Dec. 23, 1952 J. FLETCHER ET AL 2,622,549

CLOSURE MEANS FOR CHAMBER WALL OPENING WITH FLUID PRESSURE GAS ESCAPE PREVENTION MEANS

Filed May 23, 1946 3 Sheets-Sheet 1

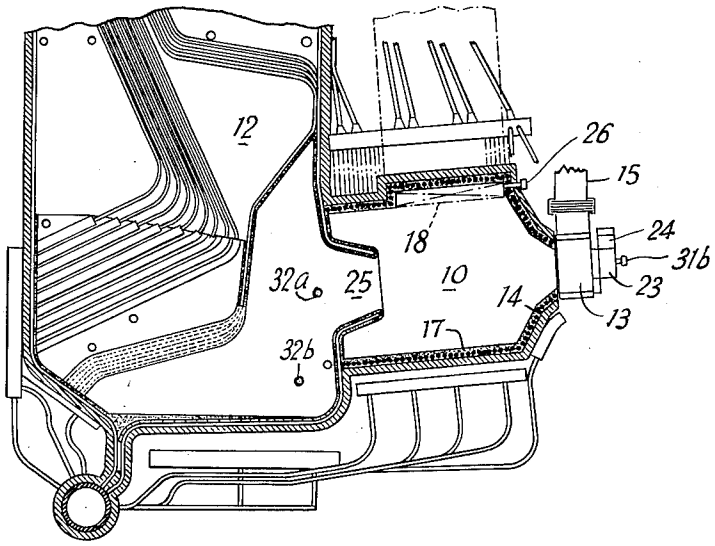


Fig. 1

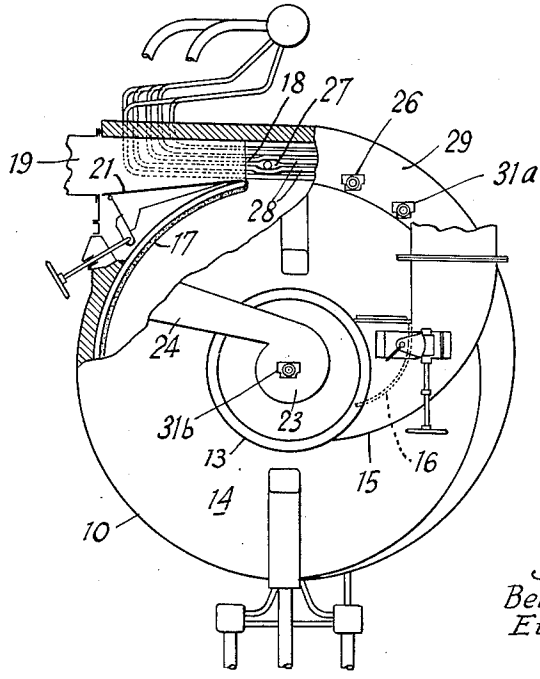


Fig. 2

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Filed May 23, 1946 3 Sheets-Sheet 2

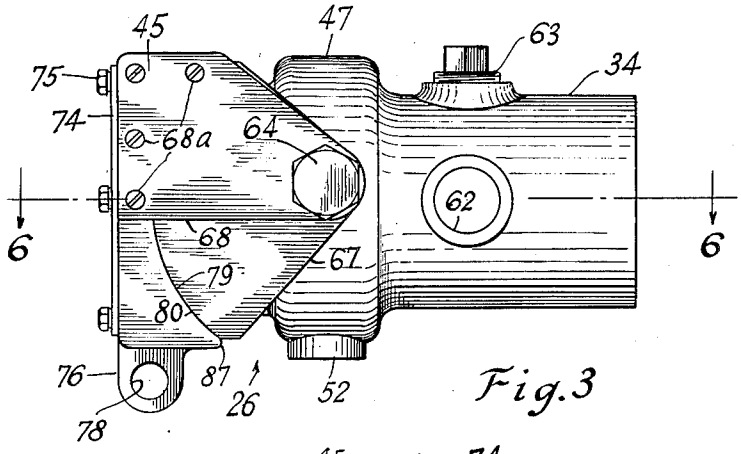


Fig. 3

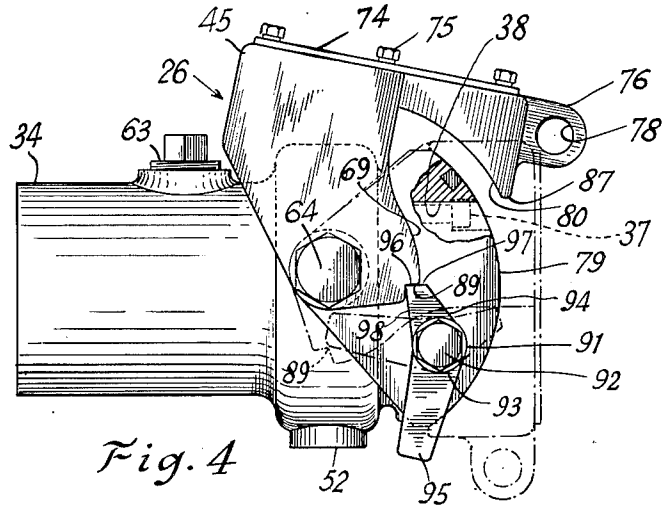


Fig. 4

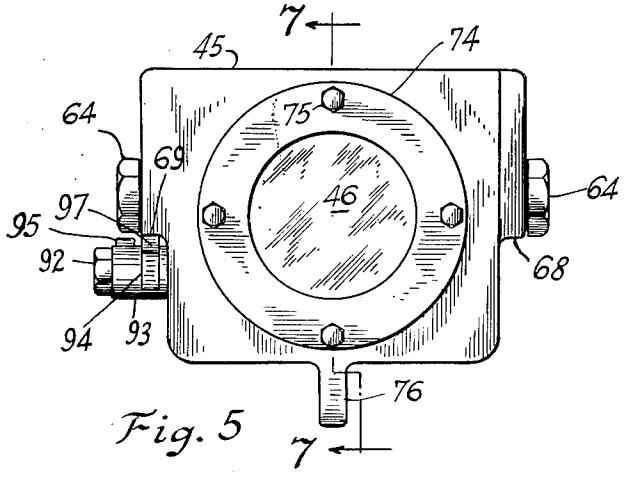


Fig. 5

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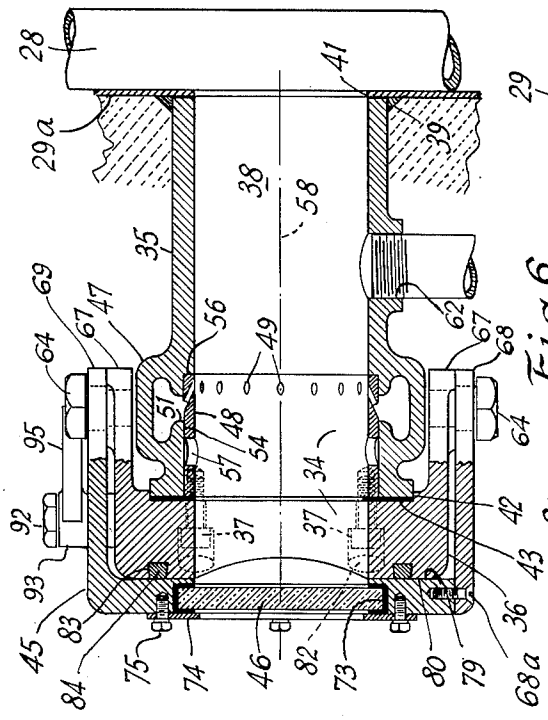


Fig. 6

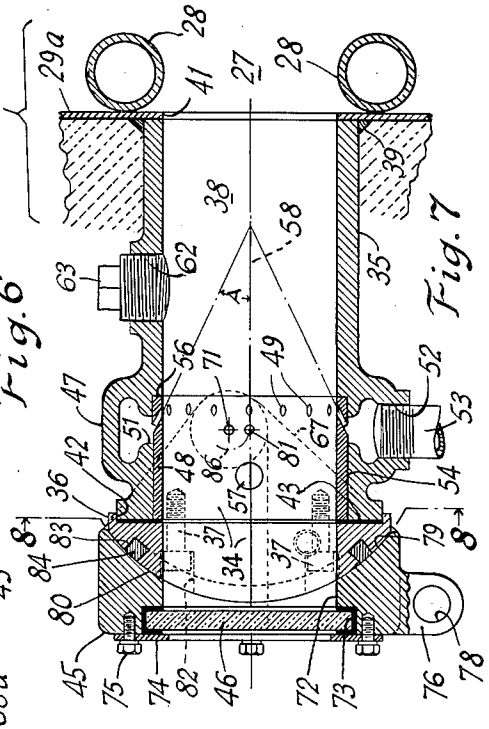


Fig. 7

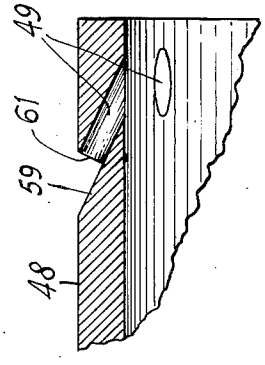


Fig. 9

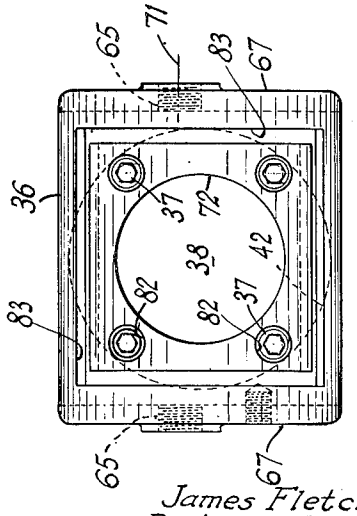


Fig. 8

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UNITED STATES PATENT OFFICE

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CLOSURE MEANS FOR CHAMBER WALL OPENING WITH FLUID PRESSURE GAS ESCAPE PREVENTION MEANS

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Application May 23, 1946, Serial No. 671,852

15 Claims. (Cl. 110—179)

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The present invention relates in general to the construction and operation of closure means especially adapted for incorporation in the walls of furnaces or other closed chambered structures operating under high internal gaseous pressures considerably above atmospheric and requiring access at intervals without necessitating shutdown or causing interference with the normal functioning of the apparatus. Structures suitable for the practice of our invention include boilers for example having a combustion chamber together with a communicating gas flow space wherein gases of combustion are utilized mainly for the generation and heating of vapor. In other suitable structures the high pressure gases may be produced for various other purposes such as for utilization in processes or as a hot motive gaseous fluid for gas turbines.

In such installations the enclosing walls are often fluid cooled to provide protection from high furnace temperatures and further are preferably made gas-tight throughout to avoid the troublesome and dangerous condition resulting from the ejection of high temperature gases and other products of combustion. When a wall opening is provided through which access may be had to the interior for cleaning or other purposes it is essential that the opening be fitted with closure means suitably constructed and arranged so as to maintain the continuity of the gas-tight wall construction. Further, since it is essential in many instances to gain access to the interior during normal furnace operation, it is highly desirable to arrange in some manner to adequately control or to actually prevent the discharge of hot products of combustion when the closure means is moved to expose the opening.

As disclosed in the copending applications of L. Kooistra, Serial No. 617,719, filed September 21, 1945, which has now matured as Patent No. 2,545,886, dated March 20, 1951, and E. H. Selnick, Serial No. 617,777, filed September 21, 1945, which has now matured as Patent No. 2,528,671, dated November 7, 1950, an effective method of restricting the escape of hot combustion gases is through the employment of high velocity jets of air or other gaseous fluid directed in a converging pattern axially of a furnace wall opening. Our present invention, while contemplating a similar use of high velocity fluid jets, includes provision for the utilization of different sizes and arrangements of jets.

An object of the invention is also to provide a closure means wherein fluid jets are directed into a passage communicating with a chamber wall

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opening, and wherein the jet holes are formed in a removable and replaceable element of the wall defining the passage, thereby facilitating among other operations, the cleaning of the holes.

An additional object is the provision of a tubular door frame unit formed of separable sections between which a member providing jet holes is secured.

Another object is the provision of a door for the frame movable about a given axis and having a seating surface therewith of eccentric curvature relative to the axis of door movement.

Among other objects is the provision of means automatically operable to prevent door closing movement when the door is moved into an open position, and releasable to permit automatic return of the door to its closed and seated position.

The various features of novelty which characterize our invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which we have illustrated and described a preferred embodiment of our invention.

Of the drawings;

Fig. 1 is a sectional side elevation of the lower portion of a steam generating unit embodying our invention;

Fig. 2 is a front elevation, partly broken away, of a portion of the structure shown in Fig. 1;

Figs. 3 and 4 are enlarged side elevations, taken from opposite sides, of a closure means indicated in Figs. 1 and 2, Fig. 3 showing the door element closed, and Fig. 4, partly in section, showing the door element open;

Fig. 5 is a front elevation of the assembly shown in Fig. 3;

Fig. 6 is a plan section taken along line 6—6 of Fig. 3 and including an associated wall structure;

Fig. 7 is a vertical section taken along line 7—7 of Fig. 5 and including an associated wall structure;

Fig. 8 is a front view of the door head element of the assembly, taken along line 8—8 of Fig. 7; and

Fig. 9 is a fragmentary enlargement, in section, showing the formation of jet holes.

Figs. 1 and 2 illustrate the invention as embodied in a vapor generating unit of the construction disclosed in the copending application of H. J. Kerr et al., Serial No. 552,120, filed

August 31, 1944, now Patent No. 2,594,312, the unit including a cyclone type of primary furnace 10 from which the products of combustion flow into a secondary furnace 12. The walls of both furnaces are lined with wall cooling tubes suitably arranged and connected so as to provide natural circulation flow paths in parallel with other vapor generating circuits of the unit, the fluid cooled walls being of improved construction enabling the unit to be maintained under relatively high positive internal pressures throughout, as fully disclosed in said Patent No. 2,594,312.

The cyclone type primary furnace 10 is of horizontally elongated substantially circular cross section and preferably fired by a primary burner 13 arranged coaxially thereof in the outer end wall 14, the burner being of a type suitable for the kind of fuel to be fired which for present purposes may be assumed to be a crushed or granular fuel, such as bituminous or semi-bituminous coal.

A stream of primary air and coal is delivered at a relatively high positive pressure through the involute curved primary air-coal pipe 15 which opens tangentially into a lower side portion of burner 13, the effective flow area of the pipe and thereby the velocity of the fuel-air stream being controlled by a manually operated control damper 16. The burner is constructed to impart a radial and forward motion to the entering coal-air stream and the whirling stream moves axially of the primary furnace in a helical path along and in contact with the circular wall 17.

Secondary air is admitted to primary furnace 10 through an axially elongated port 18 angularly spaced approximately 180° from the point of entry of the primary air-fuel stream, the secondary air being delivered to the port through a main air duct 19 having its end section fitting into and opening to the port 18, the velocity of air admission being controlled by a series of dampers 21 arranged to maintain the entering secondary air stream at all times along the primary furnace chamber wall.

A circular tertiary air chamber 23 is arranged at the outer end of the burner 13 and a regulable supply of preheated air is delivered thereto through a duct 24 having an involute curved connection to the chamber 23, producing a whirling stream of tertiary air which is directed axially of the burner.

The primary air-fuel stream thus enters the furnace chamber 10 in a high velocity stream whirling in a clockwise direction with an inner core of tertiary air whirling in the same direction. The fuel-air mixture rapidly ignites and the burning stream flows longitudinally of the furnace chamber at a high angular velocity in a film or layer following a helical path along and in close contact with the furnace circumferential wall. The secondary air enters at substantially the same velocity and direction and gradually merges with the burning stream of primary air and fuel, without disrupting the helical flow path of the latter or separating the primary air-fuel stream from the circumferential chamber wall by a layer of secondary air. Combustion is substantially completed in the primary furnace chamber and the resulting hot gases are discharged through the coaxially arranged rearwardly flaring outlet throat 25 which is formed with an angle of flare of approximately 15° to its axis to provide minimum pressure drop therethrough.

According to one method of operation all of the combustion air may be supplied at a high positive pressure, e. g. 40 in. H_2O, to the primary furnace chamber and a decreasing positive pressure maintained throughout the remainder of the unit.

Openings are provided in the walls of the unit, at various locations, through which furnace operation may be observed and, if desired, a lance or other implement inserted to dislodge slag or other accumulations, or an oil burner or other device inserted to initiate the combustion of fuel introduced through pipe 15.

A suitable closure means for one of such openings is detailed in Figs. 3–9 where an observation and lancing or lighting door assembly 26 is shown as applied to an opening 27 formed between curved tubes 28 associated with a front wall portion 29 of primary furnace 10 adjacent the secondary air inlet port 18. The wall portion 29 includes a metal casing 29a welded to the outer side of wall tubes 28 to provide with other wall portions of similar construction a completely sealed furnace chamber permitting operation at high positive furnace pressures. Doors of the same general type and function may be installed at various other locations such as at 31a and 31b in a wall of the primary furnace 10 and at the circled locations 32a, 32b, etc., in walls of the secondary furnace 12.

The complete door assembly 26 comprises a door frame unit 34 having axially aligned inner and outer end portions or sections 35 and 36 separably connected by circumferentially spaced cap screws 37 and providing a central cylindrical passage 38 in register with a furnace wall opening 27. The inner frame section 35 is secured to the wall casing 29a as by a weld 39 at the perimeter of a hole 41 therein opposite the opening 27 between spaced wall tubes 28. The outer frame section or door head 36 is formed with a counterbore recess 42 therein to receive the circular end of the tubular inner frame section 35 and with the interposed gasket 43 to form an annular fluid-tight joint therebetween.

A door or cover 45, to be described in more detail hereinafter, is mounted on the door head or door seat member 36 for pivotal movement preferably about a horizontal axis, the door having a window 46 therein to permit observation of interior furnace conditions when the door is closed. In order to prevent escape of hot furnace gases and other products of combustion when the door is open for lancing or other operations, provision is made for directing jets of air or other gaseous fluid at high velocity into the frame passage 38 in the direction of the furnace wall opening 27. For this purpose, the frame section 35 is formed with an exterior air manifold 47 extending circumferentially thereof and, radially inward of the manifold, with an interior liner means suitably formed as a cylindrical sleeve 48 having a series of circumferentially spaced holes or ports 49 therein through which air or other gaseous fluid from the manifold may be directed to form the jets. The inner periphery of the manifold is slotted as at 51 to provide a circumferentially continuous outlet to the series of jet holes or ports 49. The inlet to the manifold is provided by a tapped hole 52 to which connection may be made with a pipe 53 leading from a source of air or other gaseous fluid under the required high pressure.

It is to be understood that while Figs. 6 and 7 show the frame unit 34 at right angles to wall 29, other angularities may be employed to advantage in certain locations, depending for example on the direction and velocity of gas flow past the inner end of the chamber wall opening 27. In such

cases in general, it is desirable to install frame unit 34 so that its longitudinal axis, and thereby the longitudinal axis of the converging jet pattern is directed downstream of gas flow interiorly of the chamber, as disclosed for example in the aforesaid Patent No. 2,528,671.

The sleeve 48 is removably assembled interiorly of section 35 within a circumferential recess 54 which terminates in a shoulder 56 at its inner end, the outer diameter of the sleeve providing a sliding fit within recess 54, the inner diameter of the sleeve conforming to the diameter of the frame passage 38, and the length of the sleeve substantially equalling the axial extent of the recess 54. Thus the outer end of sleeve 48 is flush with the outer end of frame section 35 and abuts the gasket 43, thereby maintaining the sleeve in position and at the same time effecting a seal between the sleeve and wall of recess 54 to prevent discharge of high pressure fluid except through the jet holes 49. Diametrically positioned holes 57 in the sleeve, longitudinally spaced from slot 51, enable the sleeve to be engaged by a suitable tool for convenient withdrawal from frame section 35 for inspection, cleaning, renewal, or for substitution of a sleeve having jet holes of different flow characteristics and/or providing a different number or pattern of jets.

A suitable arrangement of jet holes 49, for a sleeve 48 having an internal diameter of 3⅜ in. for example, may consist of sixteen equally distributed circumferentially spaced holes 49 each of ⅛ in. diam. and inclined to the longitudinal centerline 58 of passage 38 at an angle A of 25° toward the furnace wall end of the sleeve, the resulting conical pattern of jets converging within the frame passage 38 toward a point on the central axis 58 closely adjacent the furnace wall opening 27. The holes 49 are suitably drilled from the outer surface of sleeve 48 where an annular groove 59 of right-angled cross section is formed to provide a conical drilling surface 61 normal to the axes of individual holes. With jet holes of the arrangement and size described, for preventing the ejection of gases from a chamber operating at superatmospheric pressures up to 40 in. H_2O, for example, the air supplied to manifold 47 is preferably maintained at pressures above 50 p. s. i.

In addition to the air introduced at high velocity through jet holes 49, a supply of cooling air may be continuously introduced at relatively low pressure and velocity through one or both of the pipe-tap openings 62 from a forced draft fan, not shown, associated for example with the vapor generating unit hereinbefore described. The opening not in use may be closed by a plug 63 as indicated. The continuous supply of cooling air thus introduced serves to maintain a low temperature zone within the door frame unit 34, thereby preventing the door from becoming overheated and possibly distorted, when closed, as a result of furnace radiation, and additionally providing protection to the glass observation window 46. Moreover, if any slight outward leakage should occur, the leakage will be of air rather than of hot furnace gases.

The door or cover 45 is pivoted to door head 36 on hexagonal-headed pivot pins 64 removably secured as by threads 65 to triangularly shaped door head flanges 67 at opposite sides, the pins extending through opposite side flanges or pivot arms 68 and 69 on door 45 and providing a horizontal pivotal axis 71 of door movement located a short distance above the longitudinal centerline 58 of the central frame passage 38. The door 45 is formed with a circular opening 72 in alignment with the cylindrical frame passage 38 when the door is closed, the outer end of opening 72 being enlarged to form an annular recess 73 for the observation window 46 which is held in place by a ring 74 and cap screws 75. A lug 76 at the bottom of the door is formed with a hole 78 therein for engagement by a hooked tool principally for swinging the door from its closed position.

The door seat member 36 and door 45 are provided with companionate seating surfaces 79 and 80 respectively of cylindrical formation and of the same radius, such surfaces having a common horizontal axis of curvature 81 intersecting center line 58 vertically below the pivotal axis 71 when door 45 is closed as shown in Fig. 7. Each of the surfaces 79 and 80 extends through an arc of about 100°–110° arranged symmetrically with respect to the horizontal centerline 58 of frame passage 38. The holes for cap screws 37 are counterbored as at 82 to receive the screw heads and to provide clearance between the heads and the curved door head surface 79. A packing groove 83, of dovetail cross section, filled with asbestos or other suitable packing material 84, is formed in the cylindrical end surface 79 of door head 36, the packing protruding slightly beyond the surface 79 and the groove extending in a rectangular pattern outwardly of the circle of connecting screws 37 as seen in Fig. 8. In order to facilitate the machining of the cylindrical door surface 80, one of the pivot arms, such as arm 68, may initially be formed as a separate member and subsequently secured to the body portion of door 45 by means such as screws 68*a*, substantially as shown.

When the door is in its fully closed position, as seen in Figs. 3 and 7, for example, the curved seat surfaces 79 and 80 are substantially concentric and in contact due to their radii being substantially equal and extending from a common center or axis 81 parallel to the pivotal axis 71 and normal to the centerline 58 of frame passage 38. In this position, the door is seated throughout the perimeter of packing 84 to provide a gas tight seal between the door and its frame 34, the packing being of a deformable character and having sufficient resilience to compensate for any inequality in the radial dimensions of surfaces 79 and 80 which might result from machining, the tolerances normally employed limiting the difference in radii to a maximum of about $\frac{1}{32}$ in. for example, for a nominal radius of each surface of 3⅜ in.

When the door is rotated from its closed position, in a counter-clockwise direction as viewed in Fig. 4, the surfaces 79 and 80 are gradually separated and the door thus moved out of contact with the rim of packing 84 at surface 79. It will be noted that during opening movement of door 45, and similarly during closing movement, the surfaces 79 and 80 are eccentric, and their eccentricity variable, the center of curvature of the frame surface 79 being fixed at 81 and the center of curvature of the door surface 80 moving along an arc 86 about the pivotal axis 71. The resulting movement of door surface 80 relative to frame surface 79 is therefore a combination of radial displacement with angular displacement to provide automatic sealing and unsealing of the joint between the door and its frame, and to minimize abrasive wear of the protruding packing material 84. The variable eccentricity of door surface 80 relative to frame surface 79 thus contributes to

the sealing pressure exerted on packing 84 as the door moves into its closed and seated position.

When the door 45 is swung open to a position where its lower edge 87 is above the uppermost margin of passage 38, as indicated in Fig. 4, a right-angled notch 89 formed in the lower edge of door flange 69 is automatically engaged by an arm of the trigger or latch 91 to hold the door open. The entire cross section of passage 38 is thereby exposed for lancing or other operations, and all holding members 37 are rendered accessible for removal of the outer frame section 36 together with the assembled door 45 from the stationary inner frame section 35, thereby also rendering sleeve 43 accessible for removal from the inner frame section 35. The trigger 91 is in the form of a lever mounted intermediate its length on a hexagonal-headed pivot pin 92 screwed into the side of door head 36, the trigger having a cylindrical body portion 93 through which the pivot pin 92 extends and from which arms 94 and 95 of unequal lengths project radially in generally opposite directions and in longitudinally offset relation. In the open position of the door, the side 96 of notch 89 is substantially horizontal and is engaged by the end surface 97 of the shorter trigger arm 94, the adjoining side surface 98 defining with surface 97 an angle less than a right angle to enable the arm 94 to be seated throughout the full depth of the notch. The longer counter-weight arm 95, for this position, is inclined to the vertical at an angle of about 15° to provide a certain amount of leverage holding the arm 94 in its seated position within the apex of the notch.

When door 45 is to be closed, the trigger 91 is rotated clockwise, as viewed in Fig. 4, suitably by a blow on the depending lever arm 95 to force the short upper arm 94 out of engagement with notch 89, the door then being free to respond to the force of gravity and automatically dropping to its closed position adjacent the door head surface 79 where it becomes wedged against the rim of packing material 84.

While in the disclosure of this invention the closure means has been described with reference to its application to a specific form of boiler furnace operating at positive pressures of the order of 40 in. H_2O, nevertheless, it is to be understood that our invention may also be usefully applied to furnaces and other chambered structures of various types operating at positive internal pressures ranging upwardly to 90 or 100 p. s. i., wherein the problem of preventing the discharge of high temperature gases becomes increasingly difficult.

While in accordance with the provisions of the statutes we have illustrated and described herein the best form of our invention now known to us those skilled in the art will understand that changes may be made in the form of the apparatus disclosed without departing from the spirit of the invention covered by our claims, and that certain features of our invention may sometimes be used to advantage without a corresponding use of other features.

We claim:

1. Closure means for a chamber wall opening comprising a tubular frame having longitudinally adjoining inner and outer sections providing a continuous passage therethrough for registry with said opening, a door for said passage at the outer end of said frame, said outer frame section and said door having companionate seat surfaces of corresponding curvature about a common axis extending transversely of said passage, a pivot support for said door mounted on said outer frame section and arranged for door movement about an axis parallel to and spaced from said axis of curvature, said axis of door movement intersecting said passage within said inner frame section, and means for separably connecting said sections.

2. Closure means for a chamber wall opening comprising a tubular frame having longitudinally adjoining inner and outer sections providing a continuous passage therethrough for registry with said opening, a door for said passage at the outer end of said frame, said outer frame section and said door having companionate seat surfaces of corresponding curvature about a common axis extending transversely of said passage, a pivot support for said door mounted on said outer frame section and arranged for door movement about an axis parallel to and spaced from said axis of curvature, said axis of door movement lying within the concavity of said surfaces, and means for separably connecting said sections comprising circumferentially spaced holding members extending axially through said outer section at locations covered by said door when said door is closed and rendered accessible when said door is open.

3. Closure means for a chamber wall opening comprising a tubular frame having longitudinally adjoining inner and outer sections providing a continuous passage therethrough for registry with said opening, a door for said passage at the outer end of said frame, said outer frame section and said door having companionate seat surfaces of corresponding curvature about a common axis extending transversely of said passage, a pivot support for said door mounted on said outer frame section and arranged for door movement about an axis parallel to and spaced from said axis of curvature, a rim of packing protruding from the curved seat surface of said outer frame section and surrounding said passage, and means for separably connecting said sections comprising circumferentially spaced holding members extending axially through said outer section at locations within the area enclosed by said packing.

4. Closure means for a chamber wall opening comprising a tubular frame providing a passage for registry with said opening, a door for opening and closing said passage, said frame including an inner frame section adapted for rigid securement to the wall containing said opening and an outer frame section supporting said door, said door and said outer frame section having companionate seating surfaces thereon of cylindrical curvature about a common axis in a plane normal to the longitudinal axis of said passage, said door and said outer frame section each having flanges thereon extending longitudinally of said frame at opposite sides, means for pivotally connecting said door and frame section flanges for door movement about an axis spaced from said axis of curvature, said axis intersecting said passage within said inner frame section, and means for separably connecting said outer and inner frame sections comprising axially extending holding members removably secured in one of said sections.

5. The combination with a tubular element which comprises a tubular head section assembled axially of said element to provide a continuous passage through said head section and element, a door for opening and closing said

passage, said door and said head section having companionate cylindrical seat surfaces thereon of substantially the same radius, said cylindrical seat surfaces having a common horizontal axis of curvature intersecting the longitudinal axis of said passage when said door is closed, means for separably connecting said head section to said tubular element comprising holding members extending axially of said tubular element and section, horizontally aligned pivots at opposite sides of said tubular element for supporting said door for movement about an axis vertically above said common axis of curvature, and a pivoted latch for holding said door in an open position, said door having a flange thereon extending normal to said pivotal axis along one side of said tubular element and having a notch in a lower edge portion thereof for engagement by said latch.

6. Closure means for a chamber wall opening comprising a tubular frame formed of longitudinally aligned inner and outer sections providing a continuous passage therethrough for registry with said opening, a door for said passage having its seat at the outer end of said frame, said sections terminating in end surfaces defining an annular joint therebetween, one of said sections having its inner wall surface formed with an annular recess extending axially from said joint, a sleeve removably fitting said recess and having holes therein extending from the outer to the inner periphery thereof for directing air into said passage, air supply means in communication with said holes at the outer periphery of said sleeve, and means for separably connecting said sections.

7. Closure means for a chamber wall opening comprising a tubular frame formed of longitudinally adjoining front and rear sections providing a continuous passage therethrough for registry with said opening, a door for said passage having its seat at the front end of said frame, said sections terminating in end surfaces defining an annular joint therebetween, said front section having its end surface at said joint formed with an annular recess into which the adjoining end of said rear section extends, an annular gasket assembled within said recess between said sections, said rear section having its inner wall surface formed with an annular recess extending axially from said gasket, a sleeve removably fitting said last named recess and having holes therein extending from the outer to the inner periphery thereof for directing air into said passage, air supply means in communication with said holes at the outer periphery of said sleeve, and means for separably connecting said sections.

8. In combination with a wall constructed to prevent the escape of gaseous fluid from a chamber operating under superatmospheric pressure, said wall including fluid carrying tubes together with a casing secured to said tubes and having an opening therein providing communication with said chamber between adjacent tubes, closure means for said opening comprising a tubular frame providing a passage in register with said opening, a door for opening and closing said passage, said frame including a stationary inner section having its inner end secured to said casing and an outer frame section separably joined to said inner frame section and supporting said door, said outer frame section providing a seat for said door, a sleeve removably assembled interiorly of said inner frame section and having circumferentially spaced holes therein extending from the outer to the inner periphery thereof for directing jets of gaseous fluid into said passage to prevent the ejection of fluid from said chamber when said door is open, and means for supplying said fluid to said holes comprising a fluid supply chamber surrounding said sleeve and having an inner wall portion open to said holes at the outer periphery of said sleeve.

9. Closure means for a chamber wall opening comprising a tubular frame formed of longitudinally adjoining inner and outer sections providing a continuous passage therethrough for registry with said opening, a door for said passage having its seat at the outer end of said frame, said sections terminating in a common annular joint in a plane normal to the longitudinal extent of said passage, one of said sections having its inner wall surface formed with an annular recess extending axially from said joint, a sleeve removably fitting said recess and having spaced holes therethrough for directing air into said passage in jets, means including a manifold arranged exteriorly of said sleeve for supplying air to said holes, and means for separably connecting said sections.

10. Closure means for a chamber wall opening comprising a tubular frame formed of longitudinally adjoining inner and outer sections providing a continuous passage therethrough for registry with said opening, a door on said frame movable with respect to said passage, said outer frame section providing a seat for said door, said sections terminating in a common annular joint in a plane normal to the longitudinal extent of said passage, a sleeve removably assembled interiorly of said frame adjacent said joint and providing an inner wall in common with the wall of said passage, said sleeve having circumferentially spaced holes therein arranged to direct air into said passage in jets, means for supplying air to said holes comprising a manifold arranged outwardly of said sleeve and having a circumferentially continuous outlet overlying the outer ends of said holes, said manifold forming an intermediate wall portion of said frame and being adapted to receive air under pressure, and means for separably connecting said sections.

11. The combination with a tubular frame providing a passage extending horizontally therethrough, a door for said passage at the outer end of said frame, said door and said frame having companionate cylindrical seat surfaces thereon of substantially the same radius about a substantially common and horizontally arranged axis of curvature when said door is closed, said axis extending transversely of and through said passage, pivot supports for said door arranged in substantially hoizontal alignment at opposite sides of said frame and supporting said door for angular movement about a pivotal axis parallel to and upwardly displaced from said axis of curvature, and latching means for releasably holding said door in a predetermined position, said door having a member integral therewith arranged transversely of said pivotal axis along one side of said frame and presenting an abutment surface for engagement by said latching means, and a support for said latching means fixed in relation to said frame and disposed below the path of movement of said integral side member.

12. Closure means for a chamber wall opening comprising a tubular frame providing a continuous passage therethrough for registry with

said opening, a door for said passage having its seat at the outer end of said frame, a sleeve removably assembled within said passage in contact with the peripheral wall thereof and having holes therein extending from the outer to the inner periphery of said sleeve for directing gaseous fluid into said passage, and gaseous fluid supply means in communication with said holes at the outer periphery of said sleeve.

13. Closure means for a chamber wall opening comprising a tubular frame providing a continuous passage therethrough for registry with said opening, a door for said passage having its seat at the front end of said frame, liner means removably assembled within said passage in contact with the peripheral wall thereof and having holes extending therethrough from outer to inner surface portions of said liner means for directing gaseous fluid into said passage, and gaseous fluid supply means in communication with said holes at said outer surface portions.

14. Closure means for a chamber wall opening comprising a tubular frame formed of longitudinally adjoining front and rear sections providing a continuous passage therethrough for registry with said opening, a door for said passage having its seat adjacent the front end of said frame, said sections terminating in a common peripheral joint therebetween, liner means removably assembled within one of said sections adjacent the inner wall surface thereof and having spaced holes therethrough for directing gaseous fluid into said passage in jets, means for separably connecting said sections, and means for supplying said fluid to said holes comprising a fluid supply chamber formed in the wall of said one frame section and having an inner wall portion open to said holes at outer surface portions of said liner means.

15. The combination with a tubular element which comprises a tubular head section assembled axially of said element to provide a continuous passage through said head section and element, a door for closing and opening said passage in extreme positions of movement of said door, said door and said head section having companionate cylindrical seat surfaces thereon of substantially the same radius, said cylindrical seat surfaces having a common horizontal axis of curvature intersecting said passage when said door is closed, means for separably connecting said head section to said tubular element, horizontally aligned pivots at opposite sides of said tubular element for supporting said door for movement about an axis offset from said common axis of curvature, and latch means for holding said door stationary in one of said extreme positions of door movement, said door having a flange thereon extending transversely of said pivotal axis along one side of said tubular element and having an indentation therein for engagement by said latch means in said one extreme position of door movement.

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