July 10, 1923. 1,461,324

F. PUENING

APPARATUS FOR COKING LIQUEFIABLE BITUMINOUS MATERIALS

Filed Dec. 20, 1920 3 Sheets-Sheet 1

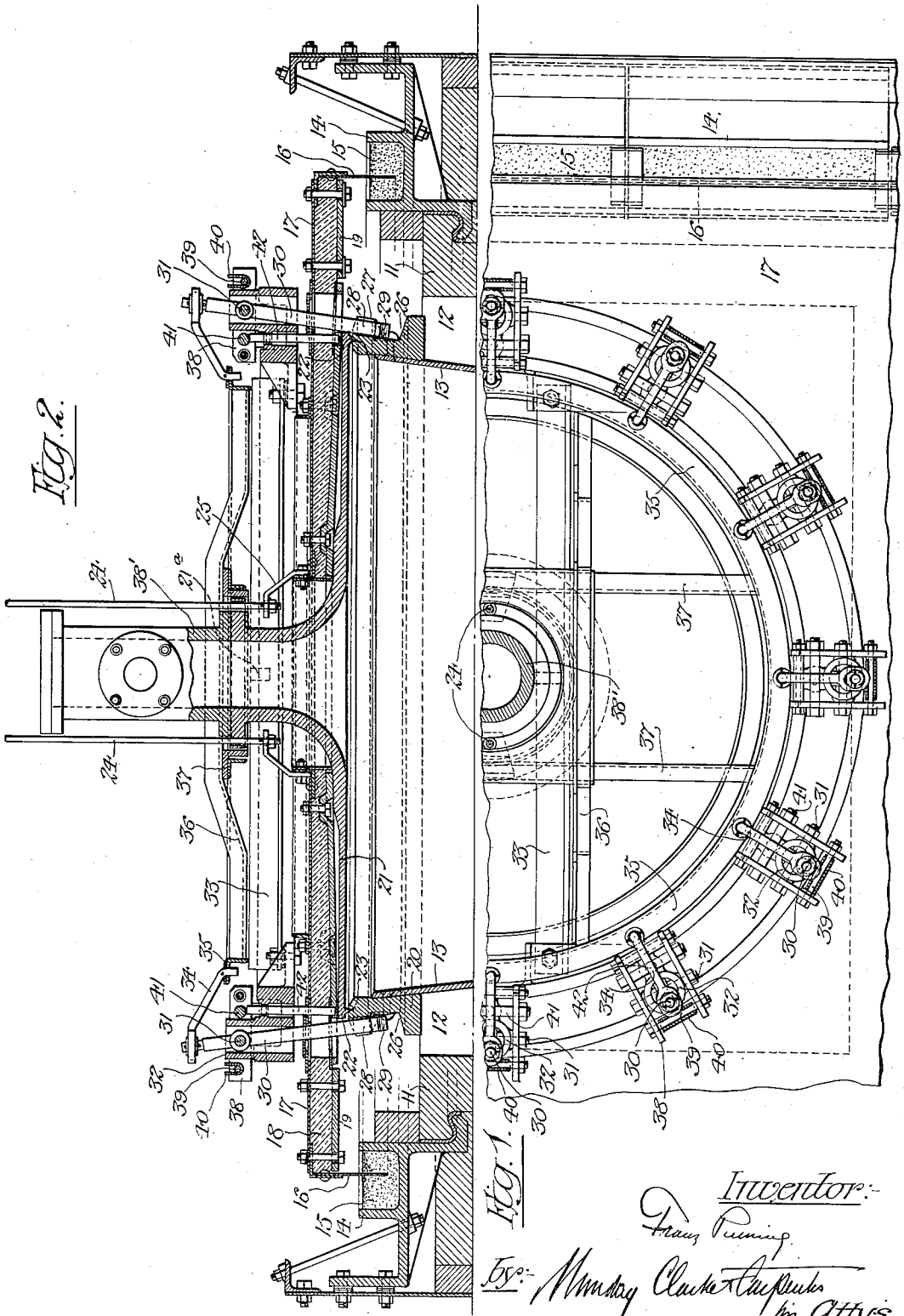


Fig. 2.

Fig. 1.

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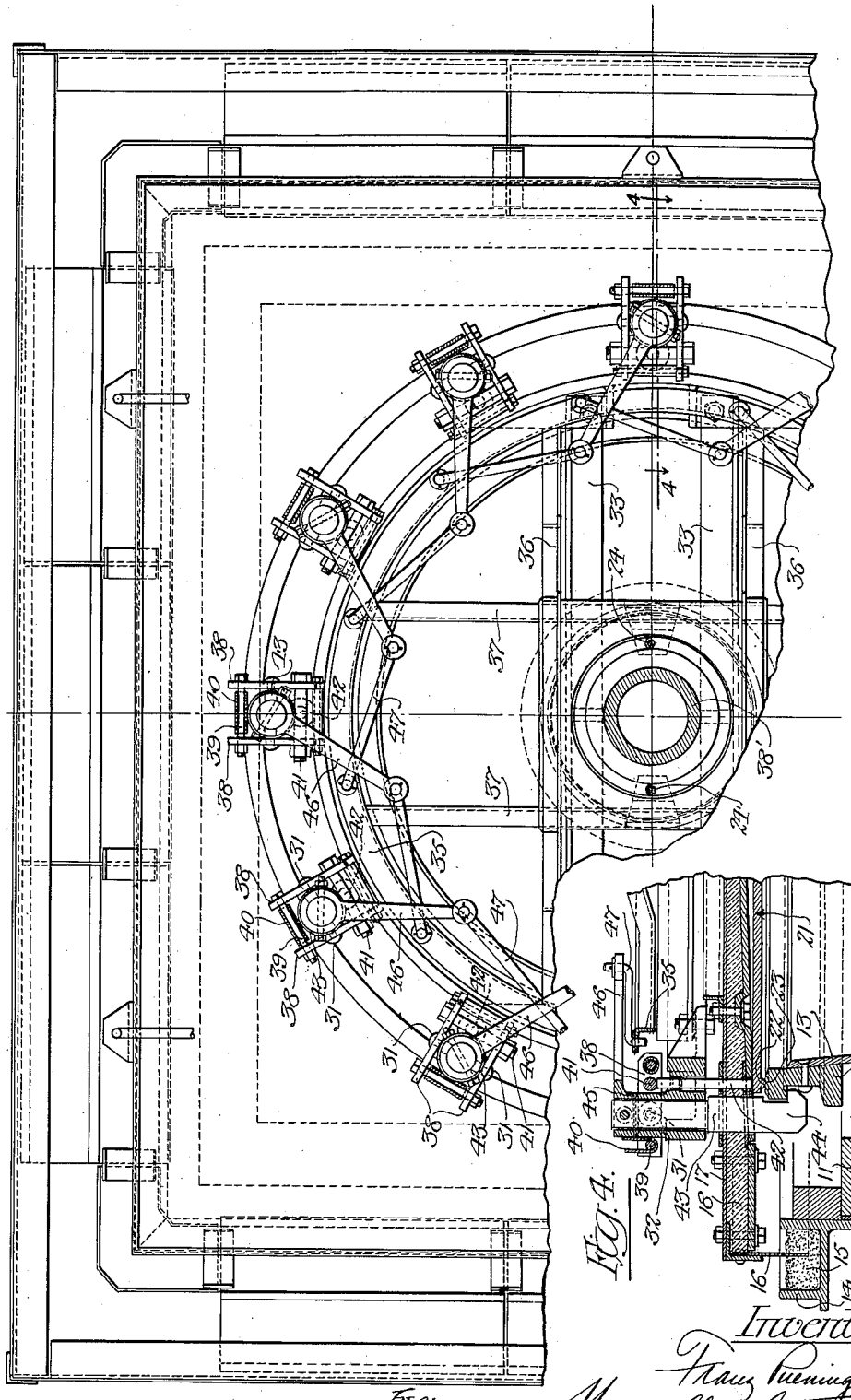


Fig. 3.

Fig. 4.

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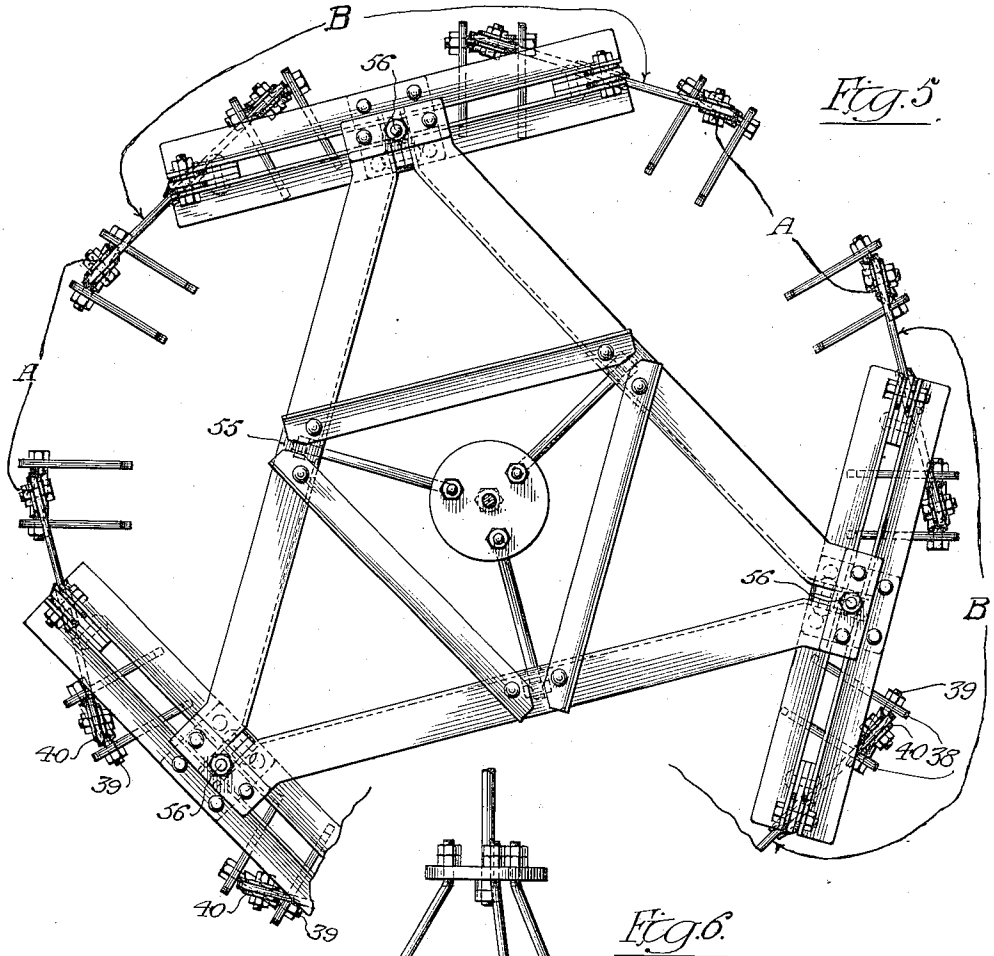


Fig. 5.

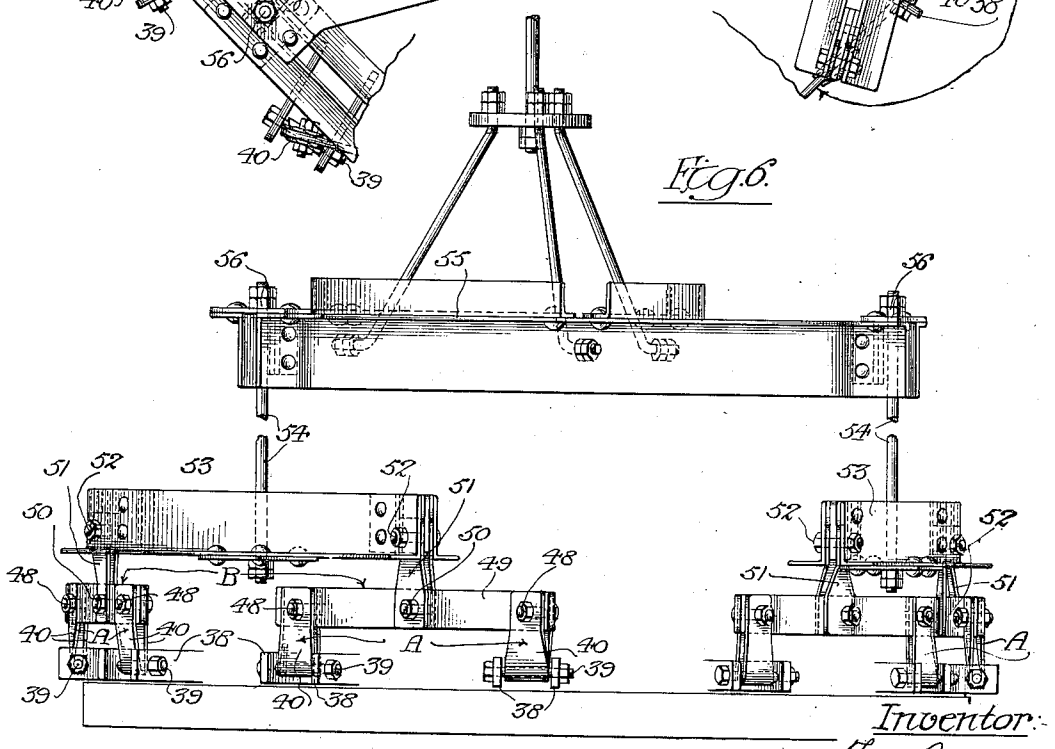


Fig. 6.

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Patented July 10, 1923. 1,461,324

UNITED STATES PATENT OFFICE.

FRANZ PUENING, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO AMERICAN TAR PRODUCTS COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE.

APPARATUS FOR COKING LIQUEFIABLE BITUMINOUS MATERIALS.

Application filed December 20, 1920. Serial No. 431,854.

To all whom it may concern:

Be it known that I, FRANZ PUENING, a citizen of Germany, residing in Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Coking Liquefiable Bituminous Materials, of which the following is a specification.

This invention comprehends improvements of general utility in the art of coking liquefiable bituminous materials, such as pitch; and also comprehends certain improvements especially applicable to pitch-coking apparatus of the general type exemplified in my prior Letters Patent of the United States No. 1,392,879, dated October 4, 1921.

The invention has for an object the provision of a thoroughly efficient means for sealing the top of the receptacle which contains the liquefiable bituminous material during the coking thereof, and for effecting such sealing by means of the weight of the receptacle itself and through the instrumentality of a receptacle cover which is located between the roof of the furnace and the top of the receptacle, thereby preventing material which might leak out of the receptacle from spilling on the roof of the furnace, and igniting, and also checking wasteful radiation of heat through the cover of the receptacle to the outer air. The reduction of the radiation factor to a minimum permits the coking to be carried on efficiently with the employment of lower temperatures than have heretofore been found practicable, for the reason that the temperature need not be raised to compensate for radiation losses and only such temperatures need be supplied to the interior of the receptacle as are necessary to coke the material. An important advantage accrues from the employment of lower temperatures, inasmuch as such lower temperatures are less destructive to the receptacle and other parts, with a consequent prolongation of their life. The sealing devices of the invention are effective, in large measure, to prevent leakages from the pot or receptacle. However, because of the novel arrangement of the receptacle cover with respect to the furnace roof, in the event leakages should occur, the spilled material will fall directly into the furnace, where it can do no damage. In the case of spilt pitch, the pitch will be simply converted into coke which may be removed from the furnace as desired. Moreover, if suction be applied to the distillate outlet of the receptacle to assist the discharge of the distillate, no air can enter the receptacle and cause an explosion. Although a small amount of burned fuel from the furnace may be drawn into the receptacle, no harm would result therefrom, but, on the contrary, the waste gas would help to convey the distillate out of the receptacle and thus assist the discharge of distillates.

Another object of the invention is the provision of efficient mechanism for suspending the receptacle within the furnace, said mechanism being engageable with the peripheral portion of the receptacle itself and also readily disengageable therefrom, without the intervention of projecting parts which become liable to breakage during the handling of the receptacle.

In addition to the general objects recited above, the invention has for further objects such other improvements or advantages in construction and operation as are found to obtain in the structures and devices hereinafter described or claimed.

In the accompanying drawings, forming a part of this specification, and showing, for purposes of exemplification, a preferred form and manner in which the invention may be embodied and practiced, but without limiting the claimed invention specifically to such illustrative instance or instances:

Figure 1 is a partial plan view of an apparatus for coking liquefiable bituminous materials constructed in accordance with the present improvements;

Fig. 2 is a vertical sectional elevation of the same;

Fig. 3 is a plan view similar to Fig. 1, but illustrating a further form of the invention;

Fig. 4 is a fragmentary vertical sectional elevation of the form of the invention illustrated in Fig. 3, the view being taken on the line 4—4 of Fig. 3;

Fig. 5 is a plan view of the larger hanger or suspension mechanism; and

Fig. 6 is a perspective of the parts illustrated in Fig. 5.

The same characters of reference indicate the same parts in each of the several views of the drawings.

In the embodiment illustrated in the accompanying drawings, the invention is applied to a pitch-coking receptacle or pot of the general form and character exemplified in my co-pending application aforesaid. For convenience, the present description will be confined to the present illustrated embodiment of the invention. The novel features and improvements made by the invention are, however, susceptible of other applications; hence the scope of the invention is not confined to the specific use and specific embodiment herein described as an illustrative example.

Referring to the drawings, there are shown at 11, 11, the side walls of a furnace chamber 12, within which is developed the heat necessary for coking the material contained within the pot or receptacle 13. The construction of the furnace is immaterial to the present invention, and for present purposes, the furnace wall 11 may be considered either as the wall of a stationary coking apparatus; or of a furnace construction in which a plurality of receptacles are conveyed through the furnace chamber, the coking of the material charged into said receptacles being effected during their movement through the furnace chamber. At the top of the furnace walls 11, which are respectively located on opposite sides of the receptacles or pots there are provided troughs 14 containing sand, designated at 15, into which sand dip the downwardly-projecting flanges 16, that are respectively provided at the opposite sides of the furnace roof 17. The roof 17 may be constructed of upper and lower metallic roof plates and an inner layer of insulating material 18 all secured together in any suitable manner. The insulating material 18 prevents excessive loss of heat by radiation from the furnace chamber, and the lower metallic shell 19 of the furnace roof serves to conduct heat to the top of the receptacle 13, where such heat is utilized for preventing condensation of the distillates gathered in the upper portion of the receptacle. Escape of gases from the furnace chamber 12 is prevented by the sand seals 15 which surround the submerged portions of the downwardly-projecting flanges at the opposite sides of the furnace roof.

In accordance with the invention, the upper end of the receptacle or pot 13 is provided with a peripheral sealing flange 20 secured to said pot in any suitable manner and preferably made of relatively thicker metal than the main body portion of the pot, not only to provide an exceedingly strong construction at the upper end of the receptacle, but also to slow up the heat penetration at this point in order to prevent the application of excessive temperatures to the vapors and distillates which gather in the upper portion of the receptacle.

During the coking of the material within the receptacle 13 the upper open-mouthed end of the latter is closed by means of a receptacle cover 21. Said cover 21 is provided with a downwardly-projecting sealing flange 22 adapted for co-operative sealing engagement with the upper finished sealing surface 23 of the sealing ring or flange 20 carried by the receptacle. The cover 21 may slide on rods 24 which slidably support the roof 17 of the furnace, and a projection 21^a carried by the cover 21 is adapted to engage the frame 33 to limit the downward movement of the cover and prevent it from falling into the furnace, when the pot is removed. This construction however permits the cover 21 to bear by gravity on the sealing flange 20 of the receptacle and such gravital movement of the cover 21 is supplemented by a like gravital movement of the roof 17 of the furnace which takes place because of the loose support of the sides of the latter in the sand seals 15. The result is that the entire weight of the cover 21 and the furnace roof 17 is supported by the flange 20 of the receptacle, a condition tending to seal the cover 21 on the top of the receptacle and to provide a substantially leak-tight joint.

The invention provides mechanism for suspending the receptacle 13 within the furnace chamber, by means of suspension devices which are adapted to engage directly with the peripheral flange 20 and to be disengaged therefrom when it is desired to release the pot. This construction obviates the necessity of providing the pot with projecting parts such as are likely to become damaged during the handling of the pot. The peripheral flange 20 is provided with an annular groove 26 and in the annular flange 27, at the top of said groove 26, there are formed, at spaced intervals therealong, pairs of lugs 28, said pairs of lugs being adapted to be engaged respectively by the opposite clamping projections 29 of hangers 30. These hangers 30 are, in the present instance, twelve in number and are each pivotally mounted on horizontal axes 31 in bearing sleeves 32 supported by the frame 33 and are connected at their upper ends by links 34 with an operating ring 35. Said ring 35 is supported by spokes 36 and 37 which connect the ring with hub member or plate that surrounds the central pipe portion 38′ of the receptacle cover 21. On rotation of the ring 35 in one direction the several hangers 30 are rotated on their horizontal axes 31 to cause their lower ends to pass from beneath the clamping jaws 28 and thus release the pot 13. Rotation of the ring 35 in the opposite direction is effective to move the lower ends of the hangers 30

into clamping position with respect to the clamping jaws 28 of the pot. Any suitable mechanism may be employed for rotating the ring 35, or, it may be rotated by manual operation if desired.

The sealing effect produced by the above set forth gravital movements of the furnace roof and receptacle cover is supplemented by the provision of means for positively forcing the receptacle cover into sealing engagement with the top sealing flange of the receptacle and said means is operated by the weight of the receptacle itself and other parts. Levers 38 are pivoted on the axes 31 of the hangers 30. Said levers 38 are respectively provided at their outer ends with studs 39 which are connected by means of links 40 with the hanger mechanism hereinafter described. The inner ends of the several levers 38 are provided with lugs 41 that are respectively adapted to engage the upper ends of vertical pressure pins 42, the latter bearing on the upper face of the peripheral portion of the cover 21. As in the normal position of the receptacle, the links 40 bear the entire weight of the pot, its cover, the furnace roof and the suspension devices, the levers 38 tend to rotate about their axes 31 in such manner as to press the lugs 41 against the pressure pins 42. This forces said pressure pins 42 downwardly to apply a tight sealing pressure on the cover 21. In order to disengage the pot 13 from its suspension devices, it is necessary to relieve the pressure of the cover on the pot. To effect this result, the pot and its flange 20 may be lifted slightly. Such lifting movement of the pot is accompanied by a slight lifting movement of the pressure pins 42 and a slight upward movement of the ends of the levers 38 that carry the lugs 41. As a result of the upward movement of said levers 38, the upward motion of the hangers 31 is relatively less than that of the flange 20 of the pot, thereby affording sufficient clearance to permit disengagement of the hangers 30 from the pot.

In the form of the invention illustrated in Fig. 3, the hangers 43 are provided at their lower ends with hooks 44 for engagement with the flange 27 of the bearing flange 20. These hangers 43 are mounted on vertical axes within the sleeve 32 and are connected at their upper ends to heads 45 provided with arms 46 which extend to and are pivotally connected with links 47, said links 47 are in turn connected with the operating ring 35, the rotation of which is effective through the above described train of connections to turn the hangers 43 in unison on their vertical axes to engage or disengage them with respect to the sealing flange of the pot.

The invention provides mechanism for equalizing the pressure of the pot cover 21 on the pot sealing flange 20, in such manner as to insure firm sealing contact of the cover with the flange throughout the entire peripheral surfaces of the cover and flange. This pressure equalization is attained by means of the improved hanger mechanism illustrated in Figs. 5 and 6. As shown in said figures, the several links 40, that are connected to the levers 38, are grouped into pairs indicated by the reference character A. The two links 40 of each pair A are pivotally suspended at their upper ends, as shown at 48, from the opposite ends of horizontal connecting bars 49, the latter being grouped into pairs indicated at B. The two bars 49 of each pair B are pivotally connected, intermediate their ends, as shown at 50, to vertical links 51 and the upper ends of the pair of links 51 corresponding to each pair of horizontal bars 49 are pivotally suspended, at 52, from the opposite ends of other horizontal bars 53. The last mentioned horizontal bars 53 are suspended, intermediate their ends by means of vertical suspension rods 54, from a frame 55 to which the upper ends of said suspension rods 54 are connected, as shown at 56. The upper frame 55 may be suspended from any fixed portion of the apparatus.

With the above described construction, the several links 40 are each free to move up and down independently of each other, by reason of the walking-beam effect, permitted by the parts from which said links 40 are suspended, and an upward yielding of a link is accompanied by a concurrent downward pressure-applying movement of the other link of the same pair. Consequently, the links 40 and their connected levers 38 adjust themselves to any surface irregularities of the pot cover 21 on which the pressure pins 42 are bearing, with the result that the pressure of the several pins 42 is equalized and firm contact of the pot cover 21 with the flange 20 is maintained throughout the peripheral portions of such cover and flange.

The invention as hereinbefore set forth is embodied in a particular construction but may be variously embodied within the scope of the claims hereinafter made.

I claim:

1. In an apparatus for coking liquefiable bituminous materials, such as pitch, in combination with a furnace chamber; a receptacle for containing the material to be coked; a plurality of suspension devices engageable with said receptacle for holding the latter suspended within said furnace chamber; a furnace roof mounted above the upper end of said receptacle; a receptacle cover interposed between said roof and the upper end of said receptacle; both said roof and said receptacle cover bearing by gravity on the top of the receptacle; means for positively forcing the receptacle cover into sealing engagement with the top of said receptacle;

and connections between said suspension devices and said last named means for operating the latter; substantially as specified.

2. In an apparatus for coking liquefiable bituminous materials, such as pitch, in combination with a furnace chamber; a receptacle for containing the material to be coked; a plurality of suspension devices engageable with said receptacle for holding the latter suspended within said furnace chamber; a furnace roof mounted above the upper end of said receptacle; a receptacle cover interposed between said roof and the upper end of said receptacle; both said roof and said receptacle cover bearing by gravity on the top of the receptacle; and means, operable by the gravital movements of the receptacle roof and receptacle cover, for positively forcing the receptacle cover into sealing engagement with the top of said receptacle, substantially as specified.

3. In an apparatus for coking liquefiable bituminous materials, such as pitch, in combination with a furnace chamber; a receptacle for containing the material to be coked; a plurality of suspension devices engageable with said receptacle for holding the latter suspended within said furnace chamber; a furnace roof mounted above the upper end of said receptacle; a receptacle cover interposed between said roof and the upper end of said receptacle; both said doof and said receptacle cover bearing by gravity on the top of the receptacle; and means, operable by the gravital movements of the parts, for positively forcing the receptacle cover into sealing engagement with the top of said receptacle; substantially as specified.

4. In an apparatus for coking liquefiable bituminous materials, such as pitch, in combination with a furnace chamber; a receptacle for containing the material to be coked; a plurality of suspension devices engageable with said receptacle for holding the latter suspended within said furnace chamber; a furnace roof mounted above the end of said receptacle; a receptacle cover interposed between said roof and the upper end of said receptacle; and means, operable by the gravital movement of the receptacle, for positively forcing the receptacle cover into sealing engagement with the top of said receptacle, substantially as specified.

5. In an apparatus for coking liquefiable bituminous materials, such as pitch, in combination with a furnace chamber; a receptacle for containing the material to be coked; a plurality of suspension devices engageable with said receptacle for holding the latter suspended within said furnace chamber; a receptacle cover; said receptacle cover bearing by gravity upon the top of said receptacle; and means, operable by the weight of the receptacle on said suspension devices, for positively forcing the receptacle cover into sealing engagement with the top of said receptacle; substantially as specified.

6. In an apparatus for coking liquefiable bituminous materials, such as pitch, in combination; a receptacle for containing the material to be coked; a plurality of suspension devices engageable with the peripheral portion of said receptacle for holding the latter suspended; and means for releasing said suspension devices in unison from the peripheral portion of said receptacle; substantially as specified.

7. In an apparatus for coking liquefiable bituminous materials, such as pitch, in combination; a receptacle for containing the material to be coked; a plurality of suspension hooks mounted on horizontal axes and engageable with the peripheral portion of said receptacle for holding the latter suspended; and means for releasing said suspension hooks in unison with respect to the peripheral portion of said receptacle; substantially as specified.

8. In an apparatus for coking liquefiable bituminous materials, such as pitch, in combination; a receptacle for containing the material to be coked; a plurality of rotatable suspension hooks and engageable with the peripheral portion of said receptacle for holding the latter suspended; and means for releasing said suspension hooks in unison with respect to the peripheral portion of said receptacle; substantially as specified.

9. In an apparatus for coking liquefiable bituminous materials, such as pitch, in combination with a furnace chamber; a receptacle for containing the material to be coked; a suspension mechanism engageable with said receptacle for holding the latter suspended within said furnace chamber; a receptacle cover; means, operable by the weight of the receptacle on said suspension mechanism, for positively forcing the receptacle cover into sealing engagement with the top of said receptacle; and said suspension mechanism including means for equalizing the pressure of the receptacle cover on the top of said receptacle; substantially as specified.

10. A retort mechanism, comprising, in combination; a retort receptacle, a plurality of suspension members engageable with said receptacle for holding the latter suspended, and means for releasing said suspension members in unison to permit dumping of said receptacle, substantially as specified.

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