July 28, 1959 K. M. SKEENS 2,897,004

MINE VEHICLE

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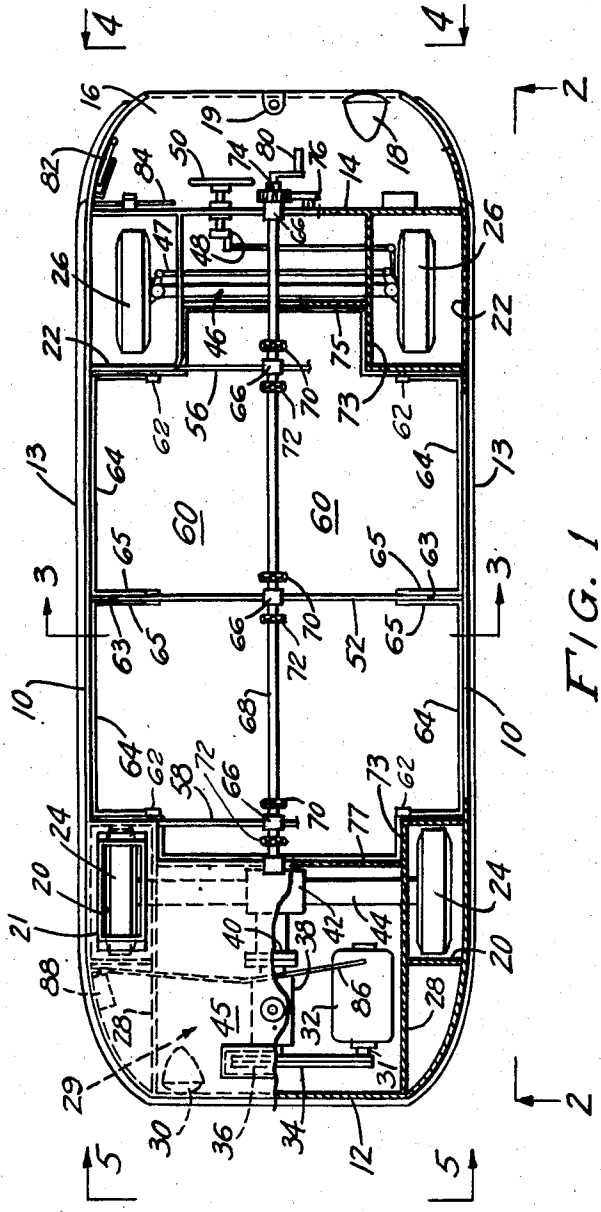


FIG. 1

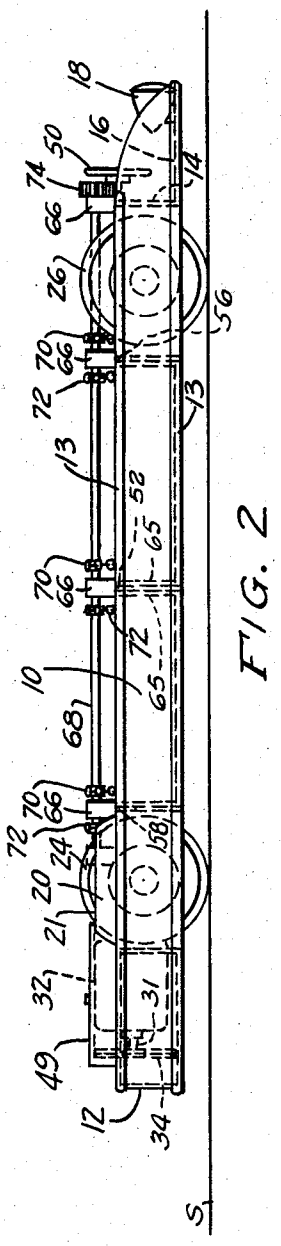


FIG. 2

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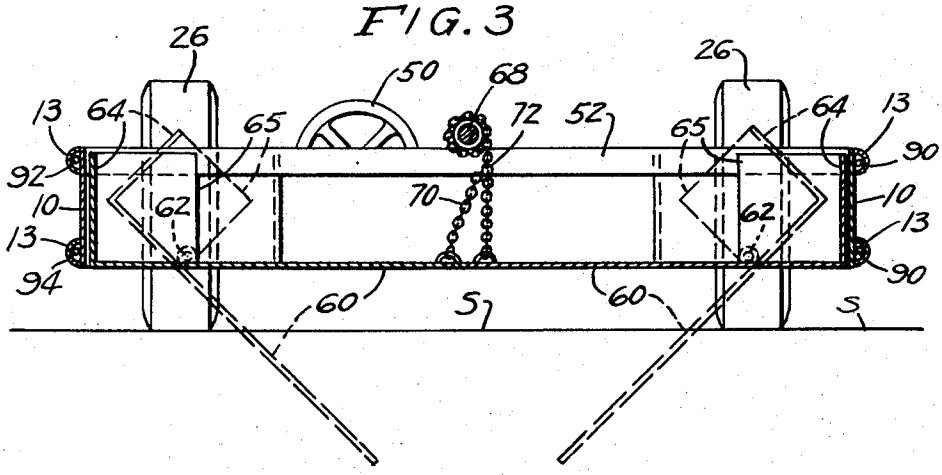
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FIG. 3



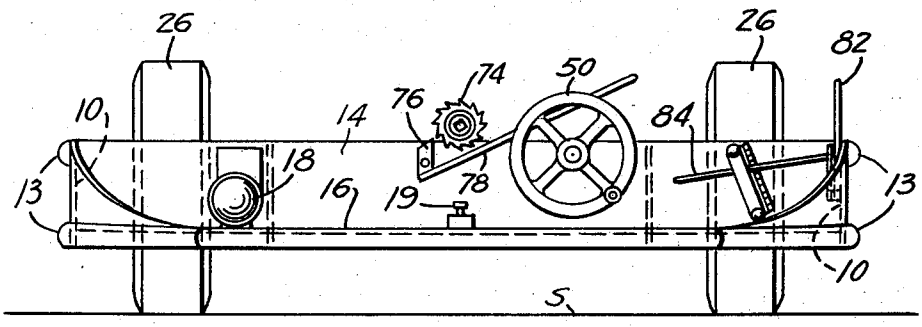


FIG. 4

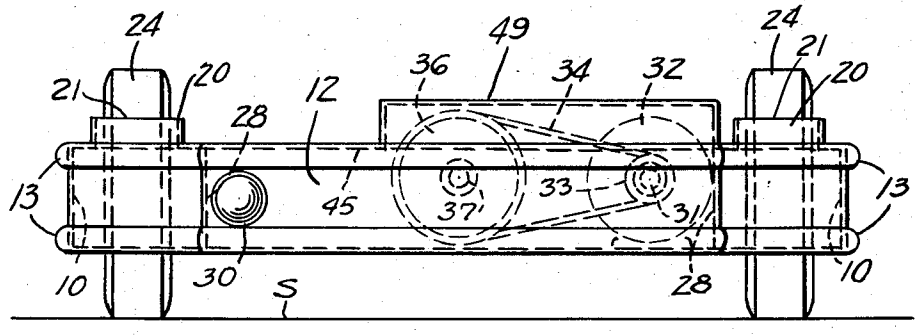


FIG. 5

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MINE VEHICLE

Kenneth M. Skeens, Richlands, Va.

Application December 6, 1955, Serial No. 551,364

1 Claim. (Cl. 298—25)

This invention relates to coal haulers or shuttle cars, and more particularly has reference to a vehicle of this type particularly designed to be used in thin or low coal seams.

The mining of coal in thin seams presents considerable difficulties, when conventional mining equipment and shuttle cars are used. A seam of this type averages 24 to 27 inches in thickness and due to this fact, which would ordinarily tend to raise to an excessive extent the cost of mining operations, many of these seams are untouched and have never been worked. Only in recent years has the mining of thin seams been deemed practical.

The main object of the present invention is to provide an improved coal hauler or shuttle car that is designed specifically for the purpose of permitting feasible mining operations to be carried on in thin seams, and to this end, the invention comprises a shuttle car which, though of substantial capacity so far as the load which can be hauled therein is concerned, will at no point over its entire length and width be of an overall height greater, for example, than 23 or 24 inches. The design, in fact, is such as to permit even a greater reduction in overall height of the vehicle to be achieved, through the use of wheels of smaller size.

A more specific object is to provide a shuttle car as described which will be of rugged construction, and will not require a large inventory of spare parts, thus to particularly adapt the same for use by those involved in relatively small scale mining operations.

Another object is to provide a shuttle car as stated which, when used in very low seams of the type referred to, will cut costs and increase production to a markedly higher extent than has heretofore been possible using equipment now available, this desirable purpose being achieved entirely by a particular type of prime mover and transmission, a particular, recessed wheel mounting, high maneuverability amid timbering or other obstructions encountered in the seam, and especially high capacity considering the overall size and height of the vehicle.

Another object of importance is to provide a shuttle car of the type referred to, the load-receiving portion of which is constituted by pivoted doors so mounted as to swing between closed and fully open positions through arcs that allow the car to be drawn directly over a pit in which the load is to be dropped.

Another object is to so design the doors as to cause the same to support a load fully from the center of the vehicle to the outermost portions of the vehicle sides, with the load-receiving space being as deep at the extreme sides of the vehicle as at the center thereof. Heretofore, all shuttle cars of which I have knowledge have been constructed with sloping sides or ends reducing measurably the load-receiving space and it has not been considered that a shuttle car of the type referred to could be manufactured, that would be sufficiently rugged as to permit its construction without the sloping sides.

A further object is to provide a shuttle car as stated in which all the controls and wiring for head lamp illumination, motor operation, etc., will be extended through conduits formed as half-round flanges on the top and bottom edges of the side walls, so that said conduits will not only protectively enclose the wiring, but will also serve to reinforce to a desirably great degree the side walls against stresses imposed thereupon by a supported load.

Other objects will appear from the following description, the claim appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a top plan view of a thin seam coal hauler formed in accordance with the present invention;

Figure 2 is a side elevational view thereof as seen from line 2—2 of Figure 1;

Figure 3 is an enlarged transverse sectional view on line 3—3 of Figure 1, the dotted lines showing the doors in partially open position;

Figure 4 is a front elevational view of the coal hauler, as seen from the right of Figure 2, on an enlarged scale; and

Figure 5 is a rear elevational view of the coal hauler as seen from line 5—5 of Figure 1.

The coal hauler constituting the present invention includes a wide, low frame having vertically disposed side walls 10 converging along gently curving lines toward one another at the front and rear ends of the vehicle, and extending in parallel relation to each other through the intermediate portion of the vehicle, that is, the portion disposed between the front and rear wheels thereof.

At their rear ends, the side walls 10 merge into a back wall 12, extending transversely of the frame. Through the full lengths of the sides and back of the frame, the walls 10, 12 are flanged as at 13 at their upper and lower edges, the flanges being of half-round formation so as to define conduits extending along the sides and back of the vehicle.

Extending transversely of the frame, adjacent the front end thereof, is a transversely disposed front end wall 14. The space between the front end wall 14 and the forward extremity of the vehicle is occupied by a horizontally disposed ledge 16, this as well as the front end wall 14 being welded or otherwise fixedly secured to the side walls and front end wall. A head lamp 18 is mounted upon the ledge 16, adjacent one side of the vehicle, and a controller switch 19, used to control operation of an electric motor to be described hereinafter, is mounted upon the front edge of the ledge medially between the opposite sides thereof.

Adjacent the rear end of the vehicle, there are provided, inwardly from the side walls, rear wheel wells 20, while similarly provided adjacent the forward extremity of the vehicle are front wheel wells 22. The rear wells have hoods 21 projecting upwardly a short distance above the top edges of the side walls, and open at their upper ends for projection of rear wheels 24 therethrough. The rear wheels are thus enclosed substantially completely, for protection against falling objects, etc.

Front wheels 26 are disposed in the wells 22 and are operated through a steering mechanism generally similar, in its basic essentials, to that of a conventional passenger automobile, with said mechanism being generally designated at 46 and including the usual tie rod 47, steering sector 48, and steering wheel 50 journalled in the front end wall 14.

The inner vertical walls of the rear wells 20 are extended rearwardly to provide the side walls 28 of a motor and transmission compartment 29. Within said compartment, at one side thereof, there is mounted a rear lamp 30. Adjacent the other side of the compartment, there is provided a motor 32. While heretofore, Diesel or other internal combustion engines have been employed,

the construction of the invention is such as to permit an A.C. motor to be installed, a five horsepower motor being found ample to provide the necessary power. On the shaft 31 of the motor 32 there is provided a drive pulley 33 around which is reeved a belt 34 passing about a driven pulley 36 of greater diameter than the drive pulley (see Figure 5), the driven pulley being adapted to rotate a shaft 37 extending into a transmission 38. At the output side of the transmission 38 there is provided a shaft extending by means of a coupling 40 to the differential 42 of a rear axle assembly 44 on which the rear or drive wheels 24 are mounted.

Covering the motor compartment is a cover plate 45, which is extended fully to the opposite sides of the vehicle, and which may have a raised portion 49 accommodating the motor and the belt and pulley assembly.

Medially between the opposite ends of the vehicle there is mounted a cross bar 52 positioned over a continuous load-receiving compartment extending from the front to the rear axles. Spaced longitudinally of the vehicle from the center cross bar 52, and extending across the full width of the vehicle, is a front cross bar 56, and a rear cross bar 58. The load-receiving compartment is bottomed at each side by a single hinged door 60 swinging upon hinges 62 (Figure 3). Each hinge 62 is provided by a sleeve on the top surface of the door, and by a short pin projecting from the adjacent wheel well. In other words, there is a single door 60 at each side, and since the recessed ends of each door receive the front and rear wheel wells at the same side, the pins of the hinges will project from the wells through sleeves provided upon the recessed ends of the doors. The axes of pivotal movement of the doors are parallel, and extend longitudinally of the vehicle adjacent the respective side walls 10. Each door, medially between its ends, has a transverse slot 63 to clear the center cross bar.

As will be noted, the hinge axes of the two doors are disposed inwardly from the outer side edges of the doors, and integrally formed on said outer side edges are upstanding walls 64. Thus, each door in cross section may be considered as being in the general shape of an L, with a long lower leg disposed at right angles to a relatively low upper leg, the pivot axis of the door being spaced longitudinally of the lower leg from its juncture with the upper leg. Extending inwardly from the wall 64 of each door are transverse walls 65. These extend at opposite sides of the slots, to prevent material from lodging under the bars behind the hinges and thus obstructing swinging of the doors. The doors are identically but oppositely formed at opposite sides of the longitudinal center line of the vehicle.

Provided upon the front end wall 14 and the several cross bars are pillow block bearings 66, and journalled in said bearings is a door operating shaft 68 extending longitudinally and centrally of the vehicle. Coiled about the shaft 68 are chain elements 70, 72 so arranged that on rotation of the shaft 68 in one direction, said chain elements will be unwound from the shaft to drop or open the doors as shown in dotted lines in Figure 3. On rotation of the shaft in the opposite direction, the chain elements are wound upon the shaft, so that the doors will be swung upwardly to their normal, closed positions.

The doors are shown in dotted lines in Figure 3 in their partially open position, and when fully open, the long legs thereof will be vertically disposed.

Further, it is to be seen that the load-receiving compartments are of full depth at all locations over their complete areas. Thus, since the load compartments extend fully to the side walls 10, the compartments are of full depth over the complete width of the vehicle, and further, are of full depth over the full length of the load-receiving portion of the vehicle. To increase the capacity of the vehicle, the doors have extensions 73, disposed between the front and rear wheel wells. Front and rear end walls 75, 77 of the compartments are extended between said front and rear wells, with the extensions 73 extending fully to said walls 75, 77.

Secured to the front end of the shaft 68 is a ratchet wheel 74 (Figure 4) engageable by a dog 76 provided upon one end of a pivoted lever 78 to normally hold the shaft against rotation in one direction, thus to prevent the shaft from rotating in a direction such that the doors would swing open accidentally.

A removable crank handle 80 is engageable with the shaft, for turning the same whenever the doors are to be swung open or closed.

At one side of the ledge 16 there is provided a brake lever 82, and adjacent the brake lever there is provided a reversing lever 84 used to reverse the motor for the purpose of permitting either forward or rearward movement of the vehicle when the motor is in operation. Lever 84 operates reversing rod 86 extending from the motor.

The braking system is of the hydraulic type, and accordingly, a master cylinder 88 is mounted adjacent one of the rear wheels as shown in Figure 1.

Referring now to Figure 3, at one side of the vehicle the conduits 13 enclose the wiring 90 that connects the controller switch 19, the motor, a suitable source of electric power, the head lamps, etc. At the opposite side of the vehicle, the top flange may be used to enclose a hydraulic brake line 92 extending between the front and rear wheels, while the bottom flange encloses a motor-reversing connecting rod 94. Suitable connections are employed between the lever 84, the motor reversing cable or rod 94, and the rod 86, to effect reversal of the operation of the motor responsive to up and down movement of the lever 84.

The actual dimensions of the several component parts of the vehicle are not specified herein, since it may be desired to change said dimensions in a commercial embodiment. However, it is of particular importance to note that the overall height of the vehicle would be such as to permit the same to enter very low seams, and in a working embodiment, the overall height, that is the distance between the tops and bottoms of the wheels, is 23 inches, with all portions of the vehicle being confined between said topmost and bottommost points of the wheels as will be seen from Figures 2 and 3.

Further, in a working embodiment, the distance from the bottoms of the wheels, that is from a supporting surface S, to the top edge of the frame is 16 inches, with a roadway clearance, that is, a distance between the supporting surface and the bottom of the frame, of five inches. The bed of the vehicle is thus approximately 10 inches deep.

It has been found in practice that a vehicle having the proportions and design characteristics described above permits working of a thin seam at a very low cost, and this is due to the fact that the coal hauler is of extremely low height, without sacrifice of carrying capacity. At the same time, the coal hauler is highly maneuverable, due to the particular construction thereof, with the wheels being fully recessed inwardly from the sides of the coal hauler, so that all impacts encountered when the coal hauler strikes an obstruction such as timbering, are taken by the periphery of the frame, regardless of where said impact is incurred upon said periphery.

Another important characteristic of the invention resides in the fact that the doors are so located that when swung to a fully open position, they will cause the load to drop downwardly in a relatively narrow space, said space at opposite sides thereof being disposed inwardly from the wheels. Thus, the wheels can be moved over opposite sides of the cavity into which the coal is to be dumped, and the load will be dropped cleanly into the pit, with said load being directed toward the center of the pit. A very narrow pit, over which the car can be driven for release of the load, is thus possible.

It is believed apparent that the invention is not neces-

sarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claim.

What is claimed is:

As a vehicle for use mainly in thin seam coal mining operations, a shuttle car the maximum width of which is slightly less than half the maximum length thereof and the maximum height of which is approximately one-third of said width, said car comprising: a frame including vertical side walls extending along the respective sides of the car at locations at which said car is of maximum width; front and rear wheels rotatably mounted upon and rollably supporting said frame in positions offset laterally inwardly from the respective side walls, said side walls defining between them a load-receiving, generally rectangular compartment at the corners of which the several wheels are disposed, said frame being formed open over the area of the bottom of the compartment; a pair of doors pivotally mounted upon the frame, the pivot axes of the doors extending longitudinally of the car at locations paralleling and spaced laterally inwardly from the side walls, said doors being swingable on their pivots between normally closed and open, load-discharging positions, the doors having inner side edges abutting in the closed positions of the doors and having outer side edges in close proximity to the respective, adjacent side walls, the pivot axes of the doors being spaced inwardly from said outer side edges thereof

whereby the outer side edges of the doors move upwardly and the inner side edges downwardly when the doors swing to said open positions thereof, the doors including upstanding longitudinal walls formed upon said outer side edges thereof and transverse walls extending inwardly from the respective ends of the longitudinal walls of the several corners of the compartment, said longitudinal and transverse walls of the doors being equal in height to the height of the side walls of the frame, the several transverse walls extending the full distance between the outer side edges of the doors and the adjacent pivot axes of the doors; and frame-supported, door-suspension means connected to the doors and operative under the control of a user to return the doors to their closed positions following movement thereof to their open, load-discharging positions.

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