March 5, 1940. J. D. RUSSELL 2,192,650

SHUTTLE CAR

Filed July 14, 1938 2 Sheets-Sheet 1

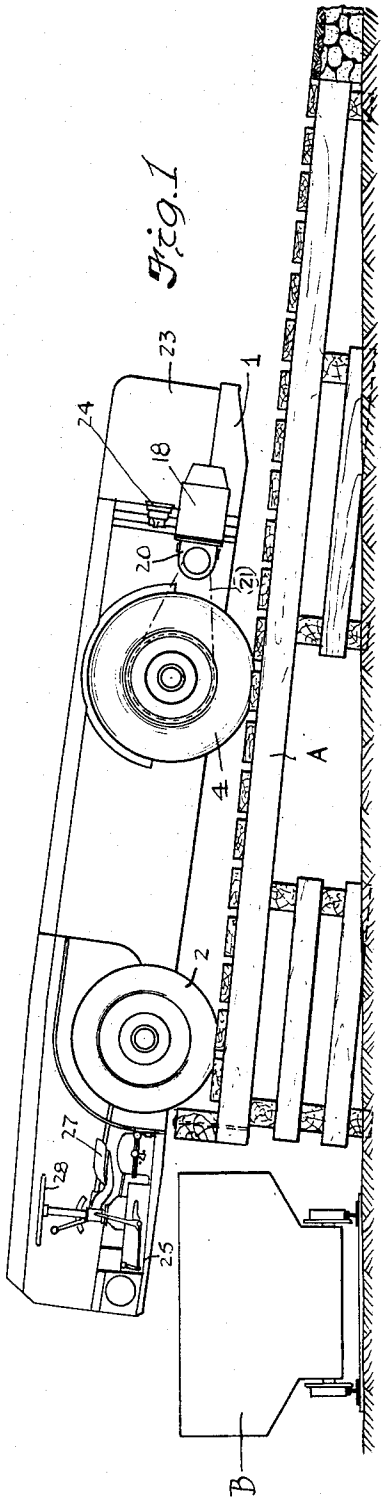


Fig. 1

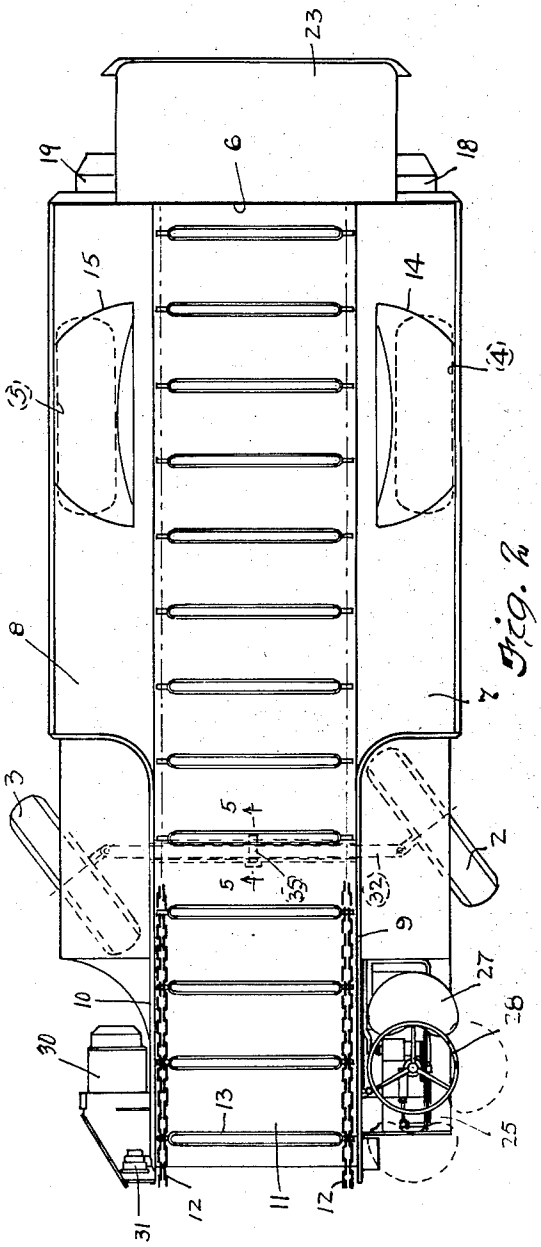


Fig. 2

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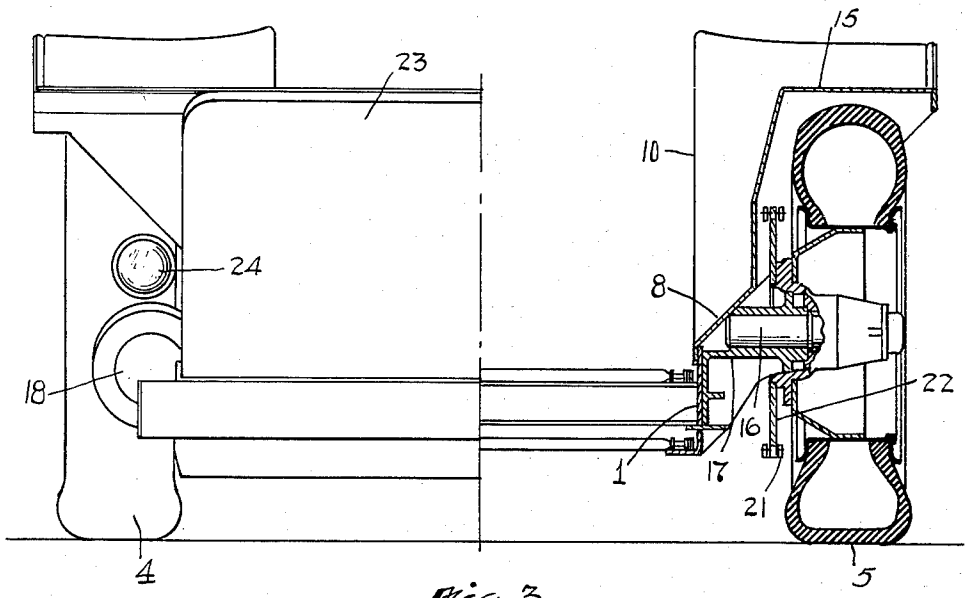


Fig. 3

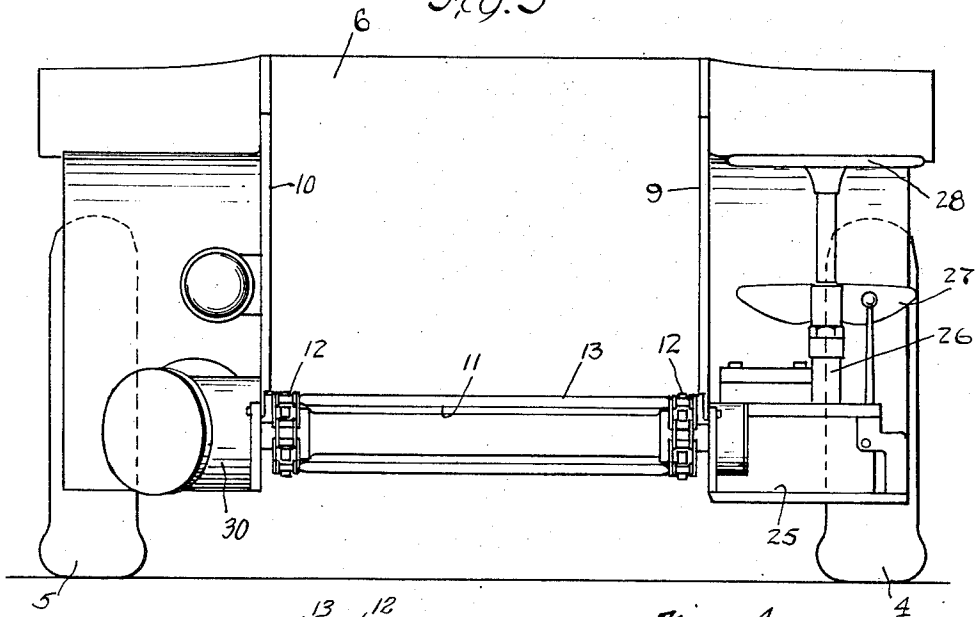


Fig. 4

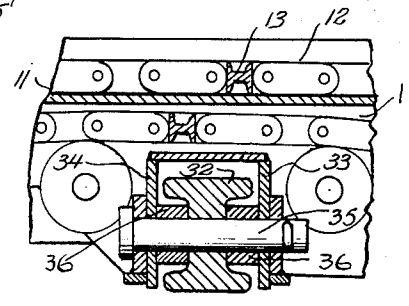


Fig. 5

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UNITED STATES PATENT OFFICE

2,192,650

SHUTTLE CAR

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Application July 14, 1938, Serial No. 219,222

18 Claims. (Cl. 214—83)

The present invention relates to a shuttle car particularly adapted for the transportation of bulk materials and under unusual operating conditions, such as in the mining of coal. As the name indicates, the car or vehicle embodying the principle of my invention is adapted to move back and forth between a receiving point such as a coal loading machine, and a discharge point such as a mine car, conveyor or hopper.

It is the general object and nature of my invention to provide a self-propelled, individually complete transportation unit capable of flexible and efficient "shuttling" operation in the moving of bulk material, such as coal, in the relatively limited and cramped space available in mining operations. Briefly outlined, the shuttle car embodying my invention comprises a pneumatic tired vehicle body with a power driven conveyor extending lengthwise of the body and forming its bottom, and an open discharge end on the body with the operator's steering wheel and control station located immediately adjacent such discharge end and within the over-all width of the body. My novel shuttle car construction possesses the advantages of maintaining a clear vision for the operator, even in relatively close quarters, such as in "thin seam" mines; permits the operator to properly and accurately guide or "spot" the car for unloading; has no inconvenient or dangerous projections which might come in contact with mine walls or timbers during movement of the car; affords protection for the operator in that his operation station is located within the outward dimensions of the car; and is capable of additional incidental uses in mining operation such as road or floor maintenance and slate "gobbing."

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

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

In said annexed drawings—

Fig. 1 is a side elevational view of the shuttle car embodying the principle of my invention and showing it in unloading position on an inclined ramp; Fig. 2 is a top plan view of the shuttle car; Fig. 3 is a rear or right hand end view with the driving wheel axle assembly in section; Fig. 4 is a front or left hand end view; Fig. 5 is a detailed sectional view of the steering wheel axle mounting in the frame, and taken substantially along line 5—5 of Fig. 2.

Now referring more particularly to the drawings, the shuttle car shown therein comprises a frame 1 carried at its left hand or forward end by the movable steering or guiding wheels 2 and 3 and at its rear end by the fixed drive wheels 4 and 5. The vehicle body consists of a rear end wall 6, the sloping or angularly inclined side wall portions 7 and 8 which merge into the vertical side wall portions 9 and 10. The conveyor apron 11 forms the bottom of the material receiving body which is of course open at its forward or discharge end, as will best be seen by reference to Figs. 2 and 4. A chain and flight conveyor consisting of the endless chains 12 and the conveyor flight bars 13 are adapted to move across the face of the conveyor apron 11. It will be noted that the sloping side wall portions 7 and 8 of the material receiving body extend from the edges of the conveyor apron 11 upwardly and outwardly to the over-all width of the vehicle or to a point sufficient to cover the drive wheels 4 and 5. Wells 14 and 15 are provided in the side wall portions 7 and 8 respectively for clearance of the wheels 4 and 5.

The side wall portions 9 and 10 extend vertically from the edges of the conveyor apron 11.

Directing attention to Fig. 3, the drive wheels 4 and 5 are mounted upon stub shafts such as the stub shaft 16 carried in the vertically offset bracket 17 mounted upon the frame 1. Individual drive motors 18 and 19 are mounted adjacent the rear end of the vehicle and are connected to the drive wheels through the speed reducing unit 20, the sprocket chain 21, and the sprocket 22 carried by the hub of the drive wheel.

A battery compartment 23 is mounted on the rear end of the frame 1 and contains electric storage batteries for supplying the necessary electric energy to the various drive motors and lighting equipment. A stern light 24 is mounted adjacent the rear end of the car.

A platform 25 is located in the space between the side wall portion 9 and the outside of the car body. A steering column 26 carrying the reversible driver's seat 25 and the steering wheel 28 is located on the platform 25. Other operating controls, such as hand brake, forward and reverse control and conveyor switch are also mounted on the platform 25 which therefore constitutes the operator's control station.

The conveyor drive motor 30 and the head lamp 31 are mounted in the space between the

side wall portion 10 and the outside edge of the car on the side opposite that of the operator's platform 25.

The front axle 32 is of conventional automotive type. The side plates 33 and 34 are set into the frame and provide a channel or tunnel for reception of the front axle 32 which is pivoted at its longitudinal center upon the horizontally positioned pin 35. Bushings 36 space the axle 32 between the plates 33 and 34. It will thus be seen that the car or vehicle has a "three point" suspension, viz., the two rear axles 16 and the pivot pin 35, whereby it can readily adjust itself to irregularities and uneven terrain without causing undue strain or distortion upon the frame 1.

It will be noted that the operator's station on the platform 25, from which the operation of the entire car is controlled, is not only in effect inset from the outer edge of the car, thus protecting the operator, but is also located immediately adjacent the front discharge end of the car. The operator can thus have an immediate, unobstructed view from the front end of the car, so that he can not only conveniently and accurately guide the path of travel of the car, but also can properly control the rate of discharge of the conveyor.

When the car is unloaded and moved in a backward direction, the operator's seat 27 is swung to a position opposite to that shown in Fig. 1. When travelling in a backward direction, the car is of course empty and the operator's vision will not be obstructed by a pile of material.

When the car is being used to transport coal from a mobile loading machine to a discharge station where it may unload into mine cars B, Fig. 1, or into a belt conveyor or other transferring device, it is driven backward into that portion of the mine where the loading machine is working and is spotted so that the boom of the loading machine will extend over either the end wall 6 or one of the sloping side walls 7 and 8. This relation between the loading machine and the car is maintained during the entire loading operation and coal is therefore delivered into the car at substantially the same point at all times. The coal delivered into the car piles up adjacent the end wall 6 and to fully load the car, the conveyor is intermittently operated to inch the coal toward the discharge opening. It is well known that when a conveyor having loose material piles thereon is set in operation the material will flatten out and the height of the same on the conveyor will naturally decrease. In order that the car will be fully loaded, a restricted throat is provided where the sloping walls 7 and 8 merge into the vertical walls 9 and 10, which acts as a dam and prevents and retards the passage of the coal from the relatively wide delivery end of the car to the relatively narrow discharge end and resists the tendency of the coal to flatten out. This restricted throat makes it possible for the car to be fully loaded for substantially the full length of the vertical side walls 9 and 10.

In Fig. 1, one method of unloading the above described shuttle car is illustrated. The car is shown driven up an inclined ramp A whereby its forward or left hand discharge end is immediately above the mine car B. It will be obvious to those skilled in the art that the car can also be discharged onto a conveyor or into a floor hopper. The car can also be used for road maintenance; that is, such as for distributing slack or "bug dust" along the roadway travelled by the car in order to fill in irregular, damp and soft spots, and without intermittently stopping the car, thus saving time and labor.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a self-propelled vehicle of the character described, the combination of a material receiving body having two side walls extending substantially the full length of said vehicle and one end wall, and a conveyor forming the bottom of said body and adapted to discharge material at the end of said body opposite said one end wall, a portion of at least one of said side walls being spaced inwardly from the outer sides of said body at a point adjacent the discharge end thereof to provide an operator's platform within the overall dimensions of said body.

2. In a self-propelled vehicle of the character described, the combination of a material receiving body having two side walls extending substantially the full length thereof and one end wall, a conveyor forming the bottom of said body and adapted to discharge material at the end of said body opposite said one end wall, a portion of said side walls being spaced inwardly from the outer sides of said body at a point adjacent said discharge end, and a steering wheel and operator's platform located in one of the spaces formed by said inwardly spaced side wall portions.

3. In a self-propelled vehicle of the character described, the combination of a material receiving body having two side walls and one end wall, a conveyor forming the bottom of said body and adapted to discharge material at the end of said body opposite said one end wall, a portion of said side walls being angularly inclined upwardly and outwardly from the edge of said conveyor, another portion of said side walls extending vertically from the edge of said conveyor, and a steering wheel and operator's station located adjacent one of said vertical side wall portions.

4. In a self-propelled vehicle of the character described, the combination of a frame, an open ended material receiving body mounted on said frame, a pair of steering wheels and a pair of drive wheels supporting said frame, a conveyor forming the bottom of said body, the side walls of said body extending over said driving wheels and being spaced inwardly from said steering wheels, a steering wheel and operator's station located in one of the spaces formed by such inwardly spaced portion of said side walls.

5. In a self-propelled vehicle of the character described, the combination of a frame, an open ended material receiving body mounted on said frame, a pair of steering wheels and a pair of drive wheels supporting said frame, a conveyor forming the bottom of said body, the side walls of said body extending over said driving wheels and being spaced inwardly from said steering wheels, a steering wheel and operator's station located in one of the spaces formed by such inwardly spaced portion of said side walls, and said last-named drive meter being located in the other of said spaces.

6. In a self-propelled vehicle of the character described, the combination of a frame, an open ended material receiving body mounted on said frame, a pair of steering wheels and a pair of

drive wheels supporting said frame, said steering wheels being located toward the open end of said body, an axle pivoted for movement about a horizontal axis for mounting said steering wheels to said frame, vertically offset stub axles mounting said driving wheels to said frame, a conveyor forming the bottom of said body, the side walls of said body extending over said driving wheels and being spaced inwardly from said steering wheel, a steering wheel and operator's station located in one of the spaces formed by such inwardly spaced portion of said side walls, individual drive motors connected to each of said drive wheels, and another drive motor connected to said conveyor, said last-named drive motor being located in the other of said spaces.

7. In a self-propelled vehicle of the character described, the combination of an open-ended material receiving body having two side walls extending substantially the full length of said vehicle, an endless conveyor forming the bottom of said car, a portion of each of said side walls adjacent one end thereof being spaced inwardly from the outer sides of said body, an operator's platform mounted within the space formed by the inwardly spaced portion of one side wall and a motor for driving said conveyor mounted in the space formed by the inwardly spaced portion in the other side wall.

8. In a self-propelled vehicle of the character described, the combination of a frame having an axle receiving tunnel extending transversely thereof, a material receiving body supported on said frame, an endless conveyor forming the bottom of said body and extending longitudinally of said frame above said tunnel, and means for lifting and guiding the lower reach of said conveyor over the axle tunnel portion of said frame.

9. In a self-propelled vehicle of the character described, the combination of a frame, an axle housing open at the bottom extending transversely of the frame and having its upper surface spaced above the bottom of said frame, a material receiving body supported on said frame, an endless conveyor extending lengthwise of said frame above said axle housing and forming the bottom of said material receiving body, and means carried by said frame for lifting and guiding the lower reach of said conveyor over said axle housing.

10. In a self-propelled vehicle of the character described, the combination of a frame, an inverted channel-shaped member inset in said frame and extending transversely thereof, an axle within said channel member and centrally pivoted thereto, a material receiving body supported on said frame, a conveyor apron forming the bottom of said body, an endless conveyor having one reach above and the other reach below said apron, and means for lifting and guiding the lower reach of said conveyor over the top of said channel.

11. In a self-propelled vehicle of the character described, the combination of a frame, an axle housing open at the bottom extending transversely of said frame and having its upper surface spaced above the bottom of said frame, an axle mounted in said housing for supporting the front end of said vehicle, steering wheels on said axle, a bracket secured to said frame on each side thereof and projecting above the top of said frame, a stub axle mounted on each of said brackets for supporting the rear of said vehicle, drive wheels mounted on each of said stub axles, means for driving said drive wheels, an open-ended material receiving body mounted on said frame, a conveyor apron forming the bottom of said body, an endless conveyor comprising spaced parallel chains having their upper reach above and their lower reach below said apron, flights extending between said chains and having their ends attached thereto, means for driving said conveyor chains, and means for lifting and guiding the lower reach of said conveyor chains over said front axle housing.

12. A self-propelled mine car of the character described comprising a frame, an axle spaced above the bottom of said frame for supporting the front end thereof, a pair of stub axles secured to said frame above the bottom thereof for supporting the rear end of said vehicle, a material receiving body mounted on said frame, an endless conveyor forming the bottom of said body and having an upper and a lower reach, means for driving said conveyor, and means for elevating and guiding the lower reach of said conveyor over said front axle.

13. In a self-propelled material transporting vehicle, the combination comprising a material holding body having a flat bottom and a material receiving compartment at one end, and a material discharge opening at the other end, conveying means passing over the bottom of said body adapted to frictionally engage the under surface of the material delivered into said receiving compartment, and on movement thereof to convey the material toward the discharge opening, means for intermittently operating said conveying means, and means between the receiving compartment and the discharge opening for piling up the material on said conveying means, whereby material in sufficient quantities to fully load said body will be moved adjacent to said discharge opening on movement of said conveying means through a distance substantially equal to the length of said vehicle.

14. In a self-propelled material transporting vehicle, the combination comprising a material carrying body having a substantially flat bottom, a relatively wide compartment at one end into which material is adapted to be delivered, and a relatively narrow compartment at the other end thereof terminating in a discharge opening, an endless conveyor passing over the bottom of said body, and extending longitudinally thereof, for transferring the material delivered into said receiving compartment into the other of said compartments, and toward said discharge opening for loading said vehicle, and a restricted throat between said compartments for piling up the material on said conveyor as it enters the discharge compartment, whereby the vehicle will be fully loaded on movement of the conveyor through a distance substantially equal to the length of said vehicle.

15. In a self-propelled material transporting vehicle, the combination of a body having a substantially flat bottom, said body having at one end a material receiving compartment into which material is adapted to be delivered, and at the other end a material holding compartment opening into said receiving compartment, but of less width than said receiving compartment, said holding compartment terminating in a discharge opening, conveying means passing over the bottom of said body and frictionally engaging the under surface of the material delivered into said receiving compartment adapted on movement thereof to move the material into said holding compartment, to load said vehicle, and means be-

tween said receiving compartment and said storage compartment for piling up the material on said conveyor, whereby the material will be moved into said holding compartment in sufficient quantities to fill the same as said conveying means is moved through a distance substantially equal to the length of said body.

16. In a self-propelled material transporting vehicle, the combination of a body having a substantially flat bottom and two side walls extending the full length thereof, said side walls having opposed substantially vertical sections at one end of the vehicle, and opposed outwardly flared sections at the opposite end thereof to provide a receiving compartment into which material is adapted to be delivered, an endless conveyor extending longitudinally of and passing over the bottom of said body for moving material from the receiving compartment into the compartment between said vertical wall sections to load said vehicle, and means for piling up the material on said conveyor as it enters the space between said vertical side wall sections, whereby material in sufficient quantity to load said space substantially to capacity will be moved thereinto when said conveyor has moved through a distance substantially equal to the length of said body.

17. In a self-propelled coal transporting vehicle, for use in underground coal mines, the combination of a body having a substantially flat bottom, opposed vertically extending side walls along said bottom at one end of said body, opposed outwardly flared side walls along the remaining portion of said bottom providing a relatively wide compartment into which the coal is adapted to be delivered, a wall connecting the vertical portion of said side wall and the flared portion thereof on each side of the body to provide a restricted throat through which the coal must pass from the receiving compartment to the opposite end of the body, and an endless conveyor extending longitudinally of and passing over said bottom for moving the coal delivered into said receiving compartment through said restricted throat and into the space between said vertical side walls to load said vehicle, said throat causing the coal to pile up on said conveyor adjacent the entrance to the space between said vertical side walls, whereby the coal in sufficient quantity to fully load the car will be moved into said space.

18. The combination in a self-propelled material transporting vehicle, of a substantially flat bottomed body for said vehicle having a compartment open at one end and provided with substantially vertical side walls, and a wider compartment adjacent to and opening into said first mentioned compartment having an end wall and outwardly flared side walls, a conveyor extending longitudinally of said vehicle and passing over the bottom of said body adapted to move material from said wider compartment into said first mentioned compartment to load the same, and a wall connecting the vertical side wall with the outwardly flared side wall on each side of said body to provide a restriction between said compartment, whereby the material will be caused to pile up on movement of said conveyor, past said throat and said first mentioned compartment fully loaded as said conveyor moves through a distance substantially equal to the length of said body.

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