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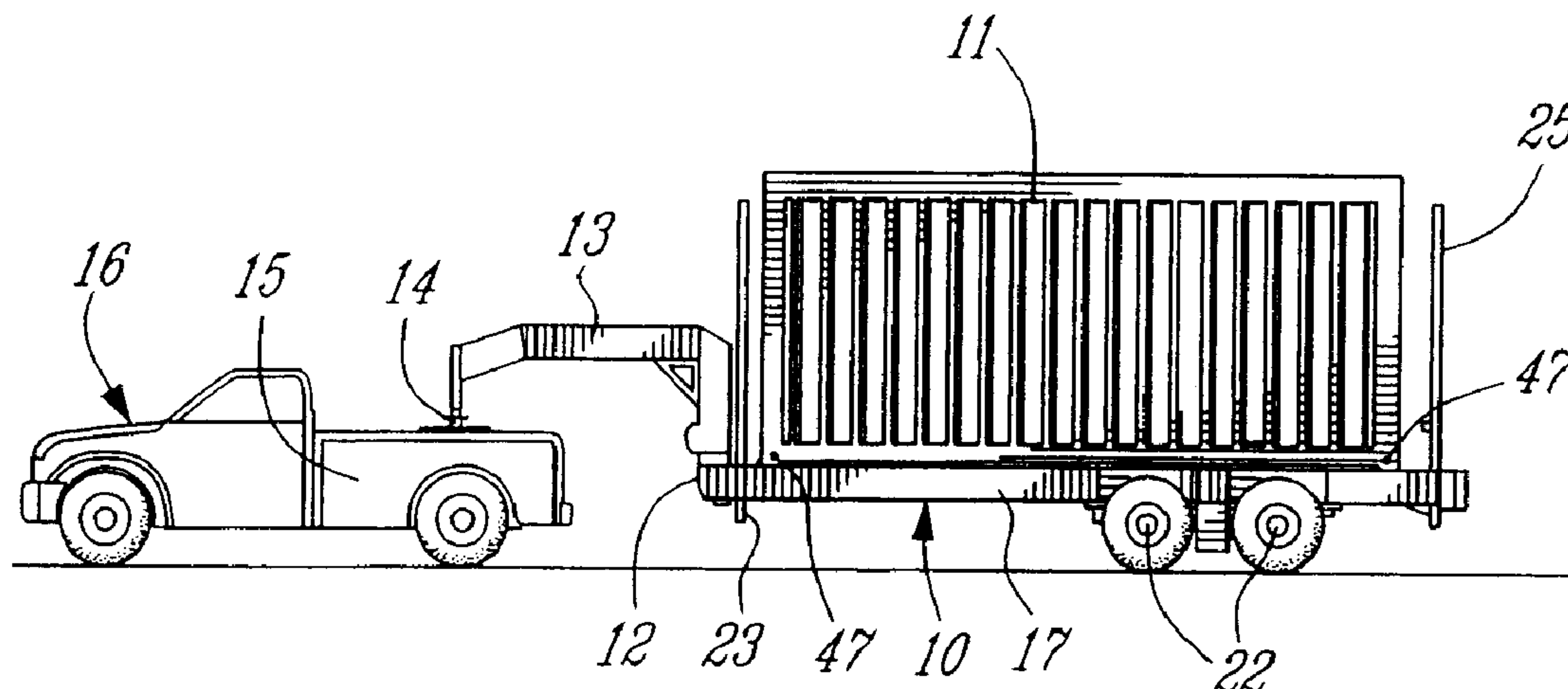
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(72) Inventeurs/Inventors:
GAUDET, JOEL, CA;
ASZTALOS, STEVE, US;
LAPALME, ERIC, CA;
MARRIS, CHRISTOPHER, GB;
VARGA, TIBOR, CA

(73) Propriétaire/Owner:
EQUIPEMENT MAX-ATLAS INTERNATIONAL INC., CA

(74) Agent: NORTON ROSE FULBRIGHT CANADA
LLP/S.E.N.C.R.L., S.R.L.

(54) Titre : REMORQUE POUR TRANSPORTER DES CONTENANTS DE FRET ET SON PROCEDE D'UTILISATION
(54) Title: TRAILER FOR TRANSPORTING FREIGHT CONTAINERS AND METHOD OF USE



(57) Abrégé/Abstract:

A trailer for transporting a freight container is comprised of a frame having a front frame section which is adapted to be coupled to a suitable road vehicle. A pair of displaceable horizontal side beams are secured to the front frame section and are provided with a hingeable rear gate formed by a pair of hinge arms. Each of the side beams has a suspension assembly to support a tandem wheel arrangement. Retractable vertical lifting piston cylinders are secured to a portion of the front frame and to the pair of hinge arms and are actuable to lift the pair of horizontal side beams and its wheels above a ground surface. Laterally extendable piston cylinders are also secured to the front frame and the hinge arms to displace the horizontal side beams outwardly and inwardly with respect to one another when lifted off the ground surface. Container lifting posts are secured to opposed ends of the front frame section and the hinge arms for removable connection to a container positioned between the side beams to lift and lower the container therebetween. Container connectors are secured to each of the side beams for securing a container thereto for transportation.



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(74) Agent: OGILVY RENAULT LLP / S.E.N.C.R.L.,
s.r.l.; Suite 2500, 1 Place Ville Marie, Montréal, Québec
H3B 1R1 (CA).

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(71) Applicant (for all designated States except US): MAX-ATLAS [CA/CA]; 371, chemin Grand-Bernier Nord, St-Jean-sur-Richelieu, Québec J3B 4S2 (CA).

(72) Inventors; and

(75) Inventors/Applicants (for US only): GAUDET, Joël [CA/CA]; 19 rue Duranceau, Candiac, Québec J5R 6R4 (CA). ASZTALOS, Steve [US/US]; 1280, N290 W, Angola, Indiana 46703 (US). LAPALME, Eric [CA/CA]; 1825, chemin des Patriotes, St-Ours, Québec J0G 1P0 (CA). MARRIS, Christopher [GB/GB]; Woodbine Cottage & Caravan Park, Warrington Road, Acton Bridge, Northwich Cheshire CW8 3QB (GB). VARGA, Tibor [CA/CA]; 187 Schubert Street, Dollard-des-Ormeaux, Québec H9B 2E5 (CA).

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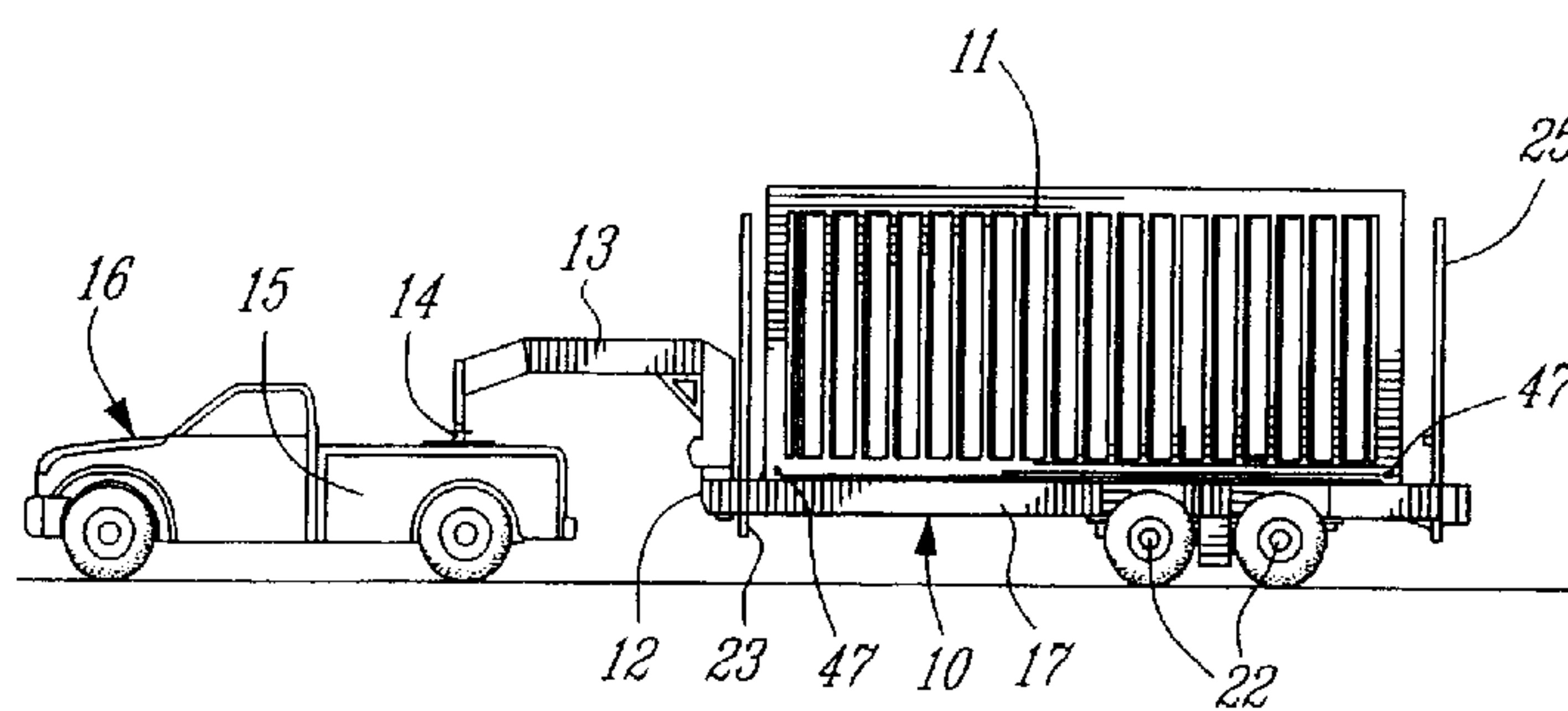


Fig. 1

(57) Abstract: A trailer for transporting a freight container is comprised of a frame having a front frame section which is adapted to be coupled to a suitable road vehicle. A pair of displaceable horizontal side beams are secured to the front frame section and are provided with a hingeable rear gate formed by a pair of hinge arms. Each of the side beams has a suspension assembly to support a tandem wheel arrangement. Retractable vertical lifting piston cylinders are secured to a portion of the front frame and to the pair of hinge arms and are actuable to lift the pair of horizontal side beams and its wheels above a ground surface. Laterally extendable piston cylinders are also secured to the front frame and the hinge arms to displace the horizontal side beams outwardly and inwardly with respect to one another when lifted off the ground surface. Container lifting posts are secured to opposed ends of the front frame section and the hinge arms for removable connection to a container positioned between the side beams to lift and lower the container therebetween. Container connectors are secured to each of the side beams for securing a container thereto for transportation.

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TRAILER FOR TRANSPORTING FREIGHT CONTAINERS
AND METHOD OF USE

TECHNICAL FIELD

5 The present invention relates to a trailer for transporting a freight container and its method of use. Preferably, but not exclusively, the container is an ISO certified container.

BACKGROUND ART

10 Container handling transport vehicles of various types are known for transporting different types of freight containers on existing public roads. However, these transport vehicles and containers have to abide to government regulations when traveling on such public roads.
15 Accordingly, containers are manufactured with strict design regulations as to size. ISO certified containers are also fabricated with specific attachments whereby to be handled and secured during transport, whether by land, sea or air. Handling equipment is also designed to engage these
20 attachments for secure handling and transportation. The trailer design of the present invention is particularly adapted to handle such ISO certified containers which can be rested directly on a ground surface and difficult to access location. Accordingly, there is no requirement to
25 provide elevated frames to support the container elevated for transfer onto conventional trailers such as described for example in U.S. Patents 5,417,540, 6,155,770, 6,532,398 and others.

30 Transporters for picking up containers lying on ground and transferring them on a transport vehicle support frame are also known. A most common type are those open top end containers in which refuse from building sites are

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deposited and later picked up by pulling the container on a pivoted support frame by a winch and cable, the container is then positively engaged for transport to a refuse disposal site. Other vehicles are also known to handle specific size shipping containers resting on ground, as described in U.S. Patent 6,910,844. Trailer transporters are also known to handle shipping containers resting on ground. U.S. Patent 4,120,413 describes a trailer having adjustable side rails and lift cylinders to load a container onto the side rails for transportation. As well, U.S. Application 2004/0223835 published on November 11, 2004, describes a trailer having a U-shaped frame and lifting members to lift a container from a ground surface for transportation. The U-shaped frame is provided with a rear gate. The present invention is concerned with a trailer container transporter of the general type as described in these later two patents referred to.

Briefly, summarizing some of the disadvantages of prior art container road transporters, they are expensive to fabricate, bulky, time consuming to load and unload, require at least two operators, some need hoist or ground support equipment and some cannot operate on rough road conditions or maneuver to pick up containers in restricted spaces and containers resting directly on the ground without supports. Some of the trailer type transporters also do not provide adequate shock damping and can cause damage to the contents of the container during transport on rough roads.

30 DISCLOSURE OF INVENTION

It is a feature of the present invention to provide a trailer for transporting a container which is

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preferably, but not exclusively, ISO certified and capable of transporting the container on public roads by a pick-up truck or other small tractor vehicles by means of a fifth wheel attachment.

5 Another feature of the present invention is to provide a trailer for transporting a container and wherein the trailer has a pair of horizontal side beams that are displaceably adjustable in a horizontal plane to permit handling of containers of different sizes and which
10 facilitates the engagement of the trailer with the container.

 Another feature of the present invention is to provide a trailer for transporting a container and which requires a single person to operate and to load and unload
15 a container therefrom.

 Another feature of the present invention is to provide a trailer for transporting a container and wherein the trailer is provided with connectors to secure ISO certified containers of different sizes thereto.

20 Another feature of the present invention is to provide a trailer for transporting a container and which is comprised of displaceable horizontal side beams, each side beam being provided with a wheel suspension to permit the travel of the trailer with a container on public road
25 surfaces or rough road surfaces while providing adequate shock absorption.

 Another feature of the present invention is to provide a trailer for transporting a container and wherein the trailer can be engaged with a container disposed in a
30 restricted space.

 Another feature of the present invention is to provide a method of transporting a container from a rest

position on a ground surface and wherein the container can be loaded on the trailer by a single person and in a substantially horizontal manner.

According to the above features, from a broad aspect,
5 the present invention provides a trailer for transporting a freight container. The trailer is comprised of a frame having a front frame section adapted to be coupled to a road vehicle. The frame further has a pair of displaceable horizontal side beams. A hingeable rear gate is formed by a pair of hinged arms which
10 are hingedly secured to a rear end of a respective one of the horizontal side beams. Each of the horizontal side beams has one or more wheels independently secured thereto by suspension means. Retractable vertical lifting means is secured to a portion of the front frame and the pair of hinged arms and
15 actuatable to lift the pair of horizontal side beams with its one or more wheels above a ground surface. Laterally extendable means is secured to the front frame and the hinge arms to displace the horizontal side beams outwardly and inwardly with respect to one another when lifted off the ground surface by the
20 retractable vertical lifting means. Container lifting and lowering means is also secured to the front frame section and the hinge arms for removable connection to a container positioned between the side beams to lift and lower the container therebetween in a substantially horizontal plane.
25 Container connecting means is secured to each of the side beams for securing the container thereto for transportation.

According to a further broad aspect of the present invention, there is provided a method of transporting a container from a rest position on a ground surface. The method
30 comprises the steps of: i) providing a

trailer having a frontal frame section, a pair of
displaceable side beams, and a hingeable rear gate formed
by a pair of hinge arms, each of the hinge arms being
hingedly secured to a rear end of a respective one of the
5 side beams, and wheels secured by suspension means to each
of the side beams; ii) lifting the trailer and wheels off a
ground surface by operating a retractable vertical lifting
means secured to the front frame and the pair of hinge
arms; iii) extending the side beams outwardly by operating
10 laterally extendable means secured to the front frame and
the hinge arms; iv) lowering the trailer back on the ground
surface by operating the retractable vertical lifting
means; v) opening the rear gate to create a rear entry
opening; vi) positioning the trailer about the container
15 from the rear entry opening; vii) closing the rear gate;
viii) engaging container lifting and lowering means with
the container; ix) lifting the container above the side
beams in a substantially horizontal manner; x) repeat step
(ii); xi) retract the side beams inwardly by operating the
20 laterally extendable means to align the side beams with
corner connections of the container; xii) repeat step (iv);
xiii) lower the container in said substantially horizontal
manner onto connecting means secured to the side beams and
engage the connecting means with the corner connections of
25 the container.

According to a further broad aspect of the
present invention there is provided a wheel supporting
suspension for securing a wheel to opposed sides of a
trailer frame. The suspension comprises a pivoted wheel
30 support arm secured at a forward pivot end to a pivot pin
retained in a frame attachment member for pivotal
connection of the pivoted wheel support arm to the frame.

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A wheel axle assembly is secured at a rear free end of the pivot arm and adapted to connect a wheel thereto. A shock absorber connecting bracket is secured to the forward pivot end of the pivotal wheel support arm and has a shock absorber connecting member extending above the pivot pin. The shock absorber connecting member is pivotally displaceable in facial alignment with a stationary shock absorber connector secured to the frame. A shock absorber is retained captive between the shock absorber connecting member and the stationary shock absorber connector and compressible therebetween by the shock absorber connecting member being displaced towards the stationary shock absorber connector by upward movement of the pivot wheel support arm to absorb vertical displacement loads transmitted to the pivotal wheel support arm by the wheel connected thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the present invention will now be described with reference to the accompanying drawings in which:

FIG. 1 is a side view showing the trailer of the present invention secured to a fifth wheel connection of a pick-up truck and wherein a container has been loaded onto the trailer;

FIG. 2 is a perspective view of the trailer showing some of the component parts thereof;

FIG. 3 is a top view of FIG. 2;

FIG. 4A is a rear view of FIG. 2;

FIGS. 4B and 4D are perspective views of differently constructed rear gate hinge arms and locking mechanisms;

FIGS. 4C and 4E are side views of the hinge arms of Figures 4B and 4D, respectively;

FIG. 4F is a fragmented perspective view illustrating the construction of the lock pin mechanism in
5 one of the rear gate hinge arms;

FIG. 5 is an exploded view showing the construction of the retractable vertical lifting mechanism to lift the pair of horizontal side beams and its wheels above a ground surface;

10 FIG. 6 is a perspective view of the coupling connector connected to the lifting cylinder of the container lifting and lowering posts;

FIG. 7 is a perspective view showing the connection of a container corner locking device for
15 engaging ISO certified containers;

FIG. 8A is a fragmented perspective view of the transverse extendable connecting mechanism as secured to one of the rear gate hinge arms;

FIGS. 8B and 8C are perspective views of another
20 version of the sliding coupling assembly employing a roller cage;

FIGS. 8D to 8F are perspective exploded views and assembled side views illustrating the construction of the horizontal adjustable guide rollers and the fixed vertical
25 guide rollers;

FIG. 9 is a further perspective view of the trailer of the present invention as seen from a different angle;

FIG. 10 is a further perspective view of the
30 transverse extendable connecting mechanism as secured to the front frame section of the trailer but with some

portions thereof having been removed to show the cylinder connection;

FIG. 11 is an enlarged fragmented view showing the construction of the container alignment pads secured on the inner face of the horizontal side beam;

FIGs. 12A and 12B are a perspective views of a pair of wheel supporting suspension constructed in accordance with the present invention for securement to a trailer frame;

FIG. 13 shows two of the wheel supporting suspensions secured to a trailer side frame with one of the suspensions having the wheel removed therefrom for the purpose of illustration;

FIG. 14 is a top view showing two wheel supporting suspensions secured to the trailer side frame on an outer side of the side frame;

FIG. 15 is a side view showing the operation of the independent suspensions when encountering obstacles on a road;

FIGs. 16A to 16C are side views showing the operation of the wheel supporting suspension from an unloaded position to a fully loaded position; and

FIGs. 17A to 17K are side views showing the method of use of the trailer of the present invention for engaging a container resting on a ground surface.

MODES FOR CARRYING OUT THE INVENTION

Referring now to the drawings and more particularly to Figures 1 to 4A, there is shown generally at 10 the container transport trailer of the present invention for transporting a freight container 11 and preferably, but not exclusively, ISO certified containers.

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The trailer 10 has a front frame section 12 provided with a towing frame structure 13 for removable attachment to a hitch 14, herein a fifth wheel hitch, secured in the box 15 of a pick-up truck 16. It is also conceivable that instead of a pick-up truck that a tractor or a motorized cab may be constructed particularly suited to handle the trailer 10 of the present invention with the trailer 10 secured to a pivotal connection (not shown) in the rear of the cab by a different type of towing frame structure, for attachment to a coupling plate of a tractor or a pintle hook of a truck or trailer.

Details of the trailer will now be described with further reference to Figures 2 to 4A. As herein shown, the trailer 10 has a front frame section 12, as above-described, and to which is secured a pair of displaceable horizontal side beams 17 and 17' which are displaceable in substantially parallel planar relationship to one another in an outward and inward direction, as will later be described. A hingeable rear gate 18 is formed by a pair of hinge arms 19 and 19'. Each hinge arm is hingedly secured to a respective one of the horizontal side beams 17 and 17' at a rear end 20 and 20' of the side beams 17 and 17', respectively. The hinge arms 19 and 19', when in their closed position, as illustrated in Figures 2 and 3, are interlocked at their free ends by a locking mechanism 90 which is actuated by a locking arm 91 as better illustrated in Figure 4A. Details of this simple mechanism are not illustrated herein.

Referring to Figures 4B to 4F, there is shown a preferred construction of the hingeable rear gate 18. As herein shown the rear gate hinge arms 19 and 19' are formed by an assembly of steel plates 100 and form a vertical

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lower housing 101 for the rear container lifting parts 25. One of the hinge arms, herein arm 19' is provided with a lock rod 102 having a beveled or tapered free end 103. A lock pin receiving hole 104 is formed in a lower face 105 of the lock rod 102. The lock rod 102 is immovably secured to the arm 19'. Therefore, as the hinge arm moves in an outward and inward direction, so does the lock rod 102.

As shown in Figures 4B, 4C and 4F, the other hinge arm 19 is provided with a lock rod receiving cavity or channel 106 dimensioned to receive the lock rod 102 thereinto whereby to interlock the two hinge arms 19 and 19' in a closed aligned position. As shown in Figure 4F, the channel 106 is provided with a friction plate 107 on a bottom wall 108 thereof and on which the lower face 105 of the lock rod 102 is displaced. A lock pin 109 projects through a hole 110 provided at a predetermined location in the friction plate 107. The lock pin 109 is spring-biased upwardly by a spring-loaded linkage 110' secured to a spring piston 111. The top free end 112 of the lock pin 109 has a convex shape whereby when the lock rod 102 enters the channel 106, the tapered free end 103 of the lock rod will push the lock pin downward and exert a pulling force on the spring piston. As the lock rod 102 further penetrates into the channel 106, to a fully closed rear gate 18, the lock pin 109 enters into the lock pin receiving hole 104 of the lock rod due to the upward force exerted on the lock pin by the spring piston 111 and its linkage 110'.

Each of the horizontal side beams 17 and 17' are provided with one or more, herein two, wheel supporting suspension assemblies 21 and 21' respectively, and independently displaceable to absorb shocks. This

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suspension 21 and 21' will be described in more detail later.

Retractable vertical lifting means in the form of vertically supported telescopic lifting legs 23 are secured to a portion of the front frame 12, herein adjacent opposed ends thereof, inside the horizontal side arm 17. These telescopic lifting legs 23 are also secured to each of the hinge arms 19 and 19' adjacent their inner end portions thereof. When these telescopic vertical lifting legs are extended they lift the horizontal side beams 17 and 17', as well as the wheels 22, off the ground surface. This is necessary in order to actuate laterally extendable means, namely pistons 50, which forms part of a transverse extendable connecting mechanisms 24 secured to each of the hinge arms 19 and 19' and to opposed sides of the front frame section 12 whereby to displace the horizontal side beams 17 outwardly and inwardly with respect to one another. The side beams may be displaced independently or in unison by operating the hydraulic controls 36.

The trailer 10 is further provided with container lifting and lowering posts, herein four such posts 25, secured in a respective one of four corner areas of the trailer frame. These container lifting posts 25 permit removable connection to a container 11 positioned between the side beams 17 and 17' to lift and lower the container therebetween, in a substantially horizontal plane, to permit engagement of the container onto the horizontal side beams 17 and 17' as will be described later. Container connecting means in the form of container locking devices 26 are also secured on a top surface 27 of the horizontal side beams 17. Only four such container locking devices 26 are herein shown but the side beams may be fitted with

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attachments to removably secure additional ones of the locking devices for handling containers of different lengths. These container locking devices 26 are also adapted to secure to the attachments provided in the corners of ISO certified containers 11 or other such containers and they are well known in the art. The side beams 17 and 17' are capable of each supporting a load of 4800 lbs. for a total handling capacity of 19,200 lbs. and a total load of 22,700 lbs. on the suspension of four wheels for the "pick-up truck" version herein illustrated.

Referring to Figure 5, there is shown in exploded view, the bottom portion of the telescopic vertical support leg assembly 23 as identified in the circled portion A of Figure 2. The vertically supported telescopic leg assembly 23 comprises a steel tube 30 in which there is slidably and telescopically received a steel post 31 constituting the leg. A hinged foot plate 32 is secured to the bottom end of the post 31 to engage the ground surface. The post 31 is slidably received within the tube 30 and displaceable by a piston rod end connection 33 secured to the free end of piston rod 34 of piston cylinder 35. All piston cylinders 35 may be operated in unison by the hydraulic controls 36 conveniently located at the front end of the trailer 10 next to the hydraulic unit 37. Alternatively, they may be operated individually if need be to lift the container 11 substantially horizontally not to displace the freight contained therein.

Figure 7 illustrates the construction of the container locking device 26 as shown in the circled portion B in Figure 2 and this locking device is positioned to be received within the corner connectors of the container 11, as is well known in the art. Accordingly, their

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construction and operation will not be described herein, sufficient only to say that, as shown in Figure 3, these are located at a precise location on the top surface 27 of the horizontal side beams 17 and 17' to engage with the locking connectors in the four bottom corners of the ISO certified container.

Figure 6 is a perspective view of the circle portion C of Figure 2 but partly fragmented whereby only the mechanism mounted in the lifting post 25 is shown herein. As herein shown, a piston lifting cylinder 38 is secured within each of the posts 25 and it has a piston rod end connection 39 secured to a coupling connector 40 which has a connecting flange 42 which is vertically displaced along a vertical slot opening 41 in the lower section of the post 25, as shown in Figure 2. The connecting flange 42 which slides along the slot 40 and extends outwardly thereof. The connecting ear 42 has an attachment hole 43 to secure a chain 44 thereto. The chain 44 has a hook 45 at its end, as shown in Figure 2, to which a container coupling connector 46 is secured to engage the connectors 47 provided in the four corners of the container 11, as shown in Figure 1. These coupling connectors 46 are engaged while the container 11 is resting on the ground surface. By actuating these piston lifting cylinders 38 by the controls 36 the container is lifted off the ground in a substantially horizontal plane to safeguard its content. After the container is re-deposited onto the ground or ground supports, after transport to its destination, the connectors are disengaged. If the container is not lying horizontally, the length of the chains can be adjusted to compensate for the tilt of the container if all of the lifting cylinders are to be operated simultaneously.

Figure 8A is an enlarged view of the circle portion D of Figure 2 and illustrates, in part, the construction of one version of the transverse extendable connecting mechanism 24. One of these extendable
5 connecting mechanisms 24 is secured to opposed sides of the front frame section 12 and to each of the hingeable rear gates. The detail D shows the mechanism secured to one of the hingeable rear gates, herein gate 19. Figure 8A will be described with further reference to Figure 10 which
10 shows part of the extendable connection 24 secured to the front frame section but with parts thereof having been removed to illustrate the entire construction. As herein shown, the extendable connecting mechanism has a hydraulic piston cylinder 50 having a piston rod end connection 51
15 secured to the horizontal side beams 17 and 17' and by actuating the cylinder 50, by use of the manual controls 36, the horizontal side arms 17 and 17' can be displaced outwardly and inwardly with respect to one another. To do so the side beam needs to be coupled at opposed ends to the
20 front frame section 12 and to associated one of the hinge arms 19 and 19' by a sliding coupling assembly 52 as shown in Figure 8A.

The sliding coupling assembly 52 is constituted by a slide plate 53 which is secured to a hinge flange 54
25 attached to a hinge connection 55 at the rear end 20 and 20' of the side beams 17 and 17', respectively. The slide plate 53 is displaceably retained captive between guide wheels 56, one of which is not shown in Figure 8A for ease of illustration, and which are secured to the hinge arms,
30 herein hinge arm 19, to permit sliding displacement of the slide plate 53 therebetween and along a straight longitudinal axis of the hinge arm. This slide plate 53 is

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shaped to extend over the cylinder 50, which is not shown in Figure 8A, but located therebehind. Accordingly, the slide plate 53 also provides a cover for the cylinder 50 to protect it from foreign matter. These guide wheels 56 are
5 disposed for frictional rotational engagement with opposed parallel edge portions 53' of the slide plate 53.

Referring now to Figures 8B to 8F, there will be described a further and preferred version of the sliding coupling assembly 52. As hereinshown, the preferred
10 sliding coupling assembly 115 is constituted by eight guide rollers, namely four horizontal, spaced-apart, adjustable guide rollers 116 and four vertical spaced-apart, fixed vertical rollers 117. The front frame section 12 is constructed from steel plates, like the hinge arms 19 and
15 19'. The front frame section defines square cages 118 at opposed ends thereof. The vertical rollers 117 are secured in aligned spaced-apart pairs between top and bottom plates 119 and 120 of the cage. The adjustable horizontal guide rollers 116 are secured in aligned spaced-apart pairs
20 between opposed side plates 125 of the cage. The spacing between the pairs of rollers is calculated whereby the slide plate 52, herein constituted by a sliding connecting beam 122 of rectangular cross-section, is in friction contact between the horizontal and vertical rollers 116 and
25 117.

As shown in Figure 8E, the horizontal adjustable guide rollers 116 are constituted by a cylinder roll 125 in which there is fitted a core rod 126 of circular cross-section and dimensioned for close sliding fit inside the
30 cylinder roll 125. The core rod 126 has an eccentric rod end 127 at a far end thereof and retained in close rotational fit in a hole provided in an inner one of the

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opposed side plates 121. the core rod 126 is also provided with an engageable head 128 at a rear end spaced forwardly of a support ring 129 adapted for retention fit in a support hole 130 formed in an outer one 121' of the side plates 121 of the cage 118. A torque coupling 131 secures about the engageable head 128 and has an extension connecting arm 132 having a hole 133 therein to receive a connecting bolt 134 therethrough. A series of threaded bolt receiving holes 135 are disposed on a radius on an exterior surface 136 of the outer side plate 121'. Thus by rotating the torque coupling 131 the cylinder roll 127 is displaced on its eccentric connection and is displaced towards or away from its frictional engagement with the sliding connecting beam 122 to compensate for wear adjustment. Further, the guide rollers 116 and 117 are replaceable individually to permit easy replacement.

The vertical rollers 117 are not adjustable but secured in a like fashion as the horizontal adjustable rollers 116. The construction of the vertical rollers 117 is shown in Figure 8F and as can be seen the rod end 138 of its core rod 139 is centrally disposed along the longitudinal axis 140 of the vertical roller 117.

As shown in Figures 9 and 11, each of the side beams 17 and 17' are provided with container alignment pads 58 on the inner surface 17'''. Figure 11 is an enlarged view of the circle portion E shown in Figure 9 which illustrates the shape and location of the pads 58. These container alignment pads 58 protect the inner side surface 17''' of the horizontal side arms 17 and 17' while the trailer is backed-up about the container 11. They also provide guides when the trailer is backed into and about the container from the rear open gate, as will be described

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later. Also, and as shown in Figures 3 and 5, one or more bumpers 59 are secured to the inner side wall 59' of the front frame section 12 to provide an abutment against the container forward end when the trailer is backed in around the container.

With reference now to Figures 12A to 16C, there will be described the construction and operation of the wheel supporting suspension assembly 21. There are two suspension wheel assemblies 21 shown in Figures 12A and 12B and shown in engagement with the side beam 17 of the trailer on an outboard side thereof. Figure 12B shows a steel plate frame construction which is laser cut and easy to assemble. Like designation numbers are used for referencing the parts . As shown in Figure 13 there are two such wheel supporting suspension assemblies secured to each of the opposed side beams 17 and 17' and these suspensions operate individually. Each suspension assembly is comprised of a pivoted wheel support arm 60 secured at a forward pivot end to a pivot pin 61 (see Figure 13) retained in a frame attachment member 62 for pivotal connection of the pivoted wheel support arm to the side beam 17 of the trailer frame.

A wheel axle assembly 63 is secured at a rear free end of the pivot arm 60 and adapted to connect to a wheel 22 as previously described and illustrated in Figure 2, for example. A shock absorber connecting bracket is secured to the forward pivot end of the pivotal wheel support arm 60 and has a shock absorber connecting member 65 extending above the pivot pin 61 and spaced therefrom. A shock absorber connecting member in the form of a flat seating plate 65 is secured to a support frame 66 which forms part of the shock absorber connecting bracket. A

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connecting fastener in the form of a bolt 67 secures a compressible shock absorber 68 in facial contact therewith and in a manner well known in the art.

As shown in Figure 13 , when the wheel supporting suspension assembly 21 is secured to the side beam 17, the shock absorber seating plate 65 is disposed in facial spaced
5 relationship with respect to a stationary shock absorber connector, herein a flat seating wall 69 formed at the front end of a recessed wall portion 70 formed in the outboard portion of the side beams. There are two such recessed wall portions which are spaced-apart . The shock absorber pad 68 is retained captive between the shock absorber plate 65 and the stationary vertical seating plate 66 and compressible therebetween by the shock absorber connecting
10 member, herein the plate 65, being displaced towards the stationary shock absorber plate 66 by the load imposed by the trailer frame and any additional load supported thereon which causes pivotal upward movement of the wheel support arm to absorb vertical displacement loads transmitted to the arm by the wheel connected thereto and resting on the ground surface.

As shown in Figures 12A, 12B and 13 , the pivotal wheel support arm 60 is
15 also provided with a lateral displacement stabilizing vertical extension plate 71 immovably secured to the pivotal wheel support arm 60. The extension plate is provided with a vertical flat friction surface 71' which is displaceable against a flat vertical arresting surface, herein the vertical wall 70' of the recess well portion 70 of the side beam on an outboard side of the side beam. This plate prevents lateral displacement of the support arm. As well, to add further
20 lateral stability there is provided a bushing 72 of shock absorbing

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material immovably retained in the frame attachment member 62 as better seen in Figure 15 and disposed about the pivot pin. This stabilizes the pivot pin joint and absorbs forces that may be transmitted to the pivot pin. It is pointed out that the vertical flat friction surface 71' of the vertical extension plate 71 is provided by an ultra-high molecular weight polyurethane plate which is secured to a surface of the vertical extension plate by a fastener, such as fasteners 71" shown in Figures 12A and 12B.

10 The wheel supporting suspensions 21 are secured to an underface of the side beam 17 by bolt fasteners or welding of the frame attachment member 62, herein a connector plate 62' to the undersurface of the side beam forwardly of the recessed wall portions or cavities 70.

15 The top view of Figure 14 illustrates the position of the wheels 22 with respect to the suspension assembly 21. Figure 16A shows the suspension assemblies 21 when secured to the trailer side beams 17 without a container connected to the trailer. The weight of the trailer is approximately 1250 lbs. Figure 16B illustrates the suspension in partial compression when the trailer is loaded with a load of approximately 22,700 lbs. As herein shown, the shock absorbers are compressed. Figure 16C shows the shock absorbers in maximum compression.

25 It is pointed out that this suspension assembly 21 was designed to be able to take a total load of 22,700 lbs. without a thru axle extending across the frame as between two wheels, as is conventional with tractor trailers. This suspension was designed whereby each side of a trailer is independent from the other side. The smoothness of the ride is assured by the independent suspension and shock absorbers. As shown in Figure 15,

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- 20 -

while one wheel is pushed up in the direction of arrow 76 by a bump 75, thus creating a sudden load increase, the other wheel, herein wheel 22', will remain independent. When the pivotal arm 60 is at the end of its travel, the shock absorber 78 will be squeezed to absorb the energy. Both shock absorbers work independently.

5 As shown in Figure 13, the spindle 63" of the wheel axle assembly 63 provides the link between the bearing (not shown) and the drum 63". It is attached to the axle 63' and it is a non-moving part of the wheel end. The drum 63" is the link between the wheel 22 and the spindle. The wheel 22 is attached to the drum and the drum rotates on the spindle bearing (not shown) . Electric brakes (not shown) are located inside the drum and help the pick-up truck
10 and trailer to brake faster and safer.

Referring again to Figure 8A, a manual locking device 80 is provided adjacent opposed ends of the side beams 17 and 17', only one being shown herein, to lock the side beams with respect to the front frame section 12 when displaced to an outward extended position and to also lock the hinge arms 19 and 19' in an open position, substantially in
15 alignment with the side beams when the side beams are in their outward position. Any convenient manual locking device may be provided to effect this interlocking and, as herein shown in Figure 8A, a lock pin 81 is displaceably retained in a bracket 82 secured to the lifting post 25 whereby to engage with a further bracket 83 extending from the wheel supporting top plate 84 of the guide wheels 56. The bracket 83 is also provided with a hole 85
20 to receive the locking bolt 81 in locking engagement therewith.

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Having described the construction of the container transport trailer 10 of the present invention, there will now be described its method of use.

With reference now to Figures 17A to 17K there is
5 now described the method of engaging the trailer 10 to the freight container 11. Firstly, as shown in Figure 17A, the pick-up truck 16 positions the trailer 10 near the container 11 and in straight alignment therewith and far enough to provide sufficient space to open the rear gate
10 18. The rear gate is unlocked. The operator then starts the hydraulic unit 37 and, using the hydraulic controls 36, causes the telescopic lifting legs 23 to be extended, as shown in Figure 17B, and sufficiently to lift the trailer and its support wheels 22 off the ground surface 93. The
15 four corners of the horizontal side arms 17 is manually unlocked from the locking mechanisms 80 and again using the hydraulic controls 36, the pistons 50 are actuated whereby to displace the opposed side beams 17 and 17' outwardly to enlarge the space therebetween sufficient to permit the
20 trailer to be safely backed up around the container without damage to the trailer or the container. As the side beams move away from one another, the lock rod 102 moves out of the lock channel 106 of the rear gate hinge arms as the cylinder 111 is actuated to unlock. The hinge arms 19 and
25 19' of the rear gate are then locked in their open position by the locking mechanism 80. The telescopic lifting legs 23 are then lifted by the hydraulic controls 36 so that the trailer wheels are again resting on the ground. The trailer is then ready to be backed up about the container,
30 as shown in Figure 17C.

The operator of the pick-up truck 16 slowly backs the trailer about the container 11 until the container hits

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the bumper 59 secured to the inner face of the front frame section 12. The operator then engages the parking brake on the pick-up truck and is now in a position to load the container, as shown in Figure 17E. With the use of the hydraulic controls 36, the coupling connectors 40 in the container lifting post 25 are lowered and the connector 46 is positioned adjacent a corner of the container where the connectors 46 are engaged within the corner connectors 47 of the container 11. This attachment to the container is done manually by the operator in the four corners of the container. The lifting cylinders 38 in the container lifting posts are then actuated in unison or independently to adjust the level of the container. The cylinders 38 withdraw the coupling connector 40 upwardly whereby to lift the container above the horizontal side arm 17, as shown in Figure 17G in a substantially horizontal manner. This position is also shown in Figure 17H. Figure 17F shows a container lying on the ground prior to being lifted. As shown in Figure 17G, the container lies above the container locking devices 26 on the top surface of the horizontal side beams 17 and 17'. At this position the lifting cylinders are at their end of travel and the container is lifted substantially horizontally not to disturb its cargo or freight.

With the container positioned as shown in Figure 17G the horizontal side beams 17 and 17' and their wheels 22 now need to be lifted off the ground surface 93 by the actuation of the telescopic lifting legs 23 and this is illustrated in Figure 17I. The wheels 22 should not touch the ground surface when lifted to that position. The hinged rear gate arms 19 and 19' are closed. The pistons 50 are then actuated by the hydraulic controls to retract

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the horizontal side arms 17 and 17' to their original closed positions where the container locking devices 26 should be aligned with the lower corner connectors 47 of the container 11 and the rear gate arms now locked. The telescopic lifting legs 23 are then retracted so that the wheels are again in engagement with the ground surface 93. Thereafter, the coupling
5 connectors 40 in the container lifting post 25 are lowered by the use of the hydraulic controls 36 to position the corner connectors in the locking devices 26 where they are then engaged with the horizontal side arm 17 of the frame of the trailer 10. After the container locking devices are engaged the operator inspects the trailer to ensure that all locking devices are secured in position. The trailer is now ready to transport the container to a further location
10 where the container is unloaded by going through the same process but in reverse mode .

The scope of the claims should not be limited by the embodiments set forth above, but should be given the broadest interpretation consistent with the disclosure as a whole.

CLAIMS:

1. A trailer for transporting a freight container, said trailer comprising a frame having a front frame section adapted to be coupled to a road vehicle, said frame further having a pair of displaceable horizontal side beams, a hingeable rear gate formed by a pair of hinged arms, each said hinge arm being hingedly secured to a rear end of a respective one of said horizontal side beams, each said horizontal side beams having one or more wheels independently secured thereto by suspension means, and one or more wheels secured to said suspension means, retractable vertical lifting means secured to a portion of said front frame and said pair of hinged arms and being actuable to lift said pair of horizontal side beams and said one or more wheels above a ground surface, laterally extendable means secured to said front frame and said hinge arms to displace said horizontal side beams outwardly and inwardly with respect to one another when lifted off the ground surface by said retractable vertical lifting means, container lifting and lowering means secured to said front frame section and said hinge arms for removable connection to a container positioned between said side beams to lift and lower the container therebetween, and container connecting means secured to each said side beams for securing the container thereto for transportation.
2. A trailer as claimed in claim 1, wherein said retractable lifting means are vertically supported telescopic legs secured on opposed sides of said front frame, and to a respective one of said hinged arms, and a hydraulic piston secured to each said telescopic legs to cause extension and retraction thereof.
3. A trailer as claimed in claim 1, wherein each side beam of said pair of horizontal side beams is provided, at a front and rear end thereof with a transverse extendable connecting linkage, said extendable connecting linkage at said front end being displaceably secured to said front frame section and at a rear end thereof being displaceably secured to a respective one of said pair of hinged arms, each said extendable connecting linkage having a hydraulic piston constituting said laterally extendable means.
4. A trailer as claimed in claim 3, wherein said transverse extendable linkage is a sliding coupling assembly.

5. A trailer as claimed in claim 4, wherein said sliding coupling assembly is constituted by a slide plate secured to a hinge flange attached to a hinge connection at said rear end of said side beams, said slide plate being displaceably retained captive between guide members secured to said hinge arm for sliding displacement along a straight longitudinal axis of said hinge arm.
6. A trailer as claimed in claim 5, wherein said guide members are spaced apart guide wheels in frictional rotational engagement with opposed parallel edge portions of said slide plate.
7. A trailer as claimed in claim 4 wherein said sliding coupling assembly is constituted by a roller cage comprised of spaced-apart horizontal adjustable rollers and spaced-apart fixed rollers, a sliding connecting beam is retained captive between said rollers in said roller cage and guidingly displaceable therebetween, said sliding connecting beam being secured to a respective end of an associated one of said pair of horizontal side beams.
8. A trailer as claimed in claim 7 wherein said horizontal adjustable rollers are secured on an eccentric rod connection, and a torque coupling secured to said eccentric rod connection for causing said horizontal adjustable rollers to move in a vertical plane to adjust said horizontal rollers with respect to abutting surfaces of said sliding connecting beam.
9. A trailer as claimed in claim 7 wherein said horizontal adjustable rollers and said fixed rollers are individually replaceable rollers.
10. A trailer as claimed in claim 1, wherein said container connecting means is a container corner locking device secured adjacent opposed ends of a top surface of each said side beams for locking engagement with lower corner engaging formations of ISO certified containers.
11. A trailer as claimed in claim 1, wherein each said side beam is provided with container alignment pads on an inner side surface thereof.

12. A trailer as claimed in claim 1, wherein said container lifting and lowering means are constituted by four vertical posts, each said post being secured in a respective one of four corner areas of said frame, a lifting piston mounted in said posts, said lifting piston having a piston rod end secured to a coupling connector for displacement of said coupling connector along a vertical slot opening of said post, said coupling connector being adapted for removable attachment to a container.

13. A trailer as claimed in claim 1, wherein there is further provided a container arresting bumper secured to an inner face of said front frame.

14. A trailer as claimed in claim 1, wherein said suspension means comprises a pivoted wheel support arm secured at a forward pivot end to a pivot pin retained in a frame attachment member for pivotal connection of said pivoted wheel support arm to said frame, a wheel axle assembly secured at a rear free end of said pivot arm and adapted to connect a wheel thereto, a shock absorber connecting bracket secured to said forward pivot end of said pivotal wheel support arm and having a shock absorber connecting member extending above said pivot pin, said shock absorber connecting member being pivotally displaceable in facial alignment with a stationary shock absorber connector secured to said frame, a shock absorber retained captive between said shock absorber connecting member and stationary shock absorber connector and compressible therebetween by said shock absorber connecting member being displaced toward said stationary shock absorber connector by upward movement of said pivot wheel support arm to absorb vertical displacement loads transmitted to said pivotal wheel support arm by the wheel connected thereto.

15. A trailer as claimed in claim 14, wherein there is further provided lateral displacement stabilizing and external shock absorbing means secured to said pivotal wheel support arm to arrest said pivotal wheel support arm against lateral loads.

16. A trailer as claimed in claim 15, wherein said stabilizing and external shock absorbing means includes a vertical extension plate secured to said pivotal wheel support arm and having a vertical flat friction surface displaceable against a flat vertical arresting surface

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of said frame, and a bushing of shock absorbing material immovably retained in said frame attachment member about said pivot pin.

17. A trailer as claimed in claim 14, wherein two of said suspension means are secured to a corresponding horizontal side beam.

18. A trailer as claimed in claim 14, wherein said shock absorber connecting member is a flat seating plate secured to a support frame of said shock absorber connecting bracket, and a connecting fastener securing an end of said shock absorber thereto, said shock absorber being a pad of compressible material.

19. A trailer as claimed in claim 18, wherein said stationary shock absorber connector is a flat transverse wall surface formed integral with said frame of the trailer.

20. A trailer as claimed in claim 16, wherein said vertical flat friction surface includes an ultra-high molecular weight polyurethane plate secured to said surface of said vertical extension plate, said vertical extension plate being a steel plate.

21. A trailer as claimed in claim 17, wherein each said horizontal side beams are straight hollow side beams, each said side beam having one or more rectangular wells formed therein from an outboard vertical side wall of said side beam, said well having a transverse flat wall section defining said stationary shock absorber connector, and a connecting fastener securing an end of said shock absorber thereto, said frame attachment member being an attachment bracket secured to a flat bottom wall of said side beam behind and adjacent said transverse vertical side wall, said pivot wheel support arm supporting the wheel connected thereto inside said rectangular cavity.

22. A trailer as claimed in claim 1, wherein said front frame section has a towing frame structure for removable attachment to a hitch of the road vehicle.

23. A trailer as claimed in claim 1, wherein there is further provided a manual locking device adjacent opposed ends of said side beams to lock said side beams with respect

to said front frame section when displaced to an outward position and to lock said hinge arms in an open position when said side beams are at said outward open positions, and gate locking means at a free end of said hinge arms to lock said hinge arms together when at a closed position.

24. A trailer as claimed in claim 23, wherein said gate locking means comprises a lock rod immovably secured to one of said pair of hinged arms and projecting from a free end thereof, and a lock rod receiving channel immovably secured adjacent a free end of the other arm of said pair of hinged arms, and releasable lock means associated with said lock rod receiving channel for release engagement with said lock rod when said pair of hinge arms are positioned at a closed position with said horizontal side beams having been displaced to a closed position.

25. A method of transporting a container from a rest position on a ground surface, said method comprising the steps of:

i) providing a trailer having a frontal frame section, a pair of displaceable side beams, and a hingeable rear gate formed by a pair of hinge arms, each said hinge arms being hingedly secured to a rear end of a respective one of said side beams, and wheels secured to a suspension of each said side beams;

ii) lifting said trailer and wheels off a ground surface by operating a retractable vertical lifting means secured to said front frame and said pair of hinge arms;

iii) extending said side beams outwardly by operating laterally extendable means secured to said front frame and said hinge arms;

iv) lowering said trailer back on the ground surface by operating said retractable vertical lifting means;

v) opening said rear gate to create a rear entry-opening;

vi) positioning said trailer about the container from said rear entry opening;

vii) closing said rear gate;

viii) engaging container lifting and lowering means with the container;

ix) lifting the container above said side beams;

x) repeat step (ii);

xi) retract said side beams inwardly by operating said laterally extendable means to align said side beams with corner connections of the container;

xii) repeat step (iv);

xiii) lower said container onto connecting means secured to said side beams and engaging said connecting means with said corner connections of said container.

26. A method as claimed in claim 25, wherein said trailer is further provided, with a towing frame structure formed with said front frame section, and wherein prior to step (ii) there is provided the step of securing said towing frame structure to a hitch of a road vehicle.

27. A method as claimed in claim 25, wherein said step (vi) comprises backing up said trailer by the use of a motorized vehicle secured to said trailer to position said trailer about said container.

28. A method as claimed in claim 25, wherein after step (ii) there is provided the step of manually unlocking said side beams from said front frame section and said hinge arms.

29. A method as claimed in claim 25, wherein after step (v) there is provided the step of manually locking said hinge arms to said side beams in an open position.

30. A method as claimed in claim 25, wherein said step (viii) comprises securing a hook, attached to a displaceable coupling connector of four posts secured in a respective one of four corner areas of said frame, to a respective one of lower corner connectors of the container, said container being an ISO certified container.

31. A method as claimed in claim 30, wherein said step (ix) comprises operating hydraulic pistons mounted in said posts to displace said coupling connectors to lift said container above container connecting means secured to a top wall of said side beams.

32. A method as claimed in claim 25, wherein after step (xiii) there is provided the step of transporting said container secured to said trailer to a predetermined location and

- 30 -

depositing said container on a surface by disconnecting same from said side beams by lifting said container and depositing same and removing said trailer from about said container.

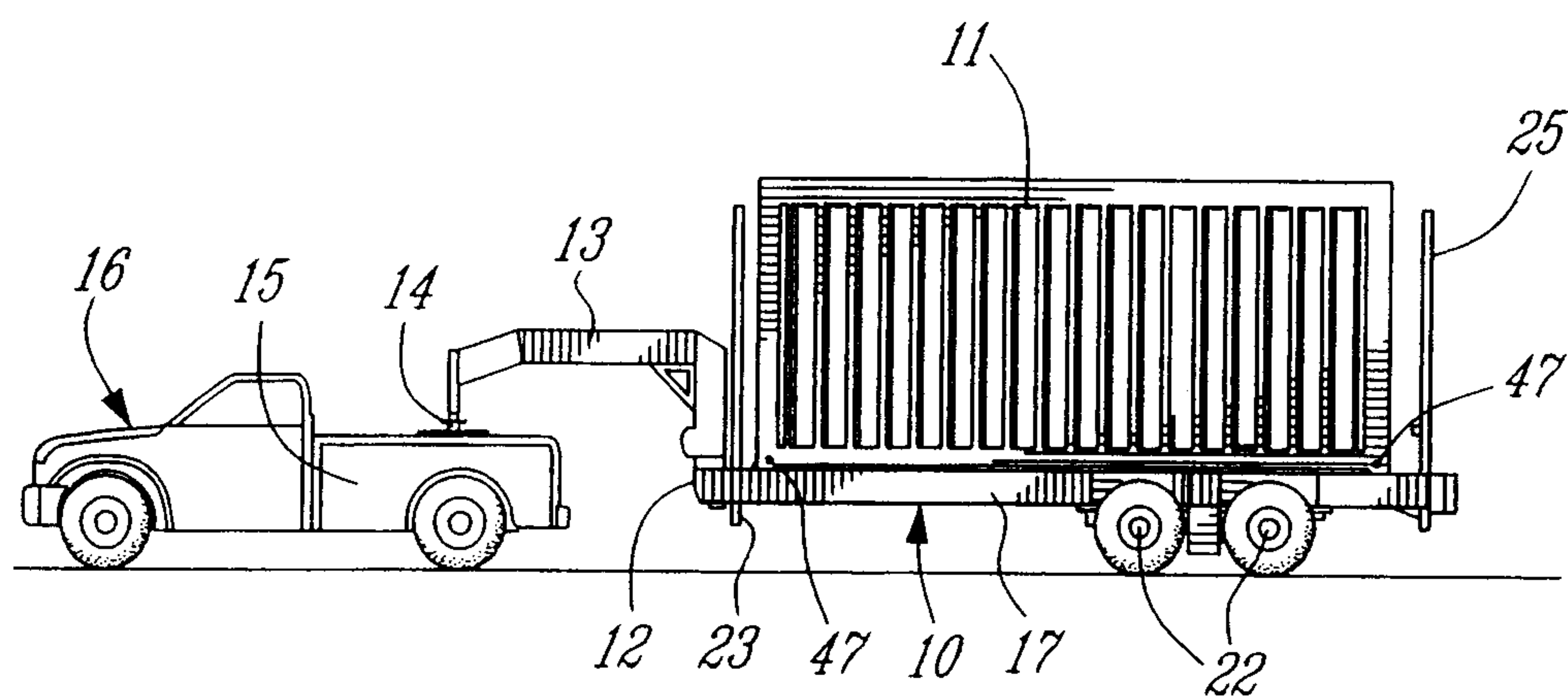


Fig. 1

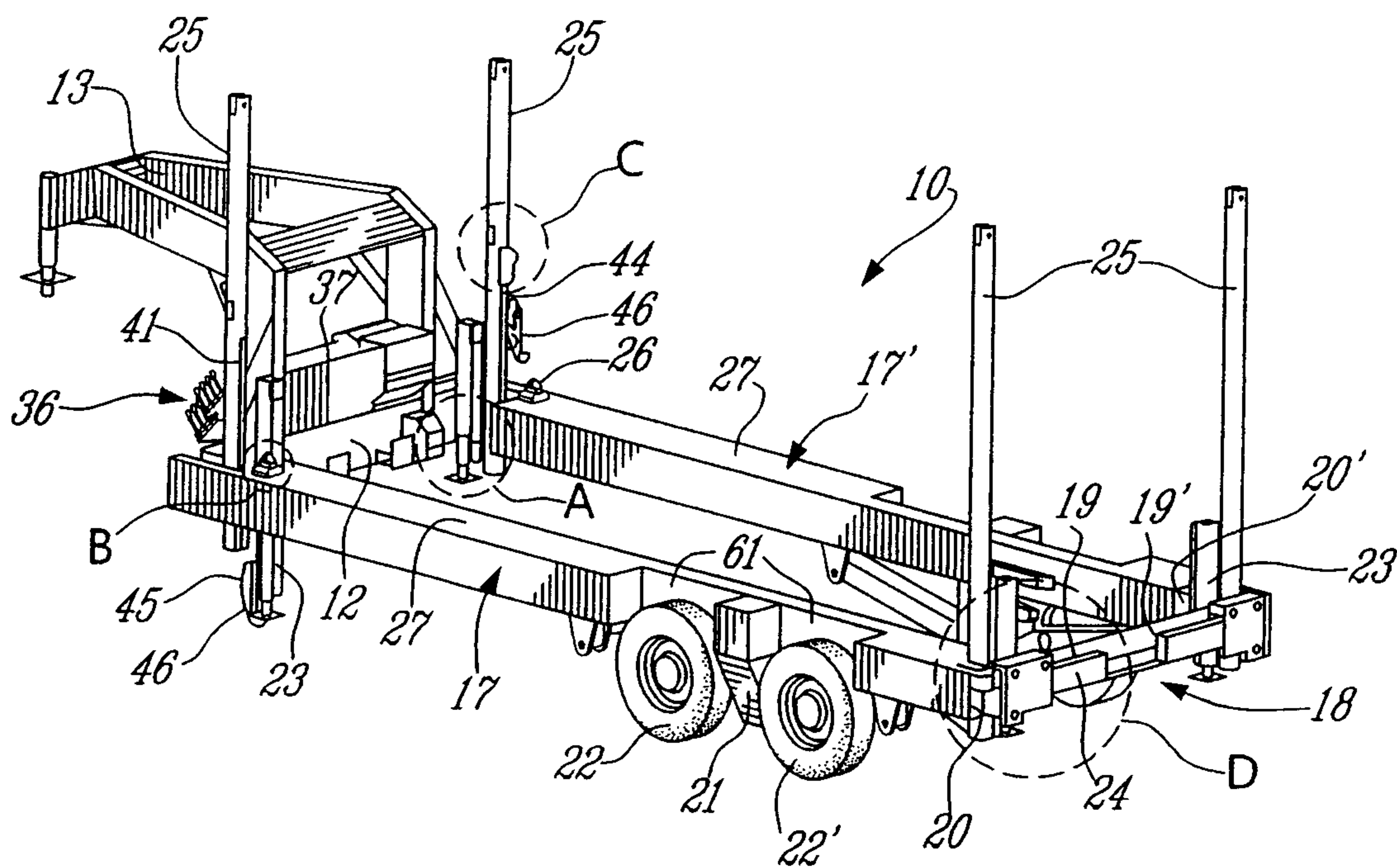
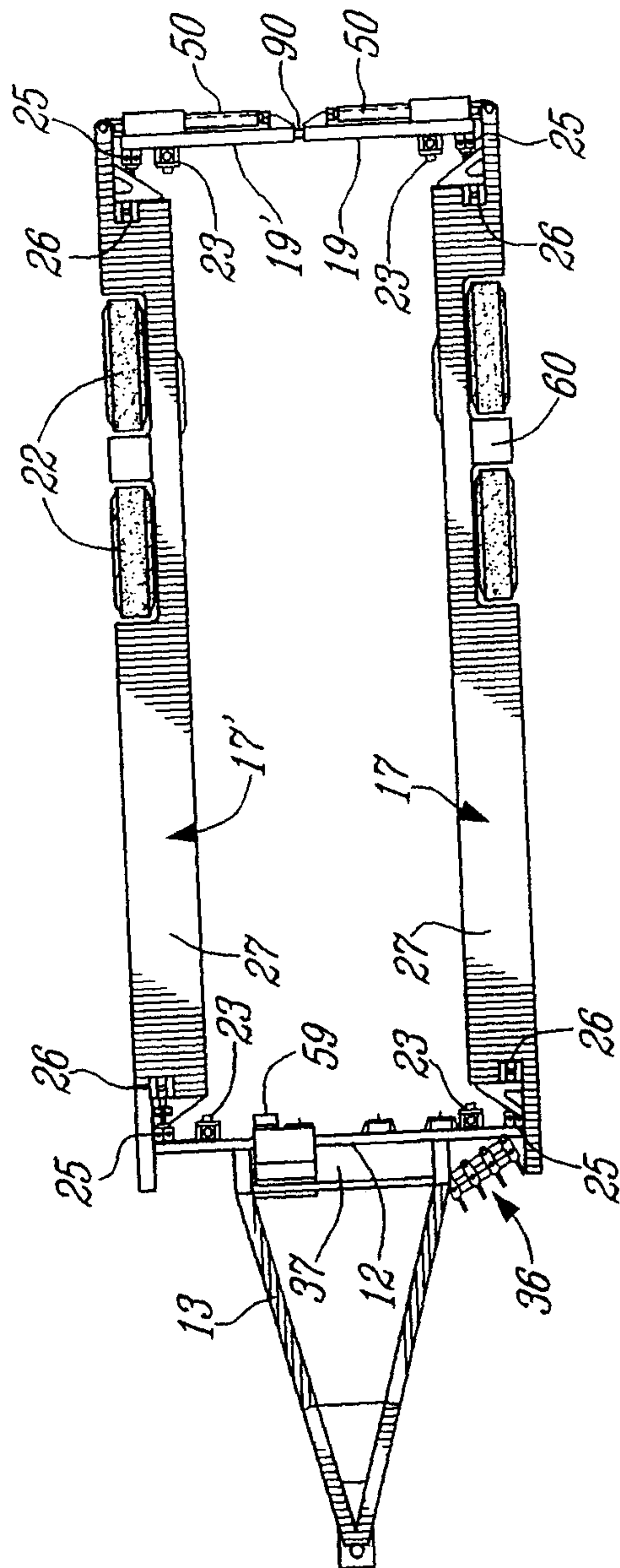
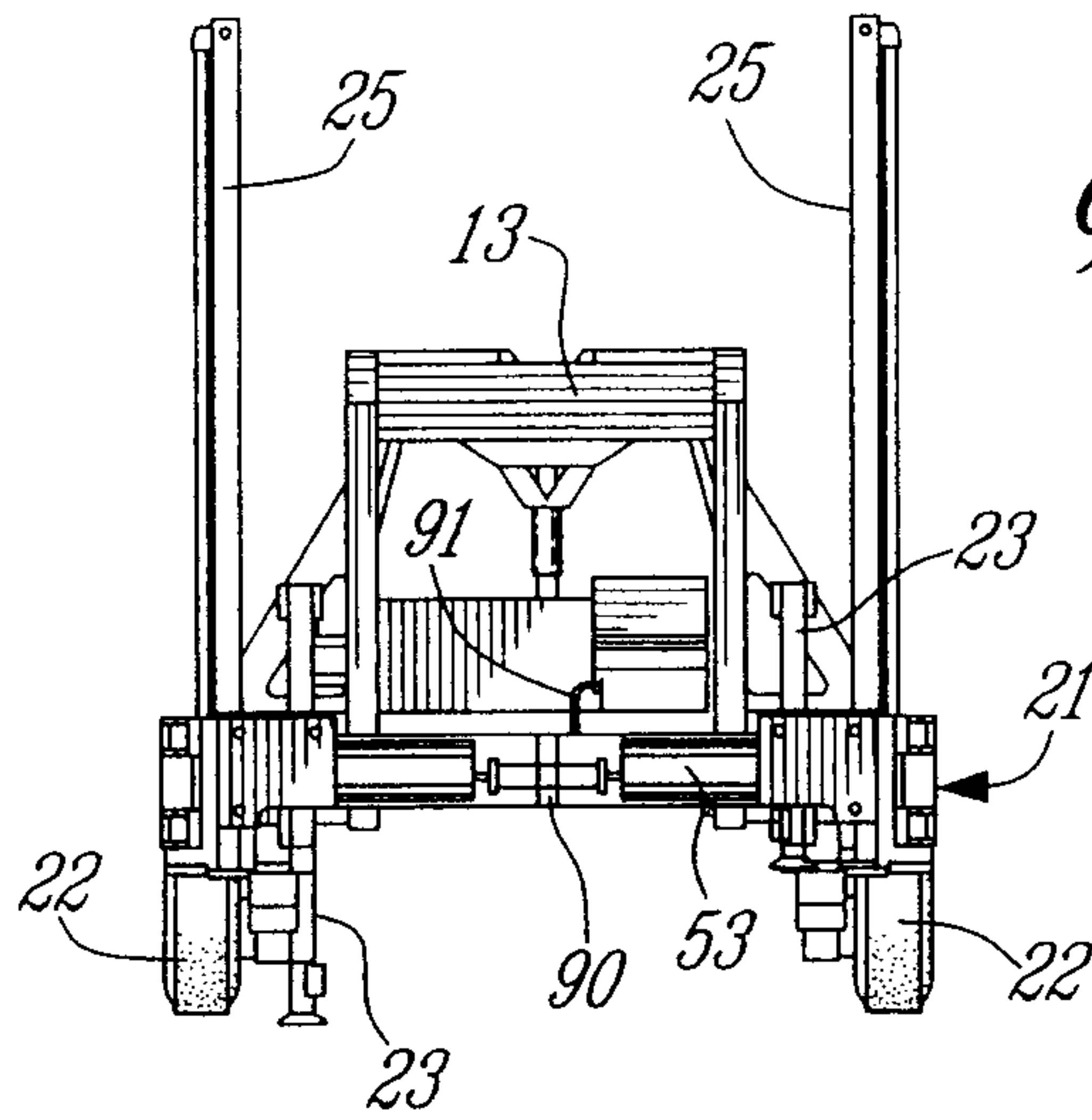
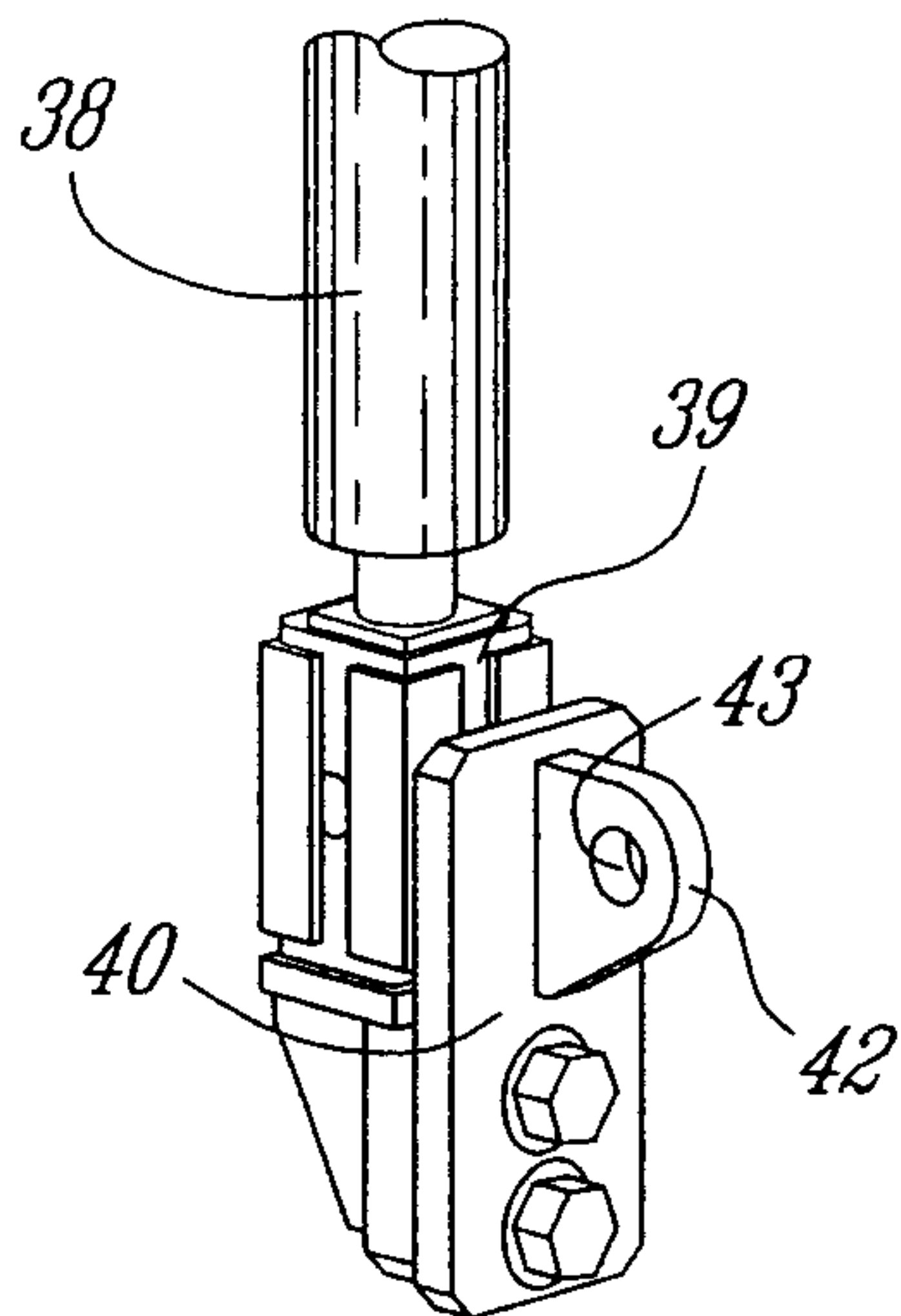
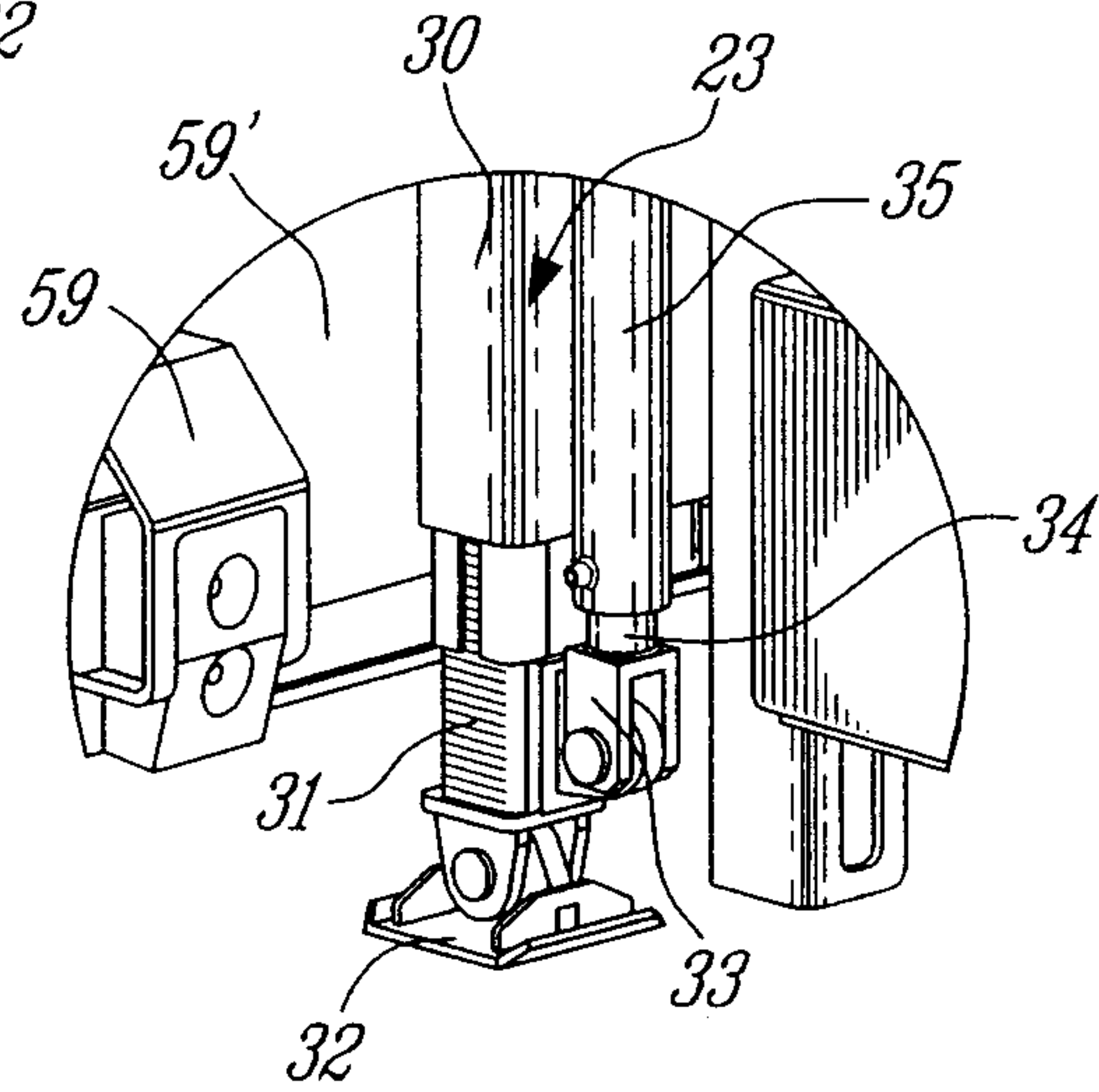
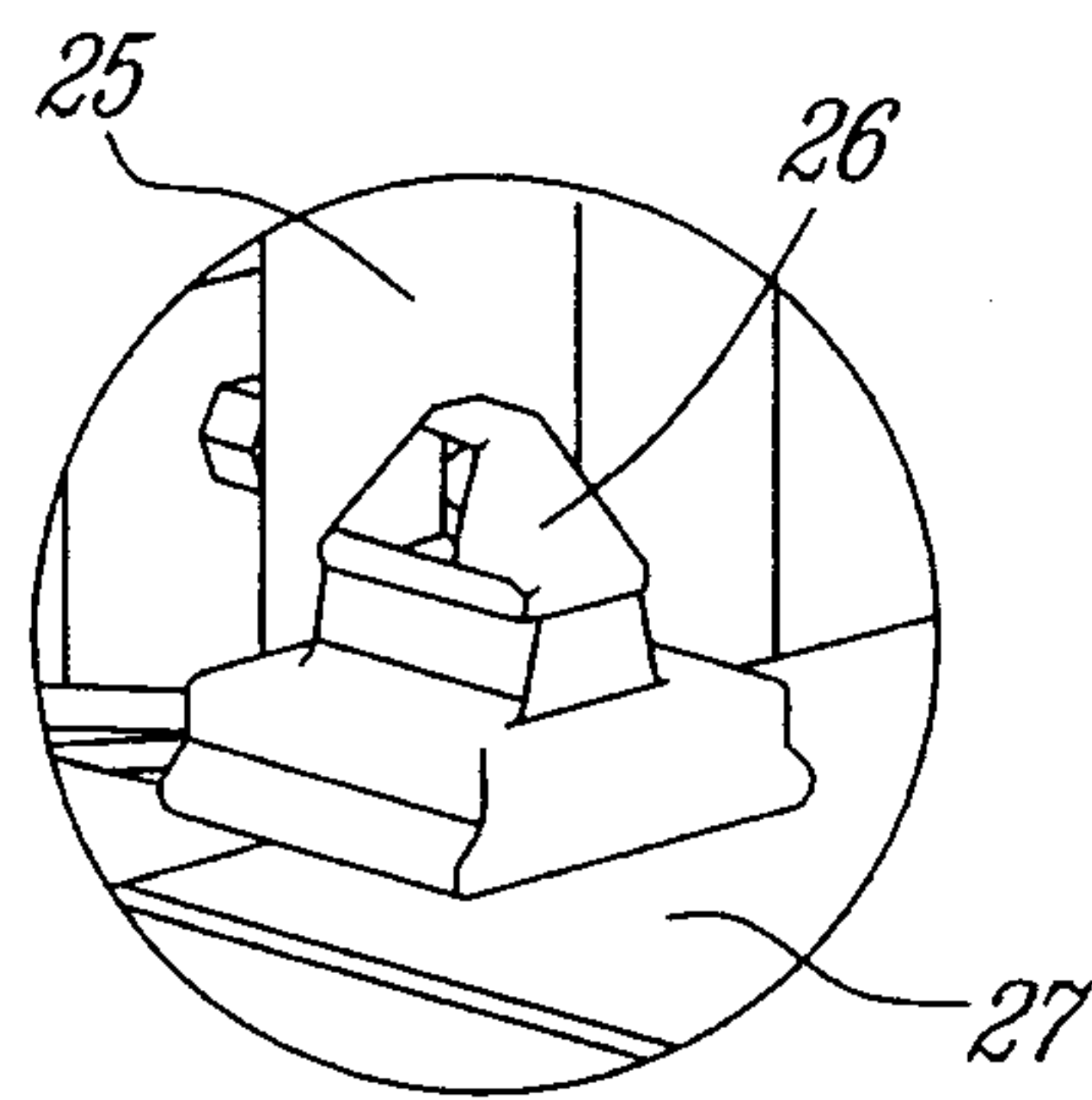
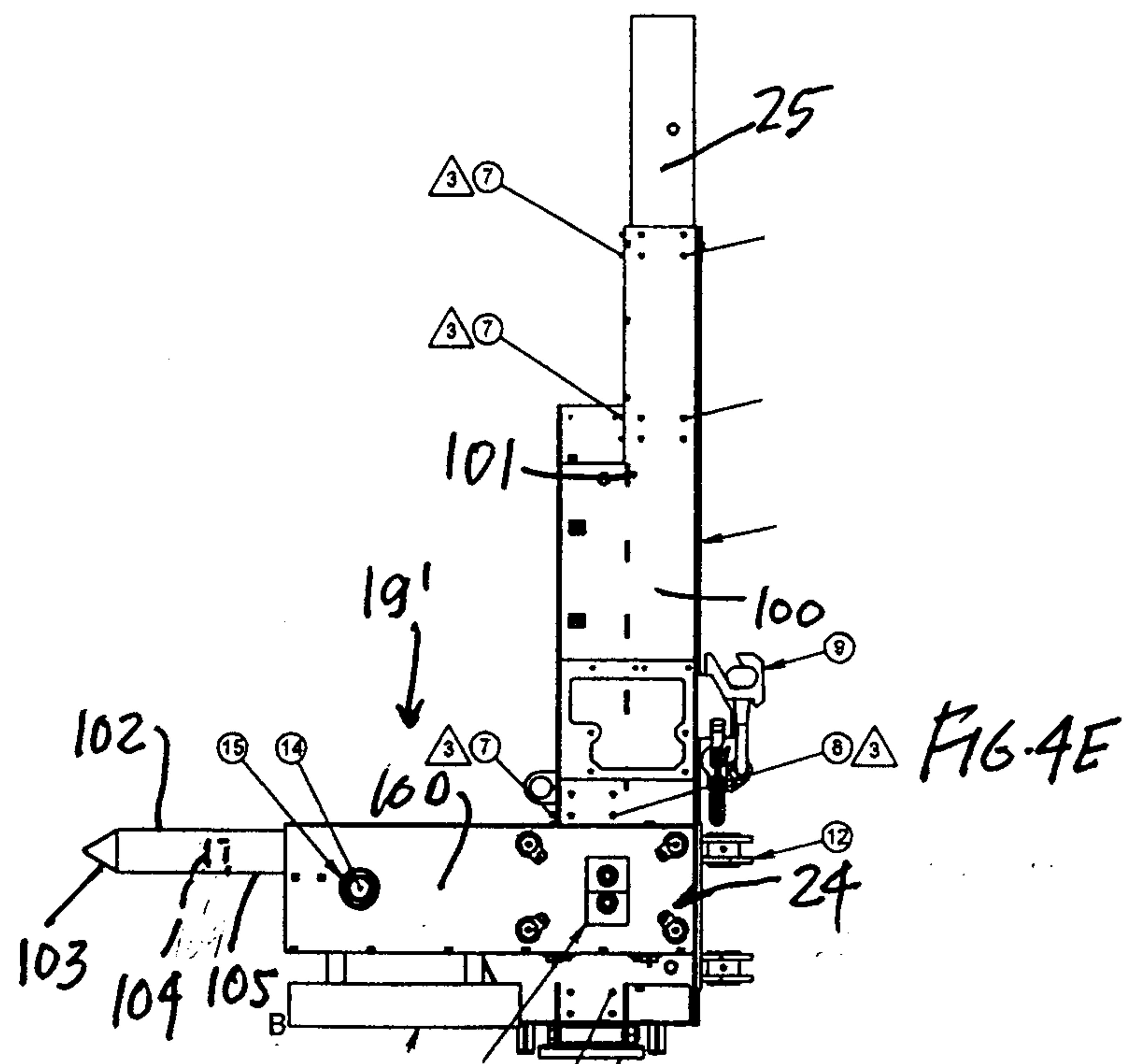
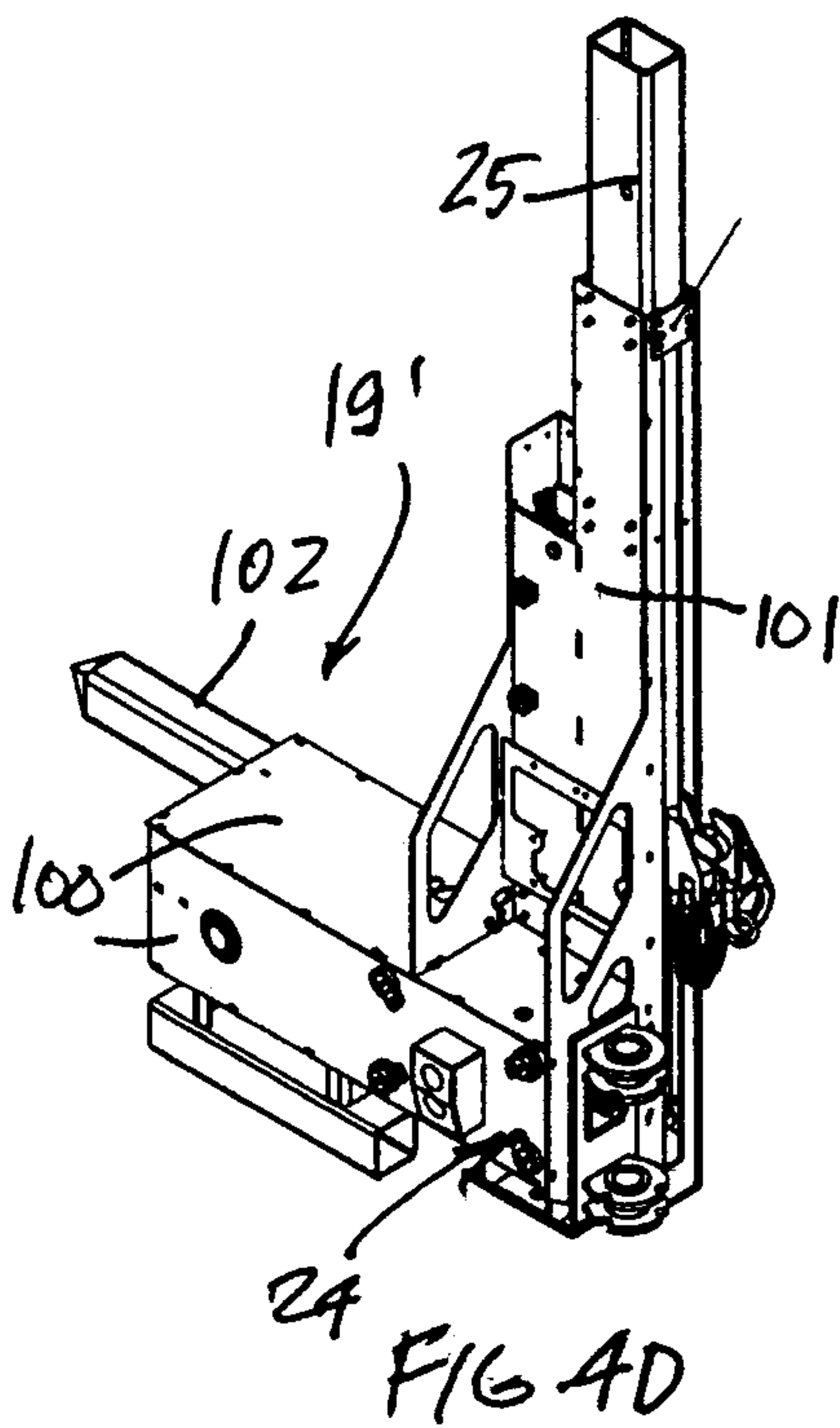
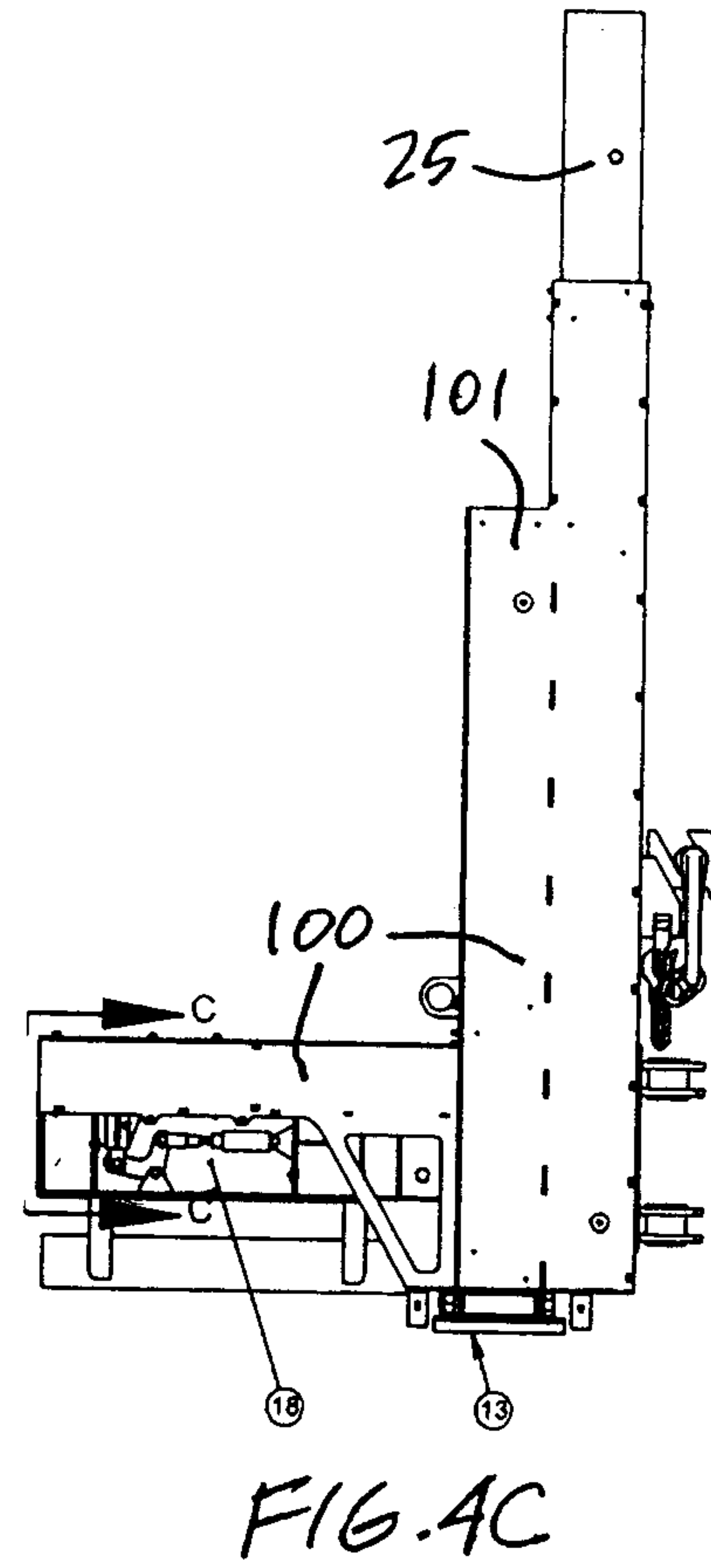
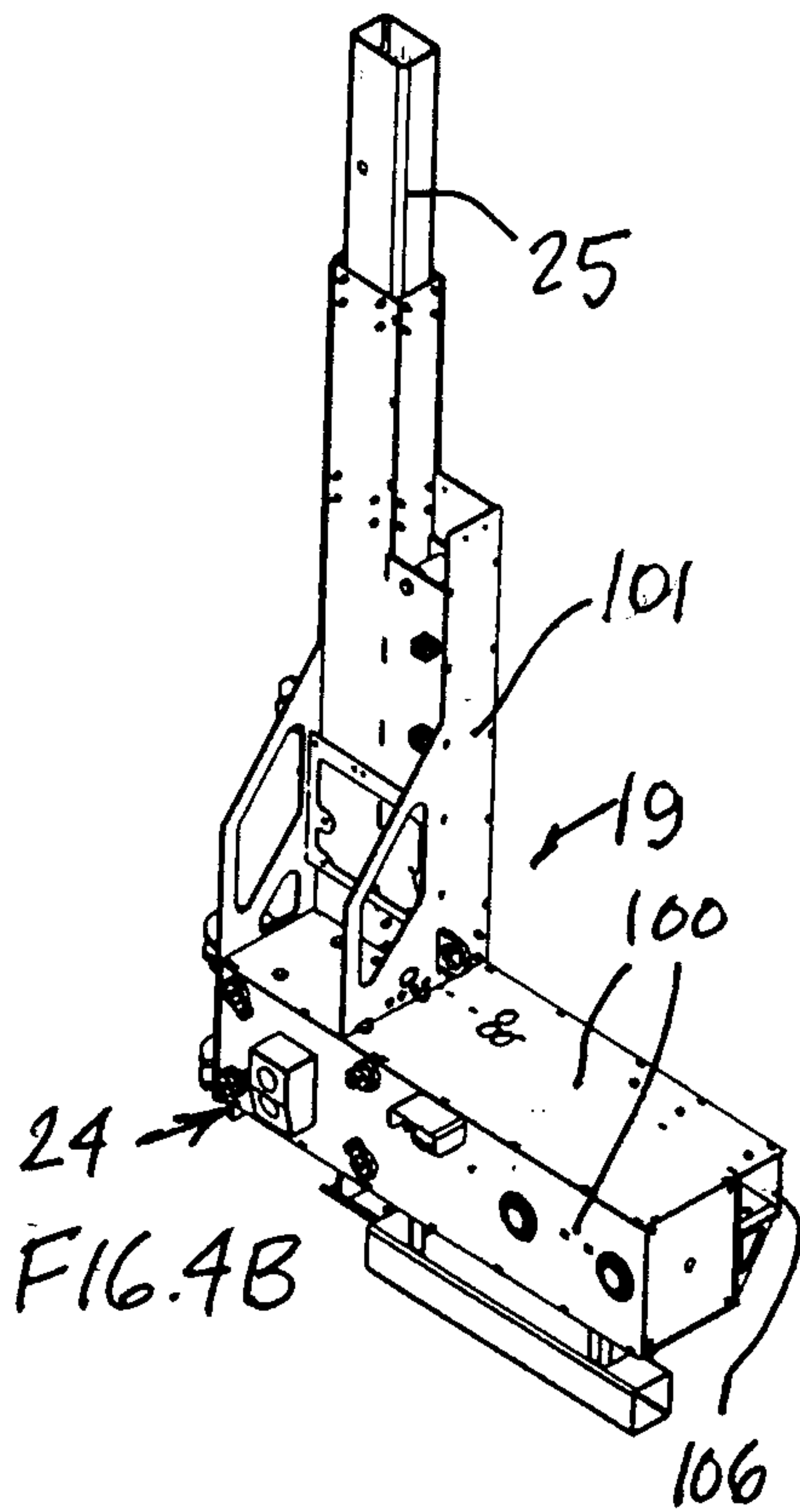


Fig. 2

*Fig. 3*

*Fig. 4A**Fig. 5**Fig. 6**Fig. 7*



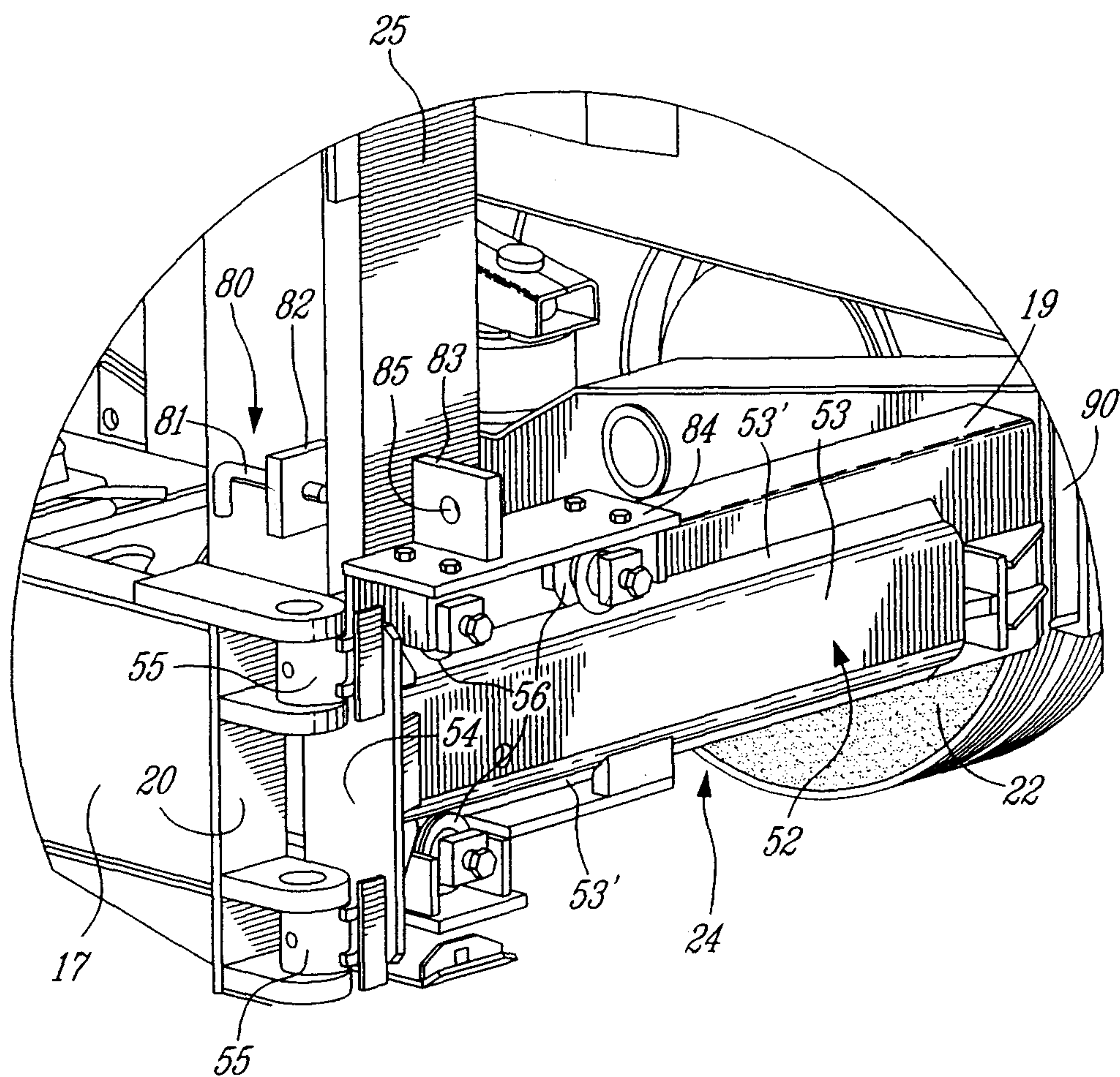


Fig. 8A

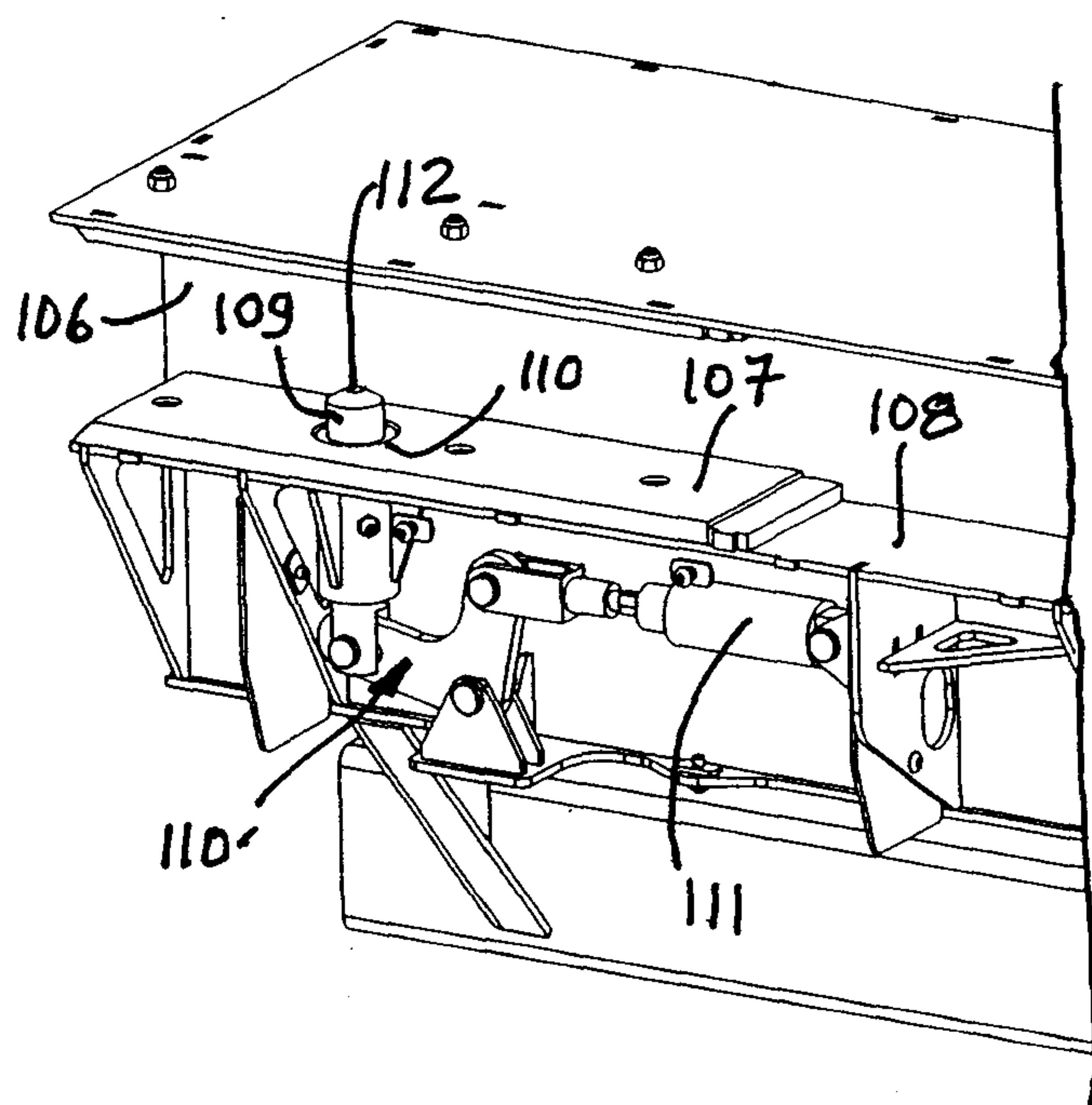


FIG. 4F

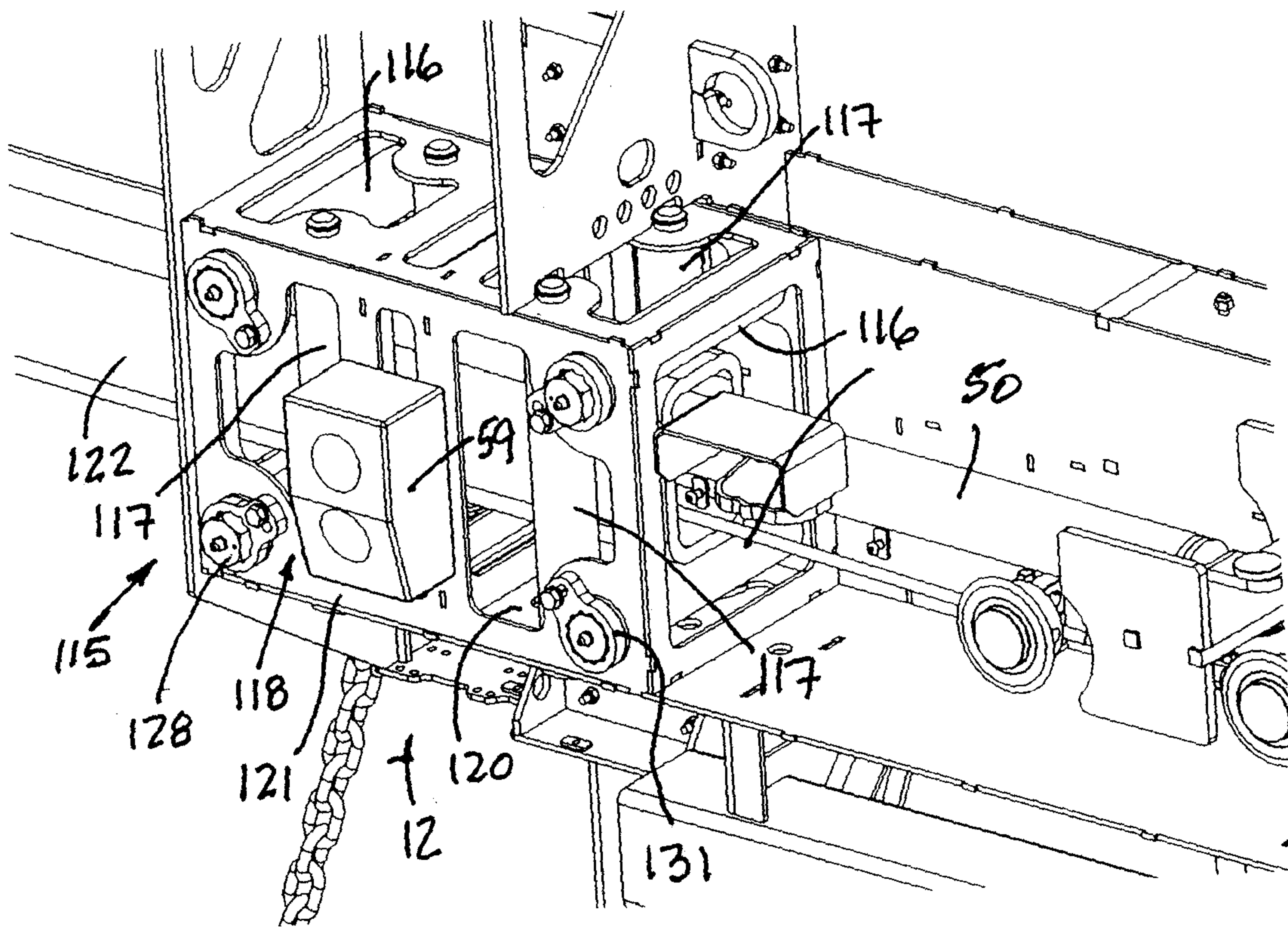


FIG. 8C

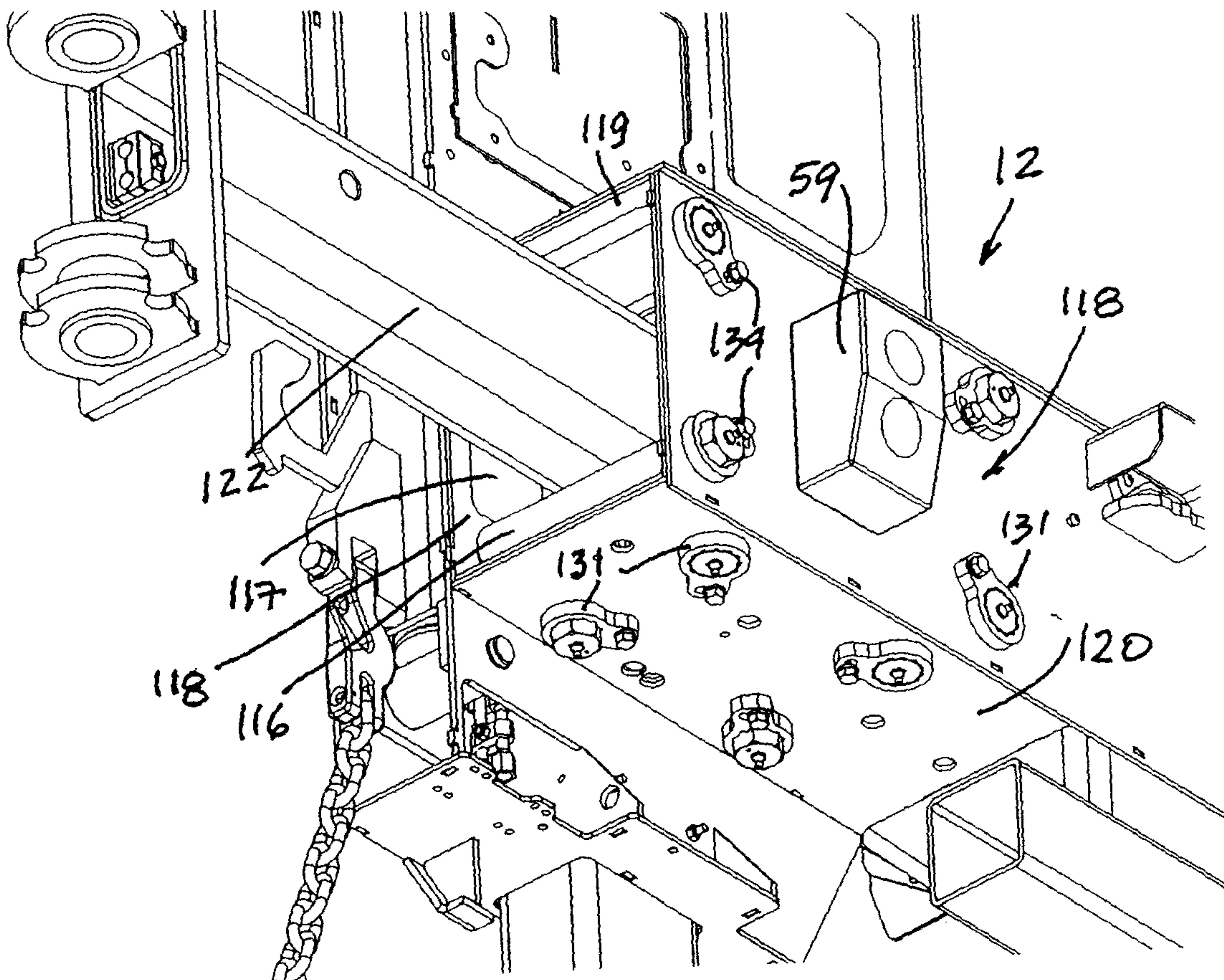


FIG. 8B

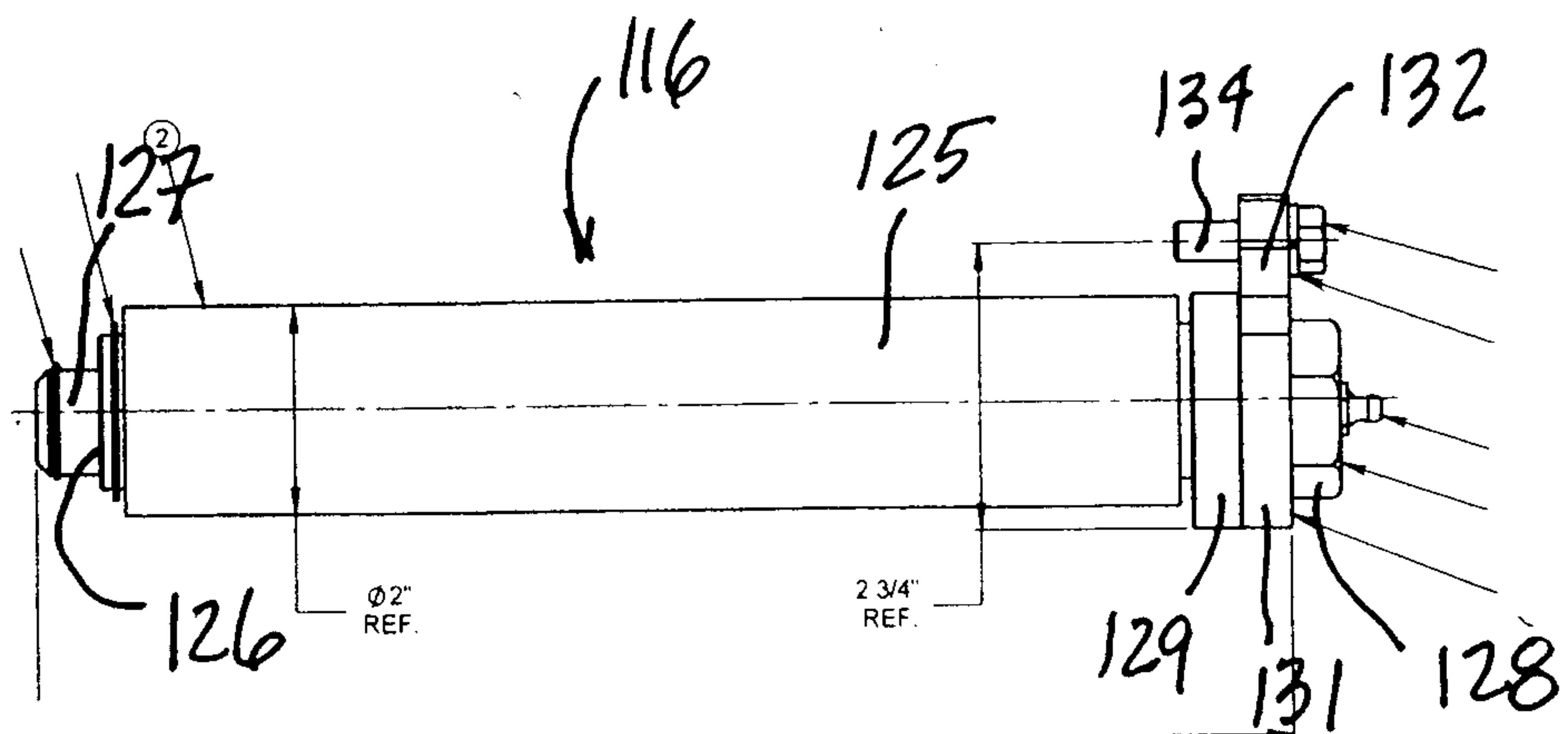


FIG. 8E

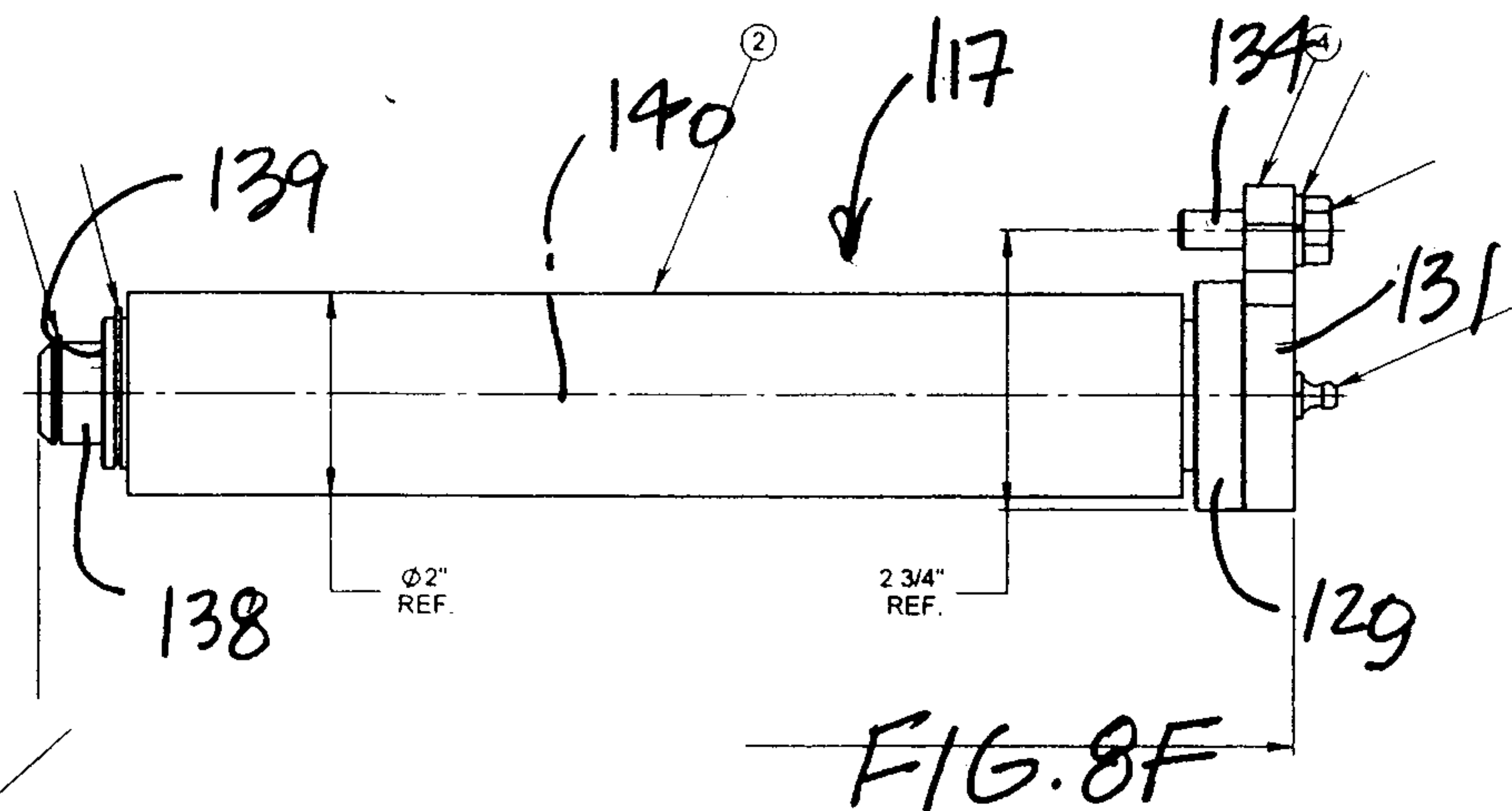


FIG. 8F

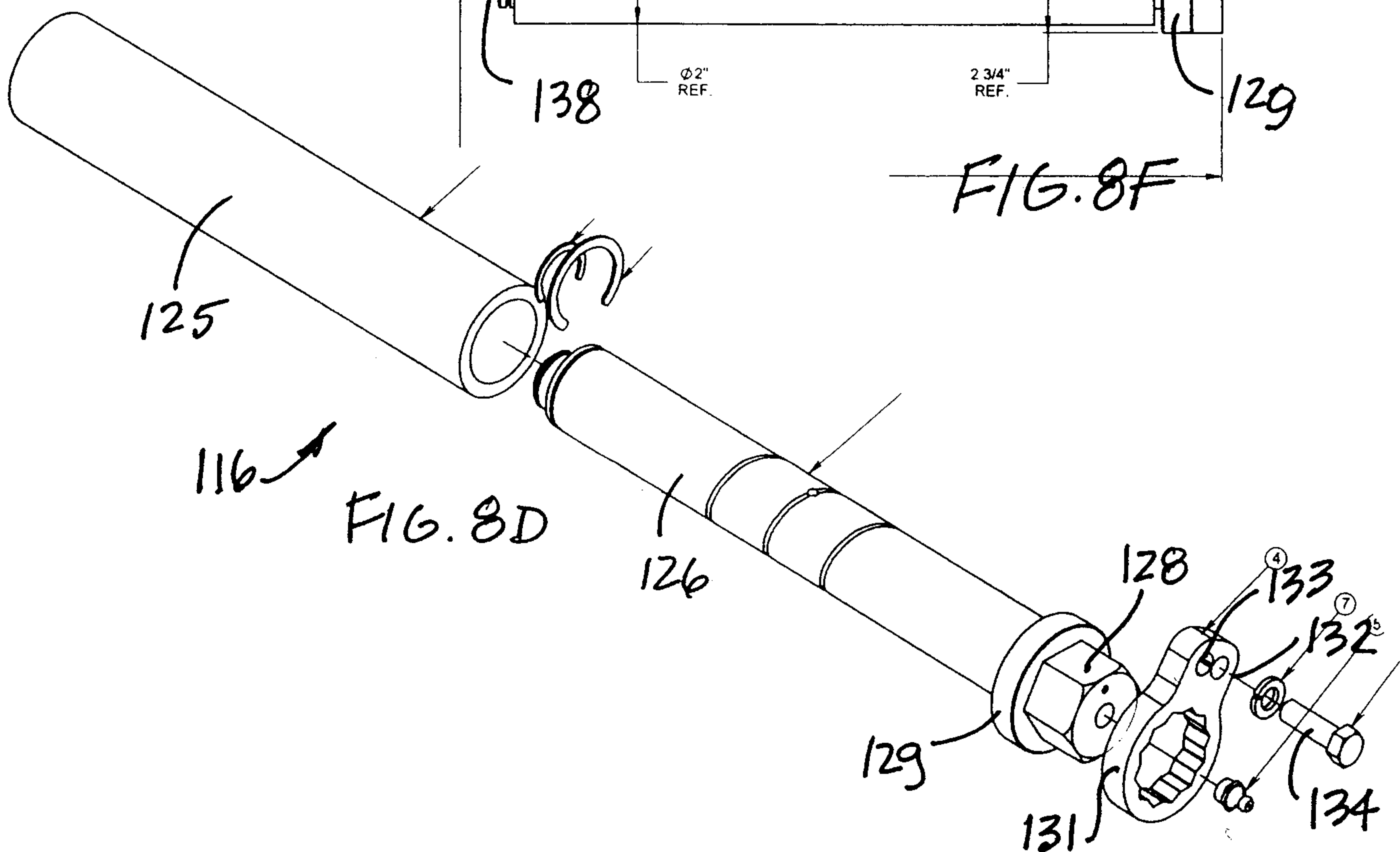
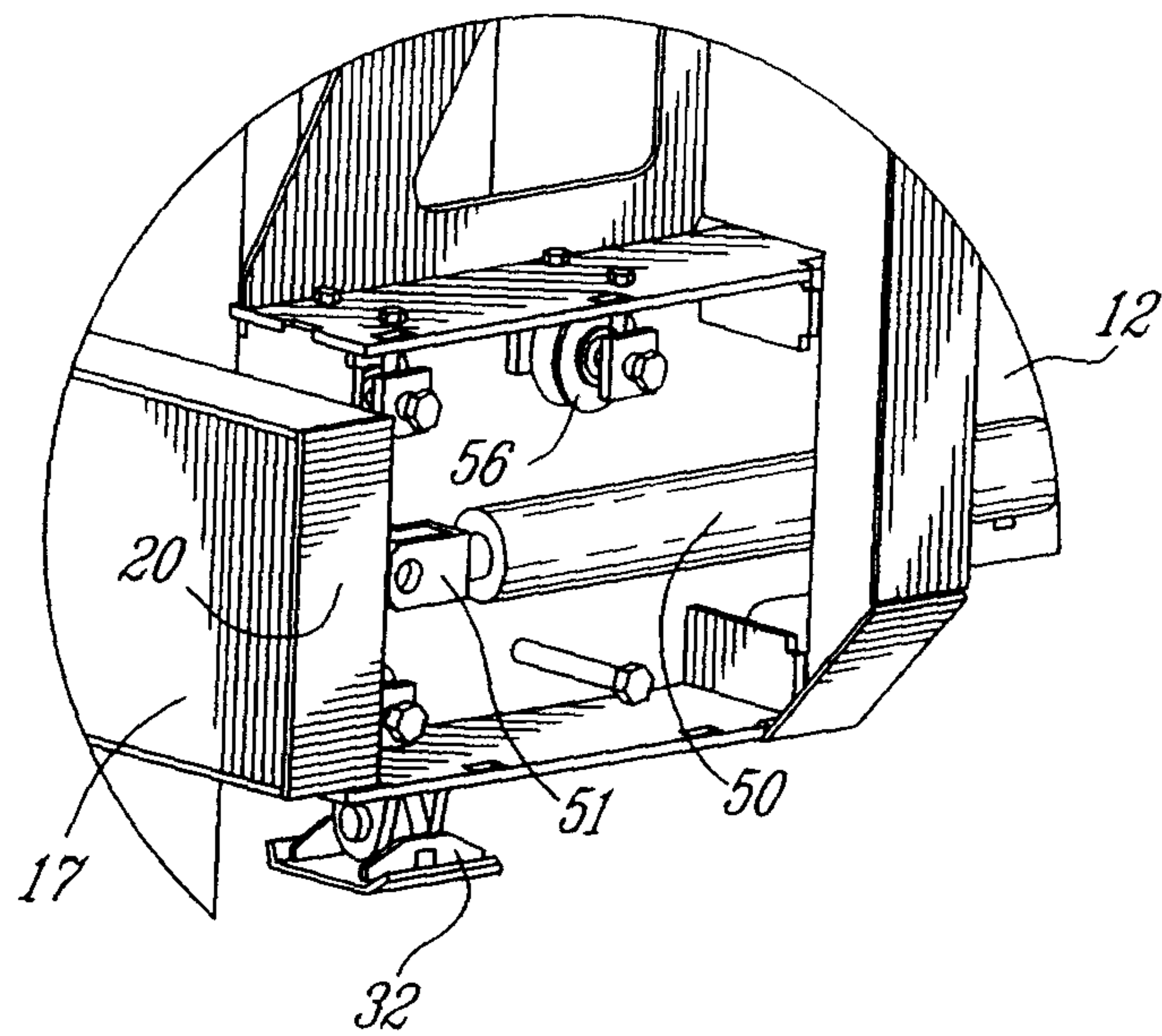
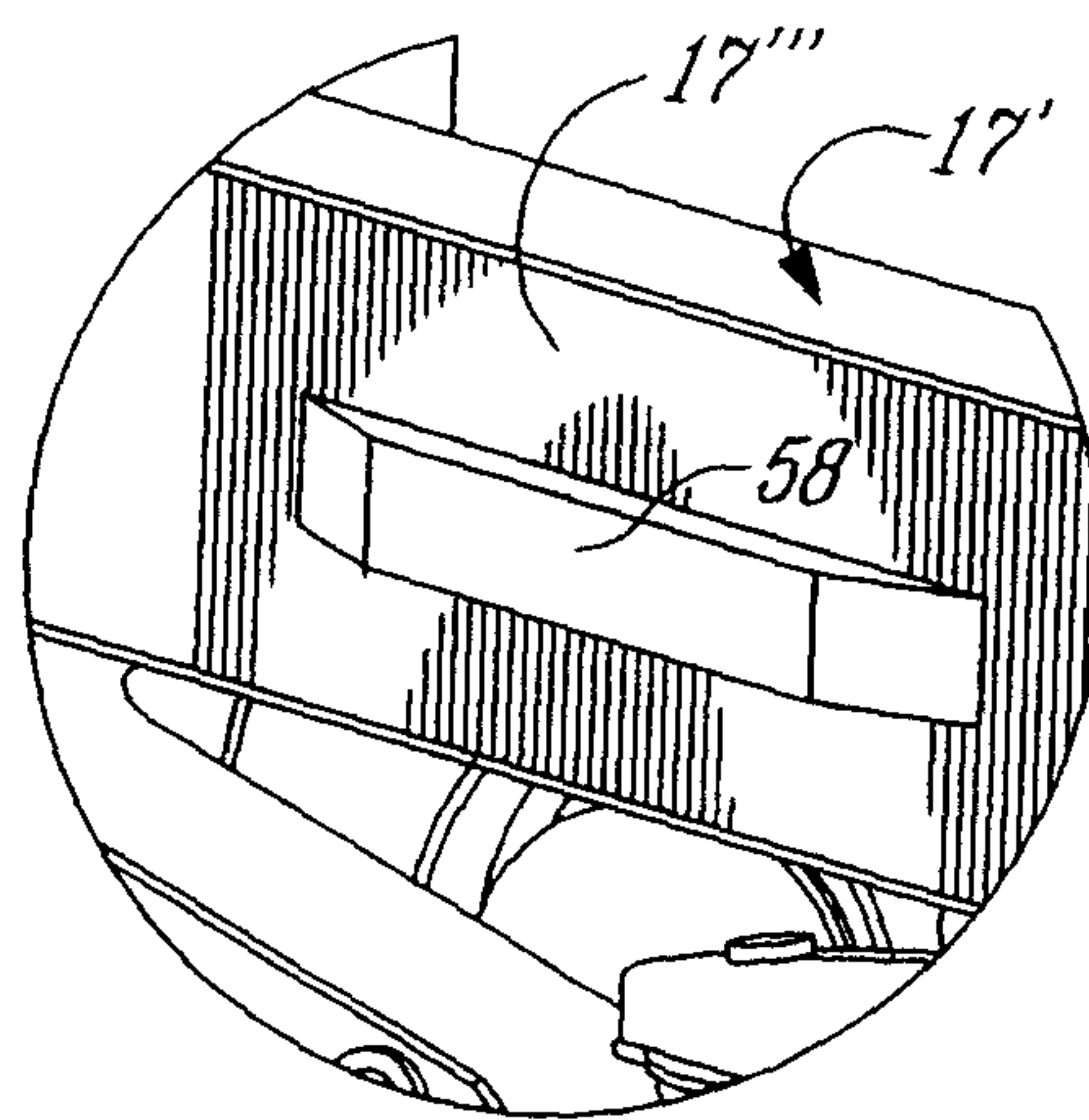
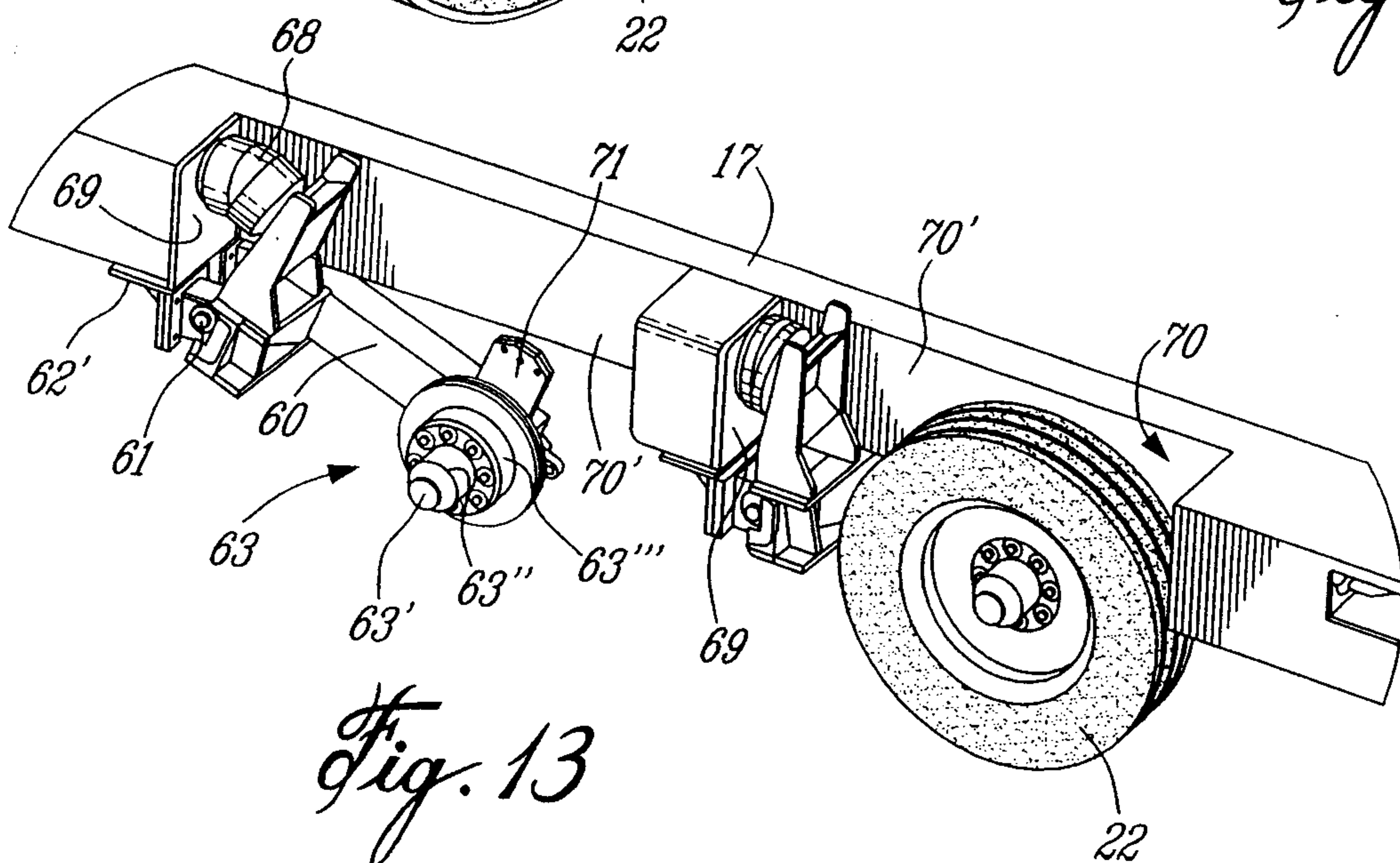
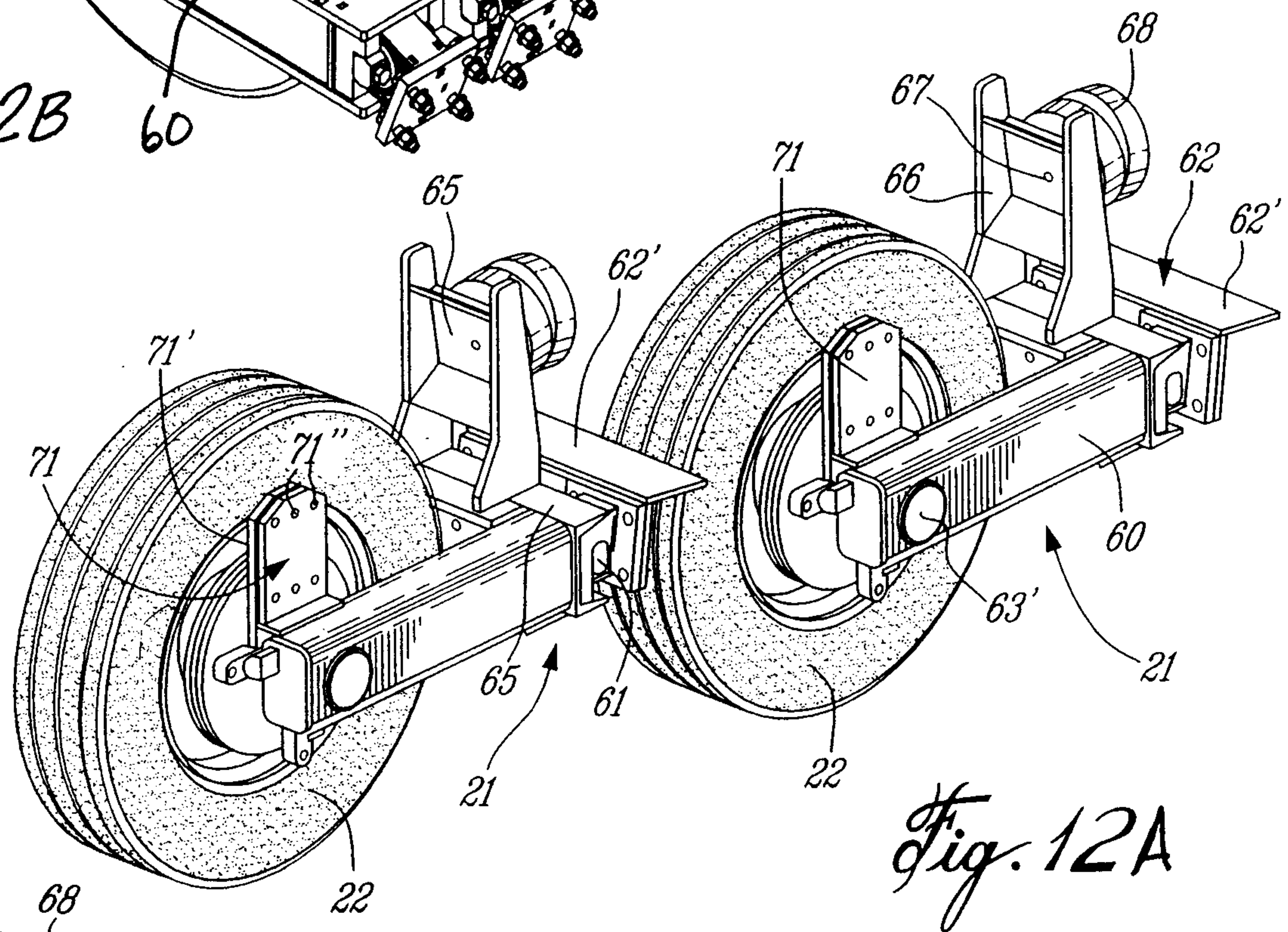
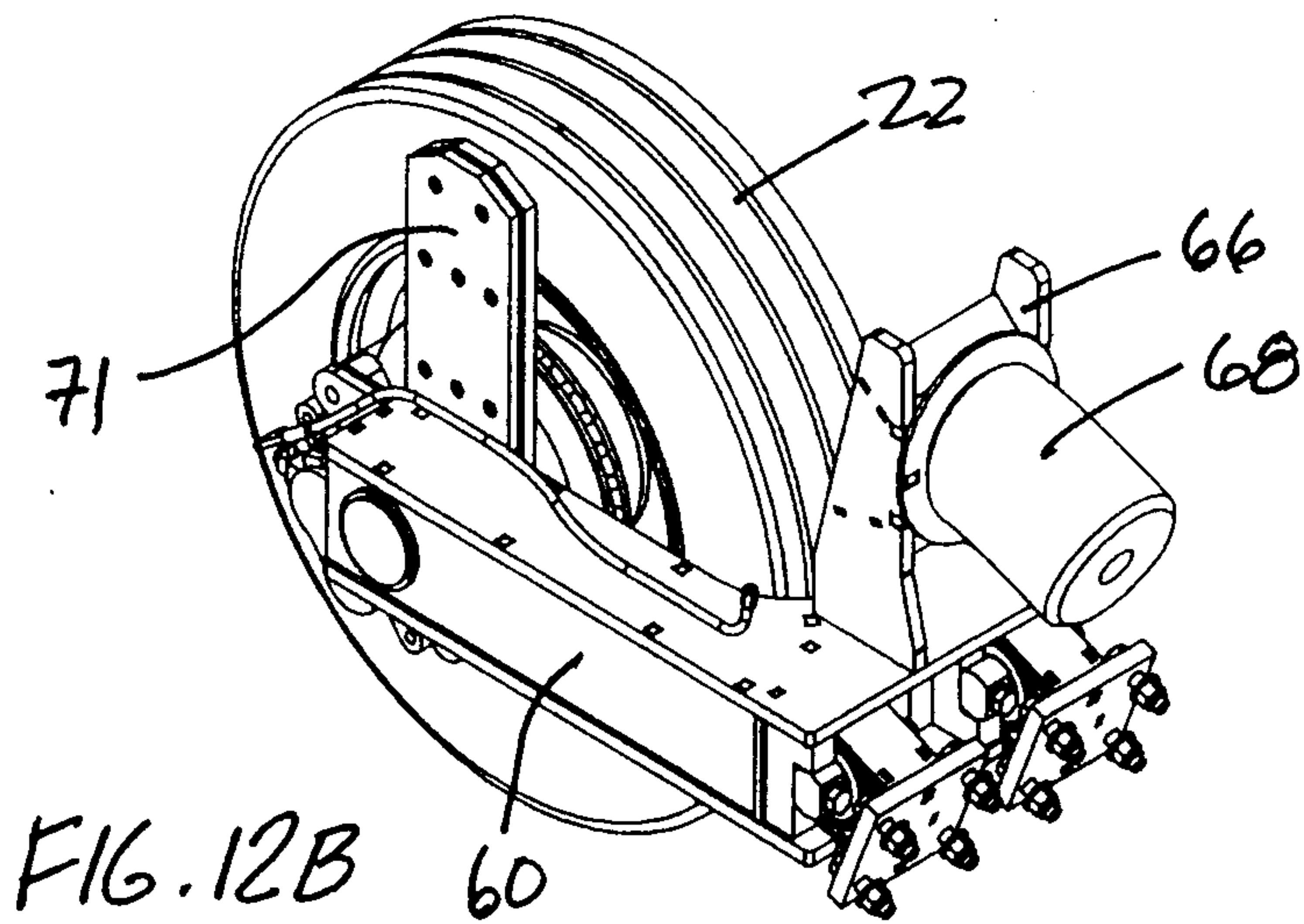
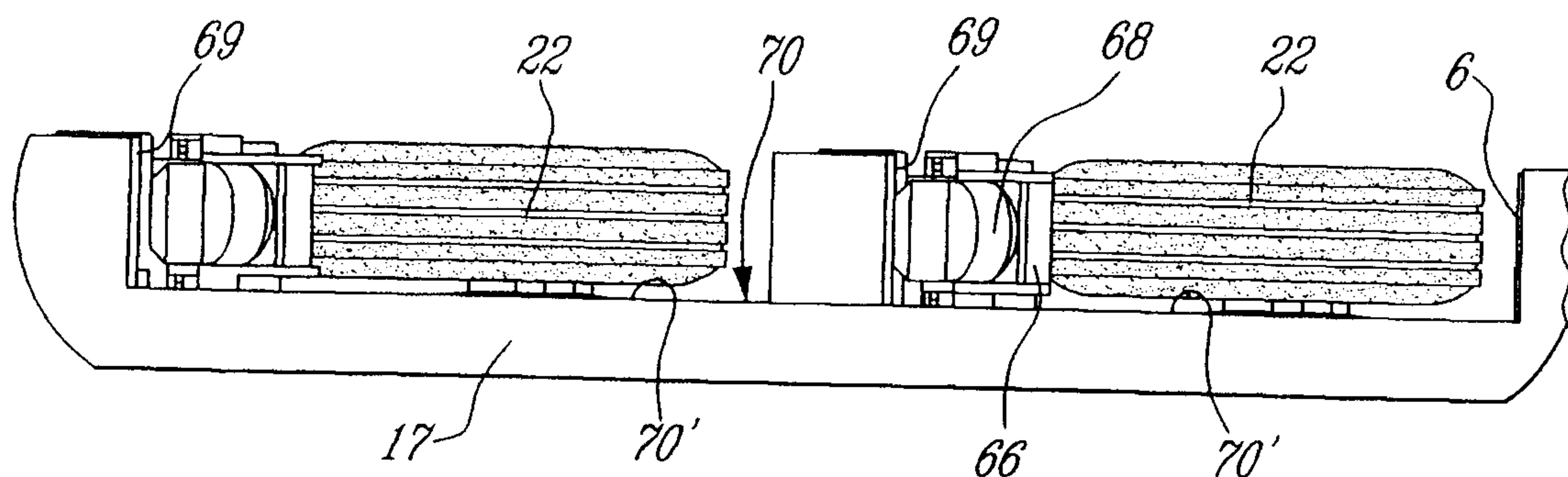
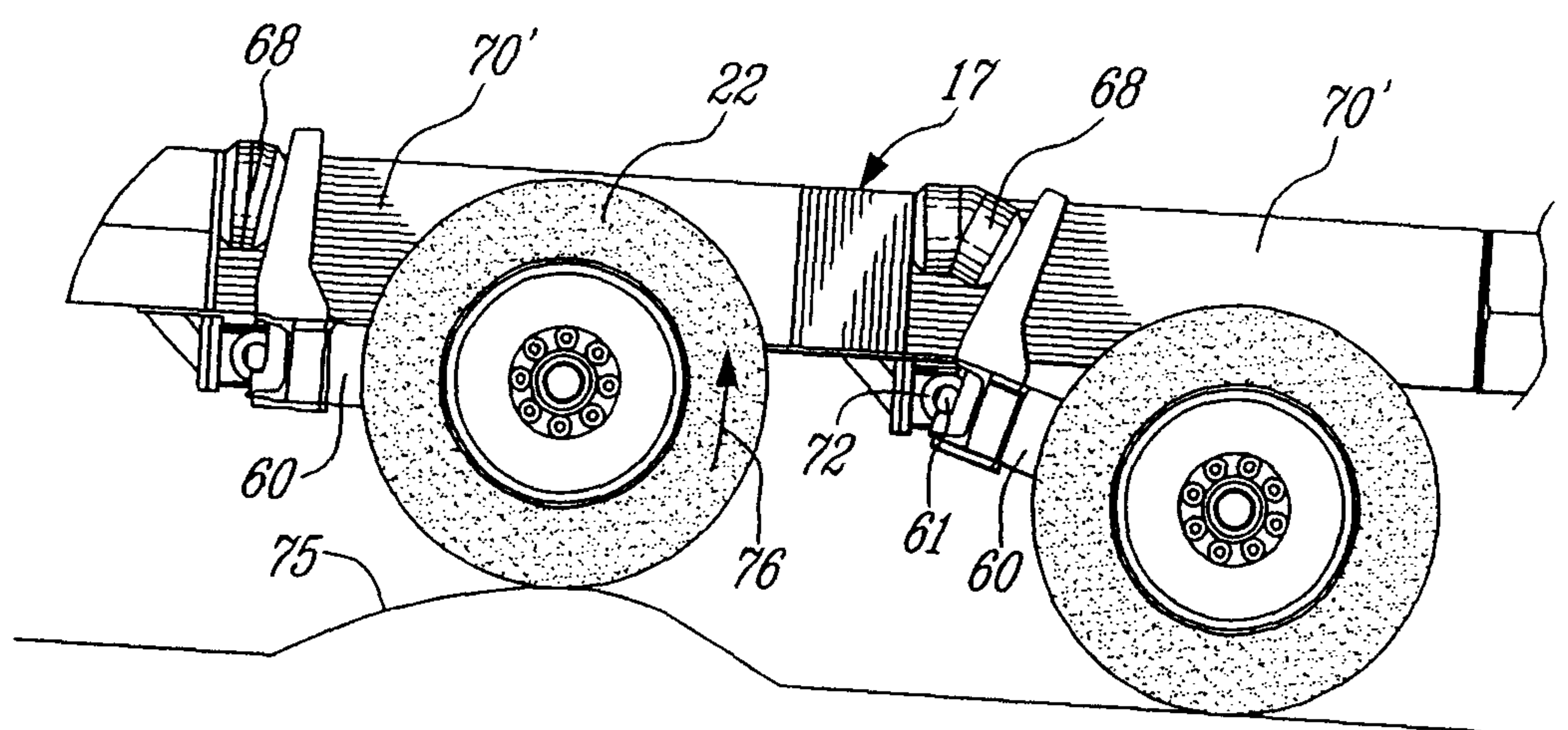
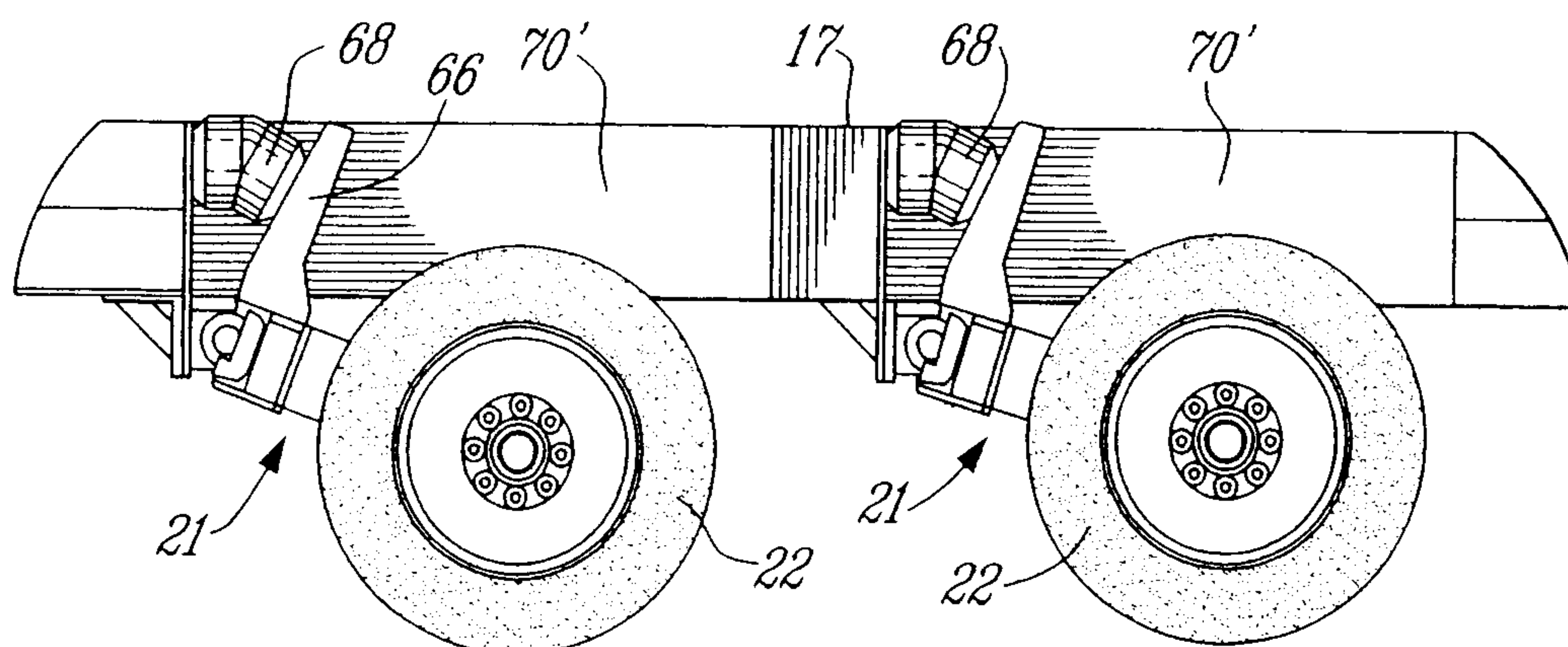
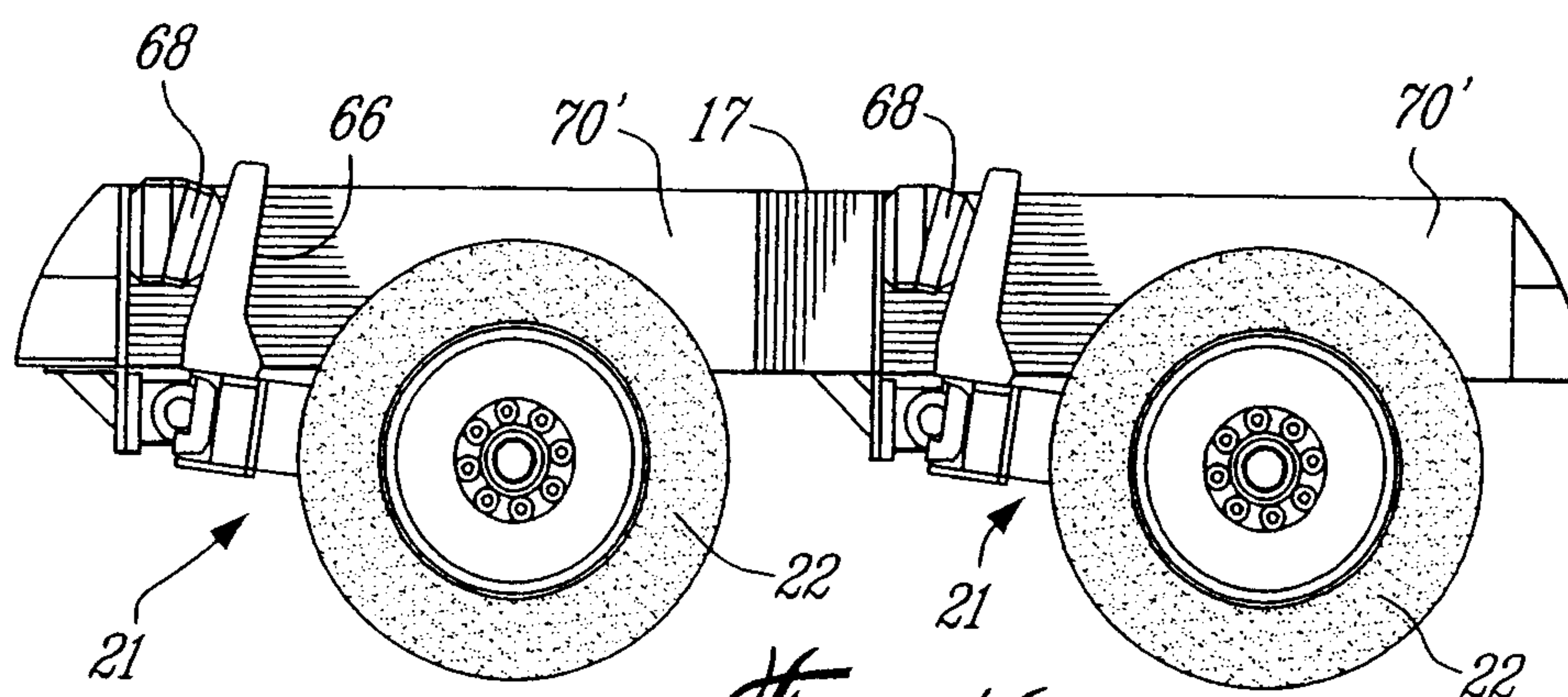
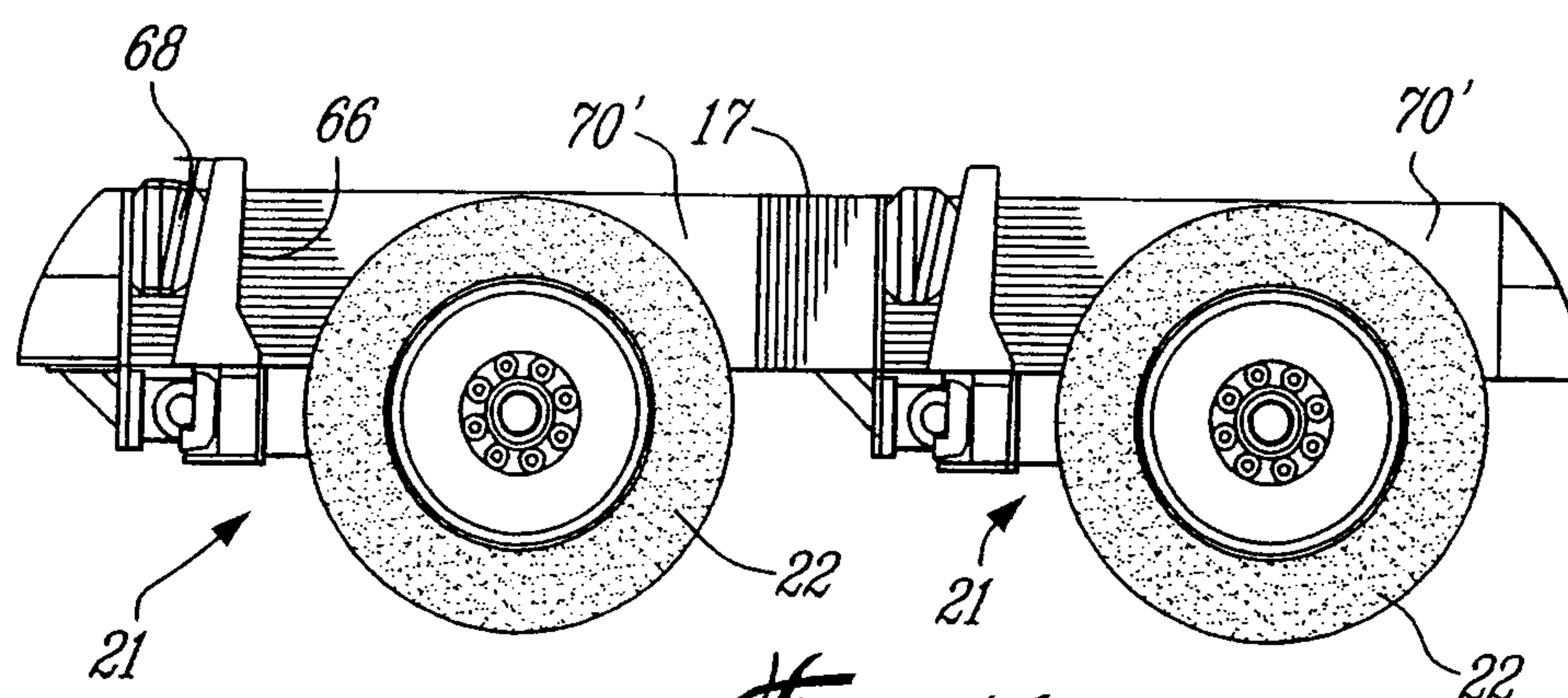


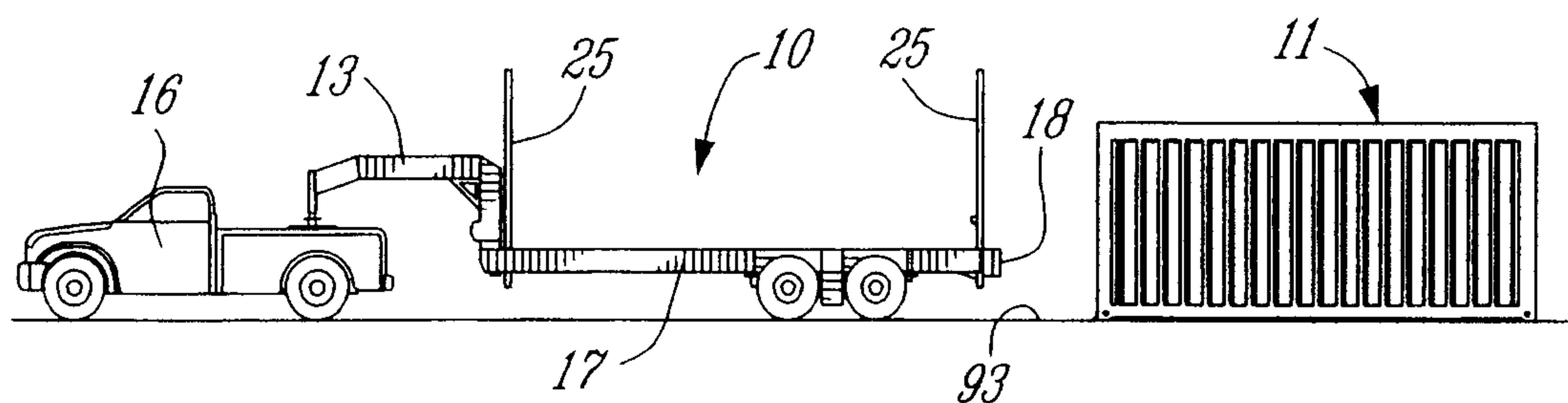
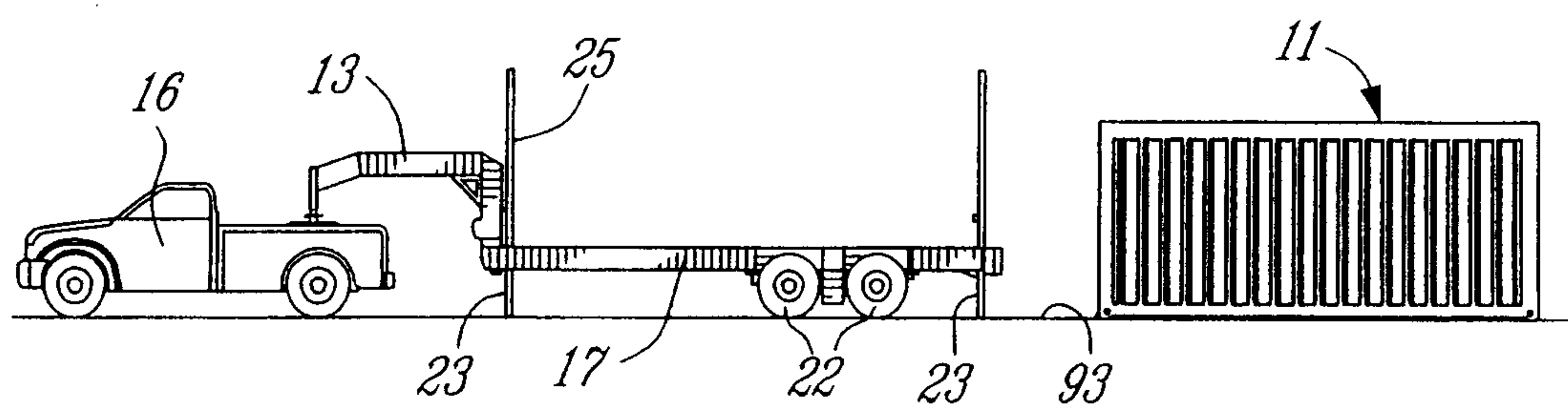
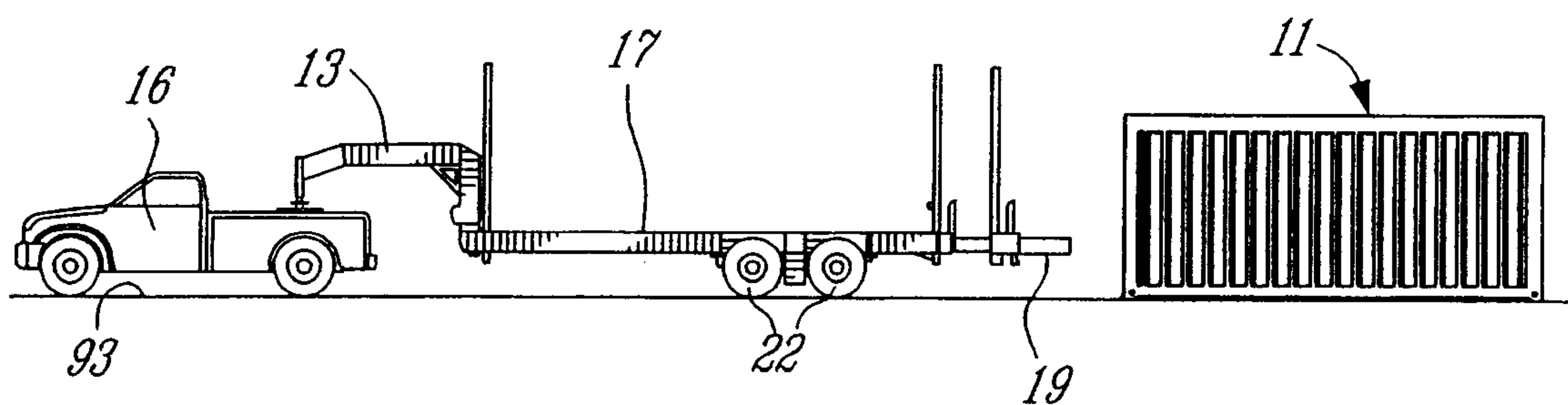
FIG. 8D

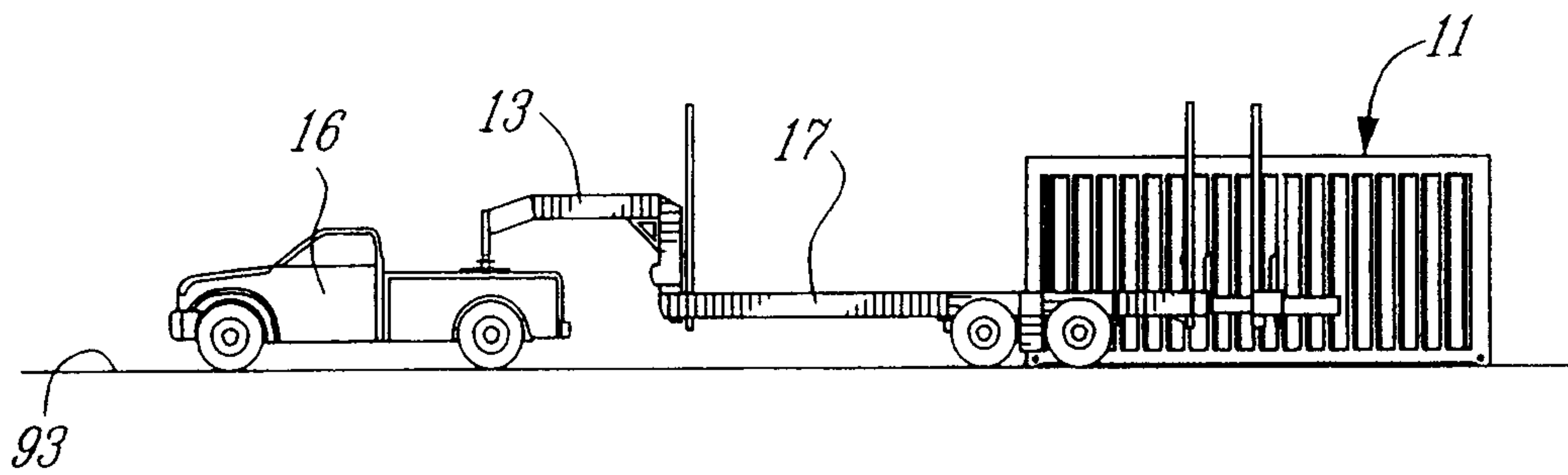
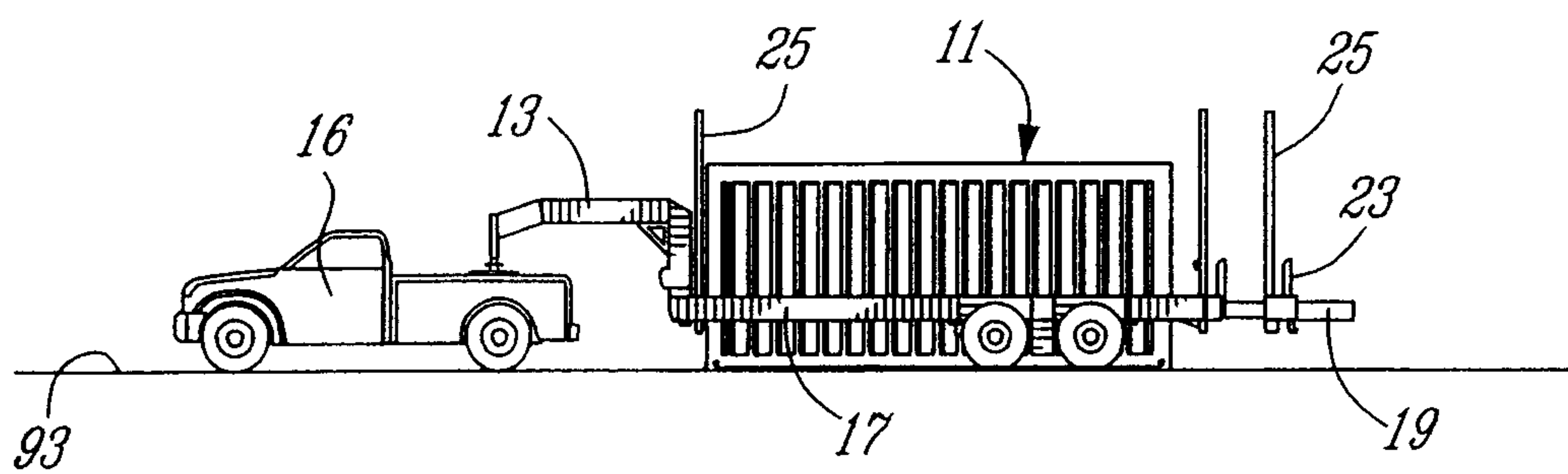
*Fig. 10**Fig. 11*

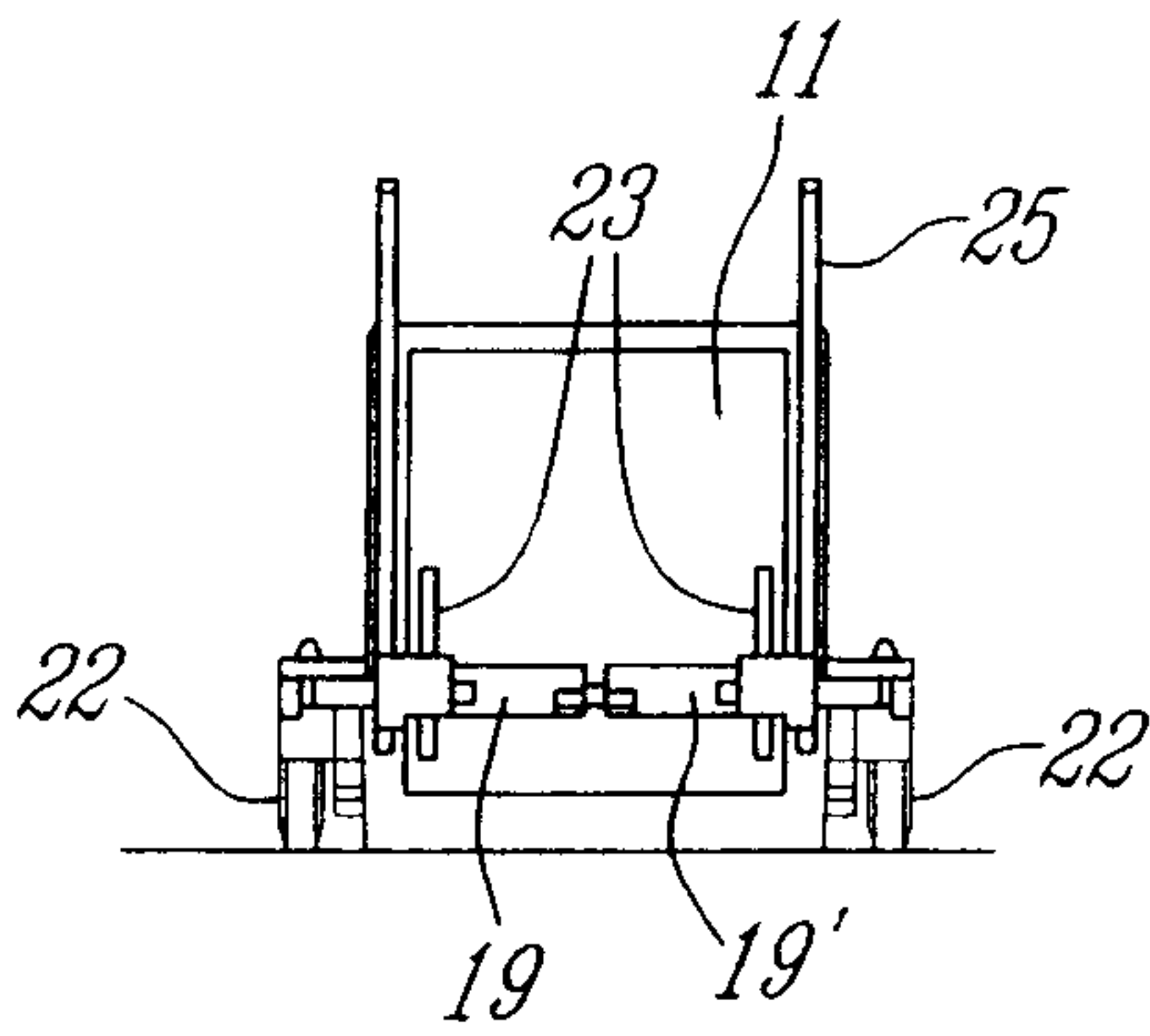
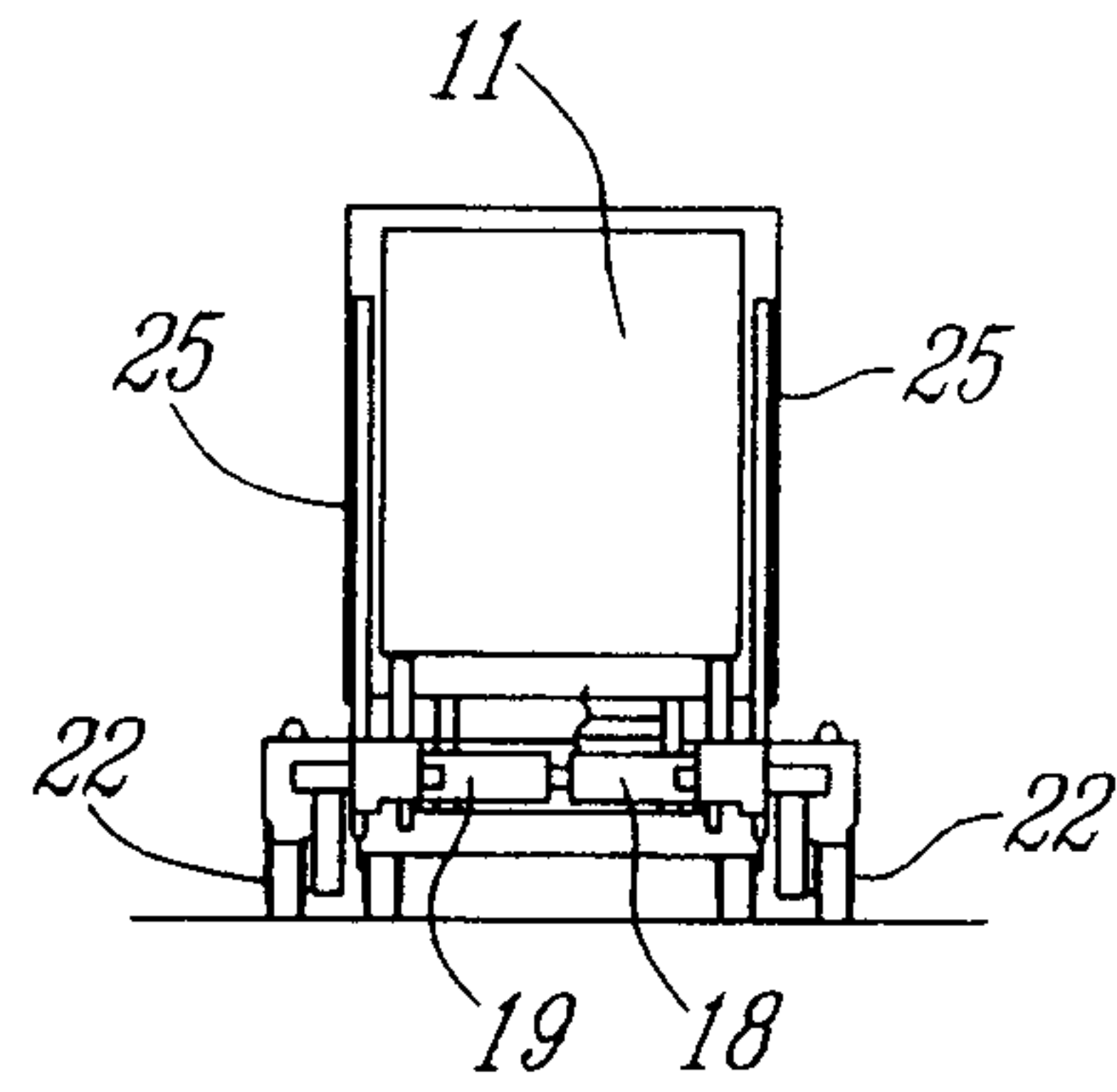
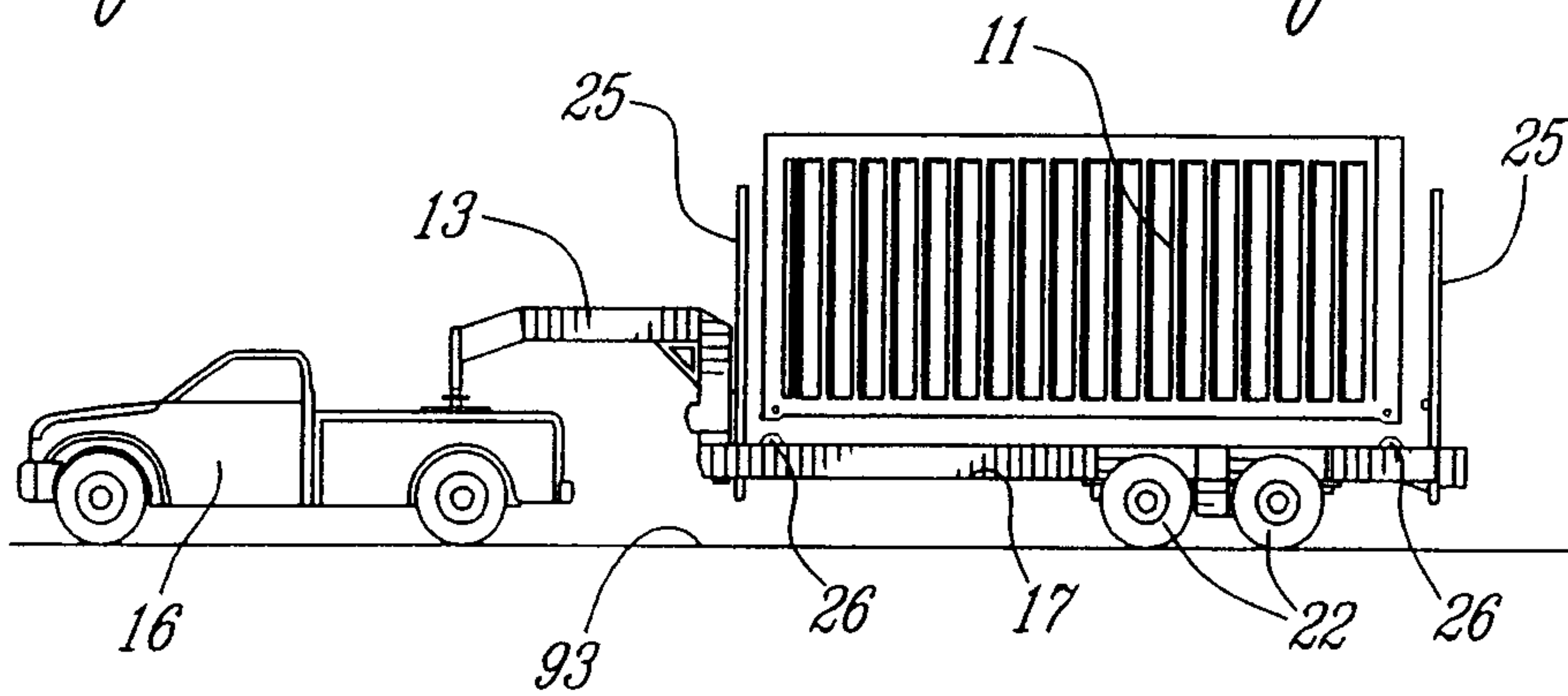
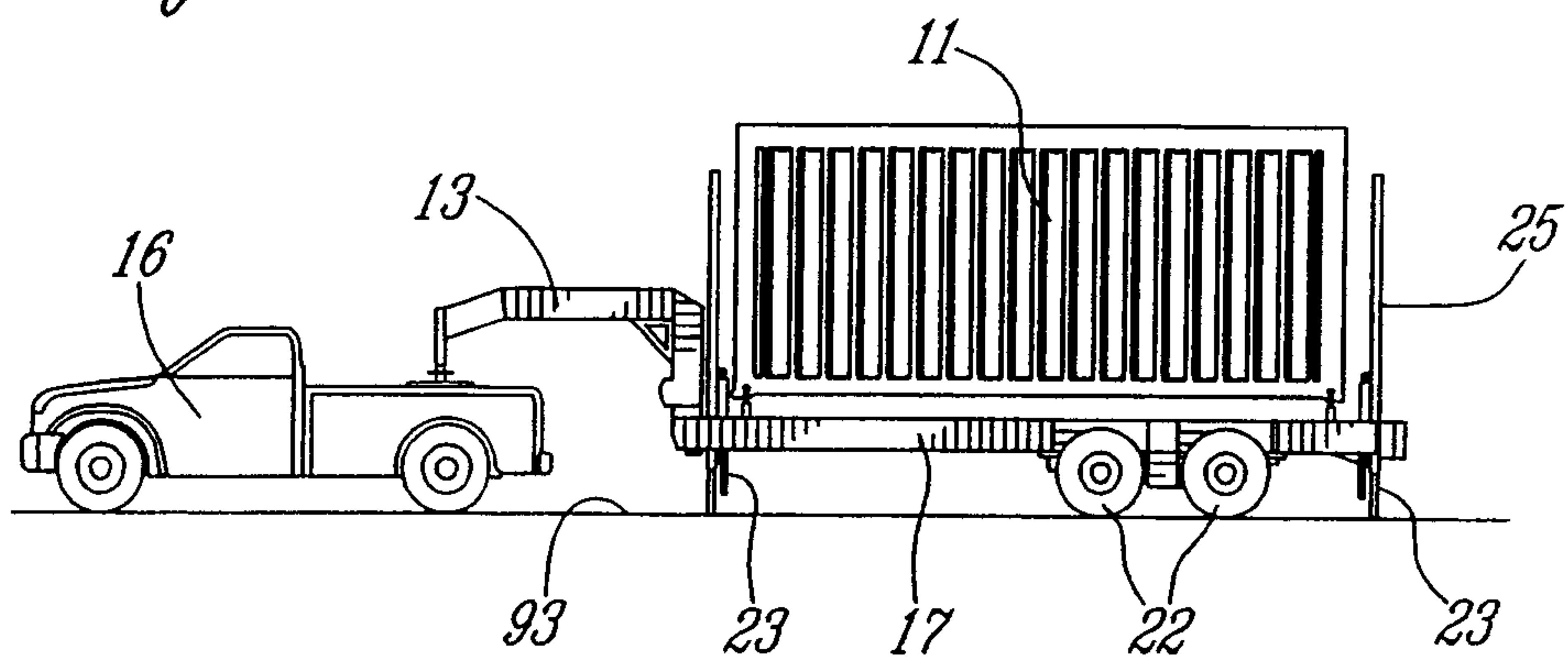


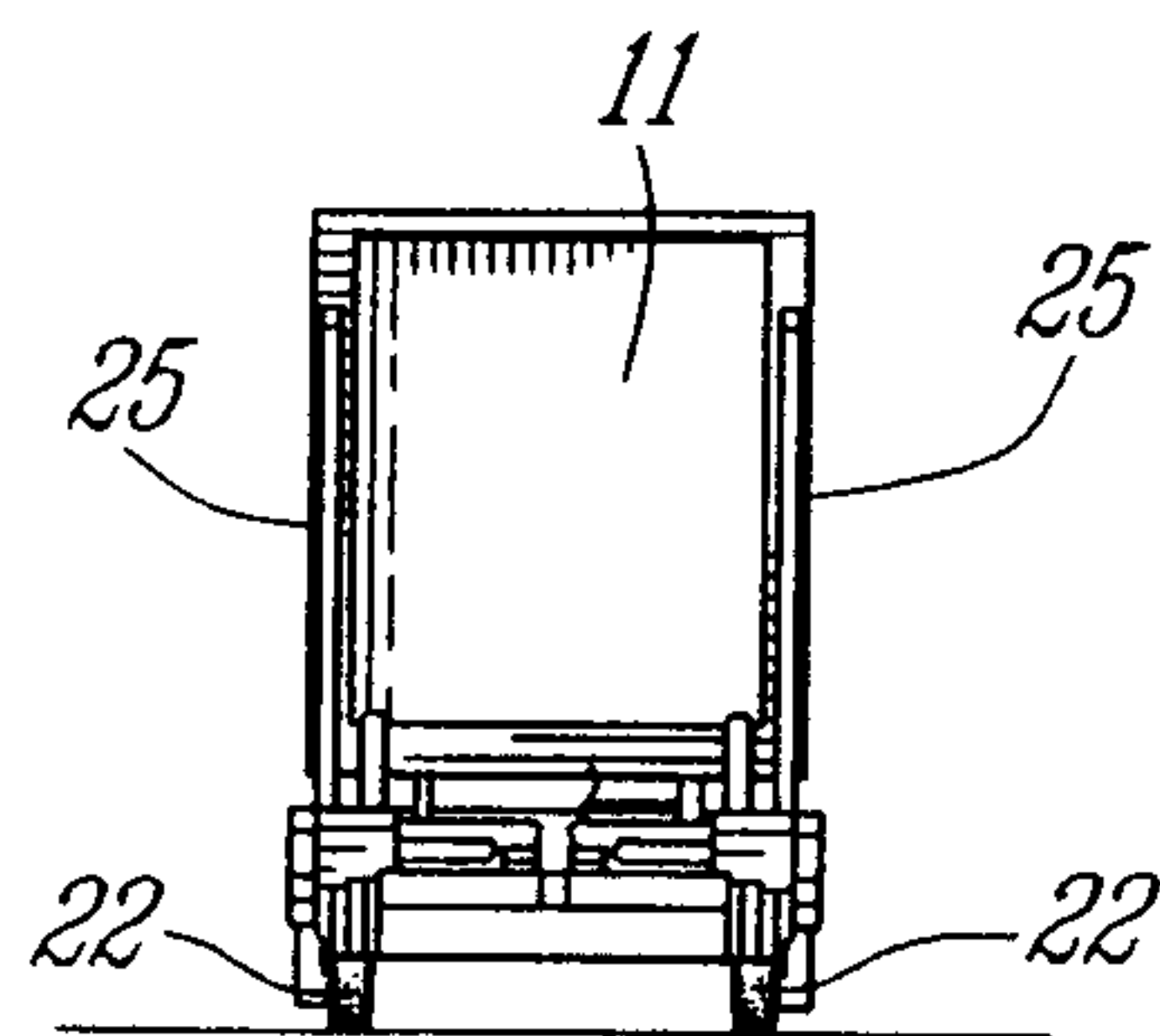
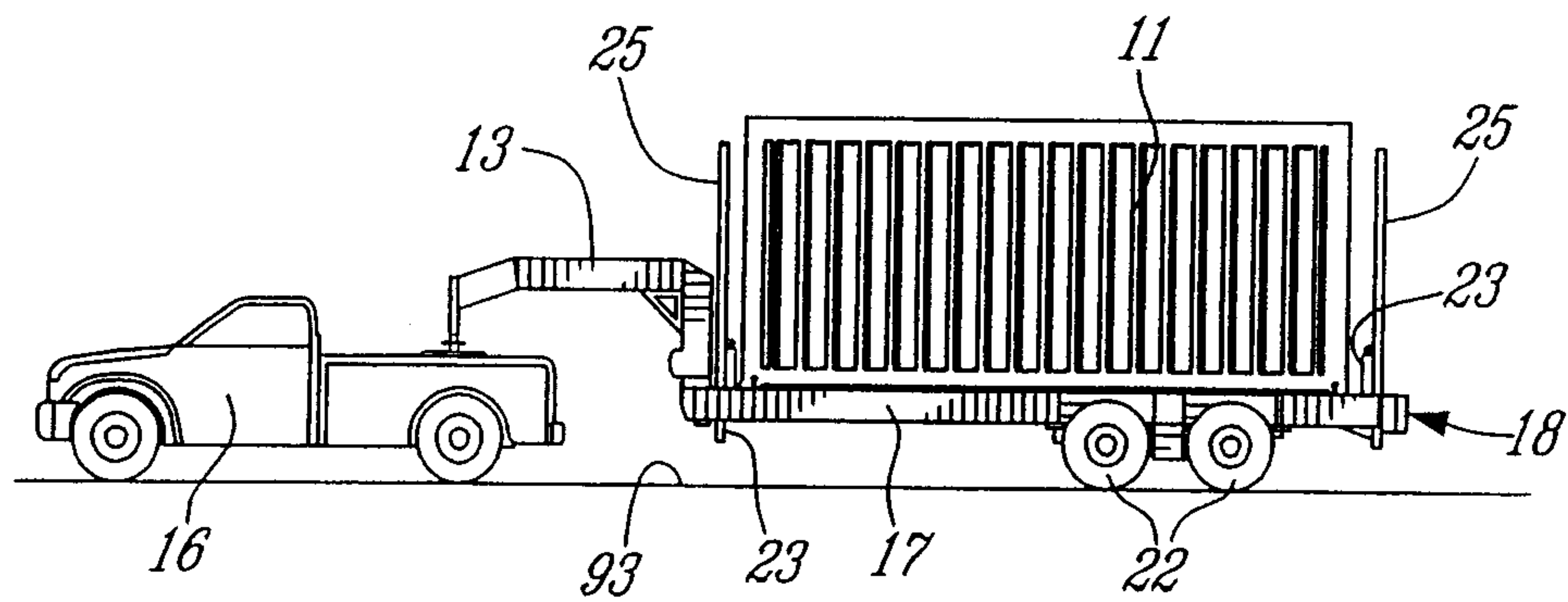
*Fig. 14**Fig. 15*

*Fig. 16A**Fig. 16B**Fig. 16C*

*Fig. 17A**Fig. 17B**Fig. 17C*

*Fig. 17D**Fig. 17E*

*Fig. 17_F**Fig. 17_H**Fig. 17_G**Fig. 17_I*

*Fig. 17J**Fig. 17K*

