May 9, 1950 A. L. LEE 2,507,341

SHUTTLE CAR

Filed March 31, 1944 4 Sheets-Sheet 1

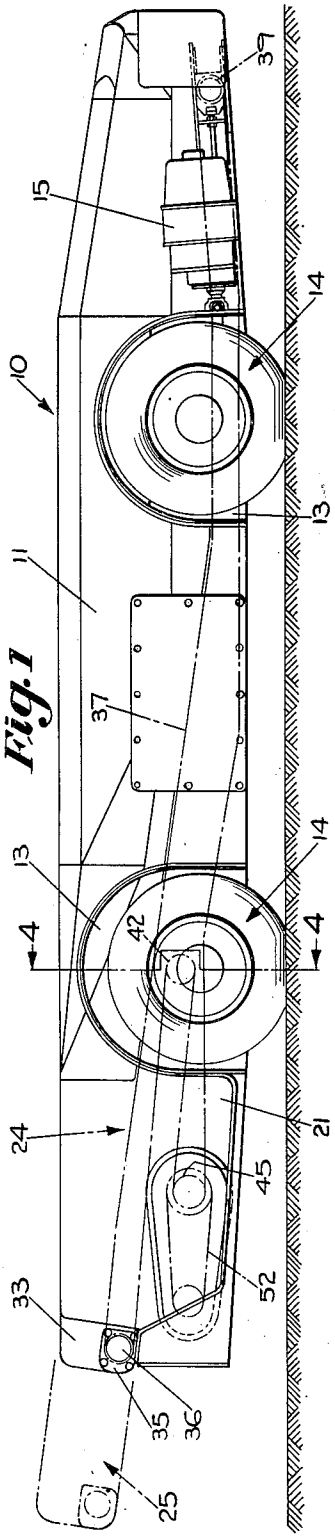


Fig. 1

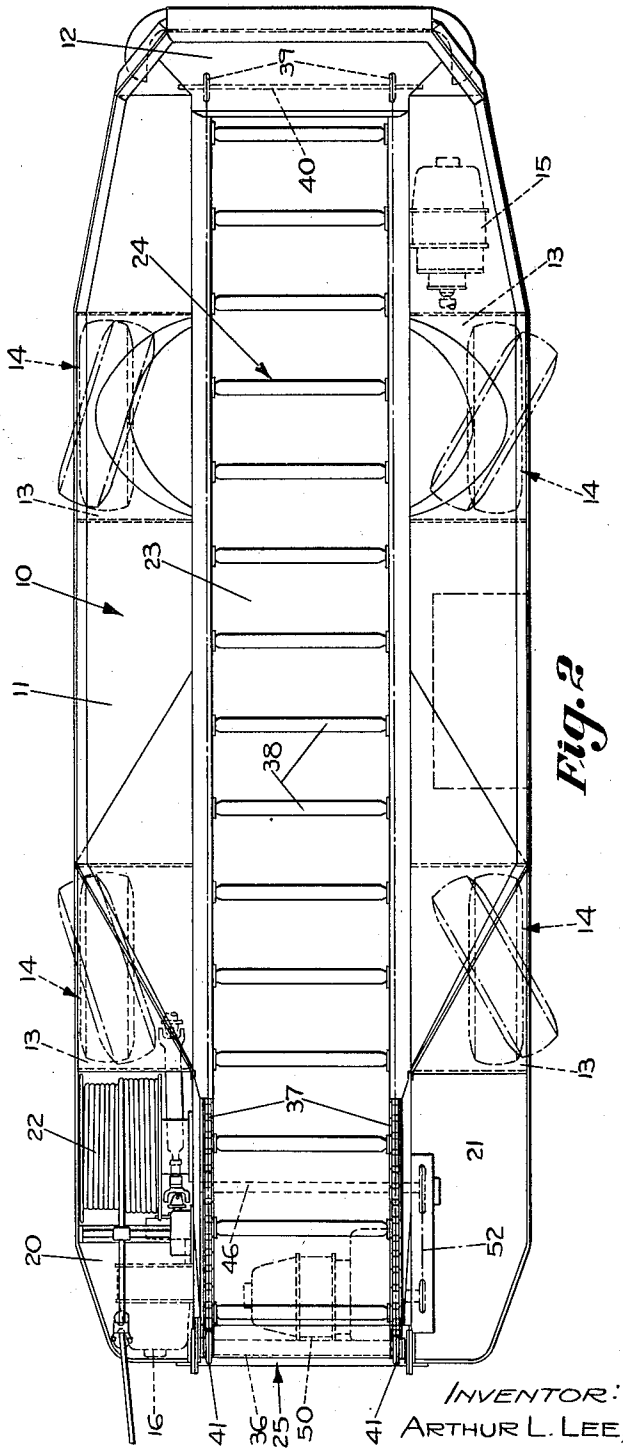


Fig. 2

INVENTOR:
ARTHUR L. LEE,
BY Chas. M. Nissen,
ATT'Y.

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SHUTTLE CAR

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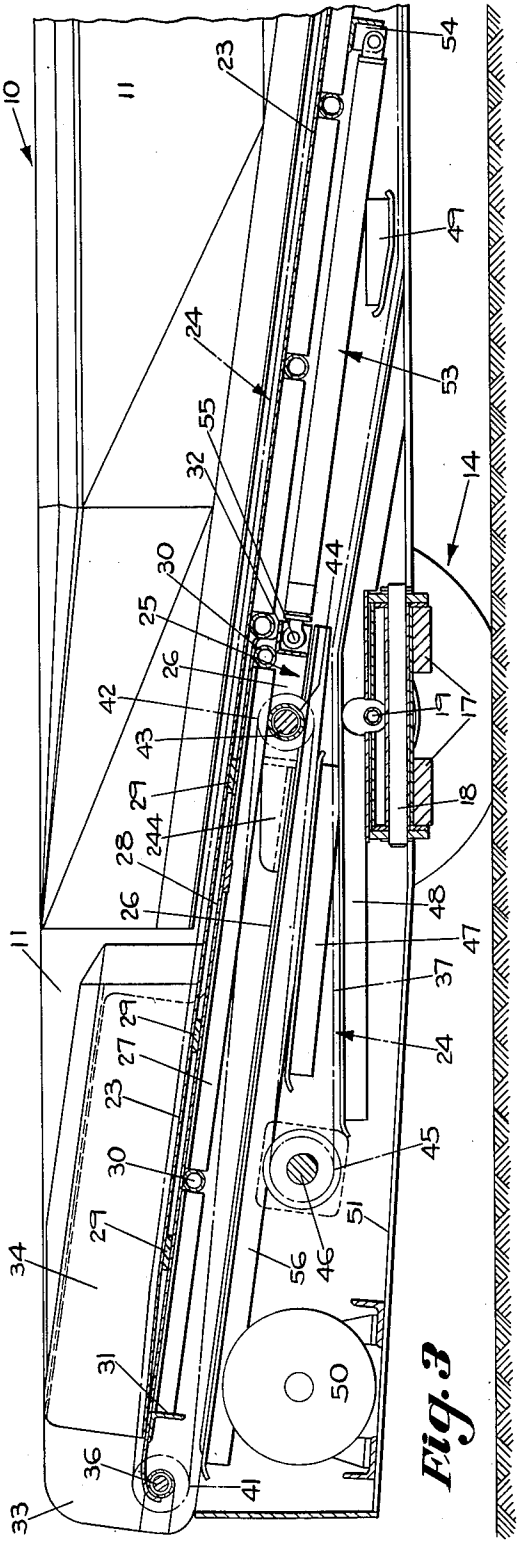


Fig. 3

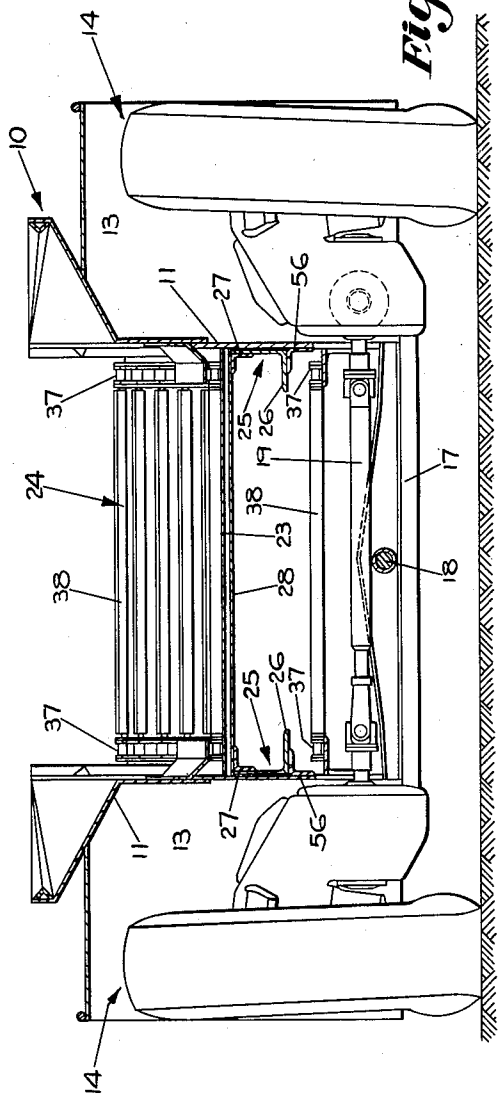


Fig. 4

INVENTOR:
ARTHUR L. LEE,
BY Chas. M. Nissen,
ATT'Y.

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SHUTTLE CAR

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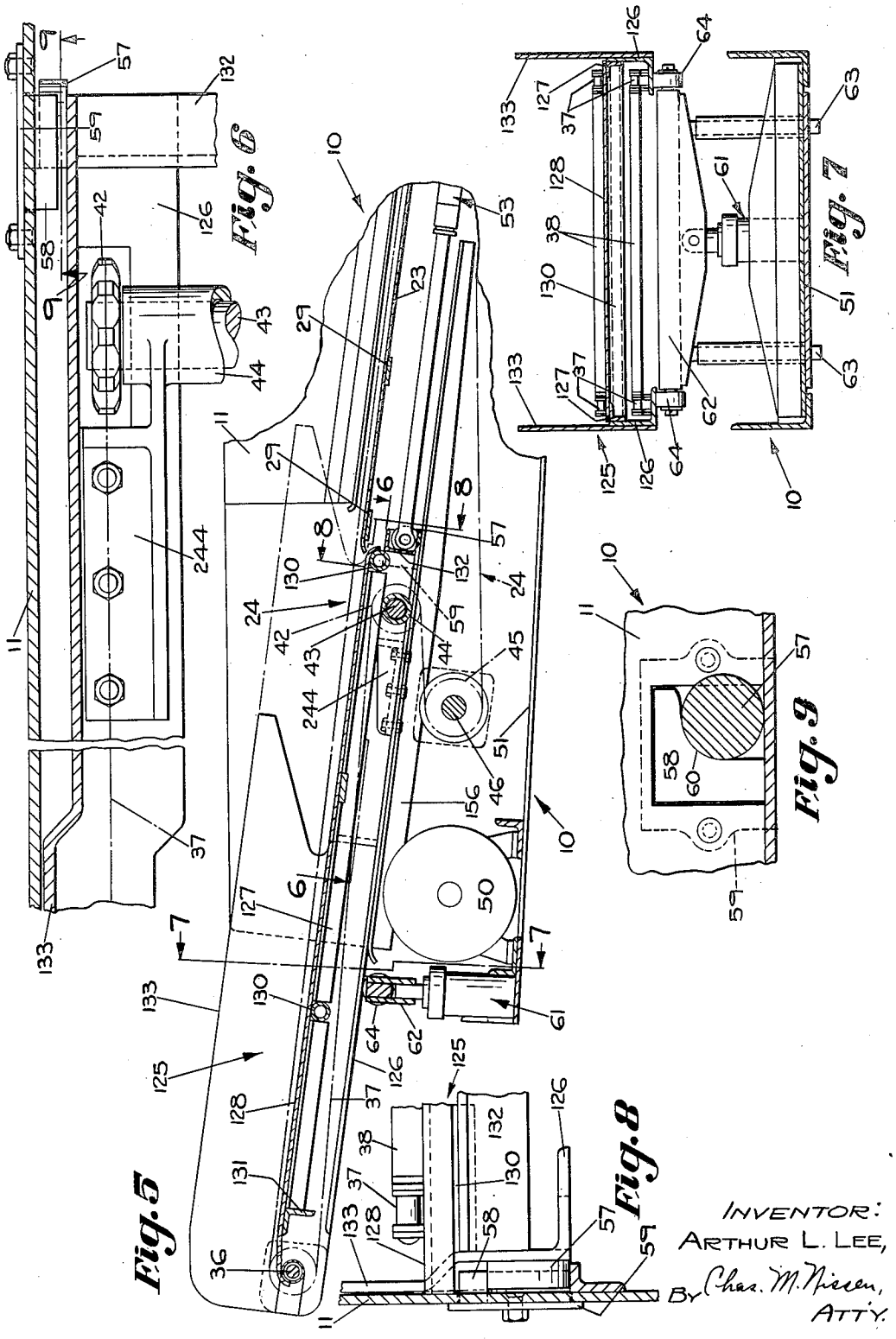


Fig. 5

Fig. 6

Fig. 7

Fig. 8

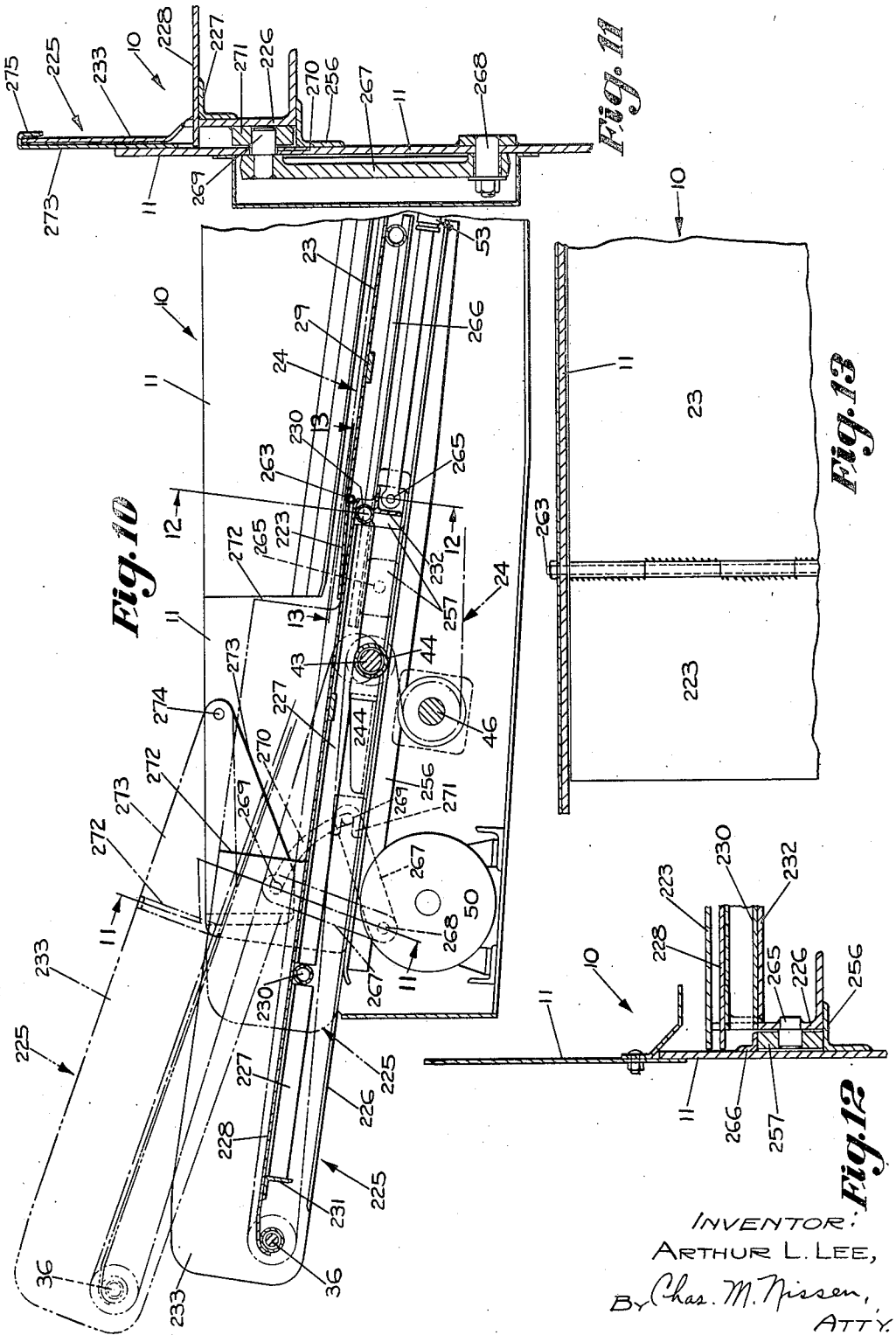
Fig. 9

INVENTOR:
ARTHUR L. LEE,
By Chas. M. Nissen,
ATTY.

May 9, 1950 A. L. LEE 2,507,341

SHUTTLE CAR

Filed March 31, 1944 4 Sheets-Sheet 4



INVENTOR:
ARTHUR L. LEE,
By Chas. M. Nissen,
ATTY.

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2,507,341

UNITED STATES PATENT OFFICE

2,507,341

SHUTTLE CAR

Arthur L. Lee, Upper Arlington, Ohio, assignor, by mesne assignments, to The Jeffrey Manufacturing Company, a corporation of Ohio

Application March 31, 1944, Serial No. 528,887

15 Claims. (Cl. 214—83.36)

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This invention relates to a shuttle car and one of the objects of the invention is to provide a shuttle car in which there is a conveyor in the bottom of a load carrying body, which conveyor has an extensible boom or frame portion adjacent the discharge end which may be extended and preferably simultaneously elevating the position of the discharge end or shaft to facilitate the discharging of the material, preferably coal, into the receiving conveyor, hopper, mine car or the like.

In a broader aspect, an object of the invention is to provide a self-propelled vehicle carrying a conveyor which lies preferably in a generally horizontal plane and in which the discharge end thereof is provided with an extensible frame portion or boom.

A further object of the invention is to provide a structure of the above mentioned type in which there is provided not only an extensible frame or boom portion at the discharge end but in addition this extensible frame or boom portion is adjustable about a horizontal axis so as to adjust the elevation of the discharge shaft. In one specific form of my invention, power operated mechanism in the form of hydraulic piston motors or jacks are employed so as to adjust the boom rearwardly and about its horizontal axis.

A still further object of my invention is to provide an improved shuttle car in which the load carrying capacity may be varied by changing the length of the shuttle car.

It is still another object of my invention to provide an improved shuttle car in which the overall length of the shuttle car may be adjusted and wherein an end of an extensible conveyor which forms the bottom of the body of the shuttle car may be variably positioned longitudinally and preferably simultaneously upwardly as the length of the car is increased.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the accompanying drawings:

Fig. 1 is a side elevational view of a shuttle car embodying the features of my invention;

Fig. 2 is a plan view thereof;

Fig. 3 is an enlarged sectional elevational view showing the discharge end of the shuttle car taken on the longitudinal center line thereof;

Fig. 4 is a transverse sectional elevational view taken on the line 4—4 of Fig. 1, looking in the direction of the arrows, with certain parts omitted;

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Fig. 5 is an enlarged sectional elevational view of a portion of the discharge end of a modified form of shuttle car;

Fig. 6 is an enlarged sectional view taken on the line 6—6 of Fig. 5, looking in the direction of the arrows;

Fig. 7 is a transverse sectional elevational view taken on the line 7—7 of Fig. 5, looking in the direction of the arrows;

Fig. 8 is an enlarged detail view taken on the line 8—8 of Fig. 5, looking in the direction of the arrows;

Fig. 9 is an enlarged detailed view taken on the line 9—9 of Fig. 6, looking in the direction of the arrows;

Fig. 10 is an enlarged sectional elevational view of a portion of the discharge end of another modified form of shuttle car;

Fig. 11 is a transverse sectional elevational view taken on the line 11—11 of Fig. 10, looking in the direction of the arrows;

Fig. 12 is a sectional elevational view taken on the line 12—12 of Fig. 10, looking in the direction of the arrows; and

Fig. 13 is a sectional view taken on the line 13—13 of Fig. 10, looking in the direction of the arrows.

The shuttle car of my invention in many of its details follows the disclosure of my application for Shuttle car, Serial No. 518,810, filed Jan. 19 1944, now Patent No. 2,457,569, granted Dec. 28, 1948, and it is to be understood that unless a contrary fact is indicated, the machine herein disclosed will follow that of said application.

Referring first to Figs. 1, 2, 3 and 4 of the drawings, the shuttle car includes a main frame on which a load carrying body 10 is rigidly mounted, which body 10 has at least some of its side members formed as an integral part of the main frame. This body 10 is of generally elongated structure and includes upwardly extending and outwardly sloping side walls 11, 11 which are connected across the receiving end by a sloping end wall 12. The body 10 is constructed to provide as large a capacity as is consistent with the desired height so it can operate in a low ceiling mine, as the principal function of the device is to receive coal or other material from a loading machine and transport the coal or other material under its own power to a discharge station where it is discharged into a conveyor, hopper, mine car, or other receptacle. In the case of mine cars, they often have appreciable height and consequently it is necessary to elevate the point of

discharge of the shuttle car to be able to discharge into them. Mechanism has been provided as a part of the shuttle car to accomplish this result.

The body 10 is provided with four wheel assembly receiving wells 13, within which are located four power driven steerable wheel assemblies 14 which are generally of similar construction, as described more completely in my afore-mentioned application, Serial Number 518,810. The pair of wheel assemblies 14 adjacent the receiving end of the shuttle car are driven by an electric motor 15 which is located on a platform provided by the main frame of the vehicle. The pair of wheels adjacent the discharge end of the vehicle are likewise driven by an electric motor 16, also located on a platform provided by the vehicle main frame.

The two wheel assemblies adjacent the discharge end of the vehicle are preferably mounted on a transversely extending axle 17 (see Figs. 3 and 4) which is pivoted at its center along a horizontally extending axis provided by a pivot pin 18. The forward and rearward pair of wheel assemblies 14 are driven by transversely extending drive shafts, there being one for each pair. The drive shaft for the pair of wheel assemblies 14 associated with the axle 17 is seen at 19 in Fig. 4 of the drawings.

Adjacent the discharge end of the shuttle car the side walls 11 of the body 10 converge so as to provide platforms or spaces 20 and 21 on opposite sides thereof within the overall lateral confines of the body 10. Space 20 is occupied in part by an electric cable reel 22 and space 21 is an operator's space where there is operator's mechanism such as a steering wheel, control levers, and the like, not illustrated. In the interest of clearness, the linkages which provide for the simultaneous steering of the wheel assemblies 14 are also not illustrated.

Extending between the side walls 11 of the body 10 and forming the bottom thereof is a generally horizontal bottom plate 23. This bottom plate 23 forms a portion of the main frame of the shuttle car and also forms a portion of the main frame of a material moving or conveyor mechanism 24, the function of which is to convey or move material such as coal from the receiving or right hand end to the discharge or left hand end, as viewed in Figs. 1 and 2 of the drawings.

By reference to Fig. 2 of the drawings, it will be seen that the material moving or conveyor mechanism 24 extends longitudinally along the center of the body 10 and in the bottom thereof over the bottom plate 23. The bottom plate 23 slopes upwardly at a gradual rate starting at a position slightly to the left of the pair of front wheels 14, as viewed in Figs. 1 and 2 of the drawings, so that as the conveyor mechanism 24 proceeds through the restricted throat at the discharge end it will have an appreciable elevation. It is, of course, obvious that the bottom plate 23 and the associated side walls 11 constitute parts of the main frame of the shuttle car, the side members of the load carrying body, and also a part of the main frame of the conveyor and that they are stationary with respect to the main frame and body 10.

To provide for an extension of the discharge position or point and also an elevation thereof when the device is discharging material, I provide a longitudinally extensible or sliding frame or boom 25 for the conveyor which constitutes an important feature of the invention herein claimed. The extensible frame or boom 25 includes a pair of side angle members 26, 26 (see Fig. 4). Extending across the tops of these angle members 26, 26 and rigidly attached thereto by corner angles 27, 27 is an extensible bottom plate 28 which is positioned below the rear end of the bottom plate 23 and is spaced therefrom over a principal portion of its length by transversely extending spacer plates 29 (see Fig. 3) preferably welded or otherwise attached to the main bottom plate 23. Also suporting the bottom plate 28 is a plurality of transversely extending pipes 30, the ends of which are welded to the angle 26. At their rearward ends the angles 26 are connected by a transversely extending angle 31 which is welded thereto and which also supports the left hand end of the bottom plate 28 as viewed in Fig. 3. The right hand or forward ends of said angle members 26 are connected by a transversely extending angle member 32.

The extensible frame or boom 25 is also provided adjacent the rear portion thereof with a pair of upstanding side plates or walls 33 which are rigidly attached to the angle members 26 and to the bottom plate 28 and which telescope or slide into guideways formed between the adjacent side walls 11 of the body 10 and supplemental inner side plates 34 which are provided adjacent the discharge throat of the body 10 as illustrated in Fig. 3 of the drawings. The upper and forward ends of the side plates 34 are bent over and welded to the side walls 11, thus covering up the tops and forward edges of the extensible frame or boom side plates 33 when said boom is in its retracted position, as illustrated in Fig. 3 of the drawings. The two spaced side plates 33 of the boom or extensible frame 25 carry bearing boxes 35 (see Fig. 1) which receive the transversely extending discharge shaft 36 of the conveyor mechanism 24 over which the bottom plate 28 of said boom 25 extends while curving about it.

The previously mentioned conveyor mechanism 24 includes a pair of endless draft chains 37, one located at each edge of the bottom plate 23. Transversely extending material conveying flights 38 interconnect the chains 37. Adjacent the head of the vehicle, the chains 37 extend around sprockets 39 carried on a head shaft 40 which is mounted in appropriate bearings on the main frame of the vehicle. At the discharge end, the chains 37 extend around sprockets 41 on the shaft 36. This run of the conveyor mechanism 24 constitutes the upper or working run thereof and is effective when the said conveyor is driven to convey material from the loading or right hand end to the discharge or left hand end, as viewed in Figs. 1 and 2 of the drawings. The return run of the conveyor mechanism 24 is constructed to provide for free longitudinal adjustment of the extensible frame or boom 25. To this end, the chains 37 after passing over sprockets 41 extend below the bottom plates 23 and 28 to laterally spaced sprockets 42 carried on a transversely extending shaft 43 which is journaled in a tubular housing 44 rigidly connected by end brackets 244 to the angle members 26 and forming a part of the extensible frame or boom 25. In other words, the discharge shaft 36 and the intermediate guide shaft 43 are both mounted on the extensible frame or boom 25. After passing over the sprockets 42 the chains 37 extend to a pair of spaced drive sprockets 45 mounted on a transversely extending shaft 46 carried in appropriate journal boxes attached

to downwardly extending portions of the side walls 11 of the main frame of the vehicle. After leaving the drive sprockets 45, the chains 37 continue their return run over appropriate guides on the main frame of the vehicle to the head shaft 40. The main frame is preferably provided with guides and supports for the several runs of the conveyor mechanism 24 between the shafts 40, 43 and 46. For example, adjacent each side of the main frame there is a supporting angle member 47 which supports the conveyor mechanism 24 while it travels between shafts 43 and 46 and their associated sprockets. Likewise, as the conveyor mechanism 24 leaves the sprockets 45 and travels to the right, as viewed in Fig. 3, it is supported over the axle 17 by angle members 48 along opposite sides of the main frame. At the forward end of each angle member 48 there is a guiding shoe 49 cooperating with each of the chains 37 of the conveyor mechanism 24.

The draft chains 37 of the conveyor mechanism 24 are driven by an electric motor 50 which is mounted on a platform 51 formed as a part of the main frame or body 10 and adjacent the discharge end thereof. It is to be noted that the motor 50 is entirely out of the way in its position below the discharge end of the conveyor mechanism 24. Chain and sprocket drive mechanism 52 interconnects the motor 50 with the drive shaft 46. It is obvious that the mounting of the shafts 36 and 46 on the extensible frame or boom 25, together with the manner in which the chains 37 are reeved about the sprockets on these shafts and the sprockets on the shafts 40 and 46, provides for the operation of the conveyor mechanism 24 for any desired position of adjustment of the extensible frame or boom 25 between either of its two extreme positions, one of which is indicated in full lines in Figs. 1, 2 and 3 of the drawings and the other of which is indicated in dotted lines in Fig. 1 of the drawings.

By reference particularly to Figs. 3 and 4 of the drawings it is obvious that the boom or extensible frame 25 is guided in its longitudinally sliding movement between the spaced apart vertical side walls 11 of the body or main frame 10. Furthermore, support for the boom or extensible frame 25 is provided by a pair of longitudinally extending angles 56, 56 which are connected to the side plates 11, 11. When the boom 25 is in the retracted position, as viewed in Fig. 3 of the drawings, the angle supports 56 extend substantially the full length thereof. Tilting of the boom or extensible frame 25 when in an extended position is prevented by the cooperation between the supporting angles 56, 56 and the transversely extending spacer plates 29. It is thus evident that the extensible frame or boom 25 is completely boxed in and is held against movement except for the longitudinal movement along its axis.

To provide for longitudinal adjustment of the boom 25 I provide a hydraulic piston motor or jack 53, the cylinder of which is preferably pivotally attached to a bracket 54 on the main frame or body 10 and the piston of which is pivotally attached at 55 to a bracket on the angle member 32 of the extensible frame or boom 25. It is obvious that by expanding or contracting the hydraulic piston motor 53, the extensible frame or boom 25 may be adjusted longitudinally of the main frame or body 10. The piston motor 53 is preferably of the double acting type and an associated control valve provides for locking it in any position of adjustment. Any desired form of hydraulic apparatus may be provided for operating the piston motor 53 which is capable of carrying out the above mentioned functions.

In Figs. 5, 6, 7, 8 and 9 of the drawings I have illustrated a modified form of extensible frame or boom and associated mechanism, which not only provides for the longitudinal extension thereof but also provides for pivotal adjustment of said boom about a horizontal axis, thus further extending the possible height of the point of discharge of the conveyor. It is to be understood that unless a contrary fact is indicated, the structure of the modified arrangement will follow that previously described in connection with Figs. 1 to 4, inclusive.

Referring particularly to Figs. 5, 7 and 8 of the drawings, an extensible frame or boom seen at 125 includes longitudinally extending transversely spaced angle members 126, 126 which are interconnected by transversely extending pipes 130 and forward and rearward angle members 132 and 131, respectively. A bottom plate 128 is rigidly connected at its sides to angle members 126 by appropriate angles 127 which are welded to the plate 128 and to the angle members 126. Side plates 133, 133 are connected to the angle members 126, 126 and extend inside adjacent portions of the side walls 11 of the body 10. Nothing similar to the side plates 34 is provided in the modification of Figs. 5 to 9, inclusive, because of the angularly adjustable nature of the adjustable frame or boom 125. Since there is no particular difference between the shafts 36, 43 and 46 in the modification of Figs. 5 to 9, as compared with that of Figs. 1 to 4, the same reference characters are employed to designate these parts in both modifications.

The boom 125 is slidably supported upon a pair of laterally spaced angle members 156 attached to side walls 11 (see Fig. 5). The extensible frame or boom 125 is longitudinally adjustable by the hydraulic piston motor or jack 53 in essentially the same way that it adjusts the extensible frame or boom 25 in the modification of Figs. 1 to 4. However, to provide for swinging adjustment of the boom 125, certain modifications have been made of the machine of Figs. 1 to 4. For example, the bottom plate 23 has been cut short so that when the boom 125 is in its extended position, said plate 23 will terminate substantially adjacent the forward end of the bottom plate 128 of said extensible frame or boom 125, as illustrated in Fig. 5 of the drawings, wherein the boom 125 is shown in its full extended position. In the modification of Figs. 1, 2, 3 and 4 of the drawings there is an appreciable overlapping of the bottom plates 23 and 28 even when the boom 25 is in its fully extended position.

When said boom 125 reaches its fully extended position, as illustrated in Figs. 5, 6, 8 and 9 of the drawings, mechanism comes into play which provides a pivotal connection between it and the main frame or body 10 of the shuttle car. This mechanism includes a pair of thick disks or cylinders 57 (see Figs. 6, 8 and 9) which are welded to the forward ends and outsides of the angle members 126 which are preferably deformed to provide adequate space for said cylinders 57, as clearly illustrated in Figs. 6 and 8 of the drawings. Said cylinders 57 abut bearing blocks 58 which are carried on removable plates 59 attached to the outsides of the side walls 11 by

bolts or the like. The bearing blocks 58 are provided with arcuate bearing surfaces or notches 60 (see Fig. 9) against which the cylinders 57 abut and with which they cooperate to provide a pivotal relation about a horizontal axis which passes through the centers of the cylinders 57.

It is obvious that when the extensible frame or boom 125 is in its full extended position, the cooperation between the cylinders 57 and the blocks 58 prevents the forward or right hand end of the boom 125 from moving upwardly or rearwardly or to the left, as viewed in Fig. 5, while providing the above-mentioned pivotal connection for said boom 125 about a horizontal axis. To swing the boom 125 about said pivotal axis I provide an upstanding hydraulic piston motor or jack 61, the cylinder of which is rigidly connected to the platform 51, preferably to the left of the motor 50. The piston of the motor or jack 61 is provided with a pivotal cross head 62 which carries a pair of telescoping guides 63 and which at its outer ends is provided with anti-friction rollers 64 adapted to support the horizontal webs of the angle members 126 of said extensible frame or boom 125.

It is obvious that by adjusting the hydraulic piston motor 61 and locking it in any desired position of adjustment, the elevation of the discharge shaft 36, or, in other words the elevation of the point of discharge of the material, may be adjusted.

It may be noted that in both modifications of the device, the longitudinal adjustment of the extensible frame or boom 25 or 125 of itself elevates the position of the discharge shaft 36, since the plane of travel thereof is inclined upwardly toward the discharge end. Additional elevation of the discharge shaft 36 and of the point of discharge of the material is, of course, realized in the modification of Figs. 5 to 9, inclusive, over that of the modification of Figs. 1 to 4, inclusive.

In Figs. 10, 11, 12 and 13 of the drawings I have illustrated another modified form of extensible frame or boom and associated mechanism, which also provides for the longitudinal extension thereof and for pivotal adjustment of said boom about a horizontal axis, the latter as an incident to such longitudinal extension, the purpose of which is to increase further the height of the point of discharge of the conveyor.

It is to be understood that unless a contrary fact is indicated, the structure of the modification of Figs. 10 to 13, inclusive, follows that previously described. The extensible frame or boom designated 225 is illustrated in full lines in Fig. 10 of the drawings partially extended and in its position just prior to the beginning of the further elevation of the discharge end thereof as provided by the special elevating mechanism. Said boom is illustrated in dot and dash lines in both the fully elevated position and in the retracted position. Said boom 225 includes longitudinally extending transversely spaced angle members 226 which are interconnected by transversely extending pipes 230 and forward and rearward angle members 232 and 231, respectively. A bottom plate 228 is rigidly connected at its sides to angle members 226 by appropriate angles 227 which are welded to the plate 228 and to the angle members 226. Side plates 233 are connected to the angle members 226 and extend inside adjacent portions of the side walls 11 of the body 10.

The structure of the shafts 36, 43 and 46 is the same as that previously described in connection with the other modifications of the device.

The boom 225 is slidably supported upon a pair of spaced angle members 256 attached to side walls 11. Said extensible frame or boom 225 is longitudinally adjustable or slidable by the hydraulic piston motor or jack 53 in essentially the same way that it adjusts the extensible frame or boom 25 or 125 previously described. However, since the boom or frame 225 is swingable, the structure generally follows that of the modification of Figs. 5 to 9, inclusive, except for certain additional modifications to be described.

For example, the bottom plate 23 has been cut short and in addition at its rearmost end is provided with a pivoted extension 223 pivoted about a horizontal axis provided by an elongated bolt 263 which is connected to the side plates 11 and to the bottom plate 23. This provides a pivoting hinge which, if desired, may be employed adjacent the end of the plate 23 in the modification of Figs. 5 to 9 of the drawings.

To provide for sliding guided movement of the boom 225, there is a sliding shoe 257, one on each side located adjacent the forward end of the boom 225 and each pivotally connected by a pivot pin 265 to the adjacent angle member 226. Each of the slide shoes 257 slides on the angle member 256 adjacent thereto, and the upper surface thereof slides below and in contact with an angle member 266, there being one adjacent each side of the frame 10 rigidly connected as by welding to the side plate 11. The angle members 266 extend rearwardly a sufficient distance that they always confine the slide blocks 257 beneath them for all positions of the boom 225.

When the boom 225 is moved rectilinearly rearwardly to the position illustrated in full lines in Fig. 10 of the drawings, mechanism comes into play so that upon further rearward movement thereof the rear end of said boom 225 is automatically elevated an additional amount over and above what it otherwise would be by such rectilinear movement.

This automatic elevating mechanism includes a pair of spaced arms 267 one on each side of and carried by the main frame or body 10. As seen in Fig. 11 of the drawings each arm 267 is pivoted at its bottom on a horizontal axis by a pivot pin 268 about a side member 11 of the main frame or body 10. The upper end of each arm 267 carries an integral pin 269 which extends inwardly through an elongated arcuate slot 270 formed on the adjacent side plate 11.

Each angle member 226 of the boom 225 carries a forked block 271 having a notch in its forward end adapted to receive the pin 269 and abut against it when the boom 225 reaches the full line position illustrated in Fig. 10 of the drawings. Under these conditions the arms 267 are in the dotted line position illustrated in Fig. 10 of the drawings.

As the hydraulic motor or jack 53 continues to force the boom 225 rearwardly, it is obvious that the two arms 267 will swing about their pivots 268 and will thus cause the boom 225 to pivot about the axis of the pivot pins 265, thus appreciably elevating the discharge end thereof, together with the simultaneous rearward longitudinal movement thereof. Under the continued influence of the motor or jack 53, the boom 225 will reach the uppermost dot and dash line position illustrated and the arms 267 will swing to their uppermost positions which are the dot and

dash line positions illustrated in Fig. 10 of the drawings.

In order to provide for the withdrawing of the boom 225 or, in other words, the retraction thereof, into the lower dot and dash line position illustrated in Fig. 10 of the drawings, it is necessary to terminate the forward ends of the walls 233 thereof at a position rearwardly of the forward end of the bottom plate 228 and in this respect the boom 225 differs from booms 125 and 25. However, the structure of the boom 225 now to be described may be substituted for comparable parts of the previously described boom 125.

The forward ends of said side walls 233 terminate along a line 272. As evident from a consideration of the structure of the boom where, in its uppermost position as illustrated in the dot and dash line in Fig. 10 of the drawings, in view of the termination of the side walls 233 at 272, it is necessary to provide some supplemental side wall devices to continue the trough side walls of said boom 225 when so elevated. To this end, adjacent its rear end each side wall 11 is provided with a pivoted plate 273 (see Fig. 11) which is generally triangular in shape, each of said plates 273 being pivoted at its rear or apex end by a pivot pin 274 to the adjacent side plate 11 of the main frame or body 10. The pivot plates 273 are preferably located inside the side plates 11.

With the boom 225 in the retracted position or in the full line position illustrated in Fig. 10 of the drawings, each of the plates 273 will be in the dotted line position as illustrated in Fig. 10 of the drawings. As the boom 225 swings upwardly about its pivot, the two plates 273 will swing upwardly about their pivots 274, each being carried by a hooked portion 275 formed at the upper rear edge of each plate 273 which hooks over the adjacent wall 233 of said boom 225. Thus the plates 273 form substantial continuations of the side walls 233 particularly when the boom 225 is in its elevated position. As boom 225 is lowered from its elevated position in response to a retraction of the boom by the piston or motor 53, under the guiding influence of the pivot arms 267, the plates 273 will swing downwardly by gravity to their dotted line positions as illustrated in Fig. 10 of the drawings.

In the operation of the device in each of the three modifications, material such as coal is received by the body 10, being delivered thereto largely over the loading or right hand end, as viewed in Figs. 1 and 2 of the drawings. When the body 10 is filled with material the vehicle is operated under its own power by driving the four wheels 14, which are also preferably steerable, to carry the material to any position where it is to be discharged, such as to a main conveyor, hopper, mine car or the like. At this position, the boom 25, 125 or 225 is extended so that the discharge point or the position of the shaft 36 will be adequately elevated and adequately extended rearwardly over the receptacle so that material can freely discharge into it. The endless conveyor mechanism 24 is then operated to convey material to the left or to the rear, over the discharge shaft 36 and into the receptacle.

The machines illustrated in the modifications of Figs. 5 to 9, inclusive, and Figs. 10 to 13, inclusive, have greater flexibility than that of Figs. 1 to 4, inclusive, in that they can discharge into a receptacle of greater height than the device of Figs. 1 to 4, by virtue of the adjustment in elevation of the discharge shaft 36 after the extensible frame or boom 125 or 225 has been fully extended to the maximum amount or as an incident of such extension.

After the shuttle car has discharged all of its material by the operation of the conveyor mechanism 24 the boom 25, 125 or 225 will be retracted and in case it is boom 125 or 225 it will also be lowered to the position illustrated in the drawings as above described. The empty vehicle will then be driven by its operator back to the loading machine to be loaded again and the operation repeated.

It will be seen that the extensible or sliding boom or frame 25 and the parts of which it is comprised form a portion of the load carrying body that telescopes with the body 10 and that the frame or boom portion 25 may be extended to increase the length of the shuttle car and simultaneously the volumetric capacity of its load carrying body. This is an important feature of my invention. In many instances during the transportation of a shuttle car through a mine and at sharp curves therein it is important, if not critical, that the overall length of the shuttle car be at a minimum and yet the shuttle car may be used in a mine room or tunnel wherein a large operating area is available. In such case it then becomes extremely desirable that the shuttle car be capable of carrying a large quantity of coal. By my structure the shuttle car may be shortened, for example, to permit its entry into the mine and when it reaches the area in which it is to work it may be lengthened any desired amount up to its maximum length and volumetric or load carrying capacity to enable it to carry as large a quantity of coal as the space in which the shuttle car is operating will permit.

It is thus obvious that I have provided a very flexible shuttle car and while the specific embodiment of my invention is directed to such a vehicle, it is to be understood that in certain broader aspects of the invention it may extend to other devices such as conveyors, loaders, and the like.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and I wish therefore not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of my invention, what I now desire to secure by Letters Patent of the United States is:

1. A shuttle car, including a main frame, wheel means for supporting and transporting said main frame, a load carrying body on said main frame, an elongated conveyor in the bottom of said body, an extensible discharge boom for said conveyor adapted to extend the length thereof, means pivotally mounting said boom for adjustment about a horizontal axis relative to the other portion of said conveyor, means for adjusting said boom to increase the conveyor length, and means for adjusting said boom about its pivotal axis.

2. In a shuttle car, a conveyor including a main frame portion, an extensible frame portion, endless chain and flight mechanism extending over both said portions, means mounting said extensible portion for pivotal movement when it is in its extended position, and means including an upstanding hydraulic jack having a supporting cross-head under said extensible portion for ad-

justing said extensible portion about its pivotal axis.

3. In a shuttle car, a conveyor including a main frame portion, an extensible frame portion, endless chain and flight mechanism extending over both said portions, means mounting said extensible portion for pivotal movement, and means including an upstanding hydraulic jack having a supporting cross-head under said extensible portion for adjusting said extensible portion about its pivotal axis.

4. In a shuttle car, a conveyor including a main frame portion, an extensible frame portion, endless chain and flight mechanism extending over both said portions, means mounting said extensible portion for pivotal movement when it is in its extended position, and means including an upstanding hydraulic jack for adjusting said extensible portion about its pivotal axis.

5. In a shuttle car, a conveyor including a main frame portion, an extensible frame portion, endless chain and flight mechanism extending over both said portions, means mounting said extensible portion for pivotal movement, and means including an upstanding hydraulic jack for adjusting said extensible portion about its pivotal axis.

6. A shuttle car in which the maximum overall length and the point of discharge therefrom may be adjusted including a telescoping load carrying body, wheels for supporting and transporting said telescoping body, an extensible conveyor including sections and an endless material moving means extending thereover, said sections forming the bottom of said load carrying body each having means forming side members of the load carrying body, one of said sections being disposed at an upward angle and extendable with respect to the other of said conveyor sections, means for extending said one section whereby when it is extended its outer discharge end moves outwardly and upwardly, means forming a pivotal connection about a horizontal axis between said conveyor sections when said one section is fully extended, and means including a hydraulic jack for adjusting said one section about said horizontal axis whereby the outer end of said section may be moved arcuately when it is fully extended.

7. A shuttle car in which the maximum overall length and the point of discharge therefrom may be adjusted including a telescoping load carrying body, an extensible conveyor including sections and endless material moving means extending thereover, said sections forming the bottom of said load carrying body each having means forming side members of the load carrying body, one of said sections being disposed at an upward angle and extendable with respect to the other of said conveyor sections, means for extending said one section whereby when it is extended its outer discharge end moves outwardly and upwardly, means forming a pivotal connection about a horizontal axis between said conveyor sections, and means for adjusting said one section about said horizontal axis whereby the outer end of said section may be moved arcuately when it is fully extended.

8. A shuttle car in which the maximum overall length and the point of discharge therefrom may be adjusted including a telescoping load carrying body, an extensible conveyor including sections and endless material moving means extending thereover, said sections forming the bottom of said load carrying body each having means forming side members of the load carrying body, one of said sections being extendable with respect to the other of said conveyor sections, means for extending said one section whereby when it is extended its outer discharge end moves outwardly, means forming a pivotal connection about an axis between said conveyor sections when said one section is fully extended, and means for adjusting said one section about said axis whereby the outer end of said section may be moved arcuately when it is fully extended.

9. A shuttle car in which the maximum overall length and the point of discharge therefrom may be adjusted including a telescoping load carrying body, an extensible conveyor including sections and endless material moving means extending thereover, said sections forming the bottom of said load carrying body each having means forming side members of the load carrying body, one of said sections being extendable with respect to the other of said conveyor sections, means for extending said one section whereby when it is extended its outer discharge end moves outwardly, means forming a pivotal connection about an axis between said conveyor sections, and means for adjusting said one section about said axis whereby the outer end of said section may be moved arcuately.

10. A shuttle car, including a main frame, wheel means for supporting and transporting said main frame, a load carrying body on said main frame, a substantially horizontal elongated conveyor in the bottom of said body, an extensible discharge boom for said conveyor adapted to extend the length thereof, means pivotally mounting said boom for adjustment about a horizontal axis relative to the other portion of said conveyor, power operated mechanism for adjusting said boom rectilinearly to increase the effective length of said conveyor, said mechanism including a reciprocating hydraulic motor pivoted at one end to said main frame and at the other end to said boom, and power operated mechanism for adjusting said boom about its pivotal axis, said last named power operated mechanism including a separate hydraulic motor.

11. A shuttle car, including a main frame, wheel means for supporting and transporting said main frame, a load carrying body on said main frame, a substantially horizontal elongated conveyor in the bottom of said body, an extensible discharge boom for said conveyor adapted to extend the length thereof, means pivotally mounting said boom for adjustment about a horizontal axis relative to the other portion of said conveyor, power operated mechanism for adjusting said boom rectilinearly to increase the effective length of said conveyor, and power operated mechanism for adjusting said boom about its pivotal axis, said last named power operated mechanism including a separate hydraulic motor.

12. A shuttle car, including a main frame, wheel means for supporting and transporting said main frame, a load carrying body on said main frame, a substantially horizontal elongated conveyor in the bottom of said body, an extensible discharge boom for said conveyor adapted to extend the length thereof, means pivotally mounting said boom for adjustment about a horizontal axis relative to the other portion of said conveyor, power operated mechanism for adjusting said boom rectilinearly to increase the effective length of said conveyor, said mechanism including a reciprocating hydraulic motor pivoted at one end to said main frame and at the other end to said boom, and power operated

mechanism for adjusting said boom about its pivotal axis.

13. A shuttle car, including a main frame, wheel means for supporting and transporting said main frame, a load carrying body on said main frame, a substantially horizontal elongated conveyor in the bottom of said body, an extensible discharge boom for said conveyor adapted to extend the length thereof, means pivotally mounting said boom for adjustment about a horizontal axis relative to the other portion of said conveyor, power operated mechanism for adjusting said boom rectilinearly to increase the effective length of said conveyor, said mechanism including a reciprocating hydraulic motor pivoted at one end to said main frame and at the other end to said boom, and power operated mechanism for adjusting said boom about its pivotal axis, said last named power operated mechanism including said reciprocating motor and pivoted arm means on said main frame pivoted on a horizontal axis and constructed to contact said boom as it travels rearwardly to pivot it about its pivotal axis to elevate its free end.

14. A shuttle car, including a main frame, wheel means for supporting and transporting said main frame, a load carrying body on said main frame, a substantially horizontal elongated conveyor in the bottom of said body, an extensible discharge boom for said conveyor adapted to extend the length thereof, means pivotally mounting said boom for adjustment about a horizontal axis relative to the other portion of said conveyor, power operated mechanism for adjusting said boom retilinearly to increase the effective length of said conveyor, said mechanism including a reciprocating hydraulic motor pivoted at one end to said main frame and at the other end to said boom, and power operated mechanism for adjusting said boom about its pivotal axis, said last named power operated mechanism including said reciprocating motor.

15. A shuttle car, including a main frame, wheel means for supporting and transporting said main frame, a load carrying body on said main frame, a substantially horizontal elongated

conveyor in the bottom of said body, an extensible discharge boom for said conveyor adapted to extend the length thereof, means pivotally mounting said boom for adjustment about a horizontal axis relative to the other portion of said conveyor, power operated mechanism for adjusting said boom rectilinearly to increase the effective length of said conveyor, said mechanism including a reciprocating hydraulic motor pivoted at one end to said main frame and at the other end to said boom, and power operated mechanism for adjusting said boom about its pivotal axis, said last named power operated mechanism including pivoted arm means on said main frame pivoted on a horizontal axis and constructed to contact said boom as it travels rearwardly to pivot it about its pivotal axis to elevate its free end.

ARTHUR L. LEE.

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