This invention relates to an improved system of, and apparatus for charging carbonising plants, such as coke-ovens and retorts.

It is often the practice to charge coke-ovens with small-sized damp or wet coal, for example. 80% of the coal may pass through a screen of \( \frac{1}{2} \)" mesh, and the coal may contain as much as 15% or more of moisture. Small-sized damp coal is a difficult material to handle, because it will not flow freely, but tends to stick and hang up in a container. The damp coal will not flow readily from the main storage bunkers of a coke-oven battery into the hoppers of the customary type of charging car, nor will it flow readily from the charging car hoppers into the coke-oven.

The present invention obviates these difficulties, and facilitates the rapid charging of small-sized damp or wet coal into coke-ovens or carbonising retorts. The invention is not restricted to such use, however, and is equally useful for charging all kinds and grades of coal into carbonising plants of the kinds mentioned.

The present invention provides a system of charging coke-ovens and carbonising retorts, in which a car movable along a battery of coke-ovens or retorts carries one or more horizontally-arranged conveyors, with a charging chute having steeply inclined sides at the same angle of each conveyor, and in which each conveyor, while stationary, is charged by positioning the car beneath the outlet or outlets of a storage bunker closed by a horizontal sliding door or doors and opening the said door or doors to deposit a mound of coal or the like on each conveyor and then closing the said door or doors, the car then being positioned with the outlets of each charging chute above the oven or retort to be charged, and the coal is charged into the oven or retort by setting each conveyor in motion in any desired order to deliver its charge of coal into the charging chute and so into the oven or retort.

The invention also includes charging apparatus for coke-ovens or carbonising retorts, comprising a car movable above the coke-ovens or retorts, which car carries one or more horizontally-arranged conveyors and one or more charging chutes, each charging chute co-acting with a conveyor, the said conveyors while stationary receiving an appropriate charge of coal or the like from a storage bunker, the coal being charged into the oven or retort by setting each conveyor in motion to deliver its charge of coal into the associated charging chute and so into the oven or retort.

In the preferred embodiments of the present invention, both the coal storage bunkers and the charging chutes on the charging car have very steeply inclined sides, in order to minimise any tendency of the coal to stick.

A preferred embodiment of the present invention, as applied to a charging car for a battery of coke-ovens, will be described with reference to the accompanying drawings, in which:

Figure 1 shows a vertical sectional elevation through the storage bunker and charging car.

Figure 2 shows on the left-hand side a vertical section through the storage bunker and charging car perpendicular to Figure 1, while Figure 2A shows an end view of the car omitting certain details, and

Figure 3 is a plan view of one outlet of the coal storage bunker, showing the outlet doors and the means of operating the same.

It will be assumed that each coke-oven contains four charging holes. The charging car comprises a frame-work running on rails along the top of a coke-oven battery, and carrying four horizontal conveyors, of suitable length, arranged side-by-side. At one end of each conveyor is a vertical charging chute, having very steeply inclined sides; the top of each chute is below the end of the associated conveyor, whilst the outlet may carry a drop-sleeve for connection with the charging hole in the oven.

The conveyors are preferably adapted to carry a considerable weight of coal and are therefore preferably of the type formed by metal plates hinged together, as shown in Figure 1. Furthermore, the conveyor is supported intermediate its ends by a series of rollers. Each conveyor is driven by a reciprocating pawl engaging a ratchet wheel; the pawl may be reciprocated through an eccentric drive from the driving motor as shown in Figure 1. Alternatively, any other suitable means for driving the conveyors may be used. The vertical level of the conveyor system on the charging car can be varied by the screws. Suitable traction mechanism is provided for driving the car along the oven battery.

The small-sized damp or wet coal with which the ovens are charged is contained in a large storage bunker, which also has steeply inclined sides to minimise the tendency of the coal to stick, and has four large rectangular outlets arranged across the width of the battery and spaced correspondingly to the conveyors on the charging car. Each outlet is closed by two sliding doors which are operated through
rack and pinion mechanism is from a source of power. Inclined scrapers 17 are provided on the underside of each door 15.

In operation, the charging car is brought beneath the outlets 14 of the storage bunker, the conveyors 5 being stationary. The outlet doors 15 are then opened and coal falls onto the top of each conveyor 5 forming a mound of coal which fills the width of the conveyors substantially to the side plates 18, the length of the mound corresponding to the extent to which the doors 15 are opened. The amount of coal placed on each conveyor 5 can thus be regulated by the extent of the opening of the doors 15. The extent to which the doors 15 are opened may be determined by a limiting device such as a switch 19 (Figure 1) which can be set at any desired position. Alternatively, or in addition, the amount of coal placed on a conveyor may be adjusted by altering the vertical distance of each individual conveyor beneath the outlet 14 by means of the adjusting screws 12 provided on the car for this purpose.

When the conveyors 5 are laden with the desired amount of coal, the doors 15 are closed. As the doors close, scrapers 17 cut through the top of the mound of coal to clear away the coal from immediately beneath the doors 15. It will be noted from Figure 2 (left-hand side) that the centre-line of each conveyor is displaced slightly to one side of the centre-line of the outlet doors, leaving a little more space on the one side into which the coal displaced by the scrapers 17 can flow without spilling over the tops of the side plates 18.

The car then moves off until it is in position with the lower ends of the charging chutes 6 above the oven to be charged. When the charging hole covers are removed and the drop-sleeves 7 lowered, the conveyors 5 are set in motion by the driving mechanism 10, 11, according to the order in which it is desired to charge through the various holes. The pawl and ratchet drive for the conveyor 5 enables the movement to be started very slowly, thus avoiding any overload on the driving mechanism. As each conveyor 5 begins to move it gradually discharges the body of coal thereon over the end into the charging chute 6 and so into the oven. Due to the steep inclination of the sides of the charging chutes 8 and to the fact that the coal is in motion, there is no tendency for the coal to stick or build up in the charging chute during charging. The conveyor remains in motion until all the coal is discharged and it is clear that none can be retained on the conveyor itself.

We claim:

1. In a coke-oven battery, a coal storage bunker associated with the coke-oven battery, outlets on the said storage bunker, horizontal sliding closure means for said outlets on the storage bunker, a charging car movable above the coke-oven comprising the battery, at least two horizontally-arranged band-conveyors on said charging car which conveyors are adapted to receive while stationary a measured quantity of coal from the outlets of said storage bunker, the outlets of the storage bunker being commensurable in size with the length and breadth of the associated band-conveyors on the charging car and spaced correspondingly to said conveyors, a charging chute having steeply-inclined sides at the same ends of each of said conveyors on the charging car, with means to operate each of said conveyors independently of the others to discharge the coal carried by each conveyor-band over the end into the associated charging chute and so into the oven.

2. In a coke-oven battery as claimed in claim 1, the provision of scrapers inclined to the direction of movement on the underside of the sliding closure means on each outlet of the storage bunker; the centre line of each band-conveyor on the charging car being offset from the centre line of the associated outlet on the storage bunker in order to accommodate material displaced by the scrapers during the closing of the closure means.

3. In a coke-oven battery as claimed in claim 1, closure means on each bunker outlet comprising a pair of horizontally-arranged oppositely-moving doors, the extent of opening of which doors is adjustable.

4. In a coke-oven battery as claimed in claim 1, means for adjusting the vertical level of each horizontal band-conveyor on the charging-car.

5. Charging apparatus for a battery of horizontal coking chambers, comprising in combination, a car movable above the battery of coking chambers, at least two horizontally-arranged band-conveyors on the upper part of the car at a substantial height above the top of the battery, vertical side plates extending along the sides of each conveyor-band, long charging-chutes having steeply-inclined sides at the same ends of, and associated with each individual conveyor, the said charging chutes extending substantially over the height of the car, and driving means to set each conveyor gradually in motion independently of the other conveyors.

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