Dec. 23, 1930. J. VAN ACKEREN 1,785,750

MEANS FOR CHARGING COKE OVENS

Filed June 27, 1925 3 Sheets-Sheet 1

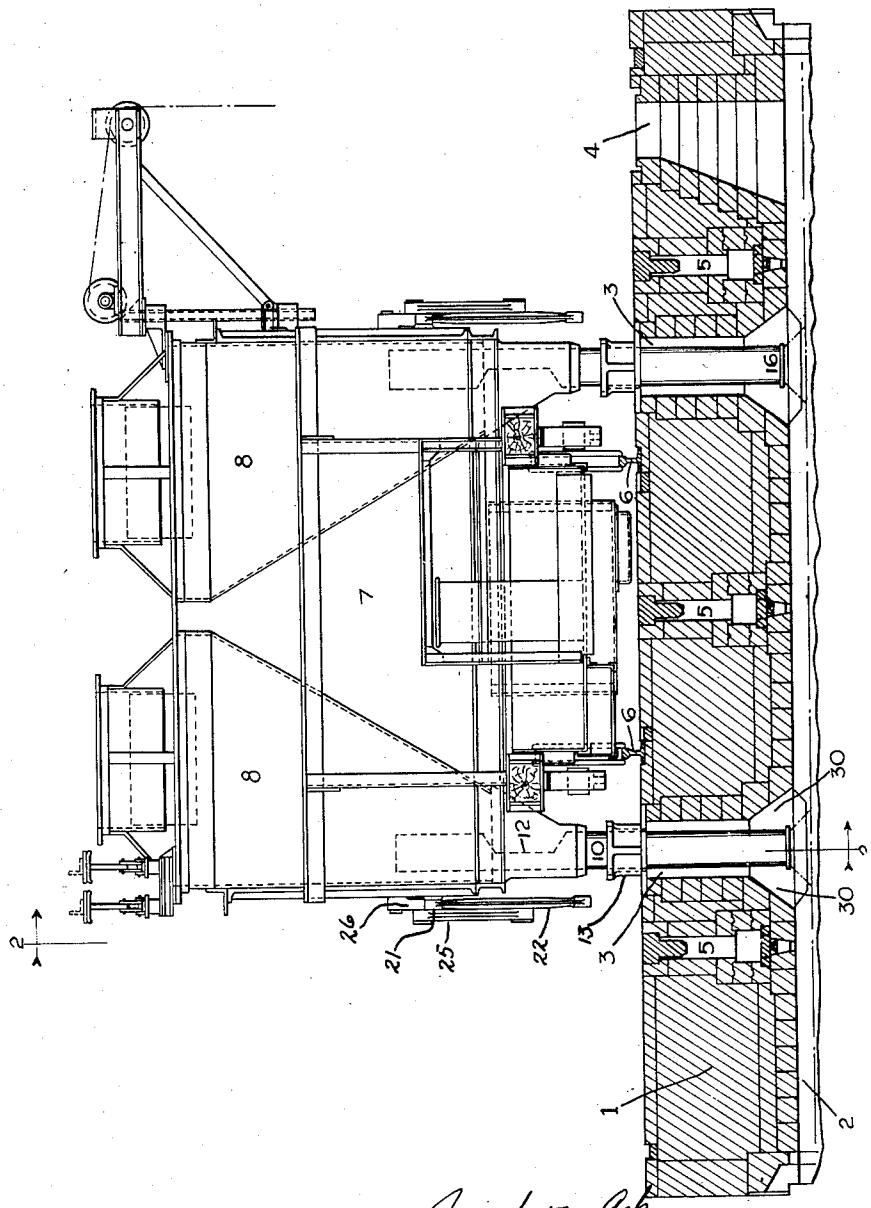


Fig. 1.

Joseph van Ackeren INVENTOR.

BY

Munday, Clarke & Carpenter ATTORNEY.

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Fig. 2

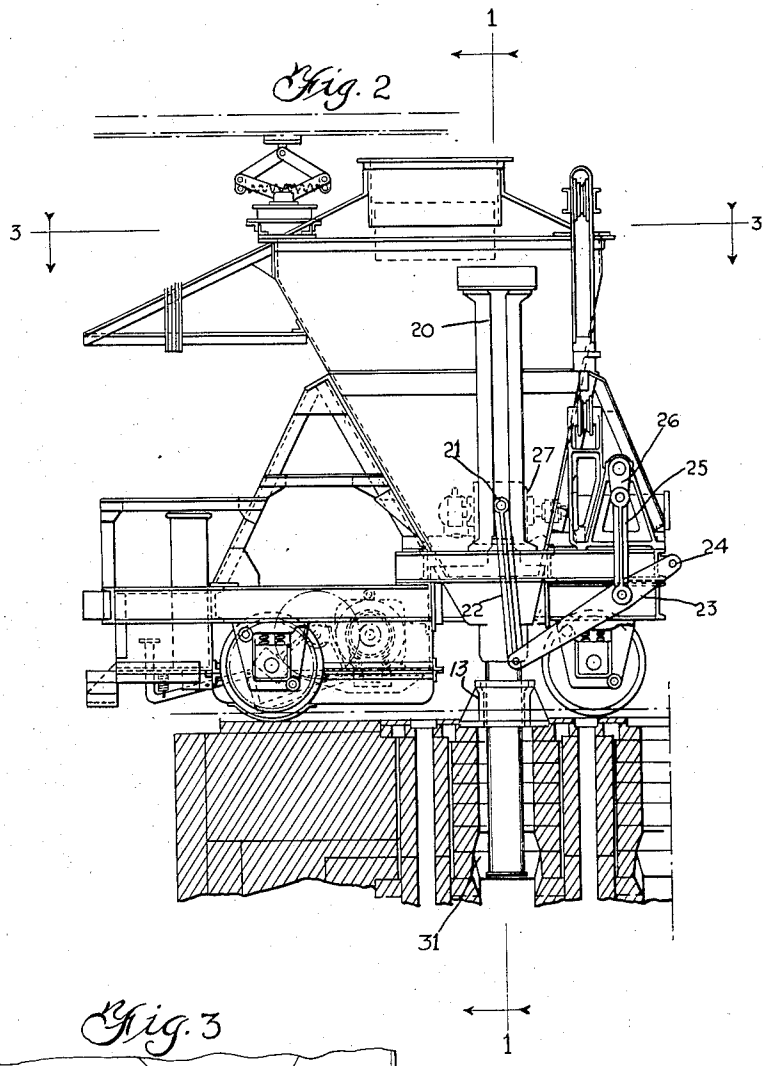
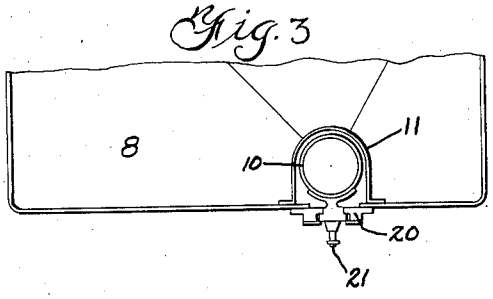


Fig. 3



Joseph van Ackeren
INVENTOR.

BY

Munday, Clarke & Carpenter
ATTORNEY.

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Filed June 27, 1925 3 Sheets-Sheet 3

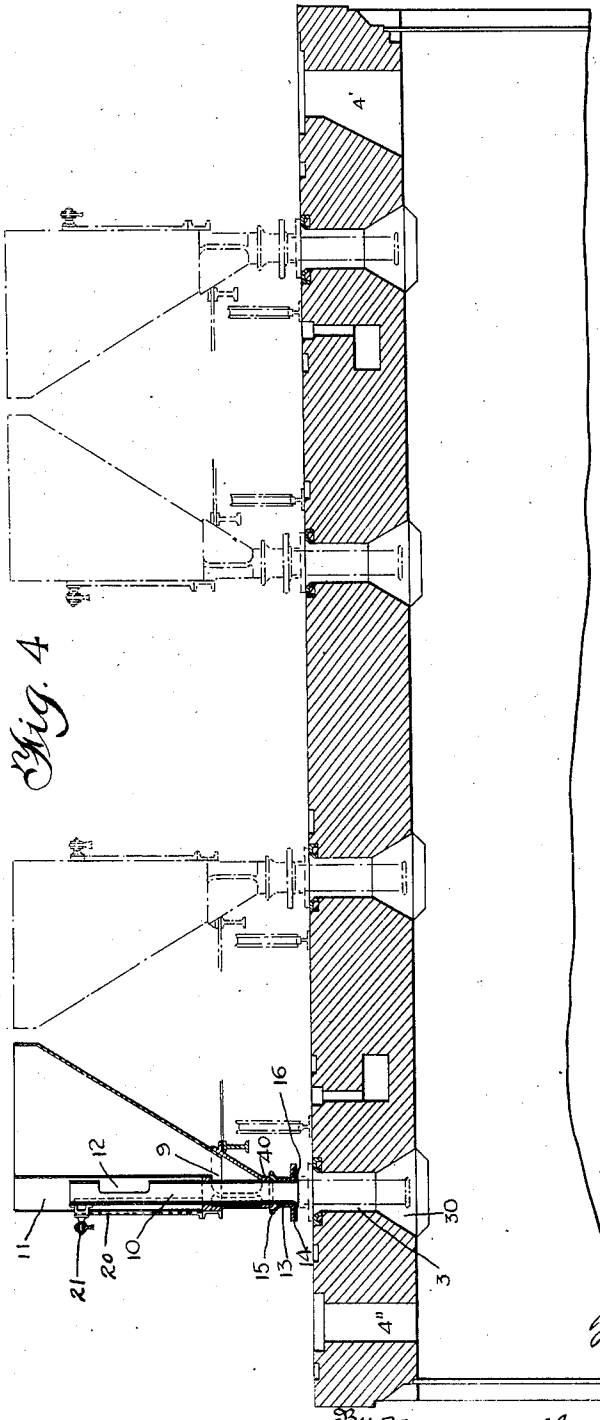


Fig. 4

Inventor
Joseph van Ackeren

By Munday, Clarke & Carpenter
Attorney

Patented Dec. 23, 1930 1,785,750

UNITED STATES PATENT OFFICE

JOSEPH VAN ACKEREN, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO THE KOPPERS COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

MEANS FOR CHARGING COKE OVENS

Application filed June 27, 1925. Serial No. 40,069.

This invention comprehends improvements of general utility in the art of charging coke ovens and similar heat treating devices, and in its more specific aspects relates to means and methods for expeditiously charging coke ovens such as those disclosed in the patents to Koppers—818,033, April 17, 1906, or Becker—1,374,546, April 12, 1921, or similar constructions, with the elimination of the smoke nuisance during the charging operation.

In charging heat treating devices of the character indicated; where a relatively long and narrow oven is employed provided with a plurality of feed openings distributed along its top and a smoke and gas offtake at one end the charges descending through the feed openings temporarily form, as it were, walls or curtains across the top of the oven interfering with the free flow of the gases generated by the coking operation and the smoke resulting from the charging operation, the gas and smoke collecting in the pockets between the successive feed openings and tending to blow out therethrough causing serious losses, burning out of the feed pipes and interference whith the charging operation.

My invention contemplates broadly expedients for overcoming these difficulties by providing by-passes for the gas and smoke around the descending charges. Important features of my invention, in its more specific aspect, comprise larry cars adapted to travel along the top of the battery provided with hoppers for conveying the charges thereto, said hoppers having discharge openings at their lower ends adapted to be simultaneously aligned with the several feed openings of an oven chamber; and feed pipes slidably mounted with respect to said hoppers, and normally operating in their raised position to close the discharge openings therein and adapted to be lowered into the respective feed openings of the oven to bridge the space between the hoppers and said openings to prevent spillage of the descending charge, said feed pipes being cut away at the upper portions of their sides adjacent the charges in said hoppers to permit passage of said charges therethrough, when said pipes are lowered, to effect registry between said cut away portions and said hopper discharge openings. Power operated means are provided on said larry cars for raising and lowering said feed pipes. Said feed pipes are also preferably provided at their lower ends with slidable collars flanged at their lower and upper ends and retained about said pipes by out-turned flanges at the lower ends of the latter, said collars being adapted to seat, when said pipes are lowered into feeding position, upon the tops of the oven feed openings, their lower flanges serving to effect an efficient seal. Their upper flanges are adapted, when the pipes and collars are in raised position, to lie adjacent the lower ends of the discharge hoppers and provide pockets surrounding the feed pipes which are filled with finely divided particles of material sifting from the hoppers around said feed pipes to prevent further sifting of the material from said hoppers and serving also, when the feed pipes are in lowered position, to prevent leakage of smoke between said sleeves and said feed pipes. The feed pipes are adapted to be lowered to a depth substantially corresponding to the bottoms of the oven feed openings and the walls about said openings are beveled or cut away at their lower edges adjacent the lower ends of said feed pipes to effect bypasses about said pipes and the charges passing therethrough for the gas and smoke accumulated in the top of the oven chamber, thus providing a free passage along the top of the oven to the gas and smoke offtake.

In addition to the general features and objects of the invention above recited, the invention has such other improvements or advantages in construction and operation as are found to obtain in the structure 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 vertical section transverse of the battery through the top of an oven show-

ing the charging apparatus thereabove in elevation.

Fig. 2 is a vertical section longitudinally of the battery through the top of an oven showing the charging apparatus thereabove in elevation,

Fig. 3 is a fragmentary top plan view of a larry hopper, and

Fig. 4 is a transverse section of a modification showing two pairs of charging openings and two charging larrys therefor, the charging hopper and feed pipe at the extreme left being shown in section.

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

Referring to Fig. 1, there is shown the top 1 of a coke oven having a coking chamber 2. Feed openings 3 are provided in the top through which the fuel is fed into the oven and at one end a smoke and gas offtake 4 is located, and at intermediate points observation openings 5, as is usual in structures of this character. Extending lengthwise of the top of the battery is a trackway 6 on which travels a larry car 7 provided with storage hoppers 8 by which the fuel is conveyed from a main source of supply to the respective coking chambers of the battery.

Where each coking chamber 2 is of relatively great length and is fed through a plurality of pairs of feed openings in its top the trackways and larry cars traveling thereon may be duplicated and operated in parallel as shown in Fig. 4. Separate smoke and gas offtakes 4′ and 4″ may be provided.

Each storage hopper 8 is provided at its lower end with a discharge opening 9 as shown in Fig. 4, this opening being normally closed by a feed pipe 10 adapted to slide vertically in a guiding compartment 11 preferably constructed as an integral part of the hopper structure. The upper portion of the feed pipe 10 is cut away at 12 on its side adjacent the storage hopper discharge opening 9 and when the pipe is lowered into feeding position fuel passes from the hopper through the feed opening 9 the cut away portion 12 in alignment therewith and pipe 10 to the oven, but when the pipe is raised the lower continuous portion thereof forms an effective seal across the opening 9 to prevent further discharge of the fuel.

The feeding pipe 10 is surrounded at its lower end by a freely sliding collar 13 provided at its lower end with a flange 14 and at its upper end with a cup-shaped flange 15, said collar being limited in its downward movement on said pipe by the out-turned flange 16 at the lower end of the latter. The guiding compartment 11 is provided with a vertical guideway 20 through which passes a bracket 21 fixed to the feed pipe 10 and freely pivoted on said bracket is a link 22 pivoted at its opposite end to a lever 23 having a fixed fulcrum 24 and pivotally connected at an intermediate point to a link 25 pivoted at its opposite end to an operating arm 26 driven by a source of power on the larry car, such as a motor 27.

The lower edges of the feed openings 3 are beveled or cut away at opposite points lengthwise of the oven as shown at 30, the cut away portions extending to a point above the lower end of the feed pipe 10 when in lowered or feeding position, and said openings are further cut away laterally at their lower ends as shown at 31, Fig. 2, to connect the opposite end cut away portions whereby to by-pass the smoke and gases about the stream of fuel descending through the feed pipes 10.

In the operation of the device the larry car, after its hoppers have been charged from a main source of supply, is moved along the trackway until its feed pipes 10 are in alignment with the feed openings 3 of the oven which it is desired to charge, whereupon the power mechanism comprising the motor 27 and inter-connections is operated to lower the pipes as shown in full lines in Figs. 1 and 2, and in dotted line in Fig. 4; the discharge openings 9 of the hoppers then being in alignment with the cut away portions 12 of the feed pipe, fuel will be discharged into the oven chamber, the pipes operating to direct the fuel and prevent spillage. The resulting smoke, together with the gases generated in the oven chambers, which would ordinarily be trapped between the several charging openings by the descending streams of fuel passing therethrough, pass through the by-passes 30, 31 about the feed pipes and along the tops of the ovens to the smoke and gas offtakes at the ends thereof, as usual in such cases, sufficient suction being maintained to avoid blowing out of the smoke and gas through the feed openings. The flanges 14 of the collars 13 are adapted to seat on the tops of the openings 3 and thereby effect a seal against the passage of smoke and gases between the feed openings and charging pipes, while at the same time the finer particles of fuel which sift down from the feed hoppers 8 around the feed pipes 10 accumulate in the cup-shaped flanges 15 and form an effective seal against the passage of smoke and gas between the collars 13 and the feed pipes. When the feed pipes are lifted their flanges 16 carry with them the collars 13 to a position in which the cup-shaped flanges 15 of the latter, together with the finer particles carried therein, seat against the lower discharge ends 40 of the hoppers thereby preventing further fine material from said hoppers sifting through the clearance between the feed pipes and their guideways, while simultaneously the lower continuous portions of the feed pipes form closures for the feed openings 9 of the hoppers.

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

I claim:

1. In combination with a coke oven battery having side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering the tops of said coking chambers and heating walls and forming the tops of said chambers, and having a charging opening and a gas offtake opening for each of said coking chambers, both the charging opening and the gas offtake opening extending through said oven-roof from the top to the bottom thereof and said charging opening being intermediate the ends of the oven; a charging device mounted for movement on the top of said oven-roof into and out of charging position with respect to the charging opening of each of said chambers; a hopper carried by said charging device in spaced relation to said oven-roof; and a chute carried by said hopper and movable relative thereto so as to bridge the space between said hopper and said oven-roof for conveying fuel from said hopper to said coking chambers; said chute being adapted to be adjusted into each of said charging openings and being so proportioned and arranged relative to said oven-roof and the said charging openings as to extend down to the bottom of the oven-roof and be spaced from the roof structure forming said openings so as to provide a free space in each of said openings when therein for passage of gas from the top of each of said chambers on one side of said openings to the top of said chambers on the other side for offflow through their respective gas offtakes while said chute is feeding fuel from said hopper through said openings into their respective chambers.

2. In combination with a coke oven battery having a plurality of side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering the tops of said chambers and heating walls and forming with its bottom the tops of said chambers, and having each of said chambers provided with a charging opening and a gas-offtake opening, both the charging opening and the gas offtake opening extending through said oven-roof from the top to the bottom thereof and said charging opening being intermediate the ends of the oven; a charging-car movable over the top of said oven-roof from coking chamber to coking chamber; a fuel hopper mounted on said charging car for movement therewith in spaced relation to the top of said oven-roof; and a feeding connection movable with said hopper from chamber to chamber and movable relative to said hopper for insertion within the charging openings of said chambers for feeding fuel from said hopper to said chambers; said feeding connection being so arranged with respect to said hopper as to have its discharge end terminate at the bottom of said oven-roof, and being adapted to form with said charging openings a free passage therein for passage of gas along the tops of said chambers from one side to the other of said openings, while inserted within said openings for feeding fuel from said hopper to said chambers through said charging openings.

3. In combination with a coke oven battery having a plurality of side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering tops of said chambers and heating walls and forming with its bottom the tops of said chambers, and having each of said chambers provided with a plurality of charging openings and a gas-offtake opening, both the charging openings and the gas offtake opening extending through said oven-roof from the top to the bottom thereof and said charging openings being intermediate the ends of the oven; a plurality of hoppers mounted in spaced relation to the top of said oven-roof for movement together from chamber to chamber and having feeding connections arranged to register with the charging openings of one of said chambers; said feeding connections being movable with said hoppers from chamber to chamber and movable relative to said hoppers for insertion within the charging openings of said chambers for feeding fuel from said hoppers to said chambers; said feeding connections being so arranged with respect to said hoppers as to have their discharge ends terminate at the bottom of said oven-roof, and being adapted to form with said charging openings free passages therein for passage of gas along the tops of said chambers from one side to the other of said openings, while inserted within said openings for feeding fuel from said hoppers to said chambers through said charging openings.

4. In combination with a coke oven battery having a plurality of side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering the tops of said chambers and heating walls and forming with its bottom the tops of said chambers, and having each of said chambers provided with a charging opening and a gas-offtake opening, both the charging opening and the gas off-take opening extending through said oven-roof from the top to the bottom thereof and said charging opening being intermediate the ends of the oven; a charging-car movable over the top of the oven-roof from coking chamber to coking chamber; a fuel hopper mounted on said charging-car for movement therewith in spaced relation to the top of said oven-roof and provided with a discharge opening for discharge of fuel

therefrom; and a feeding connection having an inlet opening for receiving fuel from the discharging opening of said hopper and being movable with said hopper from chamber to chamber and being movable relative to said hopper for insertion into the charging openings of said chambers for feeding fuel from said hopper to said chambers; said feeding connection being so arranged with respect to said hopper as to have its discharge outlet at the lower part thereof and terminate at the bottom of said oven-roof, and being adapted to form with said charging openings a free passage therein for passage of gas along the tops of said chambers from one side to the other of said openings, while inserted therein for feeding fuel from said hopper to said chambers; said feeding connection being also adapted to close said hopper discharge opening when withdrawn from said charging openings, and to have its inlet opening communicate with the hopper discharge opening when it is inserted in one of said charging openings, and having its inlet opening so located thereon relative to its discharge outlet that the discharge outlet of the feeding connection may enter said charging openings in advance of communication of said inlet opening with the hopper discharge opening.

5. In combination with a coke oven battery having a plurality of side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering the tops of said chambers and heating walls and forming with its bottom the tops of said chambers, and having each of said chambers provided with a plurality of charging openings and a gas-offtake opening, both the charging openings and the gas offtake opening extending through said oven-roof from the top to the bottom thereof and said charging openings being intermediate the ends of the oven; hopper means mounted in spaced relation to the top of said oven-roof for movement from chamber to chamber and having a plurality of discharge openings for discharge of fuel therefrom arranged to register with the charging openings of one of said chambers; and a feeding connection individual to each of said discharge openings; each of said feeding connections having an inlet opening for receiving fuel from its hopper means discharge opening and being movable with said hopper means from chamber to chamber and being movable relative to said hopper means for insertion into the charging openings of said chambers with which its hopper means discharge opening registers for feeding fuel from said hopper means to said chambers; and each of said feeding connections being so arranged with respect to said hopper means as to have its discharge outlet at the lower part thereof and terminate at the bottom of said oven-roof, and being adapted to form with said charging openings a free passage therein for passage of gas along the tops of said chambers from one side to the other of said openings, while inserted therein for feeding fuel from said hopper means to said chambers; and each of said feeding connections being also adapted to close its hopper means discharge opening when withdrawn from said charging openings and to have its inlet opening communicate with its hopper means discharge opening when it is inserted in one of said charging openings, and having its inlet opening so located thereon relative to its discharge outlet that its discharge outlet may enter said charging openings in advance of communication of its inlet opening with its hopper means discharge opening.

6. In combination with a coke oven battery having a plurality of side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering the tops of said chambers and heating walls and forming with its bottom the tops of said chambers, and having each of said chambers provided with a charging opening and a gas-offtake opening, both the charging opening and the gas offtake opening extending through said oven-roof from the tops to the bottom thereof and said charging opening being intermediate the ends of the oven; a charging-car movable over the top of the oven-roof from coking chamber to coking chamber; a fuel hopper mounted on said charging-car for movement therewith in spaced relation to the top of said oven-roof and provided with a discharge opening for discharge of fuel therefrom; a feeding connection having an inlet opening for receiving fuel from the discharge opening of said hopper and movable with said hopper from chamber to chamber and movable relative to said hopper for insertion into the charging openings of said chambers for feeding fuel from said hopper to said chambers; said feeding connection being arranged with respect to said hopper so as to have its discharge outlet at the lower part thereof and terminate at the bottom of said oven-roof, and being adapted to form with said charging openings a free passage therein for passage of gas along the tops of said chambers from one side to the other of said opening when withdrawn from said charging openings for feeding fuel from said hopper to said chambers through said charging openings; said feeding connection being also adapted to close said hopper discharge openings when withdrawn from said charging openings, and to have its inlet opening communicate with the hopper discharge opening when it is inserted in one of said charging openings, and having its inlet opening so located thereon relative to its discharge outlet that the discharge outlet of the feeding connection may enter said charging openings in advance of communication of said

inlet opening with the hopper discharge opening; a sealing member mounted for relative movement on said feeding connection and adapted to seal said charging openings while said feeding connection is being inserted therein; and means on the lower part of said feeding connection for lifting said sealing member off of said charging openings and moving it contiguous to the hopper to close the bottom of the joint between said feeding connection and said hopper.

7. In combination with a coke oven battery having a plurality of side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering the tops of said chambers and heating walls and forming with its bottom the tops of said chambers, and having each of said chambers provided with a plurality of charging openings and a gas-offtake opening, both the charging openings and the gas offtake opening extending through said oven-roof from the top to the bottom thereof and said charging openings being intermediate the ends of the oven; hopper means mounted in spaced relation to the top of said oven-roof for movement from chamber to chamber and having a plurality of discharge openings for discharge of fuel therefrom arranged to register with the charging openings of one of said chambers; a feeding connection individual to each of said discharge openings; each of said feeding connections having an inlet opening for receiving fuel from its hopper means discharge opening and being movable with said hopper means from chamber to chamber and being movable relative to said hopper means for insertion into the charging openings of said chambers with which its hopper means discharge opening registers for feeding fuel from said hopper means to said chambers; and each of said feeding connections being so arranged with respect to said hopper means as to have its discharge outlet at the lower part thereof and terminate at the bottom of said oven-roof and being adapted to form with said charging openings a free passage therein for passage of gas along the tops of said chambers from one side to the other of said openings, while inserted therein for feeding fuel from said hopper means to said chambers; and each of said feeding connections being also adapted to close its hopper means discharge opening when withdrawn from said charging openings, and to have its inlet opening communicate with its hopper means discharge opening when it is inserted in one of said charging openings, and having its inlet opening so located thereon relative to its discharge outlet that its discharge outlet may enter said charging openings in advance of communication of its inlet opening with its hopper means discharge opening; a sealing member mounted for relative movement on each of said feeding connections and adapted to seal said charging openings while said feeding connections are being inserted therein; and means on the lower part of each of said feeding connections for lifting the sealing members off of said charging openings and moving them contiguous to the hopper means to close the bottom of the joint between said feeding connections and said hopper means.

8. In combination with a coke oven battery having a plurality of side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering the tops of said chambers and heating walls, and having each of said chambers provided with a charging opening extending through said oven-roof; a hopper mounted in spaced relation to said oven-roof for movement over the top thereof from chamber to chamber and provided with a discharge opening for discharge of fuel therefrom; a feeding connection having an inlet opening for receiving fuel from the discharge opening of said hopper and movable with said hopper from chamber to chamber and movable relative to said hopper for insertion into the charging openings of said chambers; said feeding connection being adapted to close said hopper discharge opening when withdrawn from said charging openings, and to have its inlet opening communicate with the hopper discharge opening when it is inserted in one of said charging openings; a sealing member mounted for relative movement on said feeding connection so as to seal said charging openings and allow said feeding connection to be inserted into and withdrawn from said charging openings during sealing of said openings by said sealing member; means for allowing gas from each of the coking chambers to pass around that part of the feeding connection that is in the charging opening of the coking chamber when the feeding connection is inserted in the charging opening; and means on said feeding connection for lifting said sealing member off of said charging openings at the completion of withdrawal of said feeding connection from said charging openings and for moving the sealing member contiguous to the hopper to close the bottom of the joint between said feeding connection and said hopper.

9. In combination with a coke oven battery having a plurality of side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering the tops of said chambers and heating walls, and having each of said chambers provided with a charging opening extending through said oven-roof; a hopper mounted in spaced relation to said oven-roof for movement over the top thereof from chamber to chamber and provided with a discharge opening for discharge of fuel therefrom; a feeding connection having an inlet opening for receiving fuel from the discharge opening of said hopper and movable

with said hopper from chamber to chamber and movable relative to said hopper for insertion into the charging openings of said chambers; said feeding connection being adapted to close said hopper discharge opening when withdrawn from said charging openings, and to have its inlet opening communicate with the hopper discharge opening when it is inserted in one of said charging openings; a sealing member mounted for relative movement on said feeding connection so as to seal said charging openings and allow said feeding connection to be inserted into and withdrawn from said charging openings during sealing of said openings by said sealing member; means for allowing gas from each of the coking chambers to pass around that part of the feeding connection that is in the charging opening of the coking chamber when the feeding connection is inserted in the charging opening; and means on said feeding connection for lifting said sealing member off of said charging openings at the completion of withdrawal of said feeding connection from said charging openings.

10. In combination with a coke oven battery having a plurality of side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering the tops of said chambers and heating walls, and having each of said chambers provided with a charging opening extending through said oven-roof; a hopper mounted in spaced relation to said oven-roof for movement over the top thereof from chamber to chamber; a feeding connection movable with said hopper from chamber to chamber and movable relative to said hopper for insertion into the charging openings of said chambers for connecting said hopper to said chambers for feeding fuel thereto from said hopper; and a sealing member mounted for relative movement on said feeding connection so as to seal said charging openings and allow said feeding connection to be inserted into and withdrawn from said charging openings during sealing of said openings by said sealing member; means for allowing gas from each of the coking chambers to pass around that part of the feeding connection that is in the charging opening of the coking chamber when the feeding connection is inserted in the charging opening; and means on said feeding connection for lifting said sealing member off of said charging openings at the completion of withdrawal of said feeding connection from said charging openings and for moving said sealing member adjacent said hopper to prevent sifting of fuel from between said feeding connection and said hopper.

11. In combination with a coke oven battery having a plurality of side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering the tops of said chambers and heating walls, and having each of said chambers provided with a charging opening extending through said oven-roof; a hopper mounted in spaced relation to said oven-roof for movement over the top thereof from chamber to chamber; a feeding connection movable with said hopper from chamber to chamber and movable relative to said hopper for insertion into the charging openings of said chambers for connecting said hopper to said chambers for feeding fuel thereto from said hopper; means for allowing gas from each of the coking chambers to pass around that part of the feeding connection that is in the charging opening of the coking chamber when the feeding connection is inserted in the charging opening; and a sealing member mounted for relative movement on said feeding connection so as to seal said charging openings and allow said feeding connection to be inserted into and withdrawn from said charging openings during sealing of said openings by said sealing member.

12. In combination with a coke oven battery having a plurality of side-by-side horizontal coking chambers with intermediate heating walls, an oven-roof covering the tops of said chambers and heating walls, and having each of said chambers provided with a charging opening extending through said oven-roof; a hopper mounted in spaced relation to said oven-roof for movement over the top thereof from chamber to chamber; a feeding connection movable with said hopper from chamber to chamber and movable relative to said hopper for insertion into the charging openings of said chambers for connecting said hopper to said chambers for feeding fuel thereto from said hopper; and a sealing member mounted for relative movement on said feeding connection so as to seal said charging openings and allow said feeding connection to be inserted into and withdrawn from said charging openings during sealing of said openings by said sealing member; means for allowing gas from each of the coking chambers to pass around that part of the feeding connection that is in the charging opening of the coking chamber when the feeding connection is inserted in the charging opening; and means on said feeding connection for lifting said sealing member off of said charging openings at the completion of withdrawal of said feeding connection from said charging openings.

13. A charging truck for a horizontal coking retort oven battery comprising, in combination: a carriage; a hopper mounted thereon so as to be carried thereby in spaced relation to a coke oven battery and provided with a bottom outlet for discharge of fuel therefrom; a chute mounted on said carriage for movement therewith and adapted to be lowered relative to said hopper within a

charging opening of coking chambers and to extend from the bottom outlet of said hopper to said charging opening for feeding fuel from said hopper to said coking chambers; and a thimble mounted on said chute for relative movement therewith and adapted to seal said charging opening while said chute is being lowered into said opening.

14. A charging truck for a horizontal coking retort oven battery comprising, in combination: a carriage; a hopper mounted thereon so as to be carried thereby in spaced relation to a coke oven battery and provided with a bottom outlet for the discharge of fuel therefrom; a chute mounted on said carriage for movement therewith and adapted to be lowered relative to said hopper within a charging opening of the coking chambers and to extend from the bottom outlet of said hopper to said charging opening for feeding fuel from said hopper to said coking chambers; a thimble mounted on said chute for relative movement therewith and adapted to seal said charging opening while said chute is being lowered into said opening; and means on said chute adapted for lifting said thimble from said opening after said chute is substantially entirely withdrawn from said opening.

In testimony whereof, I have hereunto set my hand.

JOSEPH VAN ACKEREN.