The present invention relates generally to handling of coke oven doors and particularly to handling the same from a coke receiving car.

In coke production, it is necessary that coal be confined in ovens for coke production and that there are doors on the ovens to remove the coke therefrom and that there is some means, usually a car or machine to operate the oven doors. The coke is very hot as it is discharged from the ovens and it is quite inconvenient for operators to get close to the hot coke or to an open oven while operating the car or the operating mechanism for oven doors. The ovens themselves emit considerable heat while the same are open and this also makes it quite inconvenient for operators to get close to an open oven while placing a door onto the ovens or removing one therefrom.

The present invention aims to provide means whereby operators need not be subjected to the full inconveniences mentioned and to provide combinations of elements whereby the convenience and safety of operators is enhanced and to provide an efficient machine for operating the doors of coke ovens.

Objects of my invention are:

To provide a coking plant machine with efficient means whereby an operator is present thereon.

To provide a coking plant machine with a door operating means to open and to close the doors of coking ovens while an operator remains on the car at a convenient distance from an open coking oven and from hot coke discharged from an oven.

To provide a coking plant machine with an operator's platform or runway along the coke discharge side of the machine and above the discharge opening thereof and outwardly of the side of the machine to protect an operator on the platform against heat from hot coke in or being discharged from the coke carrying compartment of the machine.

To provide a coking plant machine with a platform on an end thereof, outside of the coke carrying compartment to protect an operator or look-out on that end of the car from heat of coke in the coke carrying compartment of the machine when an operator is present thereon.

To provide a coking plant machine with an operator's cab to protect an operator against weather conditions and against heat from open coking ovens and against heat from hot coke on the machine.

To locate this cab so that an operator has a clear view all around and can diligently control the car as to its own movement and as to the door operating mechanism and the discharge mechanism of the coke carrying compartment of the machine.

To provide a coking plant machine with an oven door operating means which effectively takes hold of such doors and removes the same from and replaces the same on ends of coking ovens and which is protected against flame and heat emitting from an open oven.

To provide a coking plant machine with an oven door operating means which can pick up a door from a place away from an oven and put the same onto that oven or remove a door from an oven and put the same in a place away from that oven.

To provide a coking plant machine with an oven door operating means which retains the oven door in correct relation to the front of an oven during removal and replacement of the door from and onto the oven.

To generally combine various elements, new and old, to provide a coking plant machine with means which tend to promote efficiency in the machine and welfare of operators in the operation thereof.

Other objects will appear during the description of the car shown in the accompanying drawings or will become obvious or apparent upon an inspection of the drawings and the specification.

In the accompanying drawings mentioned above:

Fig. 1 is a side view of a coke quenching car of my invention with a door operating mechanism thereon, designed for vertical or high coke ovens, a look-out platform on one end thereof, an operator's cab below the door operating mechanism, and a platform or runway along one side of the coke quenching compartment of the car.

Fig. 2 is a plan view of the car of Fig. 1 showing the horizontal relations of elements more clearly.

Fig. 3 is an end view of the car shown in Fig. 1, showing vertical and horizontal relations of elements more clearly.

Fig. 4 is a side view of a connection between an oven door and the chain for moving the door and has a weight therein to retain the chain vertically to facilitate attachment thereof to oven doors.

Fig. 5 is a sectional view showing the shield protecting the door operating mechanism.

Fig. 6 is a plan view of a car, similar to Fig. 1, but designed for horizontal or wide coking.
Ovens; the cab being sidewise adjacent to the door operating mechanism and to the coke carrying compartment.

Similar reference characters refer to similar parts throughout the views.

Coking ovens usually are arranged in batteries. In the drawings is shown one end of one coking oven of a battery of ovens and this end has shown thereon the oven door A resting on the floor 10 of the oven or on an extension thereof in the form of a platform 11.

The car B comprises the trucks 12 and 13 supported and adapted to run on the rails or tracks 14 and 15 and supporting the chassis of the car 16 and the hopper or coke compartment C supported on the chassis of the car. The tops or levels of the tracks 14 and 15 are located below the level of the oven floor a sufficient distance so that the coke compartment is brought into such relation to the oven floor so that coke discharged from the oven will move into the compartment during the discharge.

The platform D is provided on one end of the chassis, endwise adjacent to the compartment C to provide a space and place for an operator when necessary or desirable. This same operator may also operate the gates on the coke compartment when desired.

The platform or run-way E is supported on the chassis and extends along that side of the coke compartment which has the coke discharge gates 62 thereon. The run-way E ends in close proximity of the platform D so that an operator can conveniently step from the platform to the run-way and vice versa. The other end of the run-way is in convenient proximity to the operator's cab F and can also be conveniently reached from the ground by the steps 16. The railing 17 protects an operator on the run-way.

The car B is operated by the motor 18 mounted on the truck 13 and the control means for the motor are located in the cab F.

The cab F, in this design, is mounted on the chassis, a little distance from the end of the coke compartment to provide space for the weight compartment 19 which is provided for the purpose of applying thereto some weight or ballast 18 to counteract weight on one side of the car or to prevent tipping of the oven door to prevent tipping of the car on the tracks. This ballast is required only under certain conditions and may be omitted when the car does not have any tendency to tip on the tracks.

In this design, the oven door operating means 55 is mounted on the top of the cab, suitable windows such as 61 being provided in the cab to permit an operator in the cab to see not only horizontally but vertically as well to observe conditions around the car and the operation of the door operating means above.

The door operating ram comprises the two axially movable, sidewise spaced members 20 and 21 having the bracket structures 22 and 23 on one end thereof and the journal bearings 24 and 25 mounted on the corresponding bracket structures. The shaft 26 is journaled in the bearings 24 and 25 and has keyed onto the ends thereof, to rotate therewith the idler wheels 27 and 28 to be more definitely described herein below.

The shafts 26 and 27 are journaled in this manner, and the idler wheels 27 and 28 are journaled in the positionally fixed bearings 24 and 25 mounted respectively on the uprights 30 and 31. The ram rides on the pins 31 and 32.

The wheel 28 is keyed onto the shaft 33 to rotate therewith and is belted to the smaller wheel 29 on the shaft 40 in the cab by means of the rope or chain belt 41. The shaft 40 and the smaller wheel 29 are operated by the hand wheel 42 in the cab. The guide wheels 43, 44 and 45 are journaled in respective positions to guide the ram into a definite path of movement.

The door operating motor 46 is mounted on the ram and operates the shaft 47 rotatively. The shaft 47 is supported in the bearings 48 also mounted on the ram and has keyed thereto, to rotate therewith, the drums 49 and 50 in movement with the above mentioned idler wheels 27 and 28, respectively, which are mounted on the shaft 26.

The drawings show two flexible members or elements between the door A and the drum 50. One of such members can be used when the door is quite narrow. The specific construction of this flexible member, more specifically set forth hereinafter, adapts the same very well for single flexible elements since this specific structure prevents the chain from rotating movements or twisting on its own axis, and when a size of the chain is used, will always hold the door in proper relation to an oven.

Each of the flexible elements shown has the cable part 51, the chain part 52, and the weight 53 in the chain part.

The cable parts 51 each has one end thereof secured to the corresponding drum 49 or 50. Each of these drums is quite wide to afford sufficient space for the cable part 51 to wind thereon, preferably in single file to counteract any tendency of the cable part to climb either upon itself or upon the flanges of the drum. The other ends of the cable parts are secured to one end of the corresponding chain part 52.

The chain parts 52 pass over the idler wheels 27 or 28, respectively. Each of these idler wheels may be grooved to suit the chain part 52 so that the same will be guided in a definite path. The end of the chain part is secured to one end of the cable part 51 while the other end of the chain part is secured to the weight 53 shown in the drawings as being a ball so that there are no shoulders or the like thereon to catch other structure during a door operating movement thereof. This weight inclusion in the flexible element always puts a tension on the chain part even when no door or other weight is suspended thereon and always retains the links of the chain part in proper relation in that the lowermost part of each of the endwise curved links will always locate itself in the uppermost part of the next link. This tension on the flexible element also keeps the below described open link in a position convenient for an operator to hook onto an oven door when the door is being opened and to unhook the same after the door is replaced on the oven.

The link 54 is open on one side so that the same can easily be hooked into the link 55 secured to the ball and into the link 56 secured to the upper end of the door A. (Fig. 4.)

The shield 57 is provided on and secured to the inner end of the ram by welding or rivets or bolts or any securing means which can safely withstand the flame and heat usually emitted from an open coking oven. This shield is spaced from the ram structure by means of the stalls 58 to provide an air space 59 between the shield.
and the ram structure so that heat from the shield can not be transmitted directly to the ram structure and must pass through the heat insulating air space 55 before it can reach the ram structure.

The floors of coking ovens usually are arranged on a higher level than the ground upon which the ovens are built. Quite frequently an oven door must be deposited on the ground and away from its oven opening for various reasons and later again picked up from the ground for replacement on the oven. In devices of the prior art, there is no means for retaining the oven door away from the oven and at the same time be in a convenient place for the door operating mechanism to pick it up and to replace it on an oven or to remove the door from an oven and to move and deposit it in a place away from the oven for repairs or the like. In some cases special platforms have been built at the end of a battery of coking ovens for receiving doors which need repairing or the like but, with such platforms, it is necessary to use a locomotive crane or the like to bring the door from the platform to an oven door and then take hold of it by means of the door operating mechanism to put it onto the oven. Vice versa for removal of a door from an oven.

In the present invention, the chain part 52 always rights itself relatively to bring the door engaging hook thereon into position for easy engaging of the door either by the weight of the chain alone or with the weight therein. During the picking up or depositing of a door in a place away from an oven the cable part 51 may extend over the idler and the chain part may extend over the drum but this extension occurs only while the door is quite remote from the oven and the chain will right itself and the door thereon automatically as the latter approaches the end of a coking oven.

The shield effectively protects the ram structure particularly the journal and moving parts and the lubricant for the journals due to the angular part 60 thereof which is bent outwardly to deflect flame and heat outwardly from the ram.

The combination of elements as arranged in the present invention provides a coking plant machine with various means, and convenience brought together conveniently located and easily and conveniently operated and easily and conveniently reached for operation so that the machine as a whole is not only highly efficient but is also economical of structure and operation and presents convenience for operators of the machine.

Fig. 6 shows a plan view of Fig. 1 having the elements extended axially so that the operator's cab can be located sidewise adjacent to the coke compartment and to the door operating mechanism so that an operator can conveniently oversee the operation of the coke compartment as well as the door operating mechanism and the path of the car in the same manner as in the device shown in Figs 1 and 2. In either case, the operator's cab is adjacent to the coke compartment and to the door operating mechanism. In this case, the car as a whole is lengthened so that the cab can be placed between the coke compartment and the door operating mechanism. Otherwise the above described structure and the below described operations are substantially the same. The same reference characters are used in both structures.

As to operation of the mechanism shown and described:

The car is guided by the tracks 14 and 16 and may be moved along the tracks by the motor 18 shown in geared relation to the driving axle and driving wheels of the car.

The platform D affords a convenient means for a look-out or other passenger if required on the rear end of a power driven car.

The run-way B affords convenient means for an operator to have access to the doors on the coke compartment for operation of doors or otherwise. The run-way is located above the discharge part of the coke compartment so that an operator can have access to the discharge gates without great inconvenience from the coke compartment or reaching down from above the coke compartment and there is always considerable heat insulating air space between an operator on the run-way and the hot coke in the coke compartment.

The operator's cab is located adjacent to the coke compartment and to the door operating mechanism; vertically adjacent in Figs. 1 and 2 and horizontally adjacent in Fig. 6 so that an operator can always have complete vision over the coke compartment and over the door operating mechanism and the path of the car through windows on all sides of the cab illustrated by the window 51 in one side of the cab.

An operator can conveniently step from the rear platform D onto the run-way and from there onto and into the cab F. Likewise, an operator in the cab can conveniently step from the cab to the run-way and from thence to the rear platform.

In that manner, full and complete control of the car is afforded and the combinations of elements, as herein combined, afford an efficient and convenient assembly into one easily controlled and efficiently operating car.

To remove a door from an oven, the ram is first extended into proximity of the door by means of rotating the hand wheel 42 accordingly and thereby rotating the wheel 39 which, through the connector 41, rotates the shaft 33 and the pinions 31 and 32 thereon and in mesh with the gears 22 and 30 thereby move the ram axially to any position desired.

When the ram is in proper position, the open ended link 54 is hooked into the link 55 on the oven door. The motor 45 is then started so that the cable parts 51 will be wound upon the drums 49 and 50, respectively, and the chain parts 52 are thereby drawn over the wheels or idlers 27 and 28 and the door A will be moved upwardly and removed from the oven. The chain and cable parts of the flexible elements are arranged so that the chain parts never leave the idlers 27 and 28 during normal removal or replacement of the door.

However, when a door is to be picked up from or deposited on a floor below the level of the floor of the oven, the cable parts may extend over the idler wheels 27 and 28 and the chain parts may extend over the drums 49 and 50 during such picking up or depositing since the door need not then be held in a definite relation to an oven as the weight 53 in connection with the chain parts finding their places on the idlers when the chain is to be hooked onto the door and the two chains shown will right the door relative to the oven when the chains are hooked thereon.

The advantages of the shield 57 appear to be
quite obvious and appear to need no further special description herein.

Applicant is aware that changes and modifications can be made in the structures and relations of parts herein shown and described within the spirit and intent of the present invention and of the appended claims; therefore, without limiting myself to the precise structures and arrangements of parts as shown and described.

I claim:

1. A car adapted to move transversely in front of doors on coking ovens, an operating means on the car for successively removing doors from the ovens and placing the same thereon, a hopper on the car to receive coke from an open coking oven and having discharge openings and a movable gate for each opening on one side thereof, a runway on the car outwardly adjacent to the one side of the hopper and above the lower end of each of the openings for said discharge gates and being easily and conveniently accessible from a floor, and a moving and control means for the car and for the operating means of said ovens mounted on the car.

2. A vehicle movable transversely of ends of coking ovens having movable doors thereon, a hopper on said vehicle to receive coke from said ovens, a cab on said vehicle and spaced sidewise adjacent to said hopper to provide a protection for an operator in said cab against emissions from said hopper and to provide a space for stabilizing ballast for the vehicle, a handling means for the oven doors mounted on the top of said cab and overhanging a side of the vehicle, and ballast in said space to counterbalance the overhang of said handling means and be clear of a platform adjacent to said hopper and said cab.

EUGENE W. SCHELLENTRAGER.