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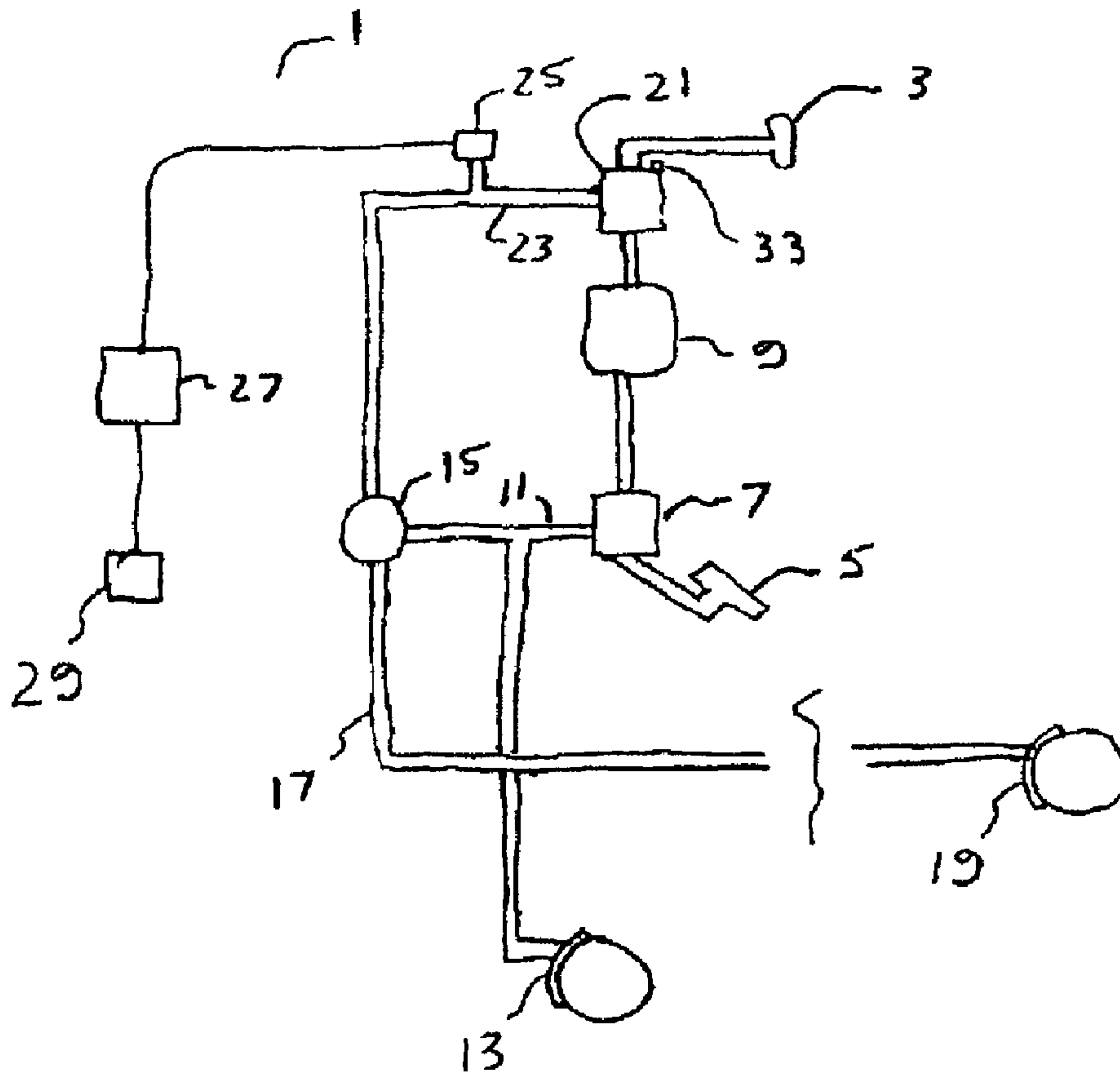
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(54) Titre : MONITEUR POUR ACTIVATION DE FREIN DE REMORQUE MANUEL

(54) Title: MONITOR FOR MANUAL TRAILER BRAKE ACTIVATION





**MONITOR FOR MANUAL TRAILER BRAKE ACTIVATION**

This invention relates to highway tractor trailer vehicles and in particular braking systems for such vehicles.

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**BACKGROUND**

Highway tractor trailer vehicles include separate systems of brakes on each of the tractor and the trailer. The systems are connected when the tractor is hitched to the trailer by  
10 connecting a set of air lines from the tractor to the trailer. The systems are coordinated such that when the brake pedal on the tractor is depressed, the brakes on both the tractor and the trailer are activated.

A separate manual trailer brake control is also provided in the truck so that the operator  
15 can activate the trailer brakes without activating the truck brakes. The manual trailer brake control is used at low speeds to check that the trailer brakes are operating by allowing the truck to roll while applying only the trailer brakes. The operator will know the trailer brakes are operating because the trailer brakes will stop the vehicle without any tractor brakes being applied. This procedure is a safety measure in that testing the trailer  
20 brakes also ensures that the trailer is properly connected to the tractor.



The manual trailer brake control is also necessary to allow the trailer brakes to be applied independently to control a jack-knife situation. Activating the trailer brakes alone slows the trailer down and pulls the vehicle straight to correct the jack-knife situation.

5 Brake failure or malfunction is a significant factor in highway accidents. Brake adjustment and function are checked by personnel at highway truck inspection points who have the power to pull a tractor or trailer out of service until the brakes are adjusted and functioning properly. Brake adjustment is time consuming, especially given the large number of wheels on tractor trailer vehicle. Self-adjusting brakes have therefore been  
10 developed for use on both tractors and trailers and operate to maintain proper adjustment of brakes and keep the vehicle on the road, however brake maintenance to correct wear on brakes remains a considerable expense for the owner of tractors and trailers.

#### **SUMMARY OF THE INVENTION**

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It is an object of the present invention to provide a method and apparatus for reducing wear and incidences of poor adjustment of trailer brakes that overcomes problems in the prior art.

20 It is common in the trucking industry for trailers to be owned by a trucking company who in turn hire tractors owned by owner-operators to pull the trailers to their various destinations. The owner-operator typically owns the tractor, and either drives it himself or hires the person who does the driving. Thus the trucking company owns the trailers



while the tractors are owned by a different party who controls how the tractor trailer vehicle is operated.

In order to save wear on the tractor brakes it is generally known that owner-operators will  
5 often use the manual trailer brake control to operate the trailer brakes without  
coincidentally operating the tractor brakes. Thus the trailer brakes are required to stop  
the tractor trailer vehicle alone without assistance from the tractor brakes. This causes  
significantly increased wear on the trailer brakes and costly premature replacement of  
trailer brakes. The problem is somewhat exacerbated by self-adjusting brakes, which  
10 ensure proper adjustment of the trailer brakes until they are virtually worn out and require  
replacement. Where trailer brakes are not self adjusting, constant use of trailer brakes  
alone using the manual trailer brake control will wear the brakes down such they may  
require adjustment by the operator prior to the destination. The operator is thus more  
inclined to operate the brakes of the tractor trailer vehicle to avoid having to make this  
15 time consuming adjustment.

For comparative mileage, brakes on trailers pulled by owner-operators often require a  
complete replacement two or three times a year, compared to trailers where the trailers  
and the trucks pulling them are owned by the same entity. In such commonly owned  
20 trailers the brakes may require replacement only about once every two years. At several  
hundred dollars per replacement, the extra costs for trailer owners are significant.



Many trucking companies presently require that tractors hired from owner-operator to pull their trailers be equipped with "tattletale" speed recorders, GPS systems, and the like so that the trucking company can monitor the operation of their trailers. Insurance costs for trailers can be reduced for example by ensuring that they are not pulled at speeds  
5 exceeding a set limit.

The invention therefore provides a monitor that records any activation of the manual trailer brake control, and the speed the tractor trailer vehicle is traveling when the activation occurs. Thus the trailer owner can determine whether the manual trailer brake  
10 control is being activated only at low speeds of about 5 - 10 kilometers per hour (kph) to test the trailer brakes and tractor trailer connection, or whether the control is being activated at higher speeds to save the tractor brakes.

The monitor can be connected to the manual trailer brake control airline, which is  
15 typically a separate line that is only pressurized when the manual trailer brake control is activated. Alternatively a switch can be positioned to detect movement of the manual trailer brake control to the activating position, however it is contemplated that monitoring air pressure will render the monitor less subject to tampering. Speed information can be gathered electronically from more modern tractors, or mechanically from older tractors in  
20 a manner similar to that used by prior art speed monitors. The monitor typically comprises a microprocessor operative to receive and store the speed and manual trailer brake control activation data. The data can be loaded to a memory card or the like at



intervals for review. Time and date data is also incorporated for tracking each tractor trailer vehicle.

Typically a trailer owner will negotiate a contract with the owner-operator that stipulates  
5 that for each use of the manual trailer brake control at a speed that is above a set limit, for  
example 15 kph, the owner-operator will pay a fine of a set amount, for example \$25 or  
\$50. Jack-knife situations are relatively rare, and so very occasional activation of the  
manual trailer brake control could be excused. The data will also indicate whether the  
operator of the tractor is checking the trailer brakes and tractor trailer connection by  
10 showing whether the manual trailer brake control was activated at low speeds. Safety  
could be improved by correcting failure of the operator to perform these checks.

#### **DESCRIPTION OF THE DRAWINGS**

15 While the invention is claimed in the concluding portions hereof, preferred embodiments  
are provided in the accompanying detailed description which may be best understood in  
conjunction with the accompanying diagrams where like parts in each of the several  
diagrams are labeled with like numbers, and where:

20 Fig. 1 is a schematic view of an embodiment of the monitor apparatus of the  
invention installed in a highway tractor.

#### **DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS**



Fig. 1 schematically illustrates a monitor apparatus 1 of the invention for detecting activation of the manual trailer brake control 3 in a highway tractor trailer vehicle. The manual trailer brake control 3 is typically located on the dashboard of the tractor and is  
5 activated by pulling on the control handle. The tractor also includes a foot pedal 5 connected to a pedal valve 7 that is charged with compressed air from a compressed air supply 9. When the pedal 5 is depressed, air is directed from the supply 9 through the pedal valve 7 to air line 11 which is connected to the tractor brakes 13 and to check valve 15. The air flows through check valve 15 to air line 17 connected to the trailer brakes 19.  
10 Thus depressing the pedal 5 provides compressed air to operate both the trailer brakes 19 and the tractor brakes 13.

The manual trailer brake control 3 is connected to a manual valve 21 that is also charged with compressed air from a compressed air supply 9. When the manual trailer brake  
15 control 3 is pulled, air is directed from the supply 9 through the manual valve 21 to air line 23 which is connected to the check valve 15. The air flows through check valve 15 to air line 17 connected to the trailer brakes 19. Thus pulling the manual trailer brake control 3 operates only the trailer brakes 19.

20 The check valve 15 is operative such that air can flow from the air lines 11 or 23 into the check valve 15 and through the check valve to air line 17 but air cannot flow from the check valve 15 backward into either air line 11 or 23. Thus when the foot pedal 5 is depressed no air flows into air line 23 connected to the manual valve 21, and so



compressed air is not present in air line 23 when the pedal 5 is depressed. Similarly when the manual trailer brake control 3 is pulled, no air flows into air line 11 and thus the tractor brakes 13 are not operated.

5 Such tractors typically include primary and back up secondary air circuits that are well known to those skilled in the art and so only those elements of the brake system of a typical tractor trailer vehicle that are required for illustration of the principles of the present invention are illustrated.

10 Air pressure sensor 25 is connected to air line 23 and is operative to detect the presence of compressed air in air line 23, and send a signal to a microprocessor 27 that compressed air is present. Compressed air will only be present in air line 23 when the manual trailer brake control is pulled to operate the trailer brakes 19 without operating the tractor brakes 13. Thus the signal to the microprocessor indicates that the manual trailer brake control 3  
15 has been activated.

The microprocessor 27 is also connected to receive data from a speed sensor 29 indicating the speed of the tractor trailer vehicle. The microprocessor 27 records any occurrence of manual trailer brake control activation, and the speed of the tractor trailer  
20 vehicle during each activation of the manual trailer brake control 3. The data can be downloaded from the microprocessor 27 to a memory device for review.



Fig. 1 also illustrates a switch 33 under the manual trailer brake control 3 that can be connected to the microprocessor 27 to record any activation of the manual trailer brake control 3 as an alternative to, or in addition to, the air pressure sensor 25.

5 The foregoing is considered as illustrative only of the principles of the invention. It is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense. Further, since numerous changes and modifications will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and  
10 described, and accordingly, all such suitable changes or modifications in structure or operation which may be resorted to are intended to fall within the scope of the claimed invention.



FIG. 1

