March 6, 1934. A. F. CASE 1,949,602

CAR DUMPER

Filed Jan. 2, 1932 3 Sheets-Sheet 1

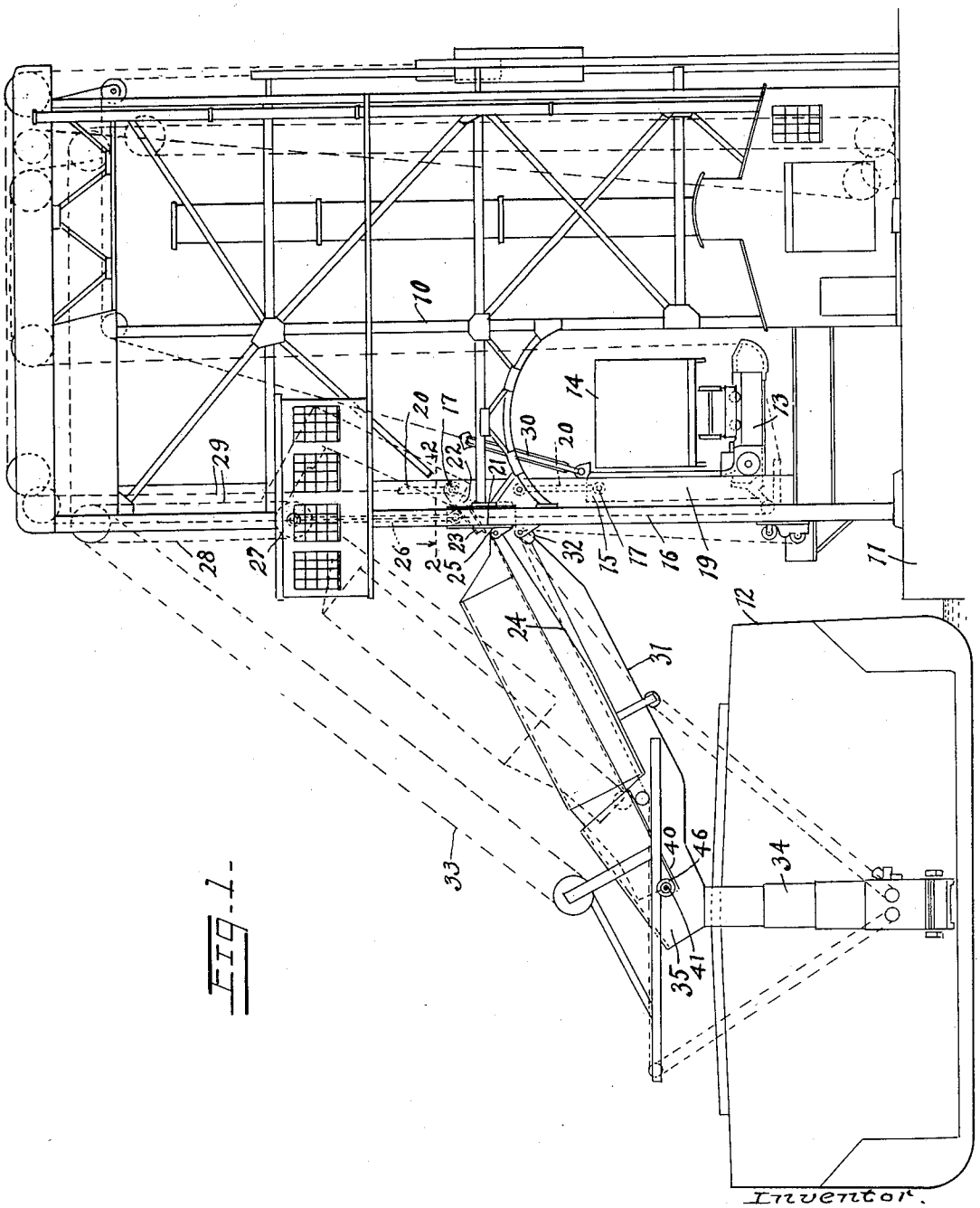


FIG. 1.

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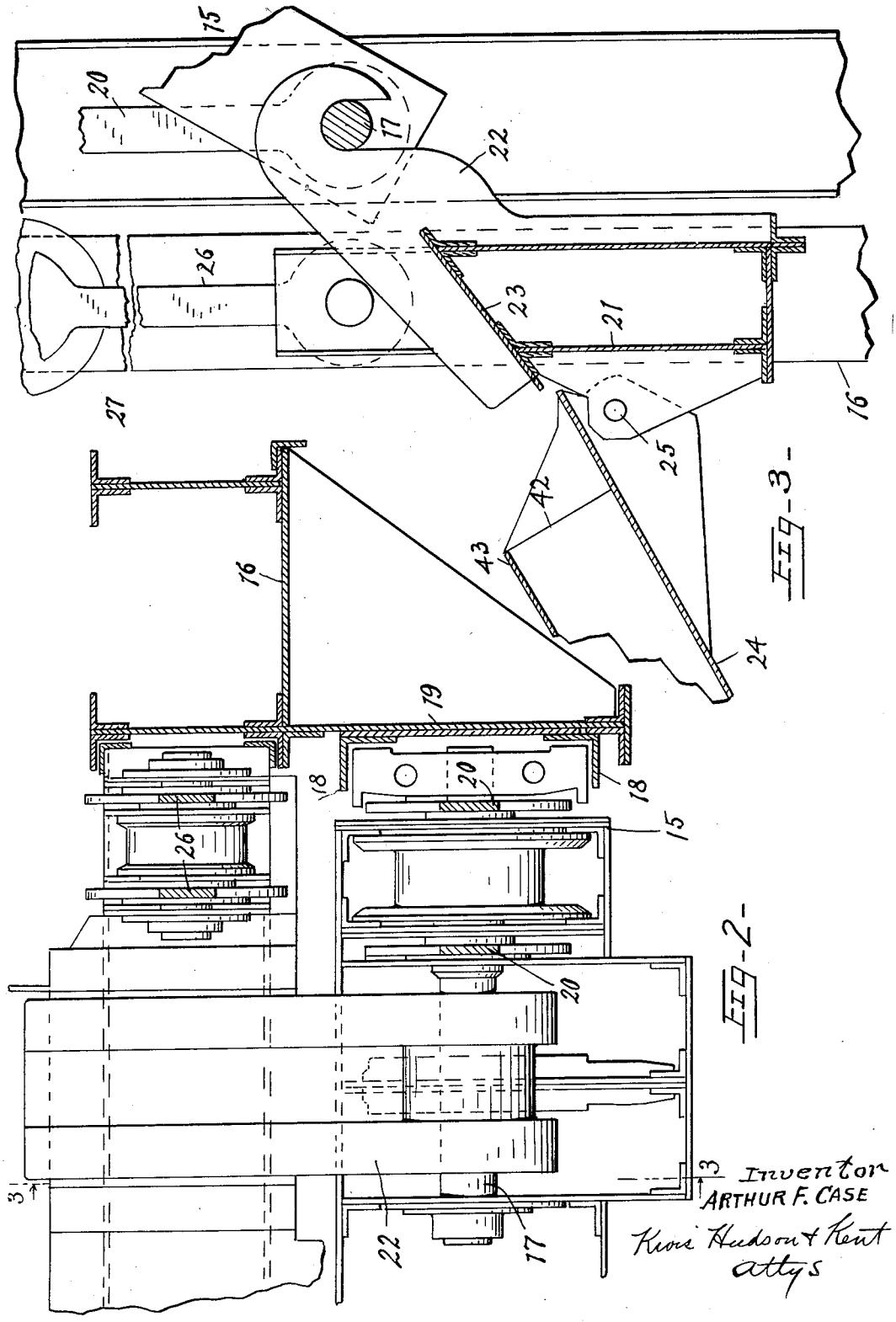


FIG-3-

FIG-2-

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Fig. 4.

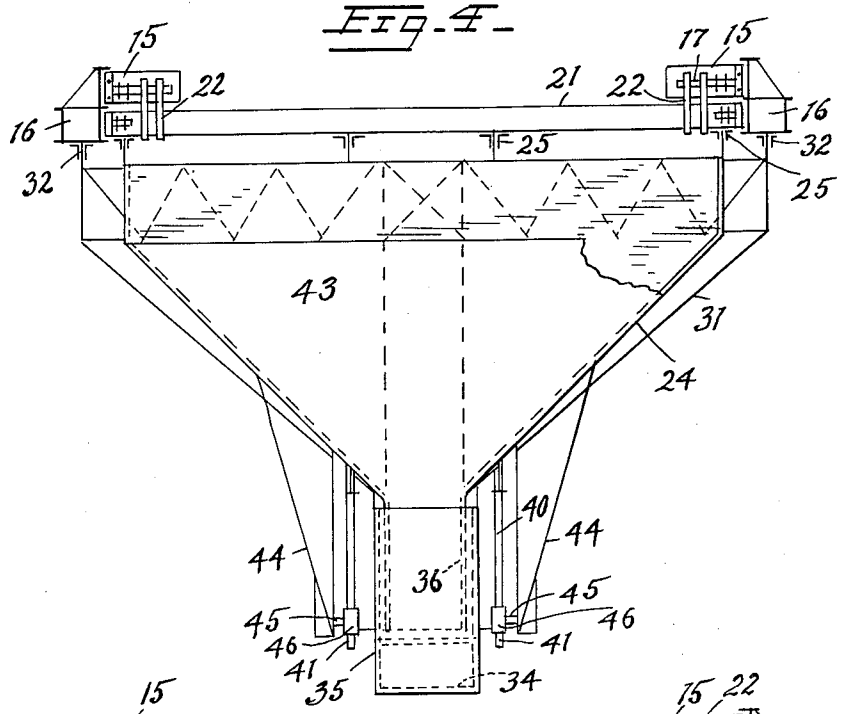
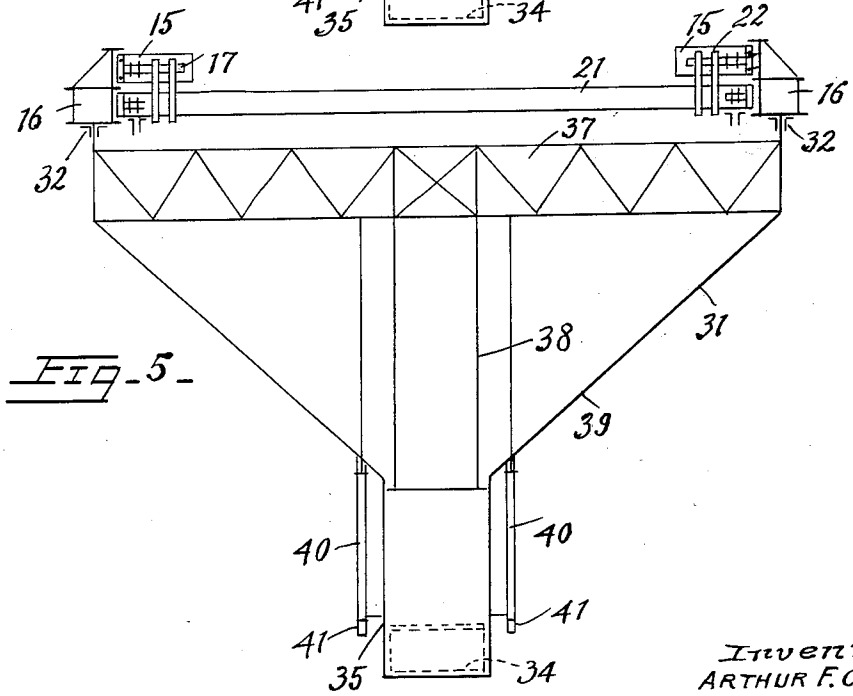


Fig. 5.



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Patented Mar. 6, 1934 1,949,602

UNITED STATES PATENT OFFICE

1,949,602

CAR DUMPER

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Application January 2, 1932, Serial No. 584,371

21 Claims. (Cl. 214—123)

This invention relates to car dumpers and is adapted to be used with car dumpers of various types, such as car dumpers of the "turn-over" type in which the cradle of the dumper revolves about a fixed pivot pin and has no vertical hoisting movement previous to its dumping rotation, or with car dumpers of the "rolling" type in which the car is clamped in a barrel-shaped cradle that is rolled up an inclined track to the point where the contents of the car are to be dumped into the pan, or with car dumpers of the "lifting" type.

However, since the invention is susceptible of especial utility when applied to car dumpers of the "lifting" type, it will be illustrated and described herein as so applied, with the express understanding that there is no intention to limit the application of the invention to this particular type of car dumper.

The "lifting" type of car dumper comprises a main frame which is usually located on a dock or pier in position to be used in the loading of cargoes, such as coal or other bulk material, into vessels lying alongside the dock or pier. Of course, car dumpers of this type are used for purposes other than the loading of vessels, as for example, they may be employed in the dumping of bulk material into a storage bin or hopper and, of course, when so employed the main framework would be located adjacent such storage bin or hopper.

The main framework of the "lifting" type of car dumper supports and surrounds a cradle upon which the cars to be dumped can be clamped. The cradle is arranged to be first hoisted vertically to the desired dumping point and then to be rotated about a horizontal axis extending longitudinally of the cradle so that the material in the car clamped on the cradle will be discharged from the car over one of the side edges thereof.

The point where the vertical hoist of the cradle terminates and its dumping rotation commences may be adjusted to suit different conditions, while the rotation of the cradle is accomplished by the engagement of pivot pins carried by the cradle with suitable hooks arranged on an adjustable girder movably supported and guided by the main framework. This adjustable girder may be moved by various means, a common one of which is, for example, two vertical screws rotatably carried in the main framework adjacent each end of the girder and cooperating with threaded members carried by the girder, the screws being driven by suitable gearing or other means.

A pan or bin into which the contents of the car are discharged by the dumping operation is attached to the adjustable girder by suitable hinges and extends outwardly of the main framework and over the boat or storage bin that is to receive the dumped material. The outer end of the pan is ordinarily supported by ropes passing around sheaves at the outer end of the pan and at the top of the main framework and connected to a suitable drum which may be rotated to raise or lower the outer end of the pan as the occasion requires. Usually, a telescopic chute is connected with and supported by the outer end of the pan to guide the material into the hold of the boat or into the storage bin that is being loaded.

The inner end of the pan which is hinged to the girder must be of such length that it will be capable of receiving the material dumped from the longest car which can be handled by the car dumper, it being understood that the contents of the cars are dumped into the pan over the side of the car and that the length of such cars is usually about fifty or sixty feet. The outer end of the pan and the telescopic chute connected thereto must be sufficiently narrow to allow the chute to be lowered through the cargo hatch of the boat being loaded, and it has been found that four feet is approximately the maximum permissible width for the chute. The pan, therefore, must be so constructed that its sides converge from a maximum of fifty or sixty feet at its inner end to a minimum of approximately four feet at its outer end.

The sides of the pan converge so sharply that they obstruct the passage of the material over the floor of the pan, and, since the angle at which coal or other similar bulk material will flow by gravity over a sloping plate is approximately 30°, it will be seen that the pan must be tilted to an angle greatly in excess of 30° before the material will flow freely down the slope of the pan despite the obstruction created to such flow by the sharply converging sides of the pan.

The steep tilting of the pan is undesirable since it will cause the material to have such a rapid velocity down the floor of the pan that a considerable breakage of the material will result.

It is also necessary to adjust the pan girder to provide variable flow angles for the pan for different classes of coal or other material. This angular adjustment of the girder is necessary also to properly position the outer end of the pan for different sized boats, since with a high boat it is necessary to raise the pan girder to its highest position in order to obtain the proper flow angle for the pan. The raising of the girder for the last named purpose requires that the cradle and car be raised a maximum amount vertically before it is rotated for the dumping operation, with the result that the speed of operation of the car dumper is slowed up and the tonnage capacity of the dumper greatly decreased.

An object of the present invention is to provide a car dumper construction of such character that the dumping operation occasions a mini-

mum amount of breakage of the dumped material.

Another object of the invention is to provide a car dumper wherein the material may be dumped into the pan when the latter is positioned at a small or flat angle and the angularity of the pan subsequently varied to cause the material to flow freely down the floor of the pan.

Another object is to provide in a car dumper means for producing a gradually increasing flow angle to the pan so that the material in the pan will discharge through the telescopic chute or out of the outer end of the pan.

A still further and important object of the invention is to provide a car dumper which is so constructed that the amount of the vertical lift of the cradle and car will be maintained at a minimum, even though it is necessary to vary the vertical position of the outer end of the pan.

A still further object is to provide a car dumper construction wherein the inner end of the pan may be located in one position during the dumping rotation of the cradle and car and in a different position while the material in the pan is flowing therefrom.

A further and more specific object is to provide in a car dumper a pan having a support at its outer end independent of the support at the inner end of the pan with the last named support arranged to be adjusted vertically of the main framework of the dumper.

Additional objects and advantages will become apparent during the following detailed description of an embodiment of the invention.

The embodiment of the invention that is to be described herein is illustrated in the accompanying drawings wherein:

Figure 1 is a side elevational view of a car dumper arranged on a dock or pier with the telescopic chute at the outer end of the pan extending through the cargo hatch of a vessel lying alongside the dock or pier and being loaded by the car dumper;

Fig. 2 is a fragmentary horizontal section taken substantially on line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a fragmentary vertical section taken substantially on line 3—3 of Fig. 2, looking in the direction of the arrows;

Fig. 4 is a diagrammatic top plan view of the pan, the support therefor, and the front side of the main framework of the dumper; and

Fig. 5 is a diagrammatic plan view similar to Fig. 4 but showing only the support for the pan, the pan being omitted in this view.

Referring to the accompanying drawings, the car dumper comprises a tower 10 built adjacent the edge of a dock 11 alongside which is tied a vessel 12 that is being loaded by the car dumper.

The tower 10 supports thereon a vertically moving tiltable cradle 13 which is adapted to receive a railway car 14, the cradle 13 having the usual guiding members, indicated generally at 15, which are mounted for vertical movement between but slightly rearwardly of the front corner posts or columns 16 of the tower 10, the cradle being suspended from horizontal cradle pins or pivots 17 carried by the guiding members 15 and to which are connected eye-bars later to be referred to.

The guiding members 15 for the cradle 13 are mounted for vertical movement between vertically extending channels formed of inwardly facing angles 18 secured to the inner sides of vertically extending plates 19 forming a part of and projecting rearwardly from the front corner posts or columns 16 of the tower, suitable reenforcing plates or gussets being provided between the columns 16 and the plates 19, as clearly shown in Fig. 2. The upper ends of the members 15 are each provided with the horizontally extending cradle pin 17 previously referred to and on which are arranged eye-bars 20.

A horizontally extending pan girder 21 is mounted on the tower between the front posts or columns 16 for vertical adjustment thereon and has fixed thereto inwardly extending hooks 22 which are adapted to be engaged by the cradle pins 17 of the cradle to limit the upward movement of the members 15 of the cradle and initiate the tilting movement of the cradle. The pan girder 21 supports a fixed, inclined deflector chute 23 of trough shape and extending along the top of the girder, and a discharge pan or chute 24 (later to be referred to more in detail) extending outwardly from the pan girder 21 and the lower edge of the deflector chute 23, the pan 24 being pivotally connected at its inner edge to the girder by means of horizontally extending pivots 25.

The pan girder 21 has portions at its opposite ends extending above the deflector 23 and to which are secured eye-bars 26 rotatably supporting at their upper ends sheaves 27 around which pass ropes 28 which extend around other sheaves on the tower and are connected to suitable hoisting machinery for raising and lowering the pan girder as desired.

The cradle 13 is operated by suitable hoist cables 29 passing around sheaves carried by the upper ends of the eye-bars 20, as is common in the art, to elevate the cradle until the cradle pins 17 engage with the hooks 22 of the pan girder and to then tilt the cradle about these pins as an axis to discharge the contents of a car thereon into the deflector chute 23 and discharge pan 24. It will also be understood that the cradle is provided with suitable clamps effective upon the tilting movement of the cradle to engage with the top of the car to hold the car upon the cradle, as is well understood in the art, a clamp of this character being indicated at 30 in Fig. 1.

The details of the construction of the tower, the cradle and the pan girder have only been referred to briefly herein, since such details per se form no part of the present invention. It should suffice to say that any form of tower construction could be employed in practicing the invention and that the cradle, if the car dumper is of the "lifting" type, should be capable of being raised, tilted or turned to dumping position, returned to its upright position, and then lowered in the tower. The pan girder can take various structural forms so long as it can be readily raised or lowered. It will be understood that the raising, tilting, and lowering of the cradle and the raising and lowering of the pan girder may be accomplished in different ways and that the control of these movements of the cradle and pan may be effected from various operators' stations, as desired.

In carrying out the invention, it is proposed to provide a supporting structure, indicated generally at 31, which has its inner end hingedly supported at 32 to the front corner posts or columns 16 of the main framework or tower 10 of the car dumper, the hinged supports 32 being fixedly carried by the framework just below the lowermost position of the pan girder 21. The outer end of the supporting structure 31 is supported by ropes 33 in the manner previously

employed in car dumper construction for supporting the outer end of the usual pan and well understood in the art. The outer end of the supporting structure 31 will support also the telescopic chute 34 through which the dumped material passes into the boat or bin in a manner well understood in the art, the means for controlling such telescopic chute being conventional and thoroughly familiar to those versed in car dumper construction.

The upper end of the telescopic chute 34 is provided with a fixed chute section 35 secured to the supporting structure 31 and arranged to guide the dumped material from the pan 24 into the telescopic chute 34. The fixed chute section 35 is provided with sides, top and bottom, and has its end facing the tower 10 open to receive the forward end of the pan 24 which normally rests on the hinged supporting structure 31.

It is proposed to construct the pan 24 with an extension 36 at its forward end which will enter the open end of the fixed chute section 35 and be capable of moving inwardly and outwardly of the chute section 35, the upper edges of the extension 36 of the pan and the side walls of the fixed chute section being so shaped as to permit a vertical tilting movement of the extension in addition to its inward and outward movement.

It will be seen that when the pan girder 21 is raised or lowered, the extension 36 at the outer end of the pan 24 will move inwardly or outwardly of the fixed chute section 35. Although various suitable arrangements might be followed for facilitating this inward and outward movement of the extension 36 in the fixed chute section, it is proposed to employ wheels or rollers connected with the pan and traveling on tracks carried by the supporting structure 31.

A form of construction suitable for the above specified purpose is diagrammatically illustrated in Figs. 4 and 5. Referring to Fig. 5 first, the supporting structure 31 will be seen to be of substantially the same plan configuration as the pan 24, with the inner edge of the supporting structure slightly longer than the length of the inner edge of the pan, it being remembered that the fixed hinged supports 32 for the supporting structure 31 are carried by the front posts or columns 16 of the tower 10 while the hinge supports 25 for the pan are carried by the pan girder 21. The supporting structure 31 would be made up of structural steel members bolted, riveted, welded, or otherwise secured together and would comprise an inner portion 37, suitably reenforced and braced, that is secured to the hinged supports 32 and an outwardly extending portion 38 connected to the middle of the portion 37, suitable diagonal braces or reenforcements 39 being provided between the portions 37 and 38. The outer end of the portion 38 supports the telescopic chute 34 and has secured thereto the fixed chute section 35. The supporting structure 31 is also provided with tracks 40 extending parallel to and on each side of the fixed chute section 35, the outer ends of the tracks 40 being provided with upwardly extending stops 41.

As previously stated, the inner end of the pan 24 will be wide enough to receive material from the longest car the dumper is capable of handling, it being this end of the pan that is hingedly connected to the pan girder 21. In addition to the floor, the pan has side walls 42 which converge toward the outer end of the pan and a top 43 which extends over a substantial part of the pan and over the extension 36, it being noted, however, that the side walls 42 of the extension 36 are parallel to each other and not convergent.

The pan 24 is provided adjacent its outer end with outwardly extending brackets 44 spaced from each side of the extension 36 and the fixed chute section 35. These brackets 44 support at their outer ends axles 45 for wheels or rollers 46 which rest upon and travel along the tracks 40 carried by the supporting structure 31, it being noted that the axles and rollers are approximately at the outer end of the extension 36.

It will be seen that, if the pan girder 21 is raised or lowered by its hoisting mechanism, the inner end of the pan will be similarly raised or lowered, while the extension 36 at the outer end of the pan will move inwardly or outwardly of the fixed chute section 35, the rollers 46 carried by the brackets 44 secured to the pan traveling along the tracks 40 of the supporting structure 31.

In order to more clearly explain the invention and to bring out the novel features and advantages thereof, a description of the operation of a car dumper having a discharge pan and supporting structure, such as disclosed herein, will now be given.

When the boat or vessel 12 is properly located at the pier and in loading position with respect to the car dumper, the supporting structure 31, with the pan 24 resting thereon, is lowered over the boat and the telescopic chute 34 is passed through a cargo hatch and located in the hold of the vessel.

At this time, the pan girder 21 is in its lowermost position and the pan 24 is resting upon the supporting structure at a flat angle of about 27° to 30°. The railroad car containing the material to be dumped is then run upon the cradle 13, it being understood that the cradle at this time is in its lowermost position. When the car has been positioned upon the cradle, the cradle hoisting mechanism is started and the cradle is elevated until the cradle or pivot pins 17 engage the hooks 22 on the pan girder 21. As soon as such engagement takes place, the tilting or revolving movement of the cradle commences and continues until the cradle has tilted sufficiently to discharge the material in the car into the deflector chute 23 and discharge pan 24. When the dumping of the material from the car has been accomplished, the cradle and car are reversely tilted or revolved and are then lowered so that the car may be removed and another car positioned upon the cradle.

As previously mentioned, the pan 24 is at a flat angle and therefore the material dumped into the pan does not flow outwardly of the pan with great velocity and consequently is not broken or damaged.

As soon as the lowering movement of the cradle has caused the pins 17 to be disengaged from the hooks 22, the pan girder 21 is raised by its hoisting mechanism to gradually increase the flow angle of the pan and to cause the material in the pan to flow through the fixed chute section 35 and into the telescopic chute 34. It will be seen that when the pan girder is thus raised, the inner end of the pan, being hingedly connected to the girder, will be correspondingly raised while the extension 36 of the pan will be moved outwardly of the fixed chute section 35, that is toward the door or open end of the section, the rollers 46 carried by the pan traveling along the tracks 40 of the supporting structure 31. Of course, this elevating of the rear end of the pan and the withdrawal of the extension

thereof from the fixed chute section increases the angle of the pan, as clearly indicated in dotted lines in Fig. 1.

As soon as sufficient material has been discharged from the pan to leave space therein for the contents of the next car to be dumped, the pan girder 21 is again lowered to its lowermost position, at which time the pan 24 is supported by the supporting structure 31 and the extension 36 at the outer end of the pan has moved inwardly of the fixed chute section 35 until the rollers 46 are adjacent the stops 41 of the tracks 40. Another car now being upon the cradle, the cradle is hoisted and tilted, and the contents of the car dumped into the pan, and the same sequence of operations followed as has been previously described.

It will be seen that a minimum amount of breakage is occasioned in the material by the dumping operation since the material is received into the pan while the pan is at a flat angle. The breakage of the material is still further reduced by retaining a quantity of material in the pan at all times, as mentioned above. It will also be seen that, since the material is dumped into the pan when the pan is at a flat angle, it is not necessary to lift the cradle as high as would be the case if the pan remained always at the same angle. Therefore, the tonnage capacity of the car dumper is increased, due to the saving of time effected because of the minimum vertical lift of the cradle. The arrangement of the pan at a flat angle during the dumping operation is also advantageous where bins or hoppers are being loaded and the head room is necessarily limited.

Although the preferred embodiment of the present invention has been illustrated and described herein, it should be understood that the invention is not to be limited thereto, but is susceptible to modifications and adaptations within the scope of the appended claims.

Having thus described my invention what I claim is:

1. In a car dumper, a main frame-work, a cradle, a discharge pan, a support for the outer end of the pan and upon which said outer end may move independently thereof toward and away from said frame-work, said support being provided with means cooperating with the outer end of said pan through which the material discharged therefrom may pass, and an independent vertically adjustable support for the inner end of said pan.

2. In a car dumper, a main frame-work, a cradle therein, a discharge pan, a support for the outer end of said pan and having its inner end connected to said frame-work and upon which the outer end of the pan may move independently thereof toward and away from said frame-work, said support being provided with means cooperating with the outer end of said pan through which the material discharged therefrom may pass, and an independent vertically adjustable support for the inner end of said pan.

3. In a car dumper, a main frame-work, a cradle therein, a discharge pan, a support for the outer end of said pan and having its inner end fixed vertically with respect to said frame-work and connected thereto and upon which said outer end of the pan may move independently thereof toward and away from said frame-work, said support being provided with means cooperating with the outer end of said pan through which the material discharged therefrom may pass, and a separate support for the inner end of said pan and movable vertically with respect to said frame-work.

4. In a car dumper, a main frame-work, a cradle therein, a discharge pan, a support for the outer end of said pan and having its inner end connected to hinges fixedly secured to said frame-work and its outer end adjustably supported from said frame-work and upon which the outer end of said pan may move independently thereof toward and away from said frame-work, said support being provided with means cooperating with the outer end of said pan through which the material discharged therefrom may pass, and a separate support for the inner end of said pan and vertically movable with respect to said frame-work.

5. In a car dumper, a main frame-work, a tiltable cradle arranged for vertical movement therein, a pan girder vertically movable in said frame-work, a discharge pan having its inner end connected to said pan girder and supported thereby, and a support for the outer end of said pan and having its inner end fixed vertically with respect to said frame-work and upon which said outer end of the pan may move independently thereof toward and away from said frame-work, said support being provided with means cooperating with the outer end of said pan through which the material discharged therefrom may pass.

6. In a car dumper, a main frame-work, a tiltable cradle arranged for vertical movement therein, a pan girder vertically movable in said frame-work, a discharge pan having its inner end hingedly connected to said pan girder and supported thereby, and a support for the outer end of said pan and having its inner end connected to hinges fixedly secured to said frame-work below the lowermost position of said pan girder and upon which said outer end of the pan may move independently thereof toward and away from said frame-work, said support being provided with means cooperating with the outer end of said pan through which the material discharged therefrom may pass.

7. In a car dumper, a main frame-work, a cradle therein, a discharge pan, a telescopic chute cooperating with the outer end of said pan, a support for the outer end of said pan and said telescopic chute and upon which said outer end of the pan may move independently of said support and chute toward and away from said frame-work, and a vertically movable support for the inner end of said pan and carried by said frame-work.

8. In a car dumper, a main frame-work, a cradle therein, a discharge pan, a telescopic chute cooperating with the outer end of said pan, a support for the outer end of said pan and said telescopic chute and having its inner end connected to said frame-work and upon which the outer end of said pan may move independently of the support and chute, and a vertically movable support for the inner end of said pan carried by said frame-work and arranged above said first named support.

9. In a car dumper, a main frame-work, a vertically movable tiltable cradle arranged therein, a vertically movable pan girder, a discharge pan having its inner end hingedly connected to said girder, a telescopic chute cooperating with the outer end of said pan, and a support for said chute and the outer end of said pan and having its inner end connected to and supported by hinges fixedly secured to said frame-work below

the lowermost position of said pan girder, the outer end of said pan being supported upon said support to move independently of the same and of said chute toward and away from the main frame-work.

10. In a car dumper, a main frame-work, a cradle therein, a supporting structure carried by said frame-work, a discharge pan, means carried by said pan adjacent the outer end thereof for supporting the same upon said structure to move independently thereof toward and away from said frame-work, said structure being provided with means cooperating with the outer end of said pan through which the material discharged therefrom may pass, and means for vertically raising and lowering the inner end of said pan.

11. In a car dumper, a main frame-work, a cradle therein, a supporting structure carried by said frame-work and provided adjacent its outer end with a track, a discharge pan having a roller adjacent its outer end engaging said track and supporting the outer end of said pan for movement independently of said structure toward and away from said frame-work, said structure being provided with means cooperating with the outer end of said pan through which the material discharged therefrom may pass, and means for vertically raising and lowering the inner end of said pan.

12. In a car dumper, a main frame-work, a vertically movable tiltable cradle arranged therein, a vertically movable pan girder, a supporting structure carried by said frame-work, and a discharge pan having its inner end hingedly connected to said girder and being provided with means adjacent its outer end for supporting said outer end upon said structure to move independently thereof toward and away from said frame-work, said structure being provided with means cooperating with the outer end of said pan through which the material discharged therefrom may pass.

13. In a car dumper, a main frame-work, a cradle therein, a supporting structure connected to and extending outwardly from said frame-work, a fixed chute section carried by the outer end of said structure, a telescopic chute extending from said section, a discharge pan having its outer end movably arranged in said fixed chute section and supported by said structure, and vertically movable means for supporting the inner end of said pan.

14. In a car dumper, a main frame-work, a cradle therein, a supporting structure connected to and extending outwardly from said frame-work, a fixed chute section carried by the outer end of said structure, tracks on said structure on opposite sides of said chute section, a telescopic chute carried by said fixed chute section, a discharge pan having its outer end movably arranged in said fixed chute section and being provided with rollers engaging said tracks and supported thereby, and vertically movable means for supporting the inner end of said pan.

15. In a car dumper, a main frame-work, a vertically movable and tiltable cradle, a vertically movable pan girder, a supporting structure connected to hinges fixed to said frame-work below the lowermost position of said girder and extending outwardly from said frame-work, a fixed chute section secured to the outer end of said structure and having a telescopic chute connected thereto, tracks on said structure and on opposite sides of said fixed chute section, a discharge pan having its outer end extending into said fixed chute section and being provided with brackets supporting rollers which engage with said tracks, and a hinged connection between the inner end of said discharge pan and said pan girder.

16. The method of handling friable bulk material such as coal or the like which comprises elevating the material to a predetermined height, dumping a quantity of the material into a discharge pan arranged at a relatively flat angle of inclination, and then increasing the angle of inclination of the pan to cause the material to flow therefrom at a velocity such that excessive breakage of the material is avoided.

17. The method of handling friable bulk material such as coal or the like which comprises elevating the material to a predetermined height, dumping a quantity of the material into a discharge pan arranged at a relatively flat angle of inclination, then increasing the angle of inclination of the pan to cause the material to flow therefrom at a velocity such that excessive breakage of the material is avoided, and then decreasing the angle of inclination of the pan to the original angle when the desired amount of the material has flowed therefrom.

18. In a car dumper, a main framework, a cradle therein, a supporting structure connected to and extending outwardly from said framework, a fixed chute section carried by the outer end of said structure, a discharge pan having its outer end movably arranged in said fixed chute section and supported by said structure, and vertically movable means for supporting the inner end of said pan.

19. In a car dumper, a main framework, a cradle therein, a supporting structure connected to and extending outwardly from said framework, a fixed chute section carried by the outer end of said structure, tracks on said structure on opposite sides of said chute section, a discharge pan having its outer end movably arranged in said fixed chute section and being provided with rollers engaging said tracks and supported thereby, and vertically movable means for supporting the inner end of said pan.

20. In a car dumper, a main framework, a cradle therein, a supporting structure connected to hinges fixed to said framework and extending outwardly therefrom, a fixed chute section adjacent the outer end of said structure, tracks on said structure and on opposite sides of said fixed chute section, a discharge pan having its outer end extending into said fixed chute section and being provided with brackets supporting rollers which engage the said tracks, and vertically movable means hingedly connected to the inner end of said discharge pan.

21. The method of handling friable bulk material such as coal or the like which comprises elevating material in a container to a predetermined height, tilting the container to dump a quantity of the material into a discharge pan arranged at a relatively flat angle of inclination, then returning the container to an upright position and lowering the same, increasing the angle of inclination of the pan to cause the material to flow therefrom at a velocity such that excessive breakage of the material is avoided, and then decreasing the angle of inclination of the pan to the original angle.

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