June 5, 1934. W. G. ADAMS 1,961,541

PORTABLE DERRICK

Filed July 9, 1930 4 Sheets-Sheet 1

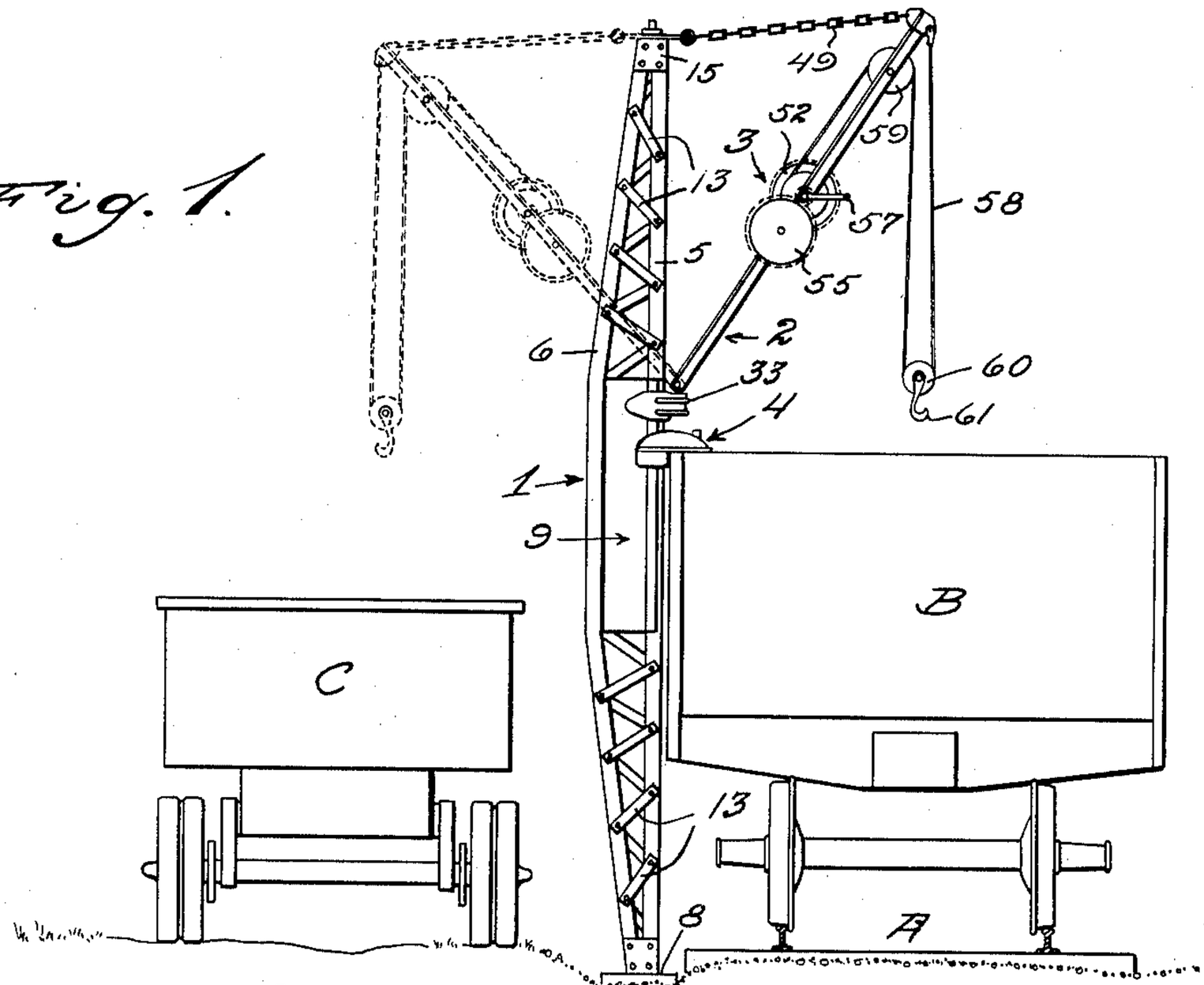

Fig. 1.

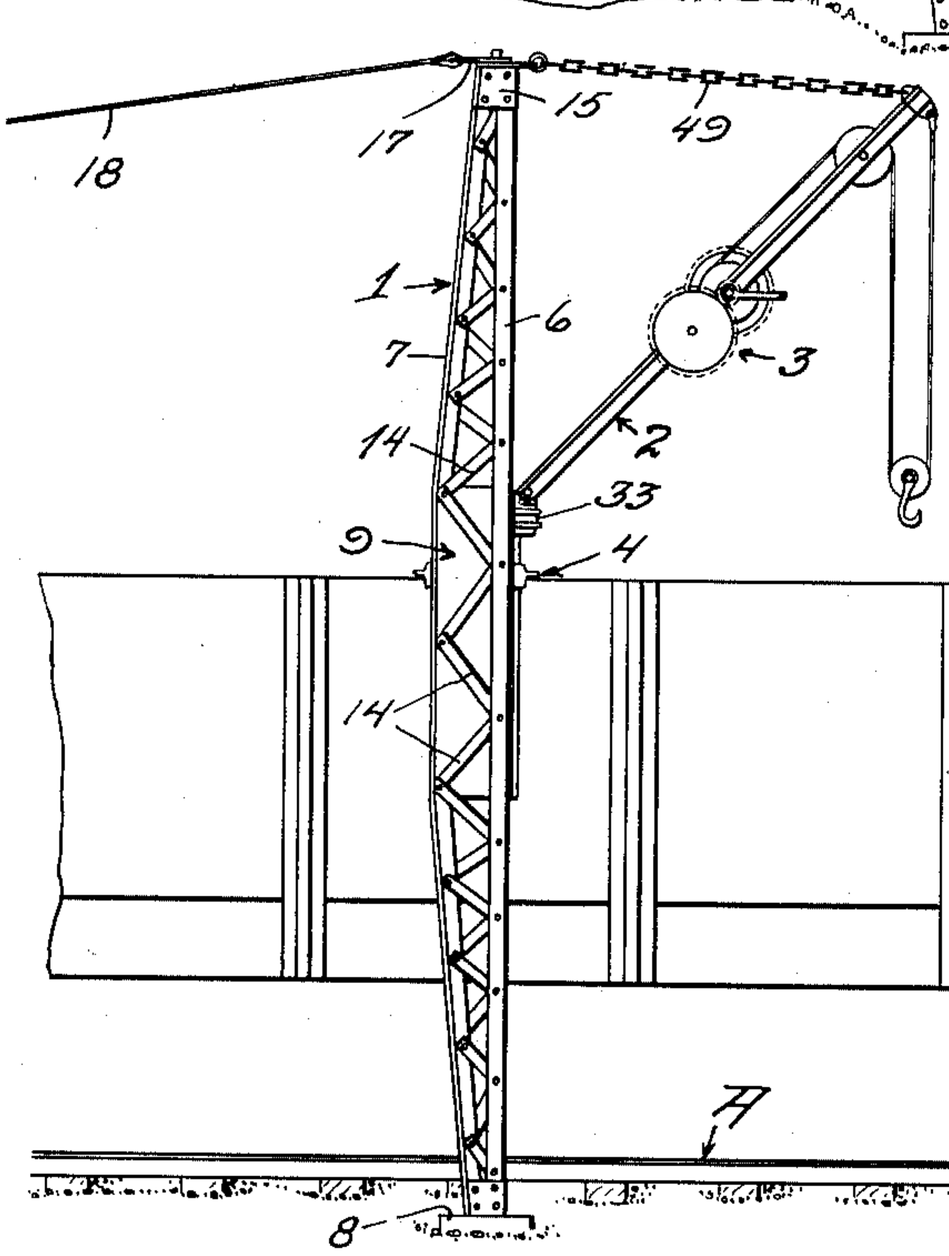

Fig. 2.

Inventor

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Fig. 3.

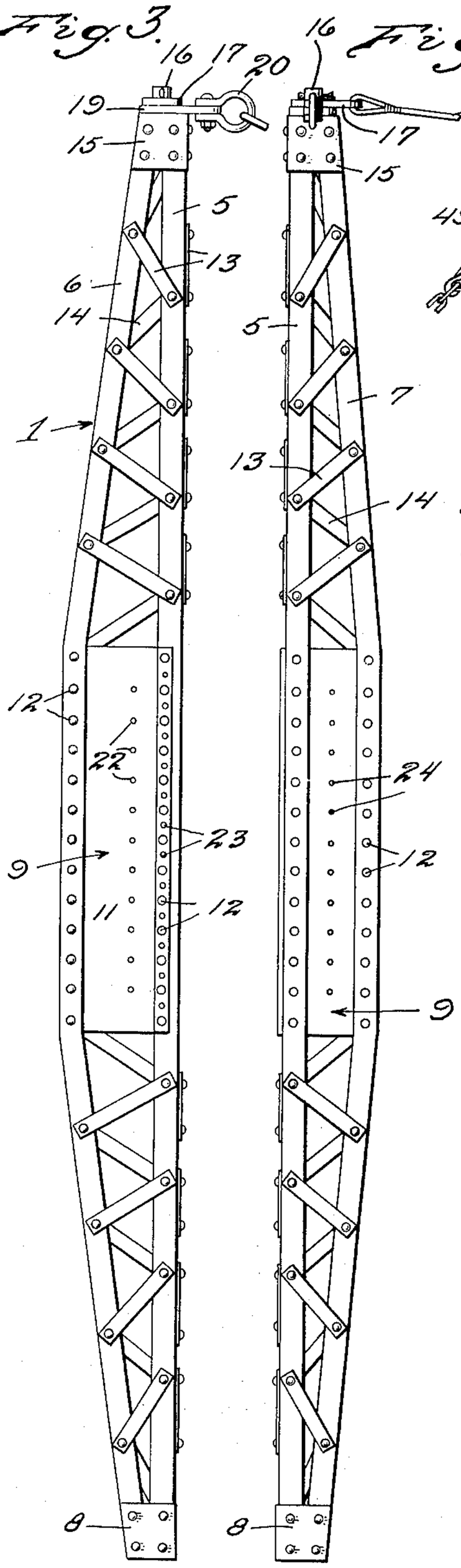

Fig. 4.

Fig. 5.

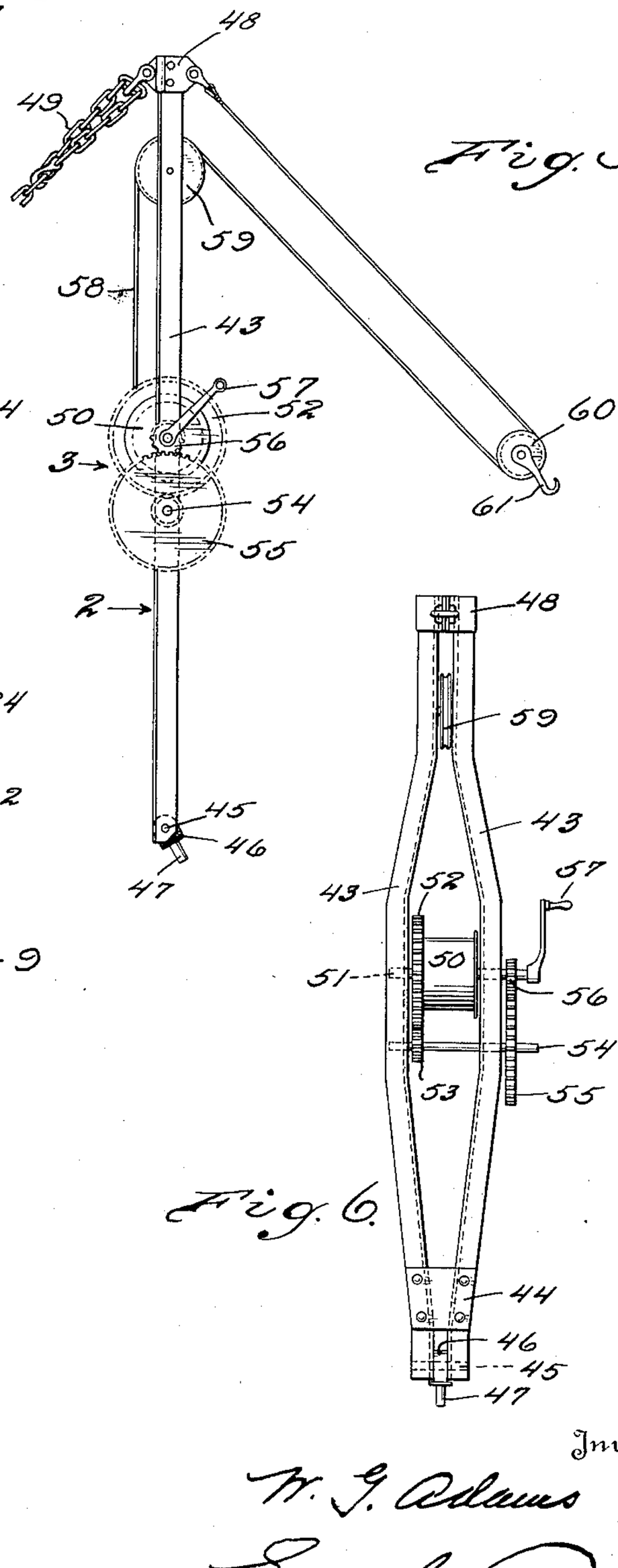

Fig. 6.

Inventor

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PORTABLE DERRICK

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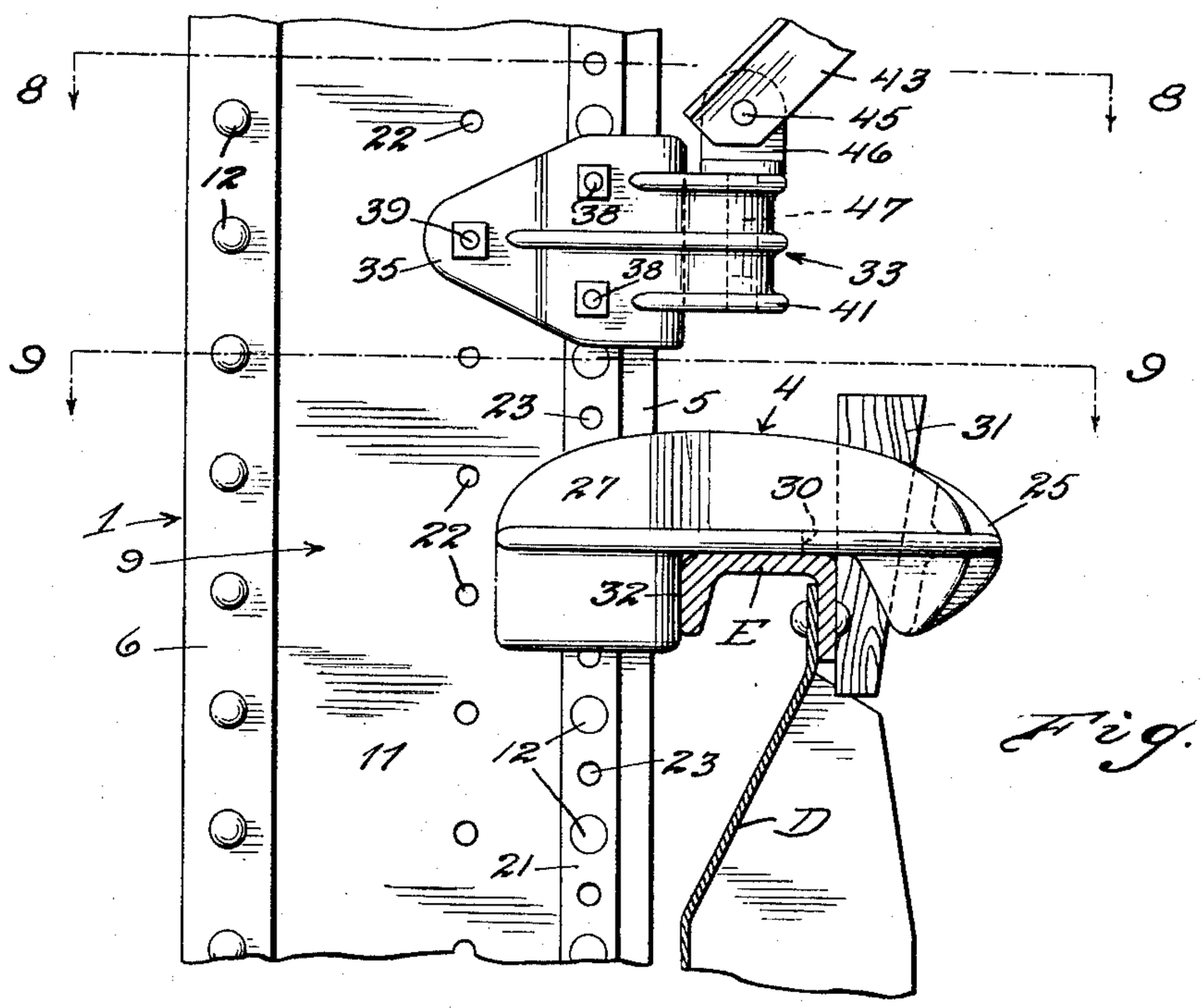

Fig. 7.

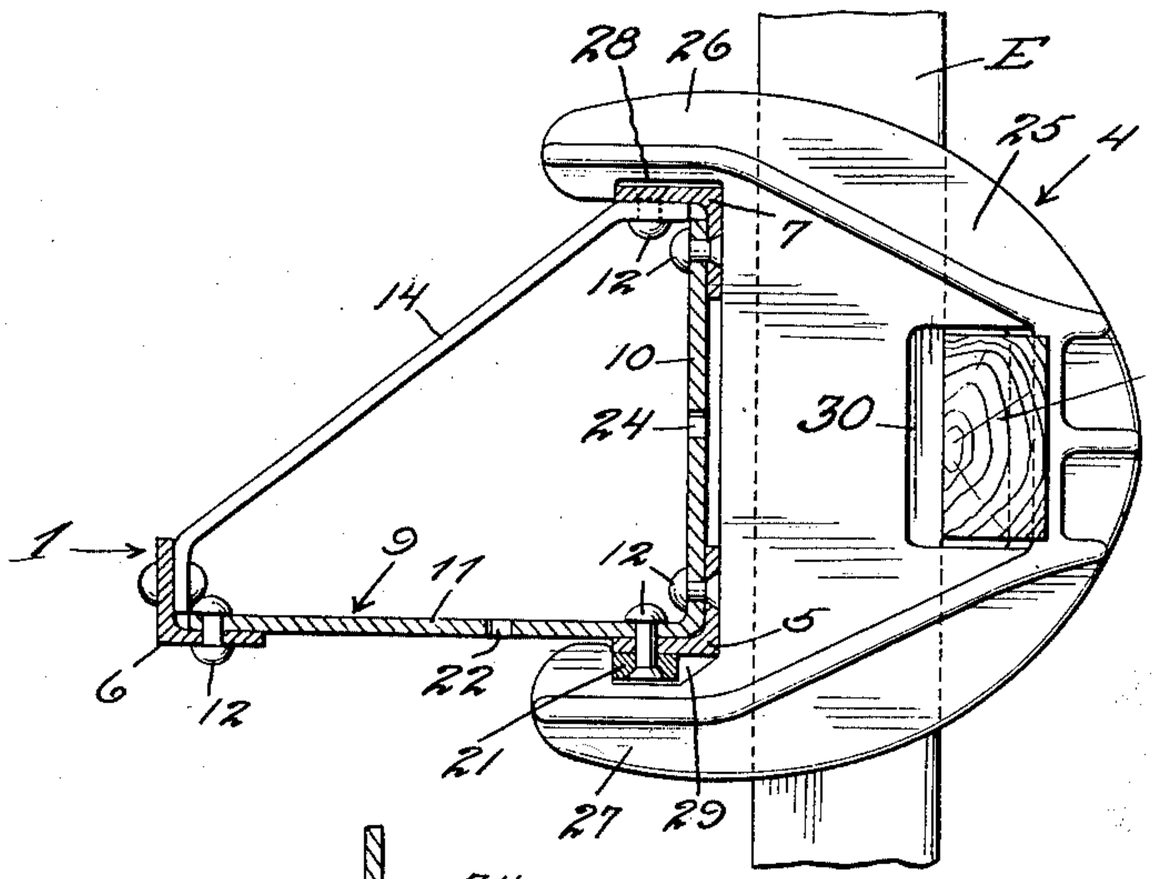

Fig. 9.

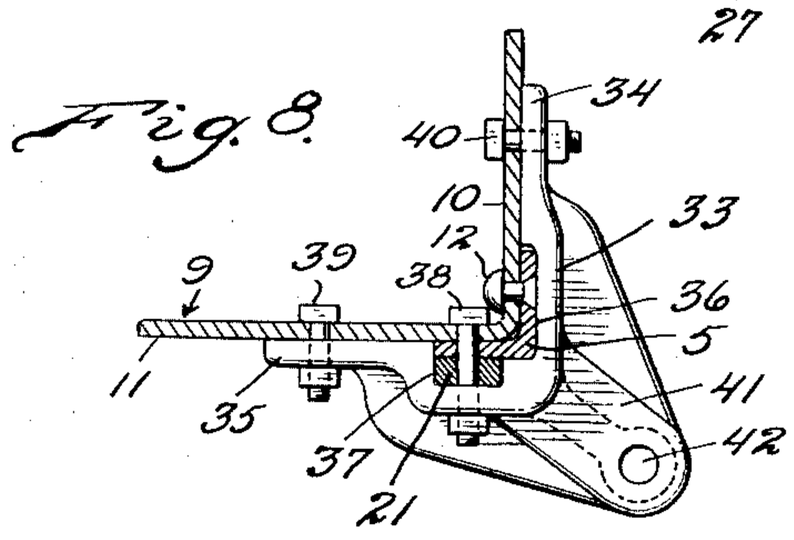

Fig. 8.

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June 5, 1934. W. G. ADAMS 1,961,541

PORTABLE DERRICK

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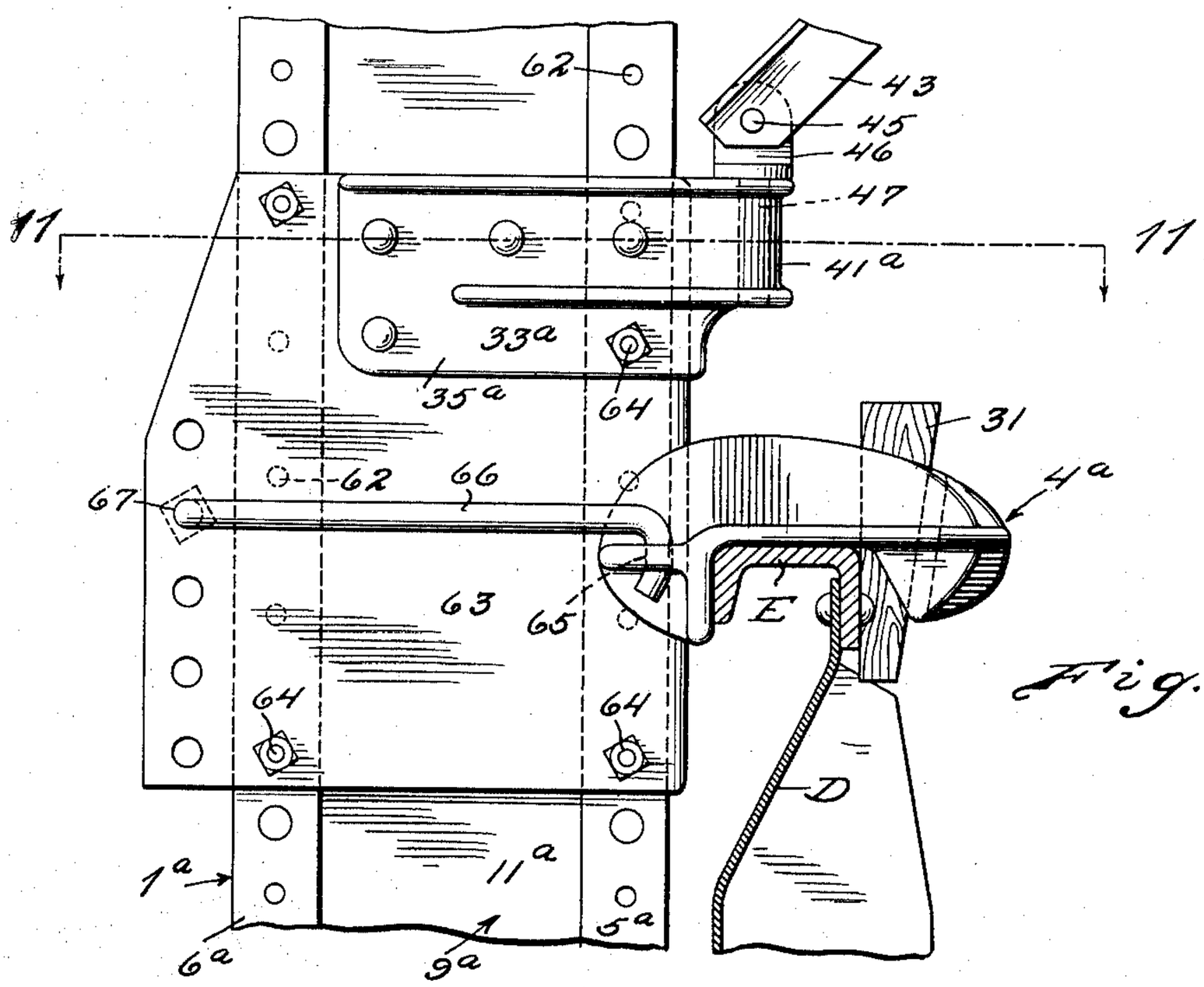

Fig. 10.

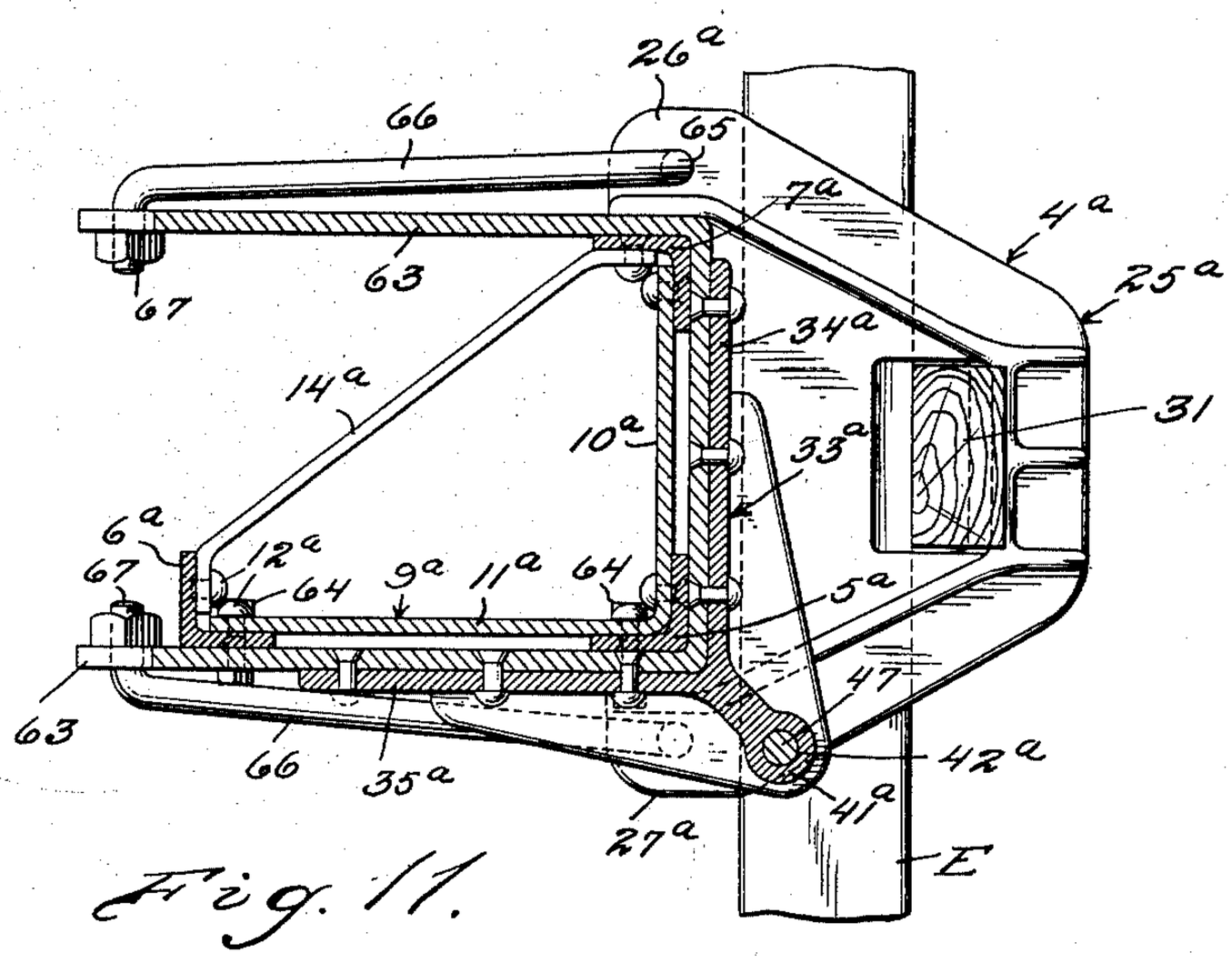

Fig. 11.

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Patented June 5, 1934 1,961,541

UNITED STATES PATENT OFFICE

1,961,541

PORTABLE DERRICK

William G. Adams, Richmond, Va.

Application July 9, 1930, Serial No. 466,811

5 Claims. (Cl. 212—58)

The invention relates to derricks, particularly those of the portable type, and has special reference to a derrick designed to be used in connection with railway cars for the purpose of loading or unloading the same.

The principal object of the invention, generally stated, is to provide a derrick adapted to be positioned at the side of a railroad track and against the side of a car to be loaded or unloaded, the construction being such that the vertical thrust or load is taken by the ground, only the lateral thrust being taken by the car itself.

It is well known that cars have been equipped with derrick or other hoisting means such as davits or the like permanently mounted thereon or even detachably mounted thereon to facilitate loading and unloading. It is also known that special derrick or other hoist cars have been constructed for the purpose. However, existing devices are open to objection on several grounds, an important one of which is that the vertical load or thrust is taken by the car body. Another objection to the permanently mounted devices is the almost prohibitive cost of equipping the individual cars with hoisting mechanism. Previously known derricks of the portable type are, furthermore, difficult to mount ready for use and demount for transfer to a different locality.

It is with all of the above facts in view that I have devised the present invention which has for an important object the provision of a derrick structure provided with clamp means for engagement with the side of the car being loaded or unloaded so that the car will act to steady the derrick without, however, receiving the vertical load.

Another important object of the invention is to provide a derrick in which the car engaging member or clamp is vertically adjustable along the mast whereby the device may be easily engaged with cars of widely different heights.

Another specific object is to provide a device of this type with a car body engaging clamp which, in addition to being adjustable, is movable so as to still remain engaged with the car body without bringing any vertical load thereon even though the mast may settle to a certain extent into the roadbed or ballast at the end of prolonged use.

Another object of the invention is to provide a derrick structure of this character in which the pivotal connection of or mounting for the boom is vertically adjustable along the mast in accordance with variations in car height.

A further object is to provide a mast of novel construction embodying peculiar retaining and guide means for the boom mounting and car body engaging clamp whereby they will always be retained in place and be prevented from accidental displacement in service.

An additional object is to provide a device or mechanism of this character which will be simple and inexpensive to manufacture, easy to assemble and set up in relation to a car, positive in action, efficient and durable in service, and a general improvement in the art.

To the attainment of the foregoing and other objects and advantages, the invention preferably consists in the details of construction and the arrangement and combination of parts to be hereinafter more fully described and claimed, and illustrated in the accompanying drawings in which:

Figure 1 is a view taken transversely of a railroad track showing an end view of a car and a side elevation of my derrick set up in association therewith, one position of the boom being shown by full lines and the other by dotted lines,

Figure 2 is an elevation taken at right angles to Figure 1 and showing the guy running to a remote point along the track,

Figure 3 is a detail side elevation of the mast alone,

Figure 4 is an elevation taken at right angles to Figure 3,

Figure 5 is a side elevation of the boom alone with the hoisting mechanism thereon,

Figure 6 is an elevation taken at right angles to Figure 5,

Figure 7 is a fragmentary side elevation, on a larger scale, showing the car engaging clamp and boom support, the side of the car being shown in section,

Figure 8 is a horizontal cross section taken on the line 8—8 of Figure 7 to show a plan view of the boom support,

Figure 9 is a horizontal cross section taken on the line 9—9 of Figure 7 to show a plan view of the car engaging clamp,

Figure 10 is a fragmentary side elevation similar to Figure 7 and illustrating a modification of the car engaging clamp and boom support, and

Figure 11 is a horizontal cross section taken on the line 11—11 of Figure 10.

Referring more particularly to the drawings, the letter A designates a railroad track, B represents a car thereon and C indicates a motor truck to be loaded or unloaded as the case may be, this truck being located alongside the roadbed in convenient position. While the present invention is

not concerned with the construction of the car, it is disclosed as of the open top type having sides D at the top of which are reinforcing channel bars E.

In carrying out the invention I provide a derrick structure which includes, generally, a mast 1, a boom 2, a suitable hoisting mechanism 3 operable manually or by power and located wherever convenient or desirable, though here shown simply for purposes of illustration as carried by the boom and means 4 for clamping the mast against the side of the car for steadying purposes. These various assemblies will be described in detail hereinafter.

The mast itself is preferably of skeleton steel construction and is shown as comprising angle bars 5, 6 and 7 which run the full length of the mast and which are preferably arranged in triangular relation when considered in cross section. The bar 5 is shown as straight throughout its length whereas the bars 6 and 7 have their central portions straight with their end portions inclined toward the ends of the bar 5 so that the major cross sectional dimensions of the mast will be at the center with the dimensions reduced toward both ends. At the lower end of the mast is a foot 8 of any desired specific construction and of greater dimensions than the mast, this foot being designed to rest upon the surface of the ground so that the ground will take the vertical load or thrust when the derrick is in use. Located within the confines of and secured to the central portions of the angle bars 5, 6 and 7 is an angle plate 9 having right angularly disposed portions 10 and 11. This angle plate is shown as riveted to the angle bars at 12. Beyond the ends of the angle plate 9 the bars 5 and 6 are connected by diagonal braces 13 and, throughout, the bars 6 and 7 are connected by diagonal braces 14. At the upper end of the mast is a head 15 formed either as a casting or as a plurality of structural steel elements secured together, and this head includes a trunnion 16 upon which is engaged a link or the like 17 apertured for connection therewith of a guy 18 which is intended to have its other end anchored to a stake, a tie or one rail of the track at a considerable distance away. Obviously this guy will support the mast against movement in one direction. Also engaged upon the trunnion 16 is a link 19 carrying a ring or the like 20 serving as anchoring means for one end of a boom to be described.

Located against the outer side of the angle bar 5 is a vertically arranged or longitudinally extending bar 21 shown as secured in place by the same rivets 12 which pass through the angle bar 5 and through the portion 11 of the angle plate, these rivets being countersunk into the bar 21 so that the surface of the latter will be smooth throughout. The side portion 11 of the angle plate 9 is provided with a vertical series of holes 22 for a purpose to be described, and there is also provided a series of holes 23 which extend through the bar 21, the angle bar 5 and the side portion 11 of the angle plate. The side portion 10 of the angle plate 9 is shown as having a vertical series of holes 24. The reason for all of these holes will shortly become apparent.

The clamping means 4 for supporting the mast with respect to the car body for bracing or steadying purposes, is shown in Figures 7 and 9 as comprising a yoke-like member 25 having arms 26 and 27 and formed preferably of web and rib construction for the sake of strength combined with lightness. The arms 26 and 27 are recessed at 28 and 29 respectively for the reception of the angle bar 7 and bar 21 respectively so that these elements will retain the yoke member against displacement laterally in any direction with respect to the mast but permit the clamp to slide freely up and down the mast as the springs in the car trucks respond to varying pressures due to loading or unloading the car, or as pressure of foot of mast depresses the ground under its bearing. The yoke member is formed with an opening 30 through which may be driven a wedge 31 which extends into the open top of the car and which engages against the inner flange of the reinforcing angle bar E. The arms of the yoke member are shown as prolonged downwardly to a certain extent as is clearly visible in Figure 7, the purpose being to provide an abutment area 32 engaging against the outer flange of the channel bar E. Furthermore by leaving the clamp unfastened with respect to the mast it is apparent that should the mast settle into the ground after prolonged movement of heavy loads it could slide through the clamp and consequently avoid bringing vertical strains upon the car.

The supporting means for the boom 2 is shown as comprising an angular member 33 which may very conveniently be formed as a casting. This member is intended to be engaged upon the mast at that corner thereof where the bar 5 is located and includes arms 34 and 35 lying respectively against the portions 10 and 11 of the angle plate 9. This member 33 is recessed at 36 and 37 for the reception of the angle bar 5 and the bar 21. It is necessary that this boom support be rigid with respect to the mast and I have therefore shown bolts 38, 39 and 40 for securing purposes, the bolts 38 passing through selected ones of the holes 23, the bolt 39 passing through a selected one of the holes 22, and the bolt 40 passing through a selected one of the holes 24. This boom support is necessarily located above the car engaging clamp, the exact distance being more or less immaterial though it is logical to assume that if the car clamp be lowered for engagement upon a car of very little height the boom support would be correspondingly lowered. As the three series of holes are provided it is a very simple matter to adjust and rigidly secure the boom support at any desired position along the central portion of the mast. The boom support includes a laterally extending portion 41 having a hole 42 therein for a purpose to be described.

The boom indicated generally at 2, is represented as comprising any suitable or necessary number of angle or other bars 43 braced as by plates 44 riveted in place. At one end the bars 43 are shown as spaced apart and have pivoted between them, as shown at 45, a member 46 carrying a trunnion 47 removably and pivotally engaged within the bearing hole 42 in the boom support. At its other end the boom carries a head member 48 of any ordinary or preferred type to which is connected a chain or other flexible member 49 in turn connected with the ring or its equivalent 20 at the top of the mast so that the upper end of the boom will be properly braced, the member 49 being adjustable as to length. The hoisting mechanism 3 may be of conventional pattern and is represented as including a drum 50 rotatable on a shaft 51 journaled through the bars 43. The drum carries a gear 52 meshing with a pinion 53 on a countershaft 54 journaled through the bars, and the countershaft is in turn equipped with a gear

55 meshing with a pinion 56 fast on the shaft 51. In the present instance the operating means is shown as consisting of a crank handle 57 though it is obvious that power means could be provided if desired. A cable 58 is trained over a guide pulley 59 between the bars 43 and has one end secured to and wrapped about the drum 50 and its other end suitably connected with the boom head 48 as shown in Figure 5. The hoisting mechanism is further shown as comprising a pulley 60 about which the cable is trained, this pulley carrying a hook 61 adapted to engage with a hoist chain or any other auxiliary device adapted to be engaged about or connected with the articles to be loaded into or out of the car. In some instances this hook may itself be engaged with the articles, depending upon the nature thereof.

In Figures 10 and 11 I have illustrated a slight modification of some of the parts. In this form the mast 1^a is of the same construction as above described in most respects inasmuch as it includes angle bars 5^a, 6^a and 7^a braced in the same manner. There is also provided an angle plate 9^a including portions 10^a and 11^a secured to the angle bars by rivets 12^a. However, the bar 21 and holes 22 and 24 are omitted and are replaced by holes 62 formed through the angle bars and through the sides 10^a and 11^a of the angle plate for a purpose to be described. In this form of the invention there is provided a channel shaped carriage 63 which embraces the mast and which is vertically adjustably mounted therealong and adapted to be held at a selected position by means of bolts 64 passing through selected ones of the holes 62. Riveted or otherwise suitably secured upon the upper portion of this carriage is the boom support 33^a which has arm portions 34^a and 35^a riveted or otherwise fastened against the carriage. At the corner adjacent the angle bar 5^a this boom support has a laterally extending portion 41^a provided with a hole 42^a adapted to receive the trunnion 47 at the lower end of the boom. The car body clamp 4^a is very similar to the clamp 4 except that the arms 26^a and 27^a thereof are not recessed as above described but are apertured at 65 for the engagement therethrough of hooks 66 pivoted at 67 upon the sides of the carriage 63. The wedge described at 31 is used in connection with this car clamp.

In this form of the invention it is observed that the car body clamp and boom support remain always in the same relative positions except that the hook mounting of the car clamp permits it to adjust itself to the car body in case the mast settles. Adjustment in this instance is about as simple as in the first described form, it being merely necessary, when it is desired to shift the carriage, to remove the bolts 64, change the position of the carriage and then insert the bolts through the proper ones of the holes 62.

In the use of both forms of the invention it is clear that the mast is simply set upon the ground at the side of the car to be loaded or unloaded and the car clamp 4 or 4^a engaged upon the side of the car with the wedge 31 driven home to effect clamping, while the clamp remains free to slide in engagement with the bars 7 and 21 on the mast as action of springs changes the height of the car and the said clamp under changing loads, thereby inducing the fixing of the mast foot by friction to the supporting ground as result of all the load being transferred by the mast to said foot, which load on the foot with said induced frictional fixing to ground prevents lateral movement of the foot. From this it is evident that by the use of this freedom of the clamp to move along the continuous one-piece rigid mast and to transfer only the horizontal reactions between the car and mast, only this one support, namely the clamp, against the tendency of vertical loads carried by the boom to overturn the mast in a direction transverse to the longitudinal axis of the car is required to be manually applied, the other fastening, namely the frictional resistance induced at the foot of the mast, being automatically provided or applied as the weight is lifted by the boom. In fact, for loads on the boom not sufficiently heavy to bring about a horizontal reaction between the mast, the clamp and the top of the car move the car along the track, the one clamp fastening is sufficient provision against overturning tendency in all directions. For very heavy loads on the boom the single guy arranged longitudinally of the car is to be utilized. The boom is freely movable with respect to the mast to swing into a position above the car or above the truck and the hoisting mechanism is of course operated in an obvious and well known manner. There is a tremendously important feature involved in the action, the essential features residing in the construction which permits the device to be used with the utmost ease and convenience in loading and unloading cars of any and all heights without bringing any vertical thrust upon the car itself which serves only to brace the mast and take the lateral thrust in the directions at right angles to the side of the car. It is disclosed herein that in the derrick as described, necessity for the provision of stabilizing means at the foot of the mast is obviated by utilizing the frictional engagement of the foot with the ground when the fastening means to the car is such that all the vertical load is brought to the foot and none sustained by the vehicle. However, when the derrick is used with a very low vehicle so that a correspondingly short portion of the mast is below the clamp, if the horizontal lever arm of the lifted load (i. e. the horizontal projection of the boom) is large in proportion to the height of the clamp above the contact of the mast foot with the ground, the stability induced by utilization of this novel single fastening of the mast to the vehicle might be impaired. To render the clamping member efficient as the sole required stabilizing means for the derrick in such cases, I have combined with it provision in the upper supporting member for the boom means for adjustment of length thereof, thereby making the horizontal projection of the boom subject to control. It is also evident that when the lower pivotal support for the boom is lowered for use with a very low vehicle, without change of length of the upper supporting member the horizontal projection of the boom is reduced. These to methods of varying the length of the horizontal projection of the boom accordingly render controllable the ratio this horizontal projection (the measure of overturning effect of the load carried by the boom) bears to the length of the portion of the mast lying between the single supporting clamp and point of frictional contact of the mast with the ground (the measure of resistance of the derrick to the overturning effect as supplied by frictional contact at the foot). In combination with the specific clamping method and means this provides for control of the degree of stability of the derrick irrespective of the height at which the clamp engages the mast

and accordingly enhances its value for general use, although for use with the lower vehicles the horizontal reach of the boom is restricted to short radius. The result is three points of support: the guy at the top resisting turning over of the device in a direction parallel to the rails, the sliding fastening to the side of the car resisting overturning at right angles to the rails, and friction at the ground resisting kicking tendency in any direction. It is known that it is impracticable to arrange a guy in a direction at right angles to the rails for the reason that most unloading is done from sidings parallel with tracks used in railway traffic. Under such circumstances the use of a guy at right angles to the rails would not be permissible. By my particular arrangement it is clear that absolute stability is obtained. The device may be easily set up or demounted and may consequently be readily transported from place to place. A feature is that no tools, with the possible exception of a wrench, are needed for setting up the device or for making adjustments. As the boom is detachable the parts may be stored or transported in a small space. It is believed that the construction, operation and advantages will be readily apparent to one skilled in the art without further explanation.

While I have shown and described preferred embodiments of the invention, it should be understood that the disclosure is merely an exemplification of the principles involved as the right is reserved to make all such changes in the details of construction as will widen the field of utility and increase the adaptability of the device provided such changes constitute no departure from the spirit of the invention or the scope of the claims hereunto appended.

Having thus described the invention, I claim:

1. In a derrick of the character described, a mast of skeleton construction provided intermediate its ends with a plate portion of angular form, a support mounted on the mast at said plate portion, a boom detachably pivotally connected with the support and carrying hoisting mechanism, and a clamp pivotally hung on the plate portion of the mast and detachably engageable with the side of the car for taking the lateral thrust.

2. In a derrick of the character described, a mast of skeleton construction provided intermediate its ends with a plate portion of angular form, an engular support mounted on the mast at said plate portion and corresponding to the angularity thereof and adjustable therealong, a boom detachably pivotally connected with the support, hoisting mechanism on the boom, a clamp mounted slidably on the plate portion of the mast and engageable with the side of the car for taking the lateral thrust, and longitudinal guide means on said plate portion partially embraced by said support and clamp for preventing lateral movement thereof away from the mast.

3. In a derrick of the character described, a mast disposable at the side of a car, a carriage vertically slidably adjustable therealong, means for securing the carriage at a selected position, a support rigidly mounted on the carriage, a boom pivotally mounted on the support, and a clamp movably mounted longitudinally on the carriage and engageable with the side of the car for taking the lateral thrust, the foot of the mast taking the total vertical load.

4. In a derrick of the character described, a mast, a carriage vertically slidably adjustable therealong, means for securing the carriage at a selected position, a support rigidly mounted on the carriage, a boom pivotally mounted on the support, a clamp mounted on the carriage and engageable with the side of the car for taking only the lateral thrust, said clamp being vertically swingably supported with respect to the carriage by means adjustable therealong.

5. In a hoisting device, a mast provided at its lower end with a foot frictionally engaging upon the ground, a carriage vertically slidably adjustable along the mast, a boom pivoted with respect to the mast, and a clamp engageable with the side of the car for taking the lateral thrust, and links pivoted on the clamp and adjustably pivoted on the carriage.

WILLIAM G. ADAMS.