June 19, 1928. 1,674,389

A. F. CASE

COAL LOADING PLANT

Filed Feb. 5, 1923 3 Sheets-Sheet 1

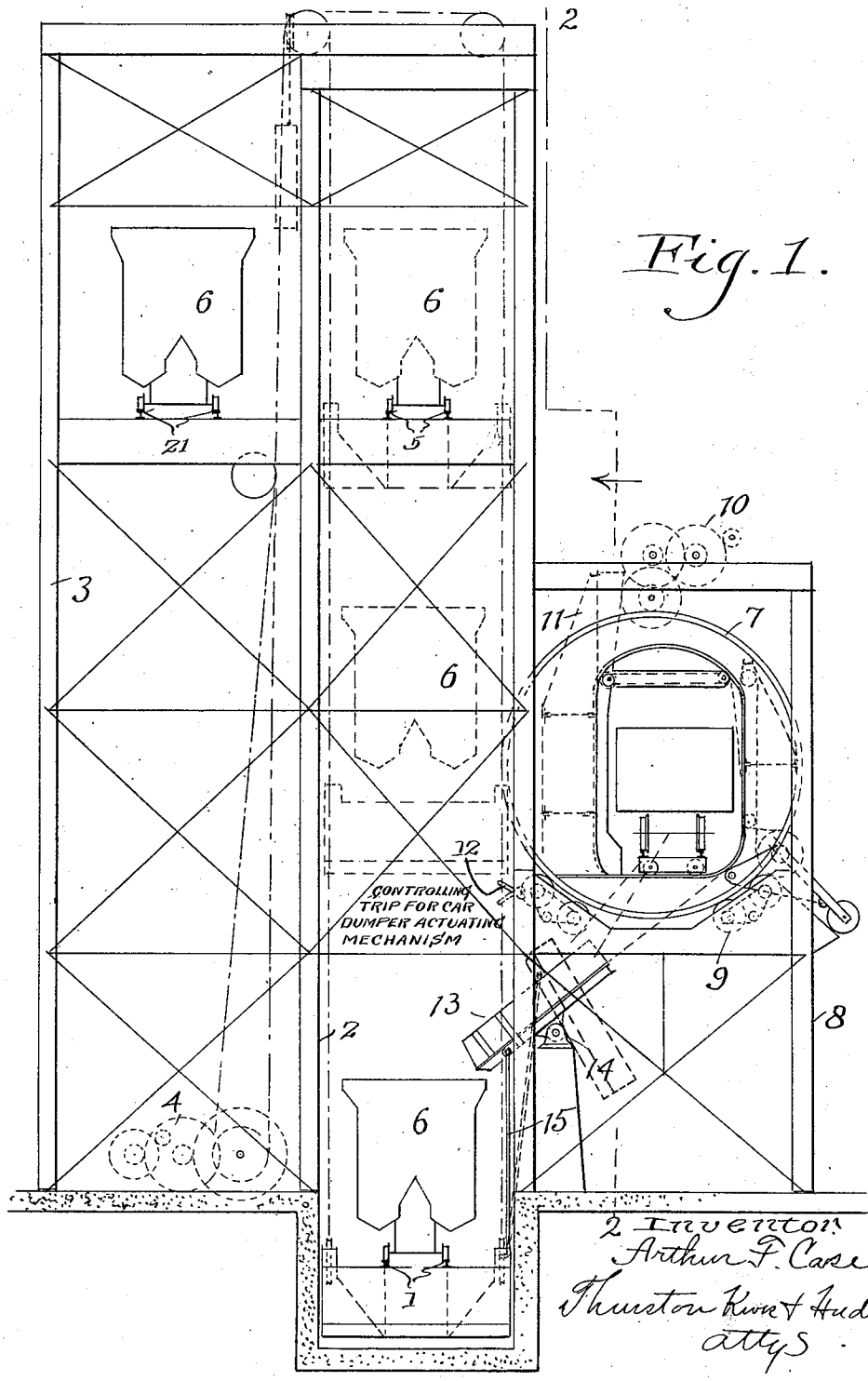

Fig. 1.

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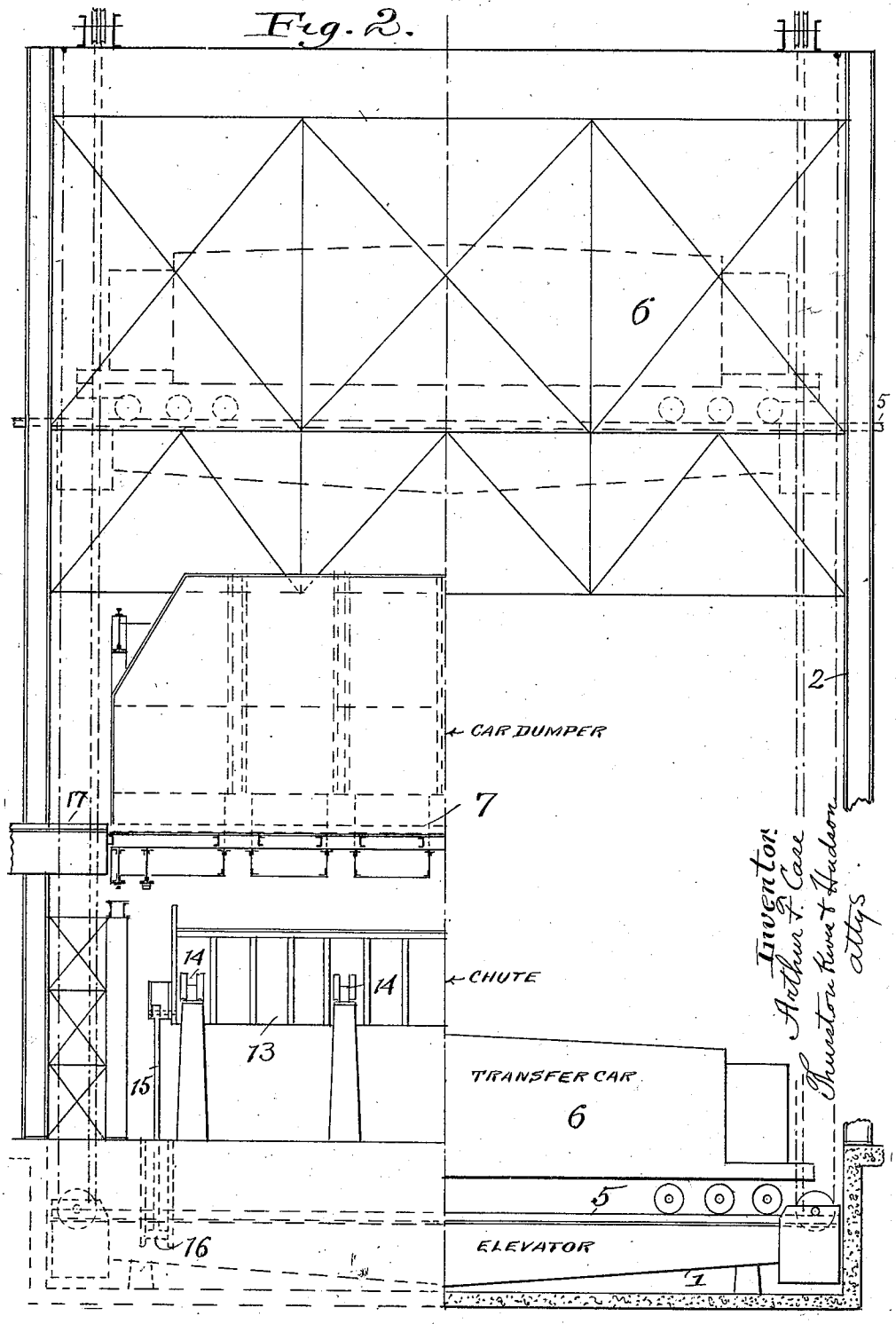
Fig. 2.



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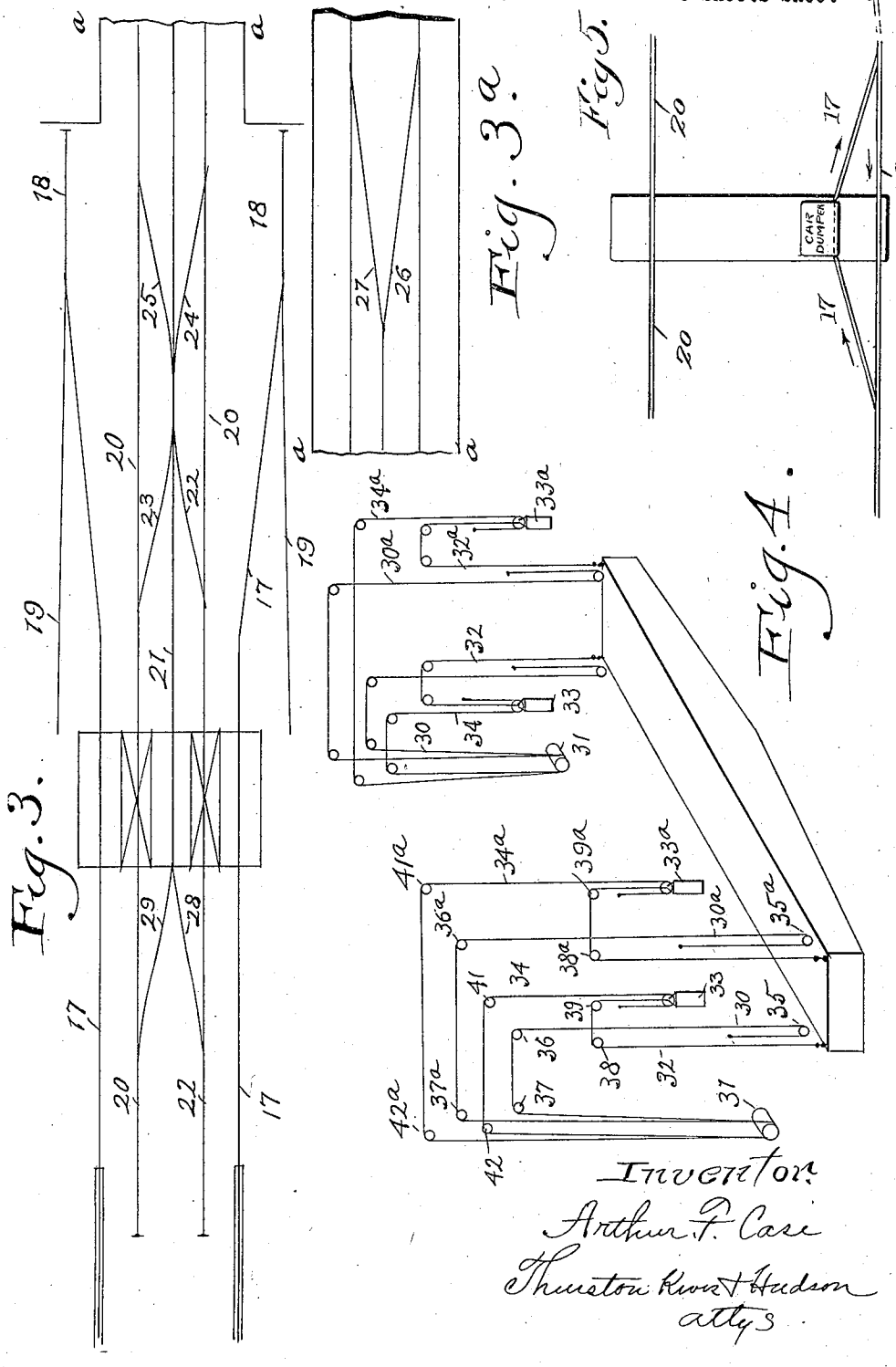

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UNITED STATES PATENT OFFICE.

ARTHUR F. CASE, OF CLEVELAND, OHIO, ASSIGNOR TO THE WELLMAN-SEAVER-MORGAN COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

COAL-LOADING PLANT.

Application filed February 5, 1923. Serial No. 616,890.

This invention relates to material handling apparatus and particularly to a loading pier for loading vessels with coal and the like. The type of loading pier and material handling apparatus to which the present invention has particular utility includes an elevated track which extends out along the pier and accommodates so-called transfer cars which deliver the coal or other material to vessel loading devices, together with suitable means by which the coal is transferred from railway cars to the transfer cars, and elevated to the upper trackway along which the transfer cars travel.

More particularly this invention is an improvement over the vessel loading apparatus or system shown in Patent No. 1,066,015, granted July 1, 1913, in the name of G. H. Hulett.

An object of the present invention is to economize in space, cost of installation and of operation by placing the car dumper along side an elevator which receives empty transfer cars from the elevated trackway and delivers loaded transfer cars thereto.

A further object is to provide means whereby the coal or other material is transferred from the railway car to the transfer car on the elevator platform by a single dumping operation.

A further object is to increase the rapidity of operation and reduce the breakage of coal in the dumping operation by providing means for actuating the car dumper to deliver material to the transfer car during the downward movement of the elevator.

A further object is to economize in the power required for operating the elevator.

Other objects will be apparent from the following description and accompanying drawings.

The following description and accompanying drawings set forth in detail certain means embodying my invention, the disclosed means, however, constituting but one of the various mechanical forms in which the principle of the invention may be employed.

Reference should be had to the accompanying drawings forming a part of this specification in which Fig. 1 is a transverse vertical section showing the elevator and car dumping cradle in elevation; Fig. 2 is a section on line 2—2 of Fig. 1, a portion of the dumper being omitted to show the elevator lifting platform; Fig. 3 is a diagrammatic plan view showing the arrangement of the trestle and railway tracks leading to and from the elevators and dumpers; Fig. 3ª shows an extension of the trestle tracks shown in Fig. 3; Fig. 4 is a diagrammatic view showing the elevating and counterbalancing means for the lifting platform; Fig. 5 is a diagrammatic side elevation showing the elevator, the dumper at the side thereof and the tracks leading to the elevator and dumper.

Heretofore the method involved, where transfer cars have been used has been to dump the coal from a car dumper into the transfer cars on a track adjacent the ground level and after the transfer car has thus received its load it was run away from the car dumper to a separate elevating structure and placed on an elevating platform and elevated to a top of the trestle, the transfer cars after discharging their loads being returned to the track adjacent the car dumper over separate return tracks.

The present invention involves the use of machinery which will be capable of dumping the coal from the railway cars into transfer cars positioned on the elevator platform so that the transfer cars can be elevated directly from the dumper and run off the elevator on to the trestle. In loading vessels alongside a pier the trestle will extend from the elevator out onto the pier and will be constructed to overhang the loading towers which are movable along the length of the pier.

By means of the present invention a large part of the travel of the transfer car after it has been loaded is eliminated. The car in the present case will receive the load from the car dumper while it is standing on the elevating platform and after receiving the load the transfer car will be elevated by means of this platform to the top of the pier trestle where it will be run off to deliver its coal to the loading tower. Before the platform descends an empty transfer car which has delivered its load and returned to the proper position will be run onto the elevator platform and lowered to the proper position to receive the coal from the next road car.

It is proposed in the present invention to so interlock the operation of the elevator

platform with the car dumper, that as the platform is lowered the car dumper will start to revolve when the platform has reached a certain point. This point will be so located that the railway car contents will be discharged into the transfer car as it is descending in the elevator so that by the time it reaches its lowest position it will be practically filled to capacity, the car dumper being so arranged with respect to the elevator that the entire contents of a car thereon will be discharged into the transfer car with a single dumping operation. The result of this arrangement is that the coal is subjected to very much less fall than would be possible if the car on the elevator platform received all its contents while in its lowermost position. This arrangement also has the advantage of saving time in loading the transfer car, the greater part of the loading operation being performed while the elevator is descending so that the elevating movement of the platform may be started almost immediately after the platform is lowered. The time thus saved enables the elevating platform to be operated at a slower speed than would be necessary if this feature were not included.

Referring to the accompanying drawings, the lifting platform 1 is movable in a suitable vertical guideway or elevator shaft enclosed by the frame work 2 which forms a part of the trestle supporting structure 3, the lifting platform being operated through suitable cables from suitable hoist operating mechanism 4 mounted at one side of the elevator shaft. The lifting platform 1 is provided with track rails 5 which form when the elevator is in raised position, a section of the trestle track. The transfer car 6 travels back and forth on the trestle tracks to and from the elevator. At one side of the elevator shaft is provided a suitable car dumper which in this instance includes a rotary car dumping cradle 7 supported on a suitable frame work 8 and rotatably mounted on supporting rollers 9 carried by the frame work. The cradle 7 is operated by suitable operating mechanism 10 and is provided on the side toward the elevator with a nose or chute portion 11, which upon operation of the cradle swings into the elevator shaft and serves to direct the coal into the transfer car and to distribute the coal therein. While the rotary cradle type of car dumper is considered preferable, other types of car dumpers may be employed. The car dumper may be any one of the types in common use, either power operated or gravity actuated in which, upon each actuation, the dumper moves through a complete cycle to discharge the contents of a car and return to normal position, the dumper being preferably that shown in my prior Patent 1,407,926, Feb. 28, 1922.

The operation of the car dumper is, in accordance with the present invention, controlled by a suitable trip 12 which when actuated serves to start the dumper mechanism into operation, the trip 12 being mounted at one side of the elevator shaft so that it is engaged by the elevator platform during the downward movement thereof. As shown herein, the trip 12 is in the form of a pivoted lever projecting into the elevator shaft and is connected to suitable devices preferably an electric switch controlling the operation of the dumper mechanism. When the elevator platform engages the trip arm 12 during its downward movement the car dumping cradle 7 starts to operate and the chute portion 11 of the cradle swings into the elevator shaft above the transfer car 6 on the downwardly moving platform delivering coal or other material from the car on the cradle into the transfer car as it approaches the bottom of the elevator shaft.

While the chute portion 11 of the car dumper is made of sufficient length to evenly distribute the coal into the transfer car, the extent of movement of the cradle in order to completely discharge the contents of a car thereon is so great that the chute portion 11 cannot conveniently be made of sufficient length to properly discharge the last of the coal from the car on the cradle into the transfer car. For this reason a deflector or chute 13 is provided beneath the cradle for directing coal into the transfer car during the latter portion of the movement of the cradle. The chute 13 is pivoted on a horizontal axis beside the elevator shaft and is so balanced that it normally is tilted to a position in which its inner end is clear of the lifting platform. The chute 13 has a depending rod 15 provided with an inwardly projecting foot portion 16 at its lower end adapted to be engaged by the lifting platform as it approaches the bottom of the elevator shaft. When the lifting platform 1 engages the foot piece 16 of the depending rod 15, the inner end of the chute 13 is swung downwardly into the elevator shaft over the transfer car 6 and serves to direct coal discharged from the chute portion 11 of the cradle into the transfer car.

Fig. 1 of the drawing shows a single elevator and a single car dumping cradle. In some installations, however, it will be preferable to provide a second elevator and car dumper directly opposite the elevator and car dumper shown in Fig. 1. Such an arrangement is indicated in Fig. 3 of the drawing which shows diagrammatically the arrangement of the railway car and transfer car tracks for such a double elevator installation. Referring to Fig. 3 of the drawing the two tracks 17 lead, respectively, to one end of each of the car dumping cradles and from the opposite ends of the cradles to

switches and kickbacks 18 from which the empty cars are delivered to return tracks 19 which lead to the yard for empty cars. The trestle tracks for the transfer cars comprise main tracks 20 which lead to the two elevators and a return track 21 which extends between the two main tracks 20 and between the two elevators. On the side of the elevator structure toward the pier, the tracks 20 and 21 are connected by a series of switches 22, 23, 24, 25, 26 and 27 by means of which loaded transfer cars may be transferred from one track 20 to the other and empty transfer cars may be switched from the main tracks 20 to the central return track 21. On the opposite side of the elevator the tracks 20 are connected to the return track 21 by means of switches 28 and 29 by means of which empty transfer cars may be placed upon the tracks 20 at the rear of the elevators so that as loaded cars are delivered from the elevators, empty cars may be placed thereon.

The elevator platform is preferably operated by suitable hoisting cables operated by suitable drums at one side of the elevator. The hoisting mechanism is counter-weighted in such a manner that the weight of the lifting platform and empty transfer car thereon is more than counterbalanced, the weight preferably being such that the amount of power required to lower the platform with the empty car thereon is practically the same as that required to raise the platform with a loaded car thereon. With such an over-counterweighted platform there is an advantage in returning the empty cars on the elevator since the difference in load in raising and lowering is decreased by the weight of the empty car.

The elevator platform 1 is connected at each end thereof by cables 30 and 30ª with a hoist drum 31 and by cables 32 and 32ª with counterbalance weights 33, 33ª, the counterweights 33, 33ª being connected to the drum 31 by cables 34, 34ª. The cables 30 and 30ª and 34 and 34ª at each end of the elevator platform are attached to the drum and wound thereon, the cables 30 and 30ª being wound in a direction opposite to the winding of the cables 34, 34ª so that as the cables 30 and 30ª are winding the counterweight cables 34, 34ª are unwinding. The cables 30 and 30ª at each end of the platform are attached at one end to a stationary support and extend downwardly around sheaves 35, 35ª carried by the platform 1, upwardly from the sheaves 35, 35ª over fixed guide sheaves 36, 36ª and 37, 37ª and then downwardly to the drum 31. The cables 32, 32ª are attached at one end to the platform 1, extend upwardly over fixed guide sheaves 38, 38ª and 39, 39ª, then downwardly from the sheaves 39, 39ª and are attached at their opposite ends to the counterweights 33, 33ª. The cables 34, 34ª at each end of the platform are attached at one end to a fixed part of the framework, extend downwardly around sheaves 40, 40ª carried by the counterweights 33, 33ª, upwardly over fixed guide sheaves 41, 41ª, 42, 42ª and downwardly to the drum 31. The counterweights 33, 33ª are of a weight such that they more than counterbalance the weight of the elevator platform with an empty car thereon and preferably of such weight that the power required to lower the platform with an empty car thereon is substantially the same as that required to raise the platform with a loaded car thereon.

In operation a loaded railway car is placed upon the dumping cradle 7 while the elevator platform 1 is in elevated position, and an empty transfer car is placed upon the platform 1 and the elevator mechanism is operated to lower the platform. When the platform engages the trip arm 12, the cradle operating mechanism is thrown into operation so that the cradle is rotated to swing the chute portion 11 thereof into the elevator shaft over the descending transfer car 6 discharging the material from the railway car into the transfer car as it descends. As the platform 1 approaches its lowermost position it engages the foot piece 16 of the chute operating rod 15 swinging the chute 13 into the position shown in full lines in Fig. 1 so that it receives material from the chute portion 11 of the dumper during the latter portion of the movement of the dumper and delivers the material into the transfer car 6. After the dumping operation is completed the elevator is operated to raise the loaded transfer car to the level of the trestle track 20, the loaded car is run off the elevator and an empty car placed thereon whereupon the above described operation is repeated.

While the present invention involves dumping mechanism which serves to co-ordinate the operation of these two machines, they may be operated, if desired, independently of each other. In addition to the normal functioning of the elevator, it may be employed to elevate empty transfer cars to the trestle tracks as for instance in installing, and may be employed to deliver the transfer cars to tracks at the ground level for purposes of repair.

Having described my invention, I claim

1. In a loading plant, the combination with an elevator adapted to receive transfer cars, a car dumper alongside the elevator shaft adapted to receive loaded cars, means for operating the car dumper to tip the cars to discharge them into transfer cars on the elevator and to return the cars to upright position, and controlling means for starting the car dumper operating means into operation engageable by the elevator upon downward movement thereof.

2. In a loading plant, the combination

with an elevator adapted to receive transfer cars, of a car dumper alongside the elevator shaft adapted to receive loaded cars, means for operating the car dumper to empty a car thereon into a transfer car on the elevator platform, means for operating the car dumper, and a trip with which the elevator platform engages during its downward movement for controlling said car dumper operating means.

3. In a loading plant, the combination with an elevator adapted to receive transfer cars, of a car dumper alongside the elevator shaft, said car dumper having a material guiding part movable into the elevator shaft during the operation of the dumper, and means controlled by the elevator for operating the dumper.

4. In a loading plant, the combination with an elevator adapted to receive transfer cars, of a rotatably mounted car dumping cradle alongside the elevator shaft, said cradle having a chute portion on the side toward the elevator, said chute portion extending beyond the periphery of the cradle and movable into the elevator shaft above the transfer car during the dumping movement of the cradle, and means operated by the elevator for operating the dumper.

5. In a loading plant, the combination with an elevator adapted to receive transfer cars, of a car dumper alongside the elevator shaft, and means for operating said car dumper including a controlling member at one side of the elevator shaft at a substantial distance from the bottom of the shaft for starting said dumper into operation, said controlling member being engageable with a movable part of the elevator whereby material is discharged from the car on the cradle into the transfer car during the downward movement of the elevator.

6. In a loading plant, the combination with an elevator adapted to receive transfer cars, of a car dumper alongside the elevator shaft, a movable chute for guiding material discharged from the cradle into a transfer car on the elevator, said chute being normally positioned clear of the elevator platform, means controlled by the elevator for projecting said chute into the elevator shaft over a transfer car on the elevator platform, and means for operating the dumper to discharge into the chute.

7. In a loading plant, the combination with an elevator adapted to receive transfer cars, of a car dumper alongside the elevator shaft, a chute mounted to turn about a horizontal axis below the cradle and alongside the elevator shaft, said chute being normally positioned clear of the elevator platform, means connected to said chute and engageable by the elevator platform for swinging said chute into the elevator shaft above a transfer car on the elevator platform, and means for operating the dumper to discharge material into said chute.

8. In a loading plant, the combination with an elevator adapted to receive transfer cars, of a rotatably mounted car dumping cradle alongside the elevator shaft, said cradle having a chute portion on the side toward the elevator shaft, said chute portion being movable into the elevator shaft upon operation of the cradle, and means for operating the cradle including a controlling member adapted to be engaged by a moving part of the elevator, said controlling member being so positioned that the cradle is operated to project said chute portion into the elevator shaft above a downwardly moving transfer car and to discharge material into the transfer car during the downward movement thereof.

9. In a loading plant, the combination with a main elevated trackway for transfer cars, of an elevator having a lifting platform with a trackway section forming, when the lifting platform is in elevated position, a portion of said elevated trackway, a return trackway for empty cars extending past the elevator at one side thereof, means at the rear of the elevator whereby empty transfer cars may be transferred to the platform, and a car dumper below the main trackway and alongside the elevator shaft whereby empty transfer cars may be lowered by the elevator, receive a load from a car on the dumper and be elevated to the main trackway.

10. In a loading plant, a pair of elevators side by side, each having lifting platforms adapted to receive transfer cars, main elevated trackways in alignment with the lifting platforms whereby transfer cars may be delivered to and from the lifting platforms, a return track for empty transfer cars between said main tracks and extending between the elevators, switches connecting said main and return tracks on opposite sides of the elevators, and car dumpers alongside the elevator shafts adapted to discharge material from cars thereon into transfer cars upon the elevator platform.

11. In a loading plant, the combination with an elevator having a lifting platform adapted to receive transfer cars, of a car dumper alongside the elevator shaft, means controlled by the movement of the elevator for operating said dumper, a chute normally held in a position clear of the lifting platform but movable to a position in which it projects into the elevator shaft over a transfer car on the platform to direct material discharged from the dumper to the transfer car, and means controlled by the movement of the elevator for operating said chute.

12. In a material handling plant, the combination with an elevator having a load carrying member, of a car dumper alongside the elevator, and a chute for guiding mate-

rial discharged from the dumper to the load carrying member, said chute being movable from a position clear of the elevator to a position in which it projects into the elevator shaft above the load carrying member.

13. In a material handling plant, the combination with an elevator having a load carrying member, of a car dumper alongside the elevator, a movably mounted chute for guiding material from the dumper to the load carrying member, said chute being normally positioned clear of the elevator, and means controlled by the movement of the elevator for moving said chute into the elevator shaft above the load carrying member.

14. In a material handling plant, the combination with an elevator having a load carrying member, of a car dumping cradle alongside the elevator shaft, said cradle having a chute portion movable into the elevator shaft during the dumping movement of the cradle, and means controlled by the elevator for operating said cradle.

In testimony whereof, I hereunto affix my signature.

ARTHUR F. CASE.