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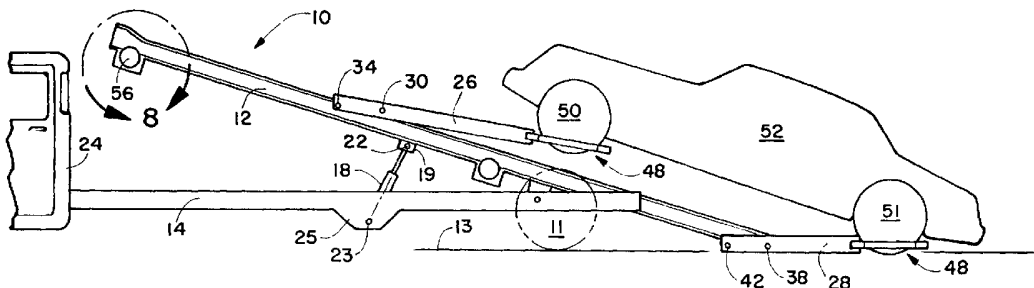
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- (71) Applicant and  
(72) Inventor: LEWIS, Carl [US/US]; 4215 Dellwood Street, San Diego, CA 92111 (US).
- (74) Agent: HARMS, Donn, K.; Registered Patent Attorney, Suite 100, 12702 Via Cortina, Del Mar, CA 92014 (US).
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(54) Title: VEHICLE CARRIER



(57) Abstract: The vehicle carrier of the present invention employs a tilting 'I' beam (12) centered on the rear of a truck type carrier (10). First and second wheel carriers (26, 28) are carried by the 'I' beam. The wheel carriers are translatable along the 'I' beam. The first wheel carrier engages and lifts the wheels (50) of the vehicle to be transported (52) that are located adjacent to the back of the carrier vehicle. The second wheel carrier engages and lifts the wheels (51) of the vehicle to be transported that are remote from the back of the carrier vehicle. The wheel carriers have 'U' shaped yokes (48) pivotally attached at each distal end of a cross member (46) that is positioned normal to the longitudinal center line of the 'I' beam. The yokes are spring biased toward the front of the vehicle to be carried so that one of the yoke arms first engages the front of a wheel and pivots around that wheel as the wheel carrier is translated rearwardly away from the carrier vehicle.



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**TITLE OF THE INTENTION**  
**VEHICLE CARRIER**

**BACKGROUND OF THE INVENTION**

5           This invention is directed to a vehicle carrier and more particularly to a vehicle carrier that can attach, lift and transport a four-wheel automobile from a fixed position completely immobile without manual assistance by the carrier operator.

10           Tow trucks or towing vehicles have been around for a long time and probably have existed since the invention of the automobile. In the early days of the automobile, due to their unreliability of operation for whatever reason requiring mechanic's assistance, being wrecked and inoperable required  
15 towing to the nearest repair garage. The first tow trucks as such were probably draft horses or the like. The use of horses was followed by automobiles using chains and the like to tow disabled automobiles. Later trucks with lift booms were used. Little effort was made to prevent damage to the vehicle being  
20 towed. In modern times, impounding of automobiles by the legal establishment and repossessing of automobiles required even additional requirement for tow trucks.

          Modern day tow trucks are designed for ease of operation, safety and to prevention of damage to the vehicle being towed.  
25 Some of these modern tow trucks include the following:

          In US Patent No. 5,607,279 Inventor Richard W Hill teaches a boom accessory for a flat bed tow truck that includes a frame that is lockable onto a power underlift hoist of a truck by retraction of a ram of the hoist against the  
30 truck frame. The frame includes a base for engagement on the ram, an upwardly and rearwardly extending boom member, and optionally, a rearward facing trailer hitch socket for permitting trailers to be towed with the boom accessory in place. A sleeve assembly is pivotally mountable atop the boom  
35 member for engaging a hook cable extending from a winch unit

of the truck, the accessory extending the utility of the tow truck by enabling retrieval of disabled vehicles without significant modification of the truck. A method for hoisting a load by the flatbed tow truck includes the steps of  
5 providing the boom accessory, extending the ram, resting the base on the ram, retracting the ram for clamping the base between the head portion of the ram and the leg member, threading the cable over the sheave, connecting the cable to the load and activating the winch for moving and hoisting the  
10 load, the cable being movably supported by the sheave. All of the past and present tow trucks require that considerable manual labor to prepare the disabled vehicle for towing.

In US Patent No. 5,607,279 Inventor Richard W Hill teaches a boom accessory for a flat bed tow truck that  
15 includes a frame that is lockable onto a power underlift hoist of a truck by retraction of a ram of the hoist against the truck frame. The frame includes a base for engagement on the ram, an upwardly and rearwardly extending boom member, and optionally, a rearward facing trailer hitch socket for  
20 permitting trailers to be towed with the boom accessory in place. A sleeve assembly is pivotally mountable atop the boom member for engaging a hook cable extending from a winch unit of the truck, the accessory extending the utility of the tow truck by enabling retrieval of disabled vehicles without  
25 significant modification of the truck. A method for hoisting a load by the flatbed tow truck includes the steps of providing the boom accessory, extending the ram, resting the base on the ram, retracting the ram for clamping the base between the head portion of the ram and the leg member,  
30 threading the cable over the sheave, connecting the cable to the load and activating the winch for moving and hoisting the load, the cable being movably supported by the sheave. The use of this device is very labor intensive.

United States patents number 4,797,057 ; 4,678,392 and  
35 5,662,453 teach additional versions of wheel lifts for a tow

truck. These patents like Hill above require considerable manual labor from the tow truck operator for their manipulation.

5 United States patents number 5,662,453; 5,13,3633 and  
4,929,142 teach various renditions of vehicle carriers with  
tilt beds that tilt downward in the rear of the carrier to the  
same elevation as the vehicle to be transported and the  
vehicle a cable is attached by the vehicle carrier operator  
and the vehicle to be transported is pulled upon the tilted  
10 bed.

#### SUMMARY OF THE INVENTION

The vehicle carrier of the present invention employs a tilting  
'I' beam centered on the rear of a truck type carrier. A first  
15 and second wheel carriers are carried by the 'I' beam. The  
wheel carriers are translatable along the 'I' beam. The first  
wheel carrier engages and lifts the wheels of the vehicle to  
be transported that are located adjacent to the back of the  
carrier vehicle. The first wheel carrier is carried by the  
20 upper surface of the 'I' beam and the second wheel carrier for  
the engaging and lifting the wheels remote from the back of  
the carrier vehicle is carried by the lower surface of the 'I'  
beam.

The first and second wheel carriers have 'U' shaped yokes  
25 pivotally attached at each distal end of a cross member that  
is positioned normal to the longitudinal center line of the  
'I' beam. The yokes are spring biased toward the front of the  
vehicle to be carried so that one of the yoke arms first  
engages the front of a wheel and pivots around that wheel  
30 capturing the wheel as the wheel carrier is translated  
rearwardly away from the carrier vehicle.

The distal end of the 'I' beam is angled to conform with  
the street or support surface that is at the level of the  
carrier vehicle and the vehicle to be transported. The 'I'  
35 beam is rotated by a pair of hydraulic rams to position the

rear distal end of the 'I' beam to street level. The first wheel carrier is translated rearwardly along the 'I' beam to engage the wheels adjacent to the back of the carrier vehicle. After engagement, the 'I' beam is rotated away from the ground level lifting the first wheel carrier and engaged end of the  
5 vehicle carried by the support. The first wheel carrier is then translated toward the front of the carrier vehicle and the second wheel carrier is translated rearwardly of the carrier vehicle passing under the first wheel carrier. The  
10 second wheel carrier operates the same as the first wheel lift engages the remaining pair of wheels of the vehicle while translating rearwardly. After engagement, both the first and second wheel carriers are translated simultaneously toward the front of the carrier vehicle to equalize the weight of the  
15 carried vehicle on the vehicle carrier and the 'I' beam is further rotated to a stowed position substantially horizontal to the carrier vehicle frame and support surface.

After loading, the carried vehicle can be transported to a desired location and unloaded from the carrier vehicle by  
20 reversing the above detailed loading procedure.

Unlike the prior art carrier vehicles, the operator of the carrier vehicle of the instant invention is not required to perform any manual labor to either load or unload the carried vehicle and does not even have to leave the cab of the  
25 carrier vehicle while loading or unloading a carried vehicle.

The principle object of this invention is to provide a carrier vehicle as described above that does not require any manual labor to load or unload a carried vehicle.

Another object of this invention is to provide a vehicle  
30 carrier that does not cause damage to the carried vehicle during loading, unloading or transport.

Yet another object of this invention is to provide an economically inexpensive vehicle carrier that provides ease of loading and unloading a carried vehicle.

Other objects and advantages will become obvious when taken into consideration with the following drawings and specifications.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 depicts a side view of the vehicle carrier of the invention;

Figure 2 depicts a side view of the 'I' beam of the carrier of Figure 1 pivoted in a deployed vehicle pickup position;

Figure 3 is a cross-sectional showing taken along line 3-3 of Figure 2;

Figure 4 depicts the positional relationship of the two wheel carriers as one wheel carrier passes under the other wheel carrier during translation of either wheel carrier;

Figure 5 is a partial plan view showing of the vehicle carrier of Figure 1.

Figure 6 depicts the wheel engaging action of the wheel carriers;

Figure 7 depicts a pair of wheels positioned on one wheel carrier with the second wheel carrier being translated under the second set of vehicle wheels; and

Figure 8 is a detail of the end of the 'I' beam 12 showing the drive motor and chain for translating a wheel carrier.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing Figures in detail, Figures 1 and 2 show the vehicle carrier 10 of the invention. Vehicle carrier 10 has support wheels 11 resting on a surface 13. The vehicle carrier 10 includes a tiltable beam 12 that is pivotally attached to the frame 14 of the vehicle carrier at pivot point 16 (see drawing Figure 2). A pair of hydraulic actuators 18 power the tilt of the 'I' beam between a stowed position as shown in Figure 1 and a full tilt vehicle load

position as shown in Figure 2. The actuators 18 are pivotally connected to the frame cross member 19 at pivots 20 and 21 and the 'I' beam cross member 22 at pivot 23 and 25. A typical hydraulic pump 56, well known in this art, operable from the cab portion of the vehicle carrier 24 provides controlled hydraulic pressure to or bleeds hydraulic pressure from the actuator 18 for its operation.

Carried by the 'I' beam 12 are a pair of wheel carriers 26 and 28 that are translatable along the 'I' beam from a stowed position as shown in Figure 1 to various deployed positions as shown in Figures 2 and 4-5 and 7. The wheel carriers 26 and 28 are translated along the 'I' beam by means of a pair of similar chains 54, see drawing Figure 8, with one on each side of the 'I' beam 12 with one attached to each carrier and operated by a hydraulic motor, electric motor 56 or the like suitable for the purpose intended.

Referring now specifically to drawing Figure 3 and Figure 4, Figure 3 is a showing taken along line 3-3 of Figure 2 and Figure 4 is a section of the vehicle carrier of Figure 2. Figures 3 and 4 depict the position of the wheel carriers 26 and 28 along 'I' beam 12. Support rollers 30 of wheel carrier 26 ride along the top 32 of the 'I' beam while carrier rollers 34 ride along the bottom of the upper surface 36 of the 'I' beam 12. Support rollers 38 ride along the top of the lower surface 40 and rollers 42 ride along the bottom surface 40 of the 'I' beam. These rollers support the wheel carriers as they are translated along the 'I' beam. In Figure 5 it should be noted that the wheel carriers 26 and 28 can pass one over the other during relative translation.

Referring now to drawing figure 5, a plan view of the vehicle carrier is shown. Each wheel carrier 26 and 28 which are substantially of the same configuration. The only differences are that the lower wheel carrier 28 has an opening 45 that allows for the wheel carrier 26 to pass over wheel carrier 28 as shown in drawing Figure 1 and a different

location for the biasing springs. Each wheel carrier includes a cross arm 46 that is normal to the 'I' beam 12 with the exception that wheel carrier 26 has a pivot point 27 to allow of angle of approach to the wheels of the carried vehicle. On each distal end of the cross arm 46 is a pivotal 'U' shaped wheel capturing member 48 between the 'U' members rearwardly of the vehicle carrier cab 24 is a bias spring 47 that pivots the 'U' members as shown toward each other.

As can be seen in drawing Figure 6, as the wheel carriers, either 26 or 28 translate along the 'I' beam in the direction of arrow 44 one arm of the 'U' members contact the front of a pair of wheels 50 on the vehicle 52 to be carried by the carrier and as the wheel carrier translates rearwardly the wheels are captured within the 'U' member against the bias of spring 47.

Referring now specifically to drawing Figure 7, this Figure depicts a vehicle 52 to be transported by the vehicle carrier 10. The vehicle 52 is shown with its front wheels in the wheel carrier 26 in a position to translate the wheel carrier 28 around rear wheels 51.

In operation, the 'I' beam is tilted to allow the wheel carrier 26 to translate rearwardly to engage wheels 50, the wheel carrier 26 is then translated along the 'I' beam 12 until the rear wheels 51 are in position for translation of the wheel carrier 28 rearwardly to capture the wheels 51 and then both wheel carriers 26 and 28 are simultaneously translated along the 'I' beam 12 and the 'I' beam is pivoted toward the vehicle carrier frame 14 to a position substantially horizontal to the carrier vehicle frame 14. The inclination of wheel carrier 26 changes to a smaller angle relative to the 'I' beam 12 as it is translated over the curved surface 31 at the inwardly end of the 'I' beam 12 toward the cab 24. This feature improves the clearance between wheel carriers 26 and 28 and lowers the height of the front of the carried vehicle in the drawing Figure 1 position.



Figure 8 depicts a chain 54 driven by a motor 56 either hydraulic or electrical. Each wheel carrier has a similar independently operated drive. The chain 54 is attached to one of the wheel carriers and the wheel carrier is translated in a direction determined by the rotational direction of the motor 56. A similar drive on the opposite side of the 'I' beam drives one of the wheel carriers as the one shown which is identical drives the other wheel carrier.

The materials of construction can be selected from any material suitable for the purpose intended.

It should be understood that all controls for pivoting the 'I' beam or translating the wheel carriers can be operated from the interior or the exterior of the vehicle carrier.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiments, it is recognized that departure may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but it is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and apparatus.

What is claimed is:

1. A carrier vehicle for transporting a vehicle having a front and back pair of wheels, said vehicle carrier having an operator cab section and a transport bed, said transport bed having a front surface adjacent to said cab and a rear distal  
5 end surface comprising:

an I beam having a pivotal attachment to said transport bed intermediate the front and rear surface thereof;

at least one actuator pivotally connected between said transport bed and said 'I' beam for pivoting said 'I' beam  
10 about the pivotal attachment to said transport bed;

a first wheel carrier for supporting a pair of wheels of said four wheel vehicle, said wheel carrier translatable along a first surface of said 'I' beam;

a second wheel carrier for supporting a pair of wheels of said four wheel vehicle translatable along the second surface  
15 of said 'I' beam; and

means for independent translation of said first and second wheel engaging assemblies.

20 2. The invention as defined in claim 1 wherein said 'I' beam extends beyond the rear surface of said transport bed.

3. The invention as defined in claim 1 wherein said at least one actuator is a pair of hydraulic rams.

25 4. The invention as defined in claim 1 wherein said wheel carriers are independently chain driven between a stowed position adjacent to said cab section and a deployed position spaced from said cab for engaging said vehicle to be  
30 transported.

5. The invention as defined in claim 1 wherein said wheel carriers include 'U' shaped assemblies on each distal end thereof carried by a support member positioned normal to the

longitudinal center line of said 'I' beam for engaging and straddling a pair of wheels.

5 6. The invention as defined in claim 5 additionally comprising a bias means connected to said 'U' shaped assemblies of each of said wheel engaging assemblies for causing the 'U' assemblies to engage a pair of said wheels when said wheel supports are translated rearwardly of said cab.

10

7. The invention as defined in claim 1 wherein said first wheel carrier translates along the top surface of said 'I' beam.

15

8. The invention as defined in claim 1 wherein said second wheel carrier translates along the bottom surface of said 'I' beam.

20

9. The invention as defined in claim 1 wherein said wheel carriers pass one over the other during relative translation thereof.

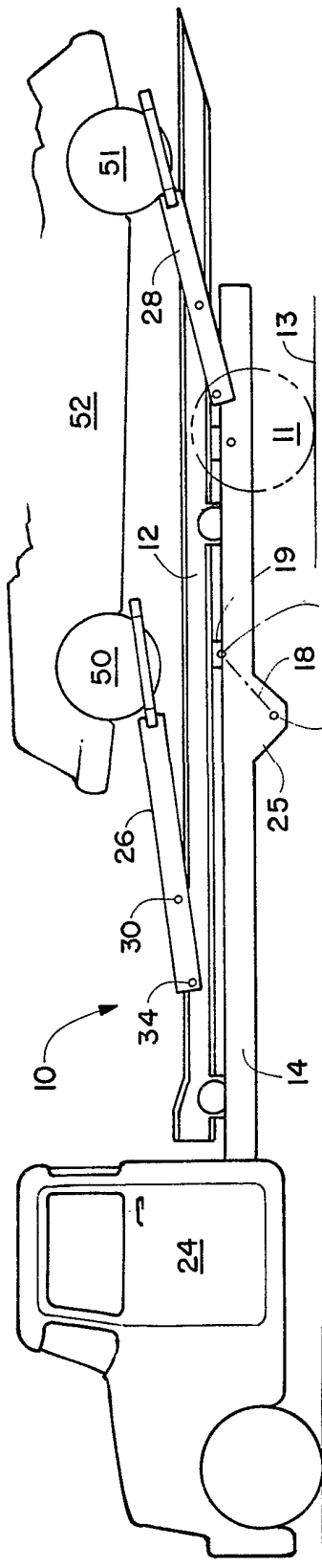


FIGURE 1

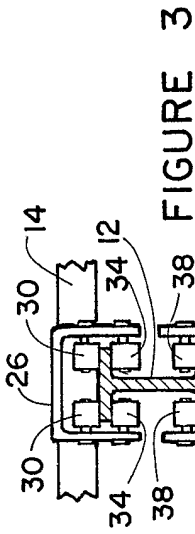


FIGURE 3

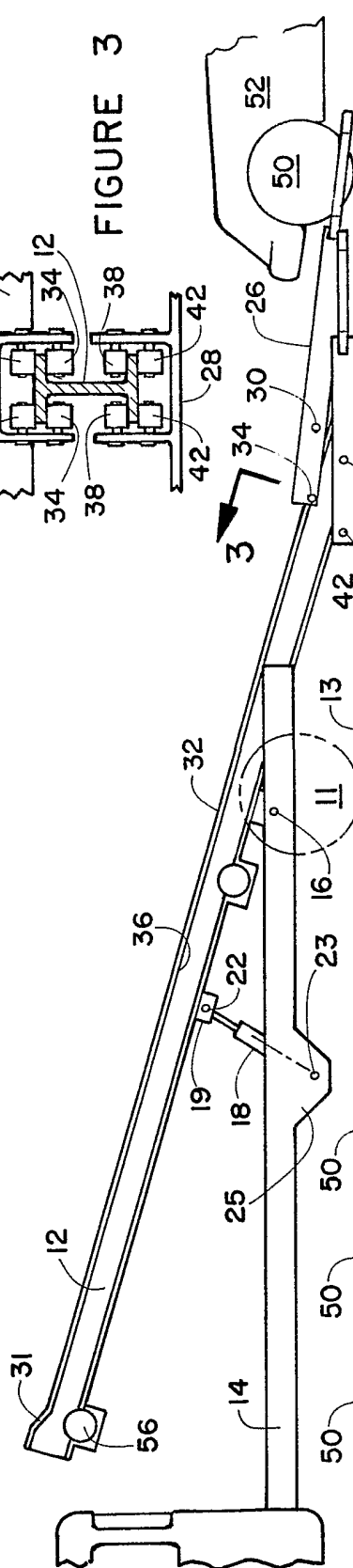


FIGURE 2

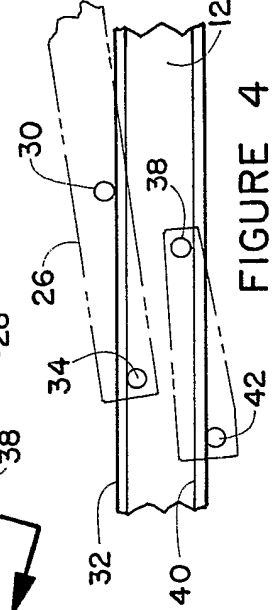


FIGURE 4

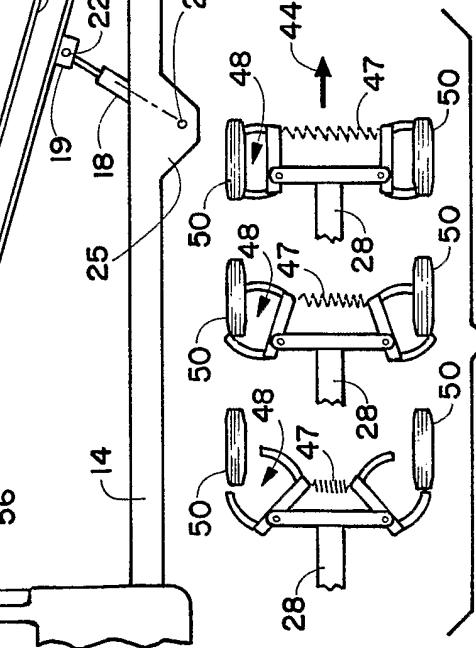


FIGURE 6

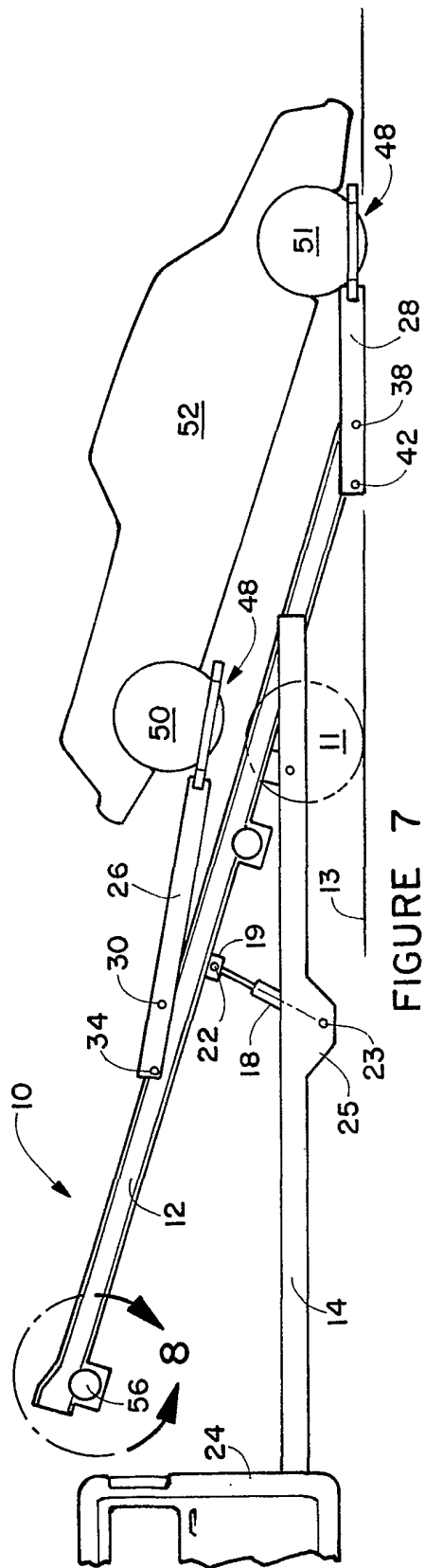


FIGURE 7

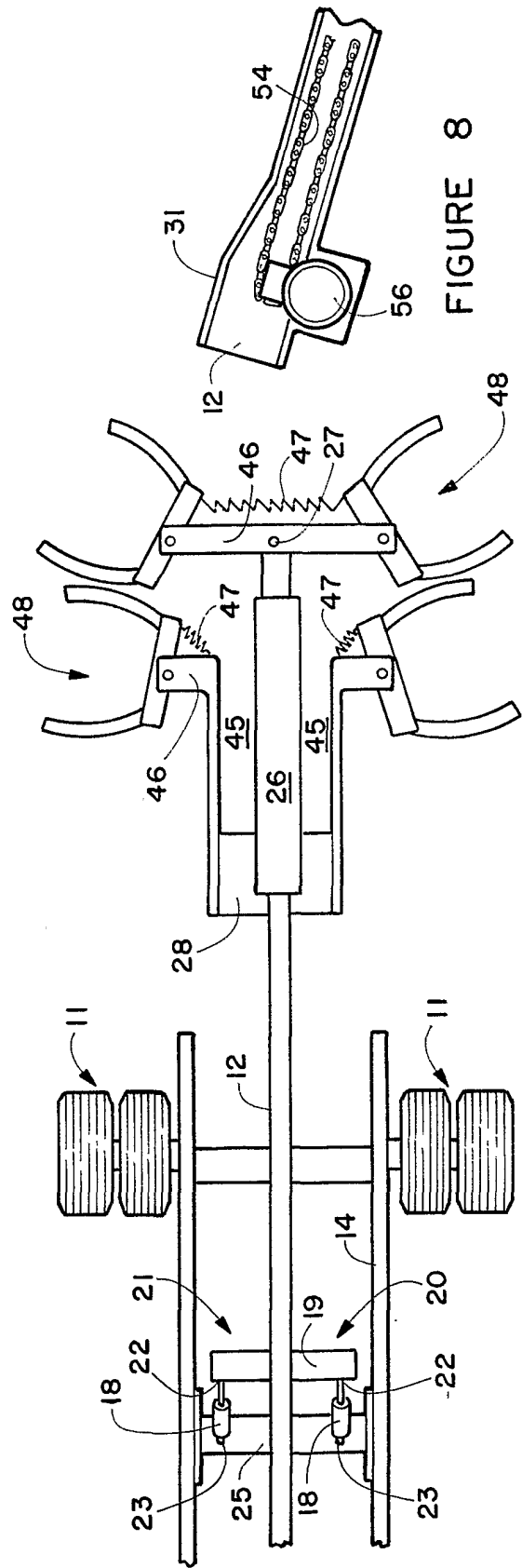


FIGURE 5

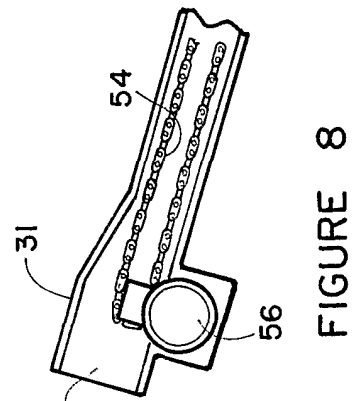


FIGURE 8

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US01/15537

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC(7) :B60P 3/12 US CL : 414/563 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) U.S. : 414/426, 477, 563		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,013,209 A (DeMichele et al) 07 May 1991.	
A	US D322,948 A (DeMichele et al) 07 January 1992.	
A	US 2,111,341 A (Tetrault) 15 March 1938.	
A	US 4,712,967 A (Farthing) 15 December 1987.	
A	US 4,761,111 A (Brown) 02 August 1988.	
A	US 4,795,303 A (Bubik) 03 January 1989.	
A	US 5,607,279 A (Hill et al) 04 March 1997.	
A	DE 2,821,436 A1 (Witech) 22 November 1979.	
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US01/15537

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	SU 1,486,380 A2 (Mosstroitrans Avtok) 15 June 1989.	
A	FR 2,690,883 A1 (Georges) 12 November 1993.	