Oct. 16, 1945. W. C. STEINMETZ 2,387,189

PORTABLE LOADER

Filed April 29, 1944 3 Sheets-Sheet 1

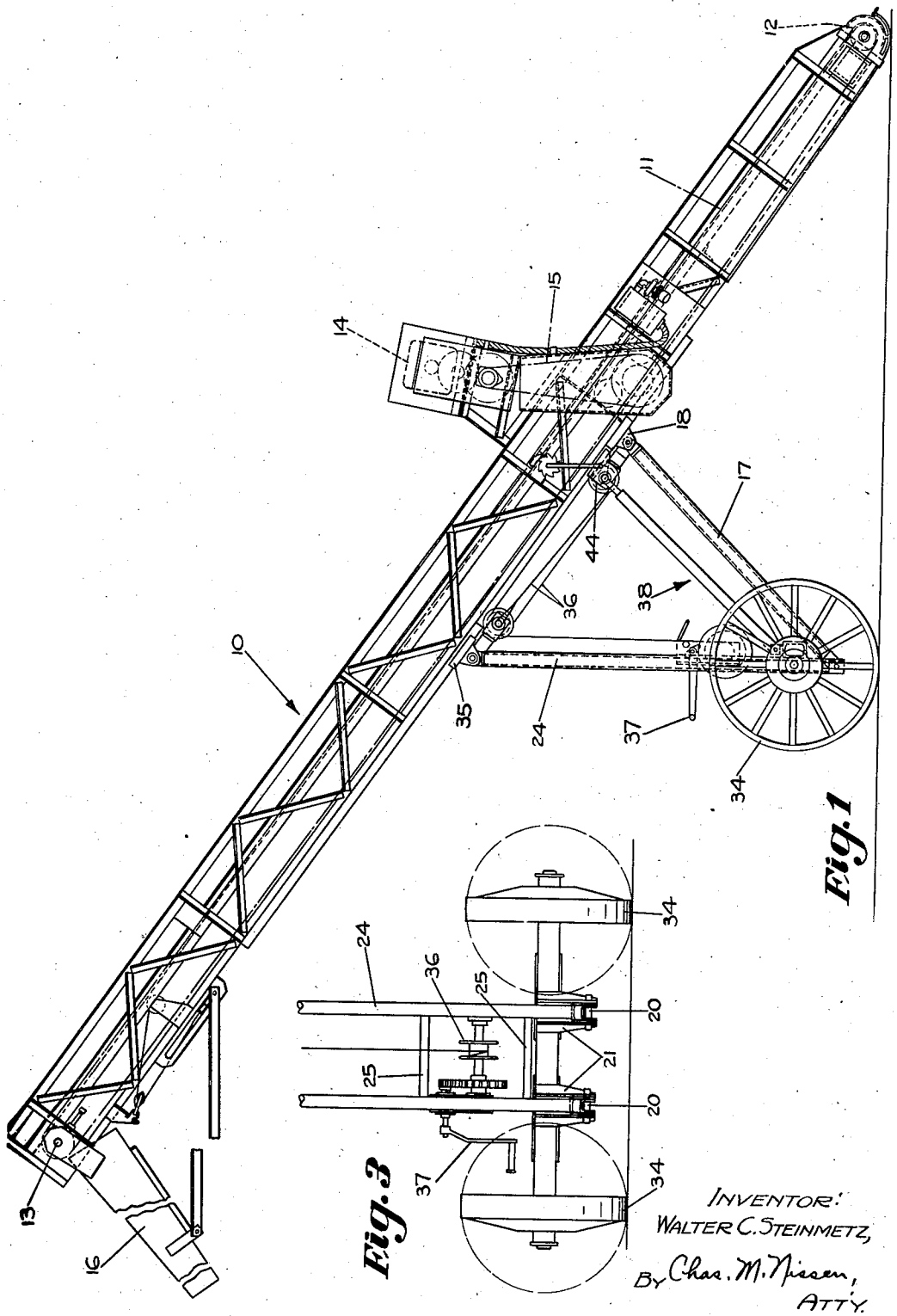


Fig. 1

Fig. 3

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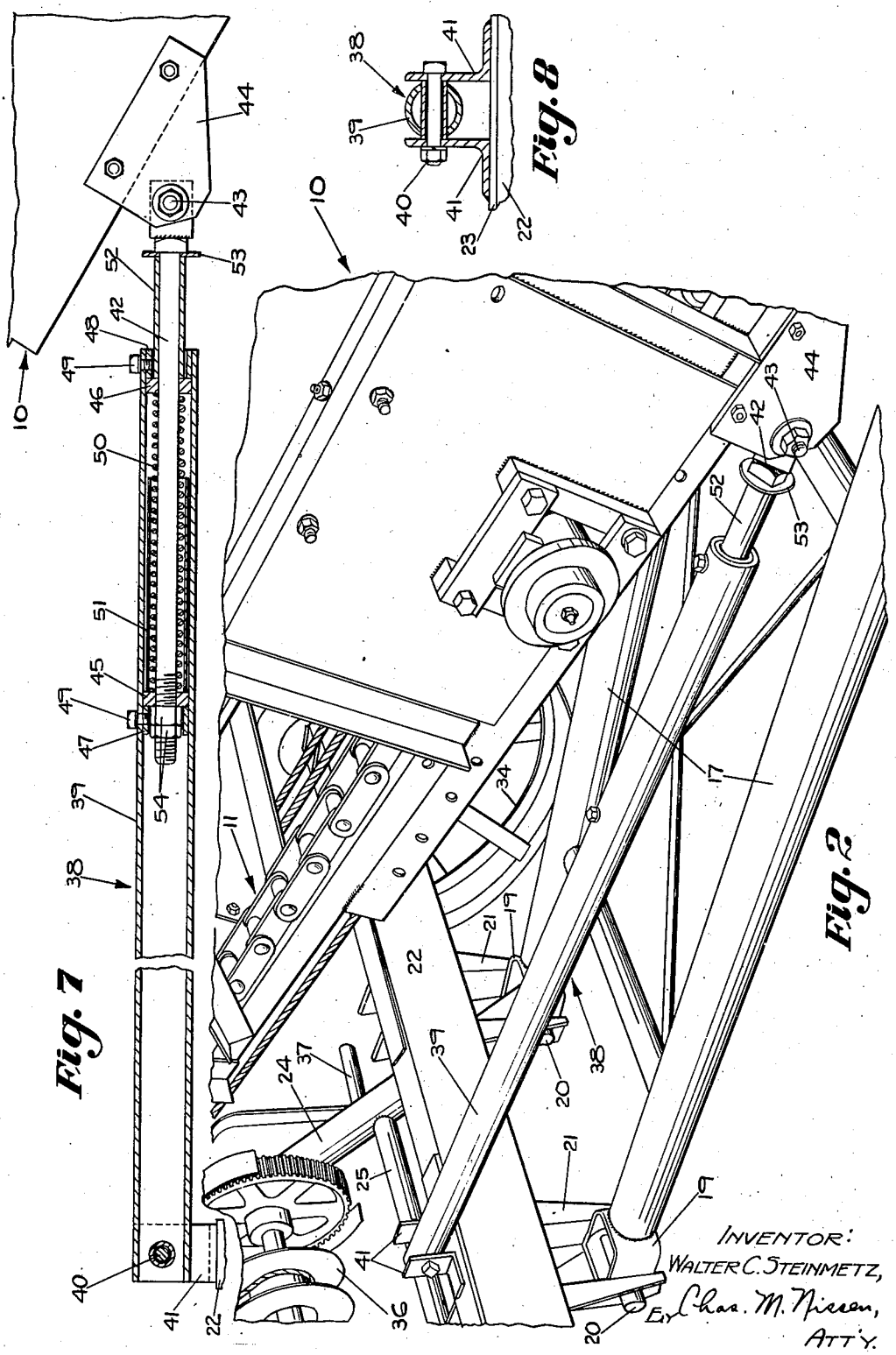


Fig. 7

Fig. 8

Fig. 2

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PORTABLE LOADER

Filed April 29, 1944 3 Sheets-Sheet 3

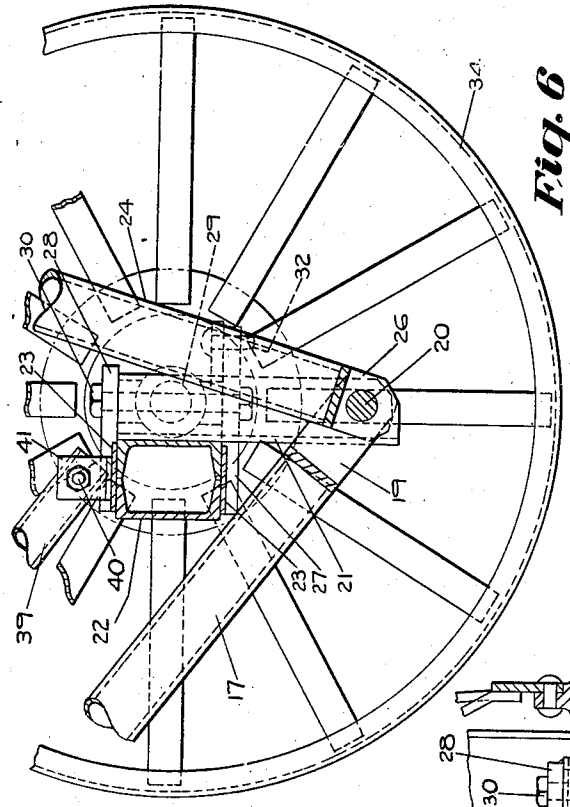


Fig. 6

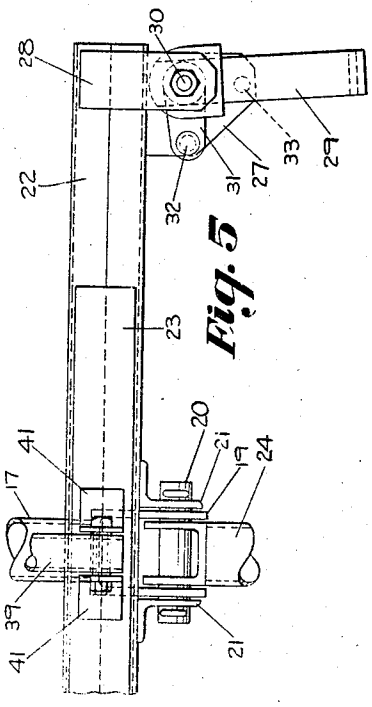


Fig. 5

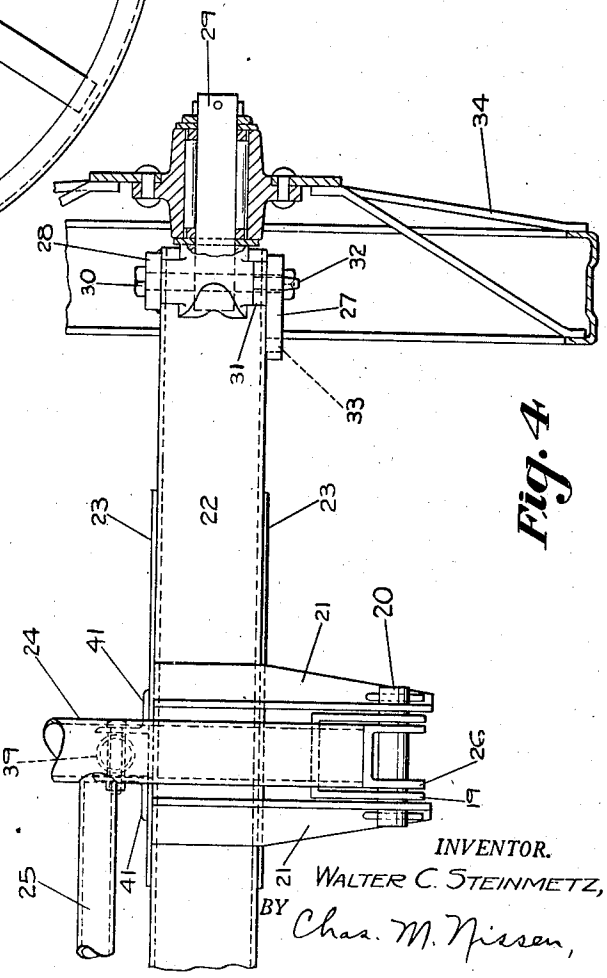


Fig. 4

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PORTABLE LOADER

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Application April 29, 1944, Serial No. 533,344

9 Claims. (Cl. 198—233)

This invention relates to a portable loader or conveyor of the general type now commonly employed in coal yards.

An object of the invention is to provide an improved loader of the above mentioned type.

A more specific object of the invention is to provide a loader of the above mentioned type in which the wheels can be pivoted or swiveled about stub axles or spindles which are mounted on king pins or bolts which remain in a vertical position for all positions of adjustment of the loader boom.

A further object of the invention is to provide improved construction of a loader in which both the mast and strut are pivotally connected to the wheel and axle assembly along a pivotal axis which is below and preferably lies in the same vertical plane as the axis of the wheels.

Still another object of the invention is to provide a loader with an axle assembly or an axle assembly alone for a loader in which the wheels are mounted upon pivot or swivel spindles and are constructed so that as the wheels are swiveled they rotate substantially on a point.

A further object of the invention is to provide an improved axle assembly for a loader.

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 the device of my invention;

Fig. 2 is an enlarged perspective view of a portion thereof;

Fig. 3 is a front view showing particularly the wheel and axle assembly together with the lower part of the mast of the loader of my invention;

Fig. 4 is an enlarged front view with parts in section showing approximately one-half of the axle and wheel assembly;

Fig. 5 is a plan view of the apparatus of Fig. 4 except that the wheel has been removed and the spindle has been rotated approximately 90 degrees;

Fig. 6 is an enlarged elevation and sectional view with parts broken away showing particularly the manner of mounting the mast and the strut on the axle assembly together with certain details of the wheel and axle and associated parts;

Fig. 7 is a sectional view of the stabilizer; and

Fig. 8 is a sectional view of a detail.

This application is a continuation in part of my application, Serial No. 505,180, for a Portable loader, filed October 6, 1943, and now abandoned.

Referring particularly to Figs. 1 and 2 of the drawings, the portable loader or conveyor of my invention includes a main frame or boom 10 which is essentially of construction well known in this art and which supports an endless conveyor belt or chain and flight type of conveyor mechanism 11 which extends between a foot shaft assembly 12 and a head or discharge shaft assembly 13. The conveyor mechanism 11 is driven from a motor 14, which is illustrated as an electric motor, by way of a chain and sprocket or equivalent drive mechanism 15. The motor 14 is mounted on a platform above the boom 10 as clearly illustrated in Fig. 1 of the drawings. Adjacent the upper or discharge end of the boom 10 there is an adjustable chute 16 for guiding the discharging material into a truck or the like.

The conveyor or loader is of the unstable type in that the lower or foot end normally rests upon the ground and in operation is generally placed adjacent a pile of material such as coal which is to be elevated into a truck or the like. The center portion of the boom 10 is supported by means of a strut 17 which may be in the form of a pair of interconnected laterally spaced pipes pivotally connected at their tops to appropriate brackets 18 rigidly attached to a bottom member of the boom 10. Each of the pipes of the strut 17 at its bottom is provided with an integral bifurcated bracket 19 which is pivotally connected by a pin 20 to a downwardly extending bracket 21 formed by a pair of spaced angle members, the tops of which are rigidly connected, as by welding, to an axle frame 22 which forms the principal part of an axle assembly. Said axle frame 22 is formed by a pair of facing channel members, as clearly illustrated in Fig. 6 of the drawings, which preferably have their contacting edges welded together and also, at least in part, are interconnected by top and bottom plates 23 also preferably welded to the channel members of said axle frame 22. The tops of the brackets 21 are preferably welded to the axle frame 22 and form an important part of the complete axle assembly. A mast 24 is also provided and it is formed of a pair of spaced pipes preferably interconnected by a cross pipe 25. Each of the pipes of the mast 24 is provided at its bottom with a bifurcated bracket 26 which is also pivoted to the pin 20 and which extends within the aforedescribed bracket 19. It is thus to be seen that both the strut 17 and the mast 24 are pivoted along a common horizontal axis and the position of this axis, which is an important feature of my invention, will be described more completely hereinafter.

At each end of the axle frame 22 there is a spindle supporting bottom plate 27 and top plate 28, both of which are welded to said axle frame 22 to provide a spindle bracket. Pivoted or swiveled on each bracket 27, 28 is a spindle or stub axle 29 which is swiveled or pivoted on a king pin or bolt 30. The base of the spindle 29 is provided with an integral arm 31 adapted to receive a bolt 32 and to be positioned in either of two positions, determined by the holes 33 positioned approximately but not exactly 90 degrees apart and formed in the bottom plate 27. Mounted on each of the spindles or stub axles 29 is a wheel 34.

The top of the mast 24 is supported in a sliding shoe 35 which slides along the bottom of the boom 10 and whose position is determined by a drum, cable and pulley mechanism 36 which is operated by a crank 37 on the mast 24 operating through appropriate reduction gearing as illustrated in Fig. 3 of the drawings. It is evident that by operating the crank 37, the angular relation of the strut 17 and the mast 24 may be adjusted and this in turn will adjust the height of the discharge end of the boom 10 while the receiving end rests upon the ground, in a manner well understood in this art.

The features of my invention together with their advantages will be obvious from a description of the various important relations of the parts and their mode of operation during various adjustments of the loader. For example, as the drum, cable and pulley mechanism 36 is adjusted to raise or lower the discharge end of the boom 10 it is evident that the angle between the strut 17 and the mast 24 will vary and both of these devices will pivot about the two pivot pins 20. As this adjustment takes place, it is important to note that there will be no resulting pivotal movement of the axle assembly. This is because of the particular relation of parts which I have provided.

By reference particularly to Fig. 6 of the drawings, it will be noted that a vertical plane passing through the pivot pins 20 also passes through the axis of the spindles or stub axles 29 when they are in their laterally extending positions in which the wheels are in the positions illustrated in Figs. 1, 3, 4 and 6 of the drawings. Because of this particular relation of parts it is obvious that the weight transferred from the boom 10 to the axle assembly will be directly below the pivotal axis of the wheels 34 for all positions of the strut 17 and the mast 24 and consequently there will be no tendency for the axle frame 22 or the axle assembly to rotate because of adjustment of the boom 10. This is of importance because if rotation of the axle frame 22 takes place the axes of the king pins 30 move away from their normal vertical positions and if such movement takes place and it is desired to swivel the spindles or stub axles 29 they will be swiveled on an axis which is other than vertical and consequently the rims of the wheels 34 will not rest evenly and firmly on the ground. Therefore I have provided an arrangement in which swiveling of the spindles moves the wheels 34 from their lateral positions to forwardly extending positions as indicated in dotted lines in Fig. 3 of the drawings. The purpose of this is to provide for swinging the boom 10 to various discharging positions while the feed or foot end remains at substantially the same point, as for example adjacent a pile of coal which is being loaded.

It may also be pointed out that the vertical axes of the king pins 30 lie in the same vertical plane which passes through the axis of the pins 20 and the axis of the spindles 29 when the latter are in their aligned or laterally extending positions. The positioning of the axis of the pivot pins 20 below the normal horizontal axis of spindles 29 not only prevents turning of the axle frame 22 and the axle assembly as the boom 10 is vertically adjusted but it also extends the range of this adjustment while making possible the use of wheels 34 of normal size since the pivotal axis of said pins 20 is closer to the ground than is normally the case. This is particularly useful in increasing the lowest position to which the discharge end of the boom 10 may be adjusted.

It is also to be noted that the vertical axis of each king pin 30 passes through substantially the center of the rim of the wheel 34. This has a further important bearing on the above described relation of parts and is an important feature in connection with the swiveling of the wheels 34 because as said wheels 34 are swiveled to their forwardly extending positions they do not travel in an arc of a circle but turn substantially on a point. As a consequence the wheel is not required to roll with half the weight of the machine on it during this swiveling operation. Furthermore, there is no leaning of the axle 22 in this construction which there would be in the absence of this alignment, as the wheels are thus swiveled.

It may be pointed out particularly by reference to Fig. 5 of the drawings that the spindles 29 do not pivot or swivel a full 90 degrees and when they are extended laterally they are in direct alignment along a horizontal axis. When they are swung forwardly to a position illustrated in said Fig. 5, they are tapered outwardly slightly from a straight ahead position, as a consequence of which their axes will intercept at a position at the foot or receiving end of the boom 10 to provide for free swinging movement of said boom about said feeding position to discharge material into variously positioned receptacles.

It may further be pointed out that the mast 24 does not extend above the boom 10 and the mast and strut support is what is generally known in the art as the V type which has the advantage of ease of hoisting the boom, better support for the boom and lack of any obstruction thereby above the boom.

Without disturbing the functioning of the parts as above described, and to stabilize the axle 22 when the wheels 34 are swung to the dotted line positions of Fig. 3, I provide a stabilizer 38. Said stabilizer 38 includes a tube 39 pivotally connected at one end by a bolt 40 to a bracket 41 rigidly attached as by welding to the top of the axle frame 22. Within the tube 39 is a rod 42, one end of which is pivotally connected by a bolt 43 to a bracket 44 attached to one side of the boom 10 and adjacent the lower portion thereof.

The rod 42 extends loosely through central openings of a pair of spaced pistons or spacers 45 and 46 which are mounted within the tube 39 and are held between the cylindrical stops 47 and 48 which are rigidly but removably held to the interior surface of said tube 39 as by screws 49.

Surrounding the rod 42 and extending between the two spacers 45 and 46 is a helical spring 50. Around the spring 50 and also within the tube 39 is a limit tube 51, the overall length of which is

less than the maximum distance between the pistons or spacers 45 and 46. Also surrounding the rod 42 and abutting the spacer 46 is a tube 52 which is preferably rigidly attached to the rod 42 and abuts a washer 53 preferably welded to the rod 42 adjacent the head end thereof.

The free end of the rod 42 which is within the tube 39 is threaded and receives a pair of nuts 54 which are free to extend into the stop 47 and abut the piston 45. The spring 50 urges the parts to the positions illustrated in Fig. 7 of the drawings. However, rod 42 is free to move in opposite directions from said positions against the action of spring 50, and for movement in either of the opposed directions said spring 50 is compressed. For example, if the rod 42 moves to the right, as viewed in Fig. 7, the piston or spacer 45 will slide in the tube 39 and compress the spring 50 which abuts the spacer 46. The extent of this sliding movement is limited by the limit tube 51 striking the spacer 46. If rod 42 moves in the opposite direction, piston or spacer 46 will slide in the tube 39 against the compression of spring 50 which abuts spacer 45 which is stationary under these operating conditions. The limit tube 51 again limits the extent of movement or it may be limited by washer 53.

In operation the stabilizer 38 expands or contracts whatever amount is necessary to maintain the king pins or bolts 30 substantially vertical as the boom 10 is adjusted. The stabilizer 38 is particularly effective to maintain this substantially upright positioning of said king pins 30 when the wheels 34 are swung to the dotted line positions illustrated in Fig. 3 of the drawings.

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 therefore wish not to be restricted to the precise construction herein disclosed.

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

1. In a portable loader, the combination with a boom, of conveying means on said boom, mechanism for adjusting the elevation of the discharge end of the boom while the receiving end thereof is at a fixed elevation, said mechanism including a horizontal axle, wheels mounted on said axle for rotation on a horizontal axis offset relative to the axis of said axle, strut means pivotally connected to said axle and boom, mast means also pivotally connected to said axle and boom, means providing the pivotal connections between said axle and said mast and strut along a common horizontal axis which is substantially in a vertical plane passing through the axis of said wheels and below said wheel axis, and means to adjust the angular relation of said mast and strut to adjust said boom as aforesaid.

2. In a portable loader, the combination with a boom, of conveying means on said boom, mechanism for adjusting the elevation of the discharge end of the boom while the receiving end thereof is at a fixed elevation, said mechanism including a horizontal axle, wheels mounted on said axle for rotation on a horizontal axis offset relative to the axis of said axle, strut means pivotally connected to said axle and boom, mast means also pivotally connected to said axle and boom, and means providing the pivotal connections between said axle and said mast and strut along a common horizontal axis which is substantially in a vertical plane passing through the axis of said wheels and below said wheel axis.

3. In a portable loader, the combination with a boom, of conveying means on said boom, mechanism for adjusting the elevation of the discharge end of the boom while the receiving end thereof is at a fixed elevation, said mechanism including a horizontal axle, wheels mounted on said axle for rotation on a horizontal axis, strut means pivotally connected to said axle and boom, mast means also pivotally connected to said axle and boom, means providing the pivotal connections between said axle and said mast and strut along a common horizontal axis which is substantially in a vertical plane passing through the axis of said wheels and below said wheel axis, and means for pivoting each of said wheels about upright axes each of which lies in said plane and also lies in a plane passing through the rim of the wheel perpendicular to the horizontal axis upon which it is mounted for rotation.

4. In a portable loader, the combination with a boom, of conveying means on said boom, mechanism for adjusting the elevation of the discharge end of the boom while the receiving end thereof is at a fixed elevation, said mechanism including a horizontal axle, wheels mounted on said axle for rotation on a horizontal axis, strut means pivotally connected to said axle and boom, mast means also pivotally connected to said axle and boom, means providing the pivotal connections between said axle and said mast and strut along a common horizontal axis which is substantially in a vertical plane passing through the axis of said wheels and below said wheel axis, and means for pivoting each of said wheels about upright axes each of which lies in said plane.

5. In a loader, the combination with a conveyor carrying boom, an axle assembly, wheels mounted on said axle assembly for rotation on a horizontal axis, mast and strut means each pivotally connected to said boom, means independently pivotally connecting the lower ends of said mast and strut means to said axle assembly below the axis of said wheels, means pivotally connecting said wheels to said axle assembly about upright axes, and a stabilizer pivotally connected to said boom and to said axle assembly at a position removed from the position of connection of said strut means thereto.

6. In a portable loader, the combination with a boom, of conveying means on said boom, mechanism for adjusting the elevation of the discharge end of the boom while the receiving end thereof is at a fixed elevation, said mechanism including a horizontal axle, wheels mounted on said axle for rotation on a horizontal axis, strut means pivotally connected to said axle and boom, mast means also pivotally connected to said axle and boom, means providing the pivotal connections between said axle and said mast and strut along a common horizontal axis which is substantially in a vertical plane passing through the axis of said wheels and below said wheel axis, a stabilizer pivotally connected at opposite ends to said boom and said axle, said stabilizer being adjustable in length, and means for pivoting each of said wheels about upright axes each of which lies in said plane.

7. In a portable loader, the combination with a boom, of conveying means on said boom, mech-

anism for adjusting the elevation of the discharge end of the boom while the receiving end thereof is at a fixed elevation, said mechanism including a horizontal axle, wheels mounted on said axle for rotation on a horizontal axis, strut means pivotally connected to said axle and boom, mast means also pivotally connected to said axle and boom, means providing the pivotal connections between said axle and said mast and strut along a common horizontal axis which is substantially in a vertical plane passing through the axis of said wheels and below said wheel axis, a stabilizer pivotally connected at opposite ends to said boom and said axle, and means for pivoting each of said wheels about upright axes each of which lies in said plane.

8. In a portable loader, the combination with a boom, of conveying means on said boom, mechanism for adjusting the elevation of the discharge end of the boom while the receiving end thereof is at a fixed elevation, said mechanism including a horizontal axle, wheels mounted on said axle for rotation on a horizontal axis, strut means pivotally connected to said axle and boom, mast means also pivotally connected to said axle and boom, means providing the pivotal connections between said axle and said mast and strut along a common horizontal axis which is substantially in a vertical plane passing through the axis of said wheels and below said wheel axis, a stabilizer pivotally connected at opposite ends to said boom and said axle, said stabilizer including spring means providing for automatic adjustment of its length, and means for pivoting each of said wheels about upright axes each of which lies in said plane.

9. In a portable loader, the combination with a boom, of conveyor means on said boom, mechanism for adjusting the elevation of the discharge end of the boom while the receiving end thereof is at a fixed elevation, said mechanism including a horizontal axle, wheels mounted on said axle for rotation on a horizontal axis, adjustable strut means connected to said axle and boom, adjustable mast means connected to said axle and boom, means providing the connection between said axle and said mast and strut at a position which is below the axis of said wheels, a stabilizer connected at opposite ends to said boom and axle, respectively, and means pivotally connecting each of said wheels to said axle for adjustment about upright axes.

WALTER C. STEINMETZ.