel shell having a horizontally open access opening and mounting therewithin material support means accessible through said access opening, said shell being mounted within a pit for positioning said material support means in substantially horizontal alignment with a floor surface in front of said pit;

a door for removably closing said access opening;

locking means carried by said shell for releasably locking said door in access opening closed position, said door when in said closed position being partially within the confines of both said pit and said locking means;

hinge means for supporting said door for both horizontally directed swinging and vertically directed reciprocating movements between said closed position and an access opening open position, wherein said door is removed from within the confines of both said pit and said locking means and disposed above said floor surface;

control means for effecting movement of said door between said closed and open positions successively through a first intermediate position effected by a horizontally swinging displacement of said door from said closed position to remove said door from within the confines of said locking means and a second intermediate position effected by a vertical displacement of said door from said first intermediate position to remove said door vertically from within the confines of said pit, said door being swung horizontally from said second intermediate position into said fully open position; and

a bridge for removably bridging the distance between said floor surface and said material support means when said door is in said open position.

7. A pressure vessel according to claim **6**, wherein said bridge is pivotally supported by said material support means and dimensioned to permit upwardly directed swinging movement thereof to assume a bridge stored position within the confines of said shell.

8. A pressure vessel according to claim **6**, wherein said hinge means includes a vertically extending bearing shaft, a first hinge part for mounting said bearing shaft for both horizontally directed rotary and vertically directed reciprocating movements, a second hinge part having one end thereof fixed to said bearing shaft for movement therewith and an opposite end thereof connected to said door; and said control means includes independent means for effecting rotary and reciprocating movements of said bearing shaft and corresponding horizontal swinging and vertical reciprocating movements of said door.

9. A pressure vessel according to claim **6**, wherein said hinge means includes a vertically extending bearing shaft, a first hinge part fixed to said shell and carrying vertically aligned upper and lower bearing devices for supporting said bearing shaft for both horizontally directed rotary and vertically directed reciprocating movements, a second hinge part having one end thereof fixed to said bearing shaft for movement therewith and an opposite end thereof connected to said door; and said control means includes a lift control cylinder for imparting vertical reciprocating movements to said bearing shaft, said lift control cylinder having a cylinder portion fixed within said pit and a vertically displaceable piston rod arranged in vertical alignment with said bearing shaft, said piston rod having an upper end thereof connected to a lower end of said bearing shaft by a rotatable thrust bearing, a swing control cylinder for imparting rotary movements to said bearing shaft, said swing control cylinder having cylinder and piston rod portions thereof connected one to each of said shell and said second hinge part for relative universal movements, and fluid circuit means for sequentially controlling operation of said lift and swing control cylinders.

10. A pressure vessel according to claim 9, wherein said circuit means includes conduits connected into upper and lower ends of said lift control cylinder portion, valve means for selectively connecting said conduits to a source of fluid under pressure whereby to extend and retract its associated piston rod to lift and lower said bearing shaft, respectively, and means for releasably locking said associated piston rod in all extended positions thereof until operation of said valve means to place said source of fluid under pressure in communication with said upper end of said cylinder portion, said locking means including a check valve arranged within the conduit connected into said lower end of said cylinder portion for permitting passage of fluid therethrough only in a direction towards said lower end of said cylinder portion, a bypass valve connected into said conduit across said check valve and a control for opening said bypass valve only in response to the operation of said valve means placing said upper end of said cylinder portion in flow communication with said source of fluid under pressure through the other of said conduits.

11. A pressure vessel according to claim 10, wherein said circuit means additionally includes conduits connected into opposite ends of said swing control cylinder portion, valve means for selectively connecting the last said conduits to said source of fluid under pressure whereby to retract and extend said swing control cylinder piston rod to effect horizontal swinging movements of said door, and additional valve means in each of the last said conduits for permitting flow of fluid from an associated end of said lift control cylinder portion only open operation of the last said valve means to connect an opposite end of said swing control cylinder portion to said source of fluid under pressure.

* * * * *