This invention relates to a mechanical handling plan for the unloading or discharging of coal or other minerals at mine shafts, and has for its chief object to provide a method of and means for discharging mine cars, especially those of large size, with a minimum amount of labour, and inexpensive as possible whilst allowing coal from different seams, or minerals of different kinds, to be hoisted at a mine shaft and discharged on to separate conveyors, screens, chutes or into separate storage bunkers.

As mine cages are usually arranged close together in mine shafts it is difficult to arrange rotatory tipplers opposite to the ends of each cage.

According to the present invention, the arrangement is such that the mine cars and tipplers, if used, can be moved sideways across the ends of the cages by any means, such as sliding or rolling, or by being carried upon movable carriages or tables running in slides or on rails across the ends of the cages. Thus a full mine car may be moved out of one of the cages and then moved sideways, if necessary, to the position of discharge.

When the said mine car reaches the discharge position it may be emptied either by means of a rotary tippler, which rotary tippler may, or may not, be mounted on the movable carriage itself, or by opening a door or doors in the car itself when the carriage has moved the car over the proper discharge opening.

This sideways movement permits the discharge of the car to take place on to one of several conveyors, chutes, bunkers, or the like as desired.

In order that the invention may be clearly understood and readily carried into effect, reference is directed to the accompanying drawings, wherein:

Fig. 1 is a diagrammatic view showing in elevation an arrangement of coal mechanical handling plant at a pit head, in which mine cages from a shaft fitted with two cages are presented for discharge.

Fig. 2 is a plan of Figure 1, and
Fig. 3 is an end elevation of Figure 1.

Fig. 4 is a similar view to Figure 1 showing a modified form of mechanical handling plant for use at a pit head.

Fig. 5 is a plan of Figure 4, and
Fig. 6 is an end elevation of Figure 4.

Fig. 7 shows diagrammatically in end elevation an arrangement of plant as applied to double decker mine cages presented from a double mine shaft.

Fig. 8 is an end view of Figure 7.

Fig. 9 shows diagrammatically in end elevation and in greater detail, a mechanical handling plant in accordance with the invention.

Fig. 10 shows diagrammatically in plan, a modified arrangement of mechanical handling plant according to the invention, and
Fig. 11 shows in plan, a still further modified arrangement of plant.

The following description of the invention is directed to the method of and means for handling coal, but is equally applicable to other minerals, further it is assumed that in describing the method of working, that one cage arrives with a full car or cars at a shaft top, whilst the other cage arrives at the shaft bottom with an empty car or cars.

Referring to the drawings in general, the same reference letters are used for the same or equivalent parts throughout. A indicates a mine cage which may be of the single or double decker type, each type having a pair of such cages operating side by side and presenting alternately to tipplers B, a full mine car C for discharge and in turn receiving an empty mine car. The mine cars being ejected from the tipplers B by rams D, D', which move the mine cars along rails E into or out of the cages A. The tipplers B are mounted on wheeled carriages F whereby the tipplers can be moved along rails E, transversely set relatively to the rails E to discharge the contents of the mine car to chutes G, conveyor bands H, screening J, or alternatively to openings in storage receptacles.

Referring more particularly to Figures 1 to 6 of the drawings at each end of the cage A, there are arranged the movable carriages F, on which the rotary tipplers B are mounted. Beyond the carriages and on the centre line of the cage, at each side are arranged the power operated rams D, D'. In Figures 1, 2 and 3, a pair of rams are used in echelon to deal with both cages, whereas in Figures 4, 5 and 6 four rams are used.

When a cage reaches the shaft top containing a full car C, the carriages F at each end of the cage are waiting with their tipplers B in position. An empty car being in one tippler with the other tippler empty. On the cage coming to rest in the required position a ram D pushes the empty car in one tippler into the cage so as to push the full car out of the cage into the other tippler. The cage at the shaft top now containing an empty car and with a full car loaded into the cage at the shaft bottom the cages may be worked to raise and lower the full and empty cars respectively.
Whilst the cages are moving in the shaft the empty tippler is moved into position for receiving the full car from the rising cage when it reaches the surface. Also whilst the cages are in motion the tippler with the full car revolves and the coal or other mineral is discharged.

In the arrangement shown in Figures 1 and 2 where a pair of rams D, D are used in echelon the mine cars follow a substantially rectangular path due to the disposition of the rams. In the arrangement shown in Figures 4 and 5, however, the cars are shuttled to and fro because of the disposition of the rams. In both cases the tipplers D, D, being moved laterally on their carriages F, F, to receive, and discharge in turn and present the mine cars to the cages for movement by the rams.

Alternatively to the full car being pushed into the tippler and moved immediately into line with the other cage, it may be emptied immediately or moved to some intermediate special emptying position and emptied, by revolving the tippler, down chutes or the like. Thus it will be understood that a full car from a cage can be discharged at various positions as required without moving more than the distance between the two cage centres. Should more emptying positions be required, the tippler can be moved sideways still further before discharging. In any case after discharge of the car, the tippler containing the empty car must be at rest on, or be moved to the centre line of the ascending cage.

As soon as a cage containing another full car arrives at the surface a ram pushes the empty car from its tippler into the cage, thus pushing the full car into another tippler where it in turn can be discharged down chutes whilst the cages are again being moved in the shaft.

It will therefore, be understood that when only two rams D, D are used, one for each cage A, the full cars C from one cage are always discharged down one of the chutes G, or the like, at one side of the shaft, and full cars from the other cage down one of the chutes, or the like, at the other side of the shaft.

If D is to be four rams D instead of two it is possible to reverse the direction of the transfer of the cars from the cage to and from the movable tipplers, if necessary.

After discharge, the coal or other mineral may be carried away by one or more conveyors F. Thus cars containing different kinds of coal or mineral may be discharged in such a manner that each kind may be kept separate and conveyed to the particular part of the cleaning or treatment plant desired for that particular class of material.

Figures 7 and 8 show an arrangement of mechanical handling plant for use with a double decker cage A, the tipplers B being arranged one above the other as with the rams D. The pairs of tipplers B are mounted on a single wheeled carriage F, the arrangement following substantially that shown in Figures 1 and 2, although the arrangement according to Figures 4 and 5 could be used.

Figure 9 illustrates in greater detail in end elevation a mechanical handling plant such as hitherto described, the full car from one of the mine cages being received by a tippler B mounted on a wheeled carriage F movable laterally on the rails E', the contents of the mine cars being discharged to chutes G to conveyor bands H and the usual screen J.

Figure 10 illustrates an arrangement in which the full cars C as presented by the cages A in turn, are ejected therefrom by a pair of rams D, pushing empty cars in front, the full cars being received by wheeled transfer carriages F movable laterally on rails to a position in line with rams D and tipplers B. The cars are moved by the rams D into the associated tippler thereby ejecting empty cars for return via the empty car transfer carriages F to the cage by the rams D. With such an arrangement, the cars follow rectangular paths, that in the upper part of the figure being counterclockwise and in the lower part clockwise.

Figure 11 illustrates a still further modification in which the cars are received from the cages A by turntable K which is associated with rams D, D and tipplers B, the operative procedure of handling the cars is as previously described, the cars moving to and fro in a right angled path.

If it is desired to know the weight of the coal or mineral, the rails E, E' on which the carriages run can be arranged to act as weigh bridges and the weight of coal or mineral discharged can be accurately obtained. Thus the invention can be arranged to allow the use of cars of any tare weight as owing to the fact that a car is discharged whilst the carriages carrying it and its tippler is on that portion of rails which form the weigh platform the difference in weight with the full and empty is always obtained.

Provisions may be made that should the tipplers and their carriages be in the way or form any obstruction in the occasional handling of bulky materials or during winding of men in the shaft, they could be moved sideways on their rails or on slides so that they can be clear of the shaft to allow unrestricted access to the cages.

An extension of the cages level with the landing level floor provides a level floor up to the cages when the tipplers are moved clear.

It will be understood that the discharge of the loaded cars may be effected with the employment of tipplers, for example, where the cars are fitted with doors or other appropriate discharge openings for emptying purposes.

What we claim and desire to secure by Letters Patent is:

Apparatus for handling coal, ore, or other mineral masses at a pit head, comprising, in combination, a pair of mine cages disposed in side-by-side relationship in association with a single mine shaft and adapted to operate alternately to move mine cars vertically between the pit head level and a lower point in the shaft, a pair of car receivers arranged adjacent to and at opposite ends of the cages at the pit head level in positions to receive cars from said cages for emptying, the said car receivers being movable laterally to the line of movement of cars into and from said cages to permit movement of cars between each of said receivers and each of said cages, a first ram operatively associated with a first one of said car receivers in alignment with a first one of said cages and adapted to push a car from said first receiver into said first cage and thereby displace a car from said first cage into and second one of said receivers when the said receivers are in alignment with a ram and said first cage, and a second ram operatively associated with said second car receiver in alignment with the second of said cages and adapted to push a car from said second receiver into said second cage and thereby displace a car from said second cage into said first receiver when
2,626,721

the said receivers are in alignment with said second ram and said second cage.

WALTER BERTRAM LODGE,

GEOFFREY ARMITAGE CORDEN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>671,025</td>
<td>Martin</td>
<td>Apr. 2, 1901</td>
</tr>
<tr>
<td>721,089</td>
<td>Ramsay</td>
<td>Feb. 17, 1903</td>
</tr>
<tr>
<td>845,217</td>
<td>Burnett</td>
<td>Feb. 26, 1907</td>
</tr>
<tr>
<td>1,226,483</td>
<td>Duvall</td>
<td>May 15, 1917</td>
</tr>
<tr>
<td>1,508,921</td>
<td>Castleman</td>
<td>Sept. 16, 1924</td>
</tr>
<tr>
<td>1,917,707</td>
<td>Castleman</td>
<td>Dec. 2, 1924</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Country</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>Apr. 27, 1908</td>
</tr>
</tbody>
</table>