June 1, 1948. L. WILPUTTE 2,442,391

SELF-SEALING LEVELLER-DOOR CLOSURE FOR COKE OVENS

Filed Feb. 24, 1944 2 Sheets-Sheet 1

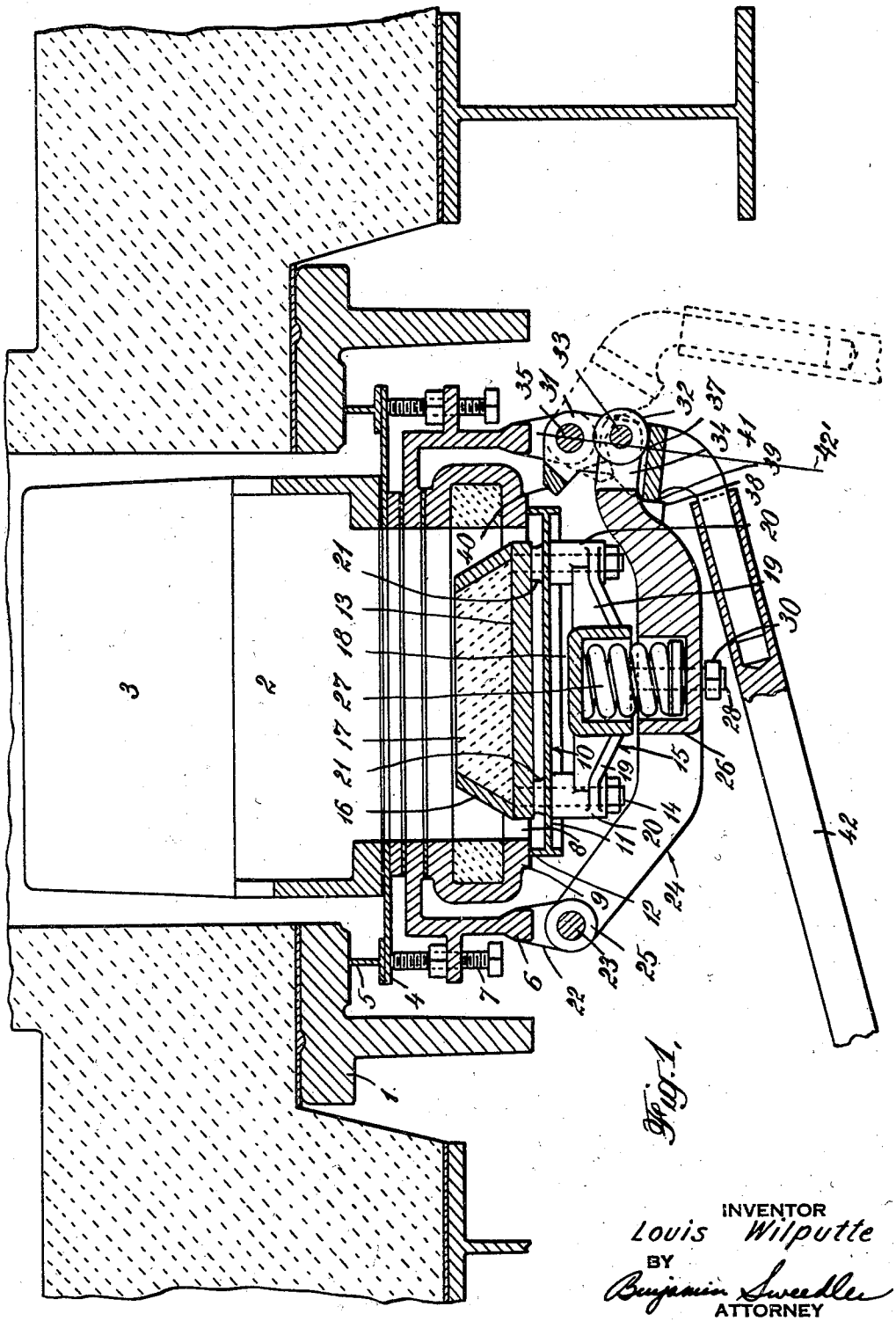


Fig. 1.

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Fig. 2.

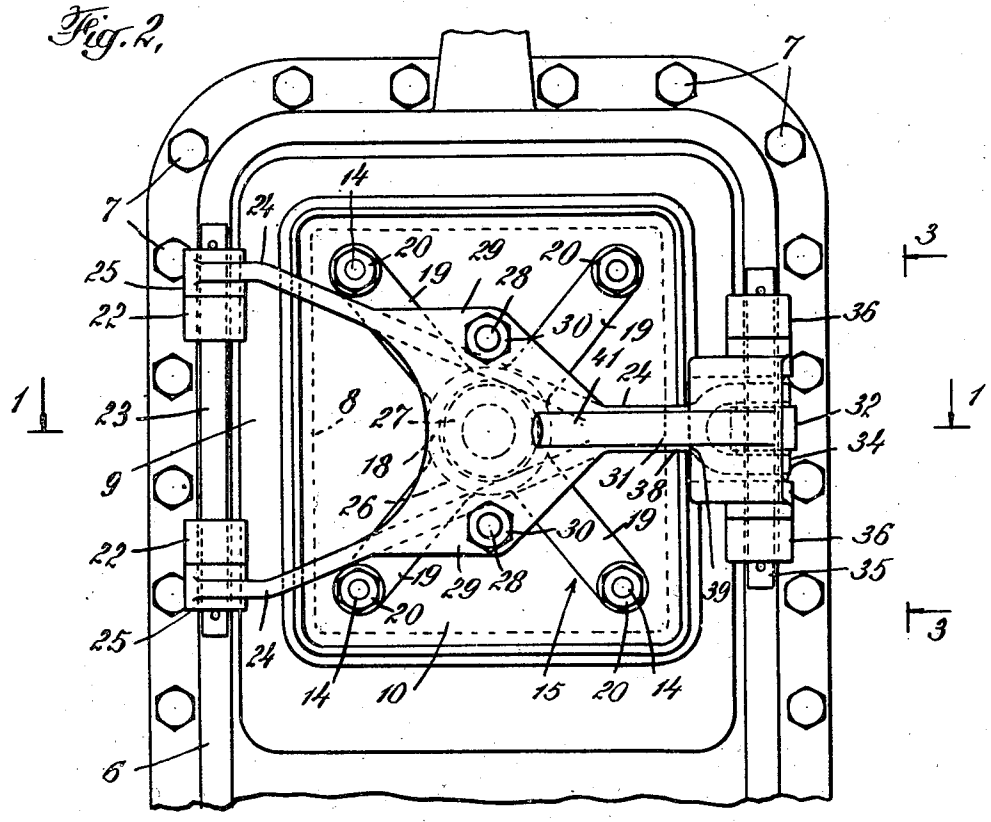
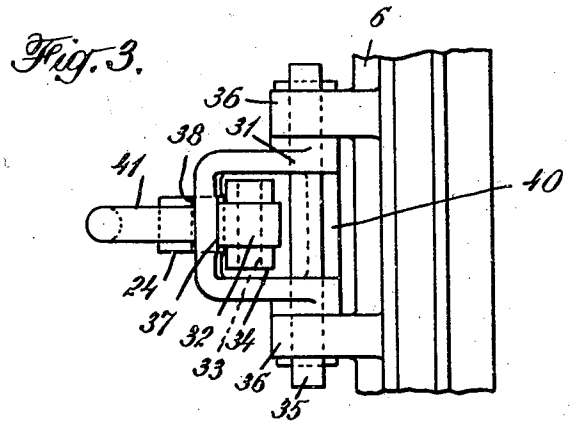


Fig. 3.



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SELF-SEALING LEVELLER-DOOR CLOSURE FOR COKE OVENS

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5 Claims. (Cl. 202—248)

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The present invention relates to door closures, and more particularly to the so-called "chuck" or coke oven leveler doors.

It is common practice in the coke oven art to provide each door on the pusher side of the battery near the upper portion thereof with a small opening, to permit entrance into the coking chamber and withdrawal from the coking chamber of the leveler bar which functions to level the charge of coal introduced into the chamber. A door is employed to close this opening during the coking of the coal charge, which door is opened to permit the entrance of the leveler bar into and its withdrawal from the coking chamber.

In known leveler door structures the pressure necessary for a tight seal of the leveler door has been applied for the most part either by means of a hand wheel on a threaded bolt, movement of which wheel in one direction tends to force the door toward its seat and in another direction permits movement of the door away from the seat, or by a locking bar driven tightly against a latch by a wedge action. In these structures the pressure exerted on the door varies greatly, depending upon the design of door, the strength of the operator, and the attention given by him to the closing of the door.

Furthermore, the leveling door opening is impinged on its side within the coking chamber by the distillation gases evolved in the coking chamber. Accordingly, condensation of tarry and pitchy constituents takes place on the leveling door frame which deposits tend to interfere with proper seating of the door. After the door is closed and the coking chamber is heated up, these deposits soften, and in heretofore known leveler doors provide a leakage space between the leveler door and the leveler door frame.

It is an object of this invention to provide a self-sealing door closure, particularly a self-sealing leveler door, in which a constant and uniform pressure is exerted on the door to maintain it in seated position, which pressure functions to force the sealing edge of the door into and through any tar or pitchy material on the door frame to maintain a tight seal. Another object is to provide a door closure equipped with a latch for maintaining the door in closed position, which closure is substantially fool-proof, i. e., unless the door is latched so that the desired pressure is exerted on the door to maintain it in sealing engagement with the door frame the door will spring open.

Other objects and advantages of this invention will be apparent from the following detailed

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description thereof, taken in connection with the accompanying drawings, in which Figure 1 is a section taken in a plane lying horizontally and extending through the leveler door embodying my invention along line 1—1 of Figure 2.

Figure 2 is a front elevation of the leveler door embodying my invention;

Figure 3 is a detailed side elevation taken in the direction indicated by the arrows 3—3 on Figure 2.

In the preferred embodiment illustrated on the drawing the invention is shown incorporated in a leveler door for a coke oven on the pusher side of a coke oven battery, and the present description will be confined to the illustrated embodiment of the invention. It will be understood, however, the novel features and improvements are susceptible to other applications, such, for example, as door closures for openings other than leveler door openings or doors not of the self-sealing type, as is the door shown on the drawing. Hence, the scope of this invention is not confined to the embodiment herein described.

In the drawing reference character 1 indicates the door frame defining the coke oven door opening on the pusher side of the coke oven battery. This opening is adapted to be closed by a door indicated generally by the reference character 2 comprising an inner plug section 3, a sealing member 4 carrying sealing knife edge 5, and a supporting frame 6. Bolts 7 pass through the supporting frame 6 and are adapted to be adjusted to tension the sealing plate 4 to maintain the knife edge 5 in desired sealing engagement with the door frame. The construction of the coke oven door, which does not form a part of this invention, may be of any desired type. It may be of the same general type as that disclosed in my patent 2,238,239 of April 15, 1941, or in Figs. 5 and 6 of Patent No. 2,126,239, granted August 9, 1938, to which reference may be had for a more detailed description of the door construction.

Disposed at the top of the door is a leveler door opening 8 which may be of rectangular or other configuration. This opening is defined by a leveler door frame 9 suitably secured to the door proper. For sealing the leveler door opening 8, leveling door 10 of n invention may be used.

In the preferred embodiment of this invention, door 10 comprises a flexible metal sealing plate 11 extending across the full width and from top to bottom of the leveler door opening 8. Welded to the edges of plate 11 is a metal sealing frame

12 adapted to make knife-edge contact with the door frame 9. The inner surface of plate 11 is protected against the high temperatures generated within the coking chamber by a heavy metal plate member 13 which may be secured over plate 11 by nuts and bolts 14 passing through a spider 15 on the outer side of the flexible plate 11, which spider is hereinafter more fully described. If desired, a metal frame 16 may be formed integrally with or fastened to the plate 13 to provide a holder for a refractory lining 17. While a self-sealing type of door has been described and represents a preferred embodiment of the invention, it will be understood that other types of doors, such as rigid doors not of the self-sealing type making edge contact with the door frame, may be used.

The spider 15, which may be a casting having a housing portion 18 and four arms, each identified by the reference character 19, extending from the housing portion 18 and terminating in bosses 20, as above noted, is secured to the outer side of the flexible metal plate 11 by nut and bolts 14. Suitable spacers 21, which may be cup-shaped flexible members, are provided between the heavy metal plate 13 and the flexible metal plate 11 so that when the nuts are drawn tight on the bolts the heavy metal protecting plate 13 is maintained in spaced relation relative to the flexible plate 11, and this plate retains its flexibility thus insuring a gas-tight seal between the sealing edge 12 and the door frame 9.

Standards 22 are mounted on the coke oven door. These standards may be integral with the supporting frame of the coke oven door or may be bolted, welded or otherwise secured thereto. In the embodiment of the invention shown in the drawings two standards 22 are employed providing a bearing for the pivot pin 23, the longitudinal axis of which extends in the same longitudinal direction as the longitudinal axis of the leveler door. A lever arm 24 has one end bifurcated and provided with bearings 25 mounted on the pivot pin 23 so that the lever arm can pivot about this pin in a direction away from and towards the coke oven door. This lever arm 24 has a portion thereof overlying the housing portion 18 in the spider to provide a housing 26 for a compression spring 27. This spring 27 is maintained under partial compression in housing 26 by means of bolts 28 which may be formed integral with or secured to the housing portion 18 of the spider 15 and extend through the flattened portion 29 of the arm 24 defining the top or cover portion of the housing 26.

The openings in the flattened portion 29 of the arm 24 through which the bolts 28 extend are slightly larger than the diameter of the bolts, permitting limited movement of the arm 24. A nut 30 is provided for each bolt 28 and these nuts may be adjusted to vary as desired the pressure exerted by the spring.

As above indicated, the spring 27 is confined in the housing 26 under partial compression; the amount of compression, however, is somewhat less than that employed to maintain the sealing door in sealing engagement when the door is in closed position and the lever arm 24 latched to hold this door in closed position under a predetermined constant pressure. The latch mechanism employed for so holding the door is disposed at the side of the coke oven door opposite that in which the pivot pin 23 is mounted. This latch mechanism consists of a latch link 31, hereinafter more fully described, cooperating with a roller 32 mounted on a pin 33 disposed in the forked end 34 of the arm 24. The latch link 31 is pivotally mounted on pivot pin 35 mounted in standards 36 which, like the standards 22, may be integral with or suitably fastened to the supporting frame of the coke oven door. The link 31 has a plane or bearing surface 37 at the end thereof directly opposite pivot pin 35 to engage the roller 32. A stop member 38 is formed integral with arm 24 and is adapted to be engaged by an extension 39 on the link 31 to limit the travel of the link in a direction toward the left-hand side, viewing Figure 2 of the drawing, i. e., when extension 39 engages stop member 38 further movement of the link is prevented and the bearing surface 37 exerts substantially maximum pressure on the roller 32 to maintain the leveler door in sealing engagement with the leveler door frame.

A second stop member 40 is formed integral with the portion of the link pivoted on pivot pin 35. When the link is swung in a right-hand direction, viewing Figure 2, this stop member engages the arm 24 and functions to break the seal between the self-sealing door 10 and the door frame 9. Secured to the portion of the link carrying the bearing surface 37 is an extending arm 41 adapted to be engaged by a handle 42. This handle is placed on the extending arm 41 when it is desired to seal or unseal the leveler door, and after sealing the handle may be removed. Thus, only one handle is required by the operator for effecting opening and closing of the door.

When it is desired to close and seal the door, the arm 24 is first moved to place the door in position over the door frame 9, latch link 31 is next swung about its pivot pin 35 so that the bearing surface 37 engages the roller 32 and movement of the latch link continued until the extension 39 engages stop 38, in which position, through action of the bearing surface 37 on the roller 32, the spring 27 is further compressed to the extent desired to maintain the sealing door in sealing engagement.

It is important to note when the link 31 is in position to effect sealing of the door the longitudinal axis of the link 31 indicated by line 42' is disposed transversely, i. e., to the left, viewing Figure 1, of the axis of roller 32. With this construction, if the operator does not move the latch link 31 a distance such that the longitudinal axis of the link 31 is disposed transversely of the axis of the roller 32, the spring 27 will cause the arm 24 to move the latch link 31 about its pivot 35 so that it will be evident to the operator the door is not fully closed. In order to properly close the door, the operator must move the link 31 to a position such that its longitudinal axis is disposed to the left, viewing Figure 1, of the axis of the roller 32, preferably so that the extension 39 engages stop 38. When this is done, a predetermined constant, uniform pressure is exerted on the door to maintain it in sealing engagement with the door frame. Hence, the door of the invention is substantially fool-proof.

It will be further noted that in the design of door herein described the action of the spring continues to be applied uniformly to the sealing edge of the door and thus forces this edge into any tar or pitchy deposit which may be present on the door frame, the pressure being exerted on the sealing edge at all times so that even though this tar or pitchy deposit soften a tight seal between the sealing edge and the door frame is still provided. Furthermore, due to the flexibility of the sealing plate 11, any slight warpage of the

door frame which might be caused by the intense heat to which the door is subjected is compensated for.

It is to be understood that this invention is not restricted to the present disclosure otherwise than as defined by the appended claims.

What is claimed is:

1. A self-sealing leveler door for a leveler door opening in a coke oven door comprising a leveler door frame; a leveler door comprising a flexible metal plate, a sealing frame secured to the flexible metal plate to engage the said door frame and a housing portion; an arm pivoted at one side of the door, extending thereacross and having a portion cooperating with the aforesaid housing portion to house a compression spring; the compression spring in said housing being maintained in partially compressed condition; a latch mechanism on the other side of the door, said latch mechanism comprising a pivoted link, a roller on said arm, said roller being disposed to be engaged by a bearing surface on said link, said latch mechanism being constructed and arranged so that when the latch mechanism is moved into position to effect sealing of the door the longitudinal axis of the link is disposed laterally relative to the axis of the roller.

2. A self-sealing leveler door closure for a leveler door opening in a coke oven door for a coking chamber opening, comprising a leveler door frame, a leveler door comprising a flexible metal sealing frame having a knife edge for making edge contact with said door frame, a heavy plate protecting said flexible metal sealing frame against the high temperatures generated within the coking chamber, a compression spring, means on said sealing frame providing a bearing support for said compression spring, said means being constructed and arranged so that the pressure of said compression spring is substantially uniformly distributed by said means throughout the entire periphery of said sealing frame, said compression spring being maintained under partial compression at all times, and means for further compressing said spring to maintain said knife edge in sealing engagement with the door frame when it is desired to seal the leveler door opening.

3. A self-sealing leveler door closure, comprising a door frame having a sealing surface, a door comprising a flexible metal sealing plate having a knife edge for engagement with the said sealing surface, a pivoted arm on which said door is mounted, the said arm being disposed across the width of the door and having a portion thereof extending beyond the door, a compression spring between said arm and the door for exerting pressure on the door to maintain it in sealing engagement with the said sealing surface, said spring being maintained in a partially compressed condition, a latch mechanism for engaging the said extending portion of said arm, said latch mechanism comprising a pivoted link, a roller carried by said arm, and a bearing surface on said link to engage said roller to further compress the spring to exert a desired pressure on the door.

4. A self-sealing leveler door closure, comprising a door frame having a sealing surface, a door comprising a flexible metal sealing plate having a knife edge for sealing engagement with the said sealing surface, a pivoted arm on which said door is mounted, the said arm being disposed across the width of the door and having a portion thereof extending beyond the door, a compression spring between said arm and the door for exerting pressure on the door to maintain it in sealing engagement with the said sealing surface, said spring being maintained in a partially compressed condition, a latch mechanism for engaging the said extending portion of said arm, said latch mechanism comprising a pivoted link, a roller carried by said arm, and a bearing surface on said link to engage said roller to further compress the spring to exert a desired pressure on the door, said link having a portion adapted to engage the arm when the link is swung in position to release the door from sealing engagement with the door frame to break the seal between the door and the door frame.

5. A self-sealing leveler door closure for a leveler door opening in a coke oven door for a coking chamber opening comprising a leveler door frame, a leveler door comprising a flexible metal sealing frame having a knife edge for making edge contact with said door frame, a compression spring, means on said sealing frame providing a bearing surface for said compression spring, said means being constructed and arranged so that the pressure of said compression spring is substantially uniformly distributed by said means throughout the entire periphery of said sealing frame, closure operating means engaging said spring to partially compress the same, and means engaging said closure operating means to further compress said spring to maintain said knife edge in sealing engagement with the door frame when it is desired to seal the leveler door opening.

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