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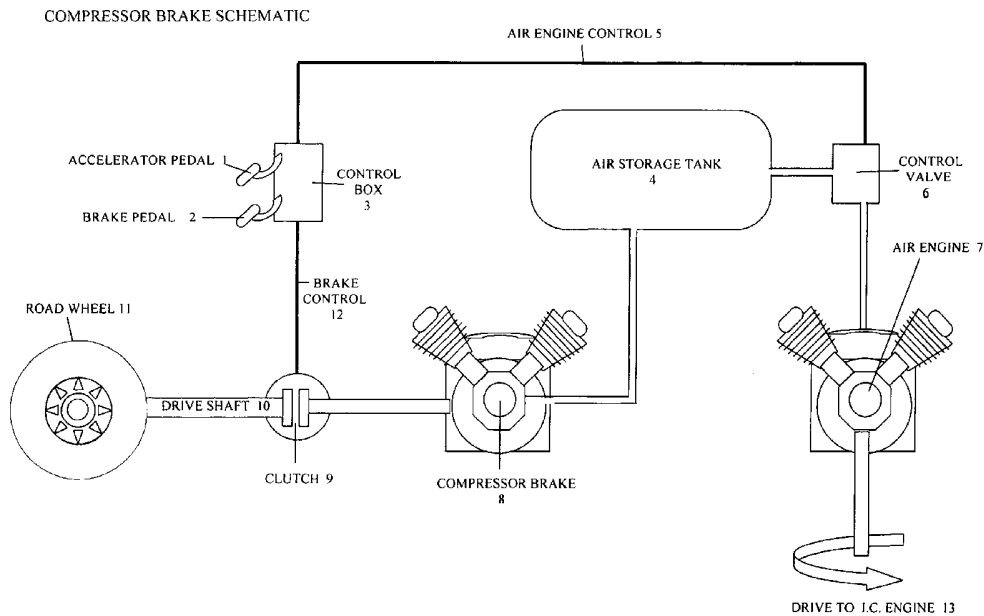
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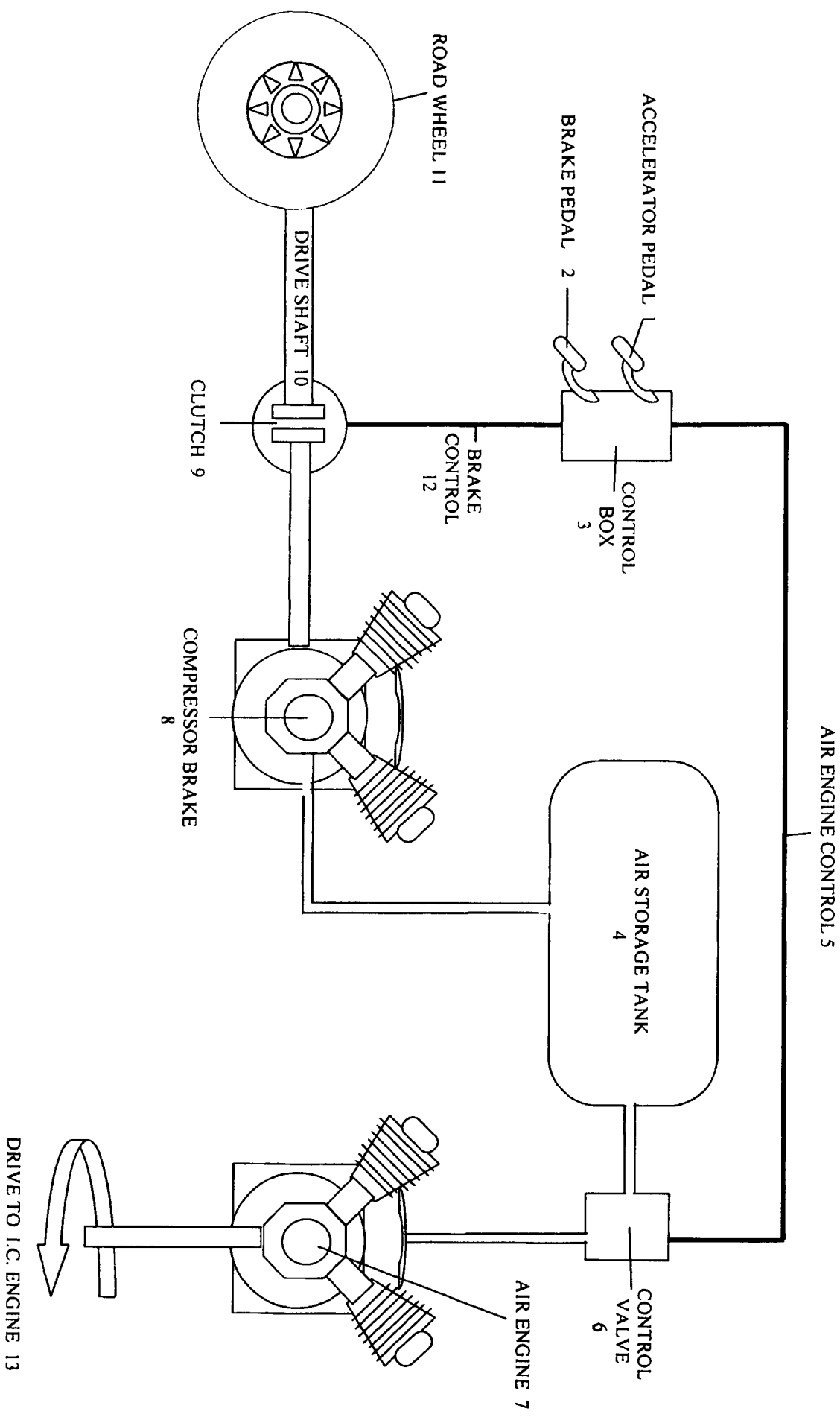
(54) Abstract Title: Regenerative vehicle brakes, using compressed air

(57) Regenerative brakes recover some of the energy lost by braking by clutching the road wheel 9 to the compressor(s) 8. The compressor(s) 8 converts this braking energy directly as compressed air into the air storage tank/accumulator 4. When the vehicle needs to accelerate, the accelerator pedal 1 movement is interpreted by the control box 3 to control the valve 6 to release the stored air to the air engine 7 to provide assistance to the internal combustion engine 13. This may be used in conjunction with solar electric powered air compressor(s) to add additional energy to the storage tank during daylight hours.

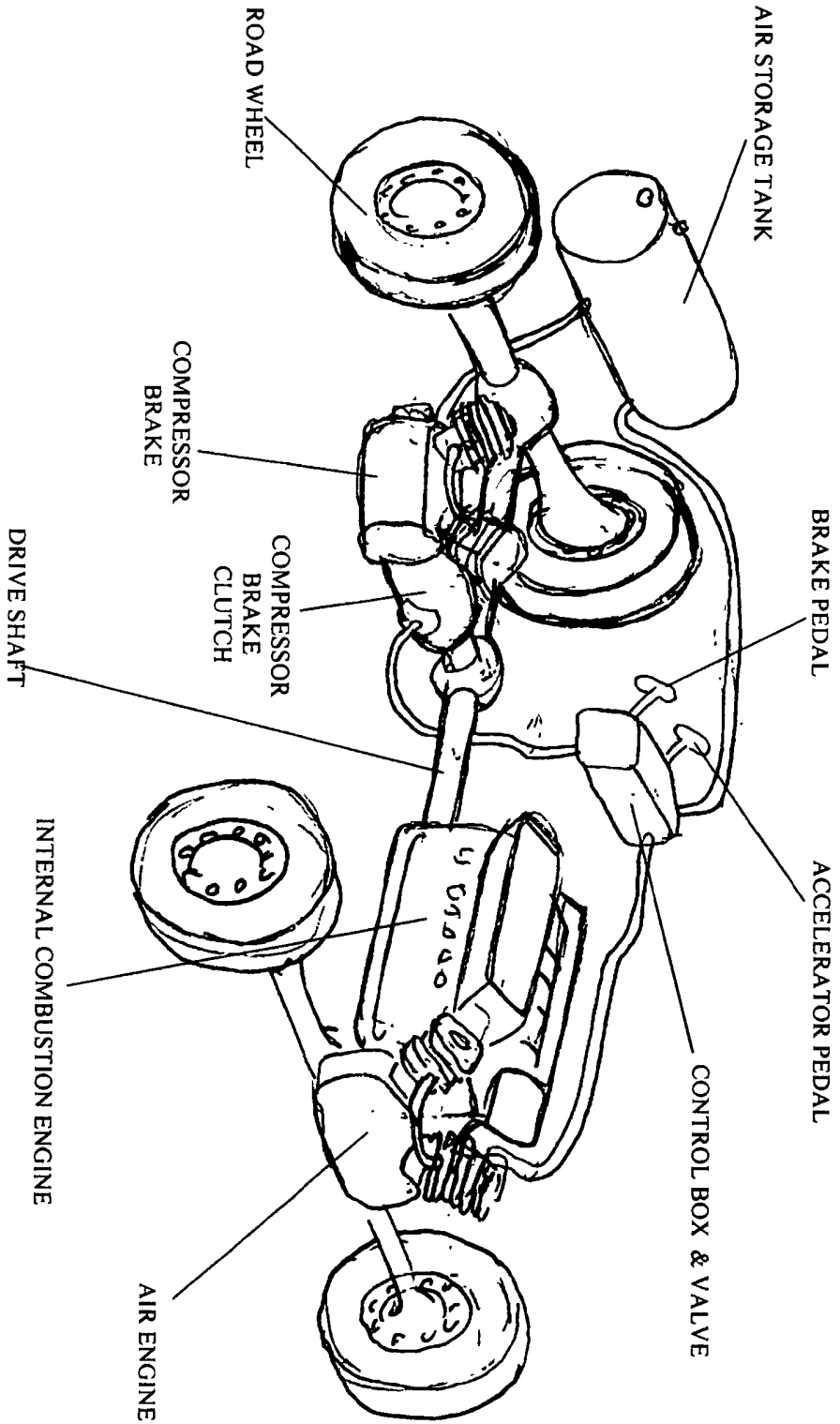


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COMPRESSOR BRAKE SCHEMATIC



COMPRESSOR BRAKE VEHICLE LAYOUT DIAGRAM



COMPRESSOR RECYCLE AIR BRAKES (COMPRESSOR BRAKING MECHANISM)

2444269

Basic Patent Description

The basic principle was originally devised to improve fuel economy for heavy vehicles, by using a simple method to recover the energy lost during braking, and reapplying it to assist the restarting of motion. The invention was designed with larger vehicles in mind such as heavy goods wagons, buses and trains, but also the principle could be applied to smaller lorries vans and cars.

In short, instead of the conventional approach to air braking, the motion of the vehicle is used to turn air compressors. The resistance for slowing the vehicle is from the energy required for the motion to turn large air compressors. Firmer pressing of the brake pedal allows more diversion of the wheel turning motion to the air compressor rotation. Consequently, the air is stored in the compressor tank as the energy needed is slowing the vehicle. On release of the brake pedal, and on applying the accelerator pedal (whilst in gear) this compressed air is converted back into rotation energy to assist the vehicle back into motion by means of an air engine (or air driven engine assistance).

Operation

In practice, the compressor brake may be several paralleled compressors for larger braking capacity. From the Compressor Brake Schematic diagram that follows it can be seen that the road wheel is clutched (9) to the compressor(s) brake (8). This allows the vehicle to travel without braking friction whilst in motion. Should the vehicle need to stop, then the brake pedal (2) is applied via the brake control line (12) to control the clutch (9) which in turn applies a controlled drive to the compressor(s) brake (8) according to the amount of brake pedal pressure applied. The design is such that with the pedal fully applied the energy necessary to drive the compressors fully from the road wheel is equal to the same braking from a conventional braking mechanism. The compressor brake (8) converts this braking energy directly as compressed air into the air storage tank (4).

When the vehicle needs to move again from stop, the accelerator pedal (1) movement is interpreted by the control box (3) to the control valve (6) to release the stored air to the air engine (7) to provide assistance to the internal combustion engine of the vehicle (13). This greatly reduces the losses involved with re-acceleration. This then reduces fuel consumption, and the emissions associated with moving a heavy load from a stationary position.

Variations

The method of controlling or clutching the compressors for controlled braking may vary according to the final design and the vehicle type, as may the method of engaging the air engine to the combustion engine. The brake control may be cable, hydraulic or other principle. Also the type of compressors, air storage medium, and air engine may vary to according to the vehicle type and size. In some cases the braking may be combined so that only some of the braking is by means of the compressor recycling, with the remaining braking achieved by an other mechanism.

PURPOSE OF INVENTION

With continuous improvements with engine efficiency the progress toward cleaner vehicles that produce less emissions is improving all the time. It will be possible to further improve the efficiency of a vehicle using the compressor brake method, by using solar electric powered air compressors to add additional compressed air to the air storage tank during daylight hours. This will ensure even more available energy to assist the efficiency. It had been envisaged for example, using the hollow area above a lorry cabins airfoil to house these additional solar electric driven air compressors with the solar panels mounted into the airfoil.

Claims

The claim is that engine efficiency and therefore reduced fuel consumption along with reduced emissions can be achieved with this invention. Air is chosen as the medium for storing the braking energy because its value does not deteriorate, as does electrical charge from batteries. Also there is no toxic waste by-product as with batteries with the compressed air.

Use of this alternative air breaking system uses the energy required to stop a vehicle to turn air compressors and so store compressed air in a tank. For all vehicles the energy is then available for assisting the vehicle to accelerate from stop thus greatly improving the efficiency of the engine. This principle lends itself to all vehicles from cars, to large lorries buses and even trains. The heavier the load the more energy is retrieved from braking, and therefore the more energy is available for assisting the vehicle from stop to accelerate.

This invention may lend itself toward assisting other engine efficiency mechanisms for the joint purpose of producing "virtual no emission vehicles" that also need less fuel to operate.



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Examiner: Jason Clee

Claims searched: all

Date of search: 28 March 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	all	DE 2359721 A (Kopper, W.) especially see the abstract and figures
X	all	DE 4219514 A (Kuhn, R.) especially see the abstract and figures
X	all	DE 3100256 A (Krellenberg, R.) especially see the abstract and figures
X	all	CA 2432399 A (Ching, L. K.) see whole document
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X	all	DE 10221269 A (Stys, A. S. & D. S.) especially see the abstract and figures
X	all	GB 2348673 A (Monfor, A. O. & P. A.) see whole document
X	all	JP 10166888 A (Nitsukuparu Enterprise KK) especially see the abstract and figures
X	all	WO 95/09299 A (Mochizai, T. & Wada, T.) especially see the abstract and figures
X	all	US 2005/252696 A (Kaufman, J. S.) especially see paragraphs 0022, 0026 & 0090
A	-	US 5271225 A (Adamides, A.) especially see column 11 line 58 to column 12 line 2



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Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

F2F

Worldwide search of patent documents classified in the following areas of the IPC

B60T

The following online and other databases have been used in the preparation of this search report

Online: WPI, EPODOC & English language full text databases