FORM 1

COMMONWEALTH OF AUSTRALIA
PATENTS ACT 1952

APPLICATION FOR A STANDARD PATENT

I/We, HYDRO ENERGY INDUSTRY COMPANY, LTD.

of 7th Fl. No. 372 Lin-Sen North Road,
Taipei, Taiwan, Republic of China

hereby apply for the grant of a standard patent for an invention
entitled "Method and Device for Saving Fuel for Automobiles",
which is described in the accompanying complete specification.

Details of basic application(s):

Number of basic Name of Convention country in Date of basic
application application which basic application was filed application

24958 Philippines December 8, 1980

My/our address for service is care of CLEMENT HACK & CO., Patent
Attorneys, 140 William Street, Melbourne, Victoria, 3000,
Australia.

DATED this 30th day of March, 1981

HYDRO ENERGY INDUSTRY COMPANY, LTD.

To: The Commissioner of Patents.
In support of the application made by Hydro Energy Industry Company, Ltd. for a patent for an invention entitled Method and Device for Saving Fuel for Automobiles.

1. I am/we are the applicant(s) for the patent, or am/are authorised by the abovementioned applicant to make this declaration on its behalf.

2. The basic application(s) as defined by Section 141 of the Act was/were made in the following country or countries on the following date(s) by the following applicant(s) namely:

   | Country, filing date and name of Applicant(s) for each basic application |
   | Philippines | Dec 8, 1980 |
   | by Hydro Energy Industry Company, Ltd. |
   | by | |

3. The said basic application(s) was/were the first application(s) made in a Convention country in respect of the invention on the subject of the application.

4. The actual inventor(s) of the said invention is/are Liu Suan-Ching, 7th Fl. No. 372 Lin-Sen North Rd., Taipei, Taiwan, Republic of China.

5. The facts upon which the applicant(s) is/are entitled to make this application are as follows: the said applicant is the assignee of the actual inventor.

DECLARED at Taipei, Taiwan this 4th day of March 1981

Republic of China

Liu Suan-Ching
A method for saving fuel for automobile engines in which intake air or intake fuel-air mixture is drawn to the engine by a suction effect, comprising the steps of:

a) heating water with exhaust gas from the engine to become steam,

b) introducing said steam to the intake air or intake fuel-air mixture through an opening provided in the passage of the intake air or intake fuel-air mixture, and

c) drawing said steam through said opening with the suction effect of the intake air or intake fuel-air mixture,
TO BE COMPLETED BY APPLICANT

Name of Applicant: HYDRO ENERGY INDUSTRY COMPANY, LTD.

Address of Applicant: 7th Fl. No. 372 Lin-Sen North Road, Taipei, Taiwan, Republic of China

Actual Inventor: Liu Suan-Ching

Address for Service: CLEMENT HACK & CO., 140 William Street, Melbourne, Vic. 3000, Australia.

Complete Specification for the invention entitled:

METHOD AND DEVICE FOR SAVING FUEL FOR AUTOMOBILES

The following statement is a full description of this invention, including the best method of performing it known to me:

METHOD AND DEVICE FOR SAVING FUEL FOR AUTOMOBILES

The following statement is a full description of this invention, including the best method of performing it known to me:

...
This invention relates to a method and Device for Saving Fuel for Automobiles.

Many attempts have been and are being made to save fuel consumed by automobiles and to improve the gas mileage. It has been widely known that adding certain amounts of water to the fuel will serve the purpose of fuel conservation. However, aside from the theoretical proof of the feasibility of saving fuel by adding water thereto, mixing water with petroleum based fuel in a liquid state is still far from practical usage simply because water will not mix with liquid fuel easily. Even if water is mixed satisfactorily with liquid fuel, it will not evaporate easily as the fuel does for mixing with air in pre-combustion process, and the water tends to remain in a liquid state when brought into the engine with the air or fuel-air mixture, which is undesirable.

In view of the aforesaid problem the present invention proposes a method, and a device, for converting water into gaseous state or steam, to be mixed with the air, or the fuel already evaporated in a gaseous state and mixed with air or fuel-air mixture, to obtain a homogeneous mixture of water particles with the particles of air, or fuel and air, before being brought into the engine.

This invention discloses a method and device for saving fuel for automobiles. The device is adapted to introduce steam, which is generated within the device by heating water with the exhaust gas from the engine, to the intake air or intake fuel-air mixture drawn by the engine and causing it to mix therewith. The device comprises a metallic body to be attached to an automobile engine, the metallic body having an intake passage which directs air or fuel-air mixture to the inlet ports of an engine, an exhaust passage which directs the exhaust from the exhaust ports of the engine to an exhaust pipe, a water passage through which water is directed and heated to become steam,
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and an opening through which the steam is drawn to mix with the intake air or intake fuel-air mixture.

The main object of this invention is to provide a method and device for saving fuel for an automobile, wherein water is heated to become steam and drawn to mix with the intake air, or with the fuel already in a gaseous state and mixed with air.

Another object of this invention is to provide a method and device for saving fuel for an automobile by introducing steam to the intake air or intake fuel-air mixture and mixing it therewith, wherein the steam is obtained by heating the water with the exhaust gas from the engine.

Still another object of this invention is to provide a method and device for saving fuel for an automobile by introducing steam to the intake air or intake fuel-air mixture and mixing it therewith, wherein the steam is obtained by heating the water within the device with the exhaust gas from the engine, the device being attached to the cylinder head of the engine in place of the intake or exhaust manifold.

Fig. 1 is a schematic drawing showing the principal arrangement of the device of this invention.

Fig. 2 is a schematic drawing showing a modified arrangement of the device of this invention.

Fig. 3 is a top view of an embodiment of the device of this invention, partially in section to show the intake passage.

Fig. 4 is a top view of the embodiment as shown in Fig. 3, partially in section to show the exhaust passage.

Fig. 5 is a vertical cross sectional view of the embodiment as shown in Fig. 3 and 4, showing the intake passage.

Fig. 6 is an oblique, perspective view of a diffuser used in the embodiment shown in Figs. 3, 4 and 5.

Referring to Fig. 1 wherein the principal arrangement of the device of this invention is shown; 3 is the fuel saving device of this invention, H is the cylinder head of...
an automobile engine and 9 is a carburetor. A is an air cleaner and E is an exhaust pipe. \( V_1 \) indicates an intake valve in the cylinder head and \( V_2 \) indicates an exhaust valve. 4 is a water tank prepared for supplying water to the device of this invention.

As is apparent from Fig. 1, the device of this invention is embodied in connection with a gasoline engine of carburetor type by way of example. It is to be understood that the principle illustrated hereinafter is equally applicable to other types of engines using petroleum based fuel, such as fuel injected type.

Referring to the drawings the device of this invention comprises a metallic body 3, which can be an aluminum casting or a composite sheet metal piece, having therein an intake passage 1, an exhaust passage 2, a water passage 5 and an opening 52. Said intake passage 1 is provided with an inlet port 11, which is adapted to be connected to the outlet end of a carburetor generally designated at 9, and outlet ports 12 to correspond with the intake ports on the cylinderhead of the engine. The intake mixture drawn by the engine from the inlet port 11 is properly distributed to each cylinder through each outlet port 12 of the intake passage 1. Said exhaust passage 2 (Fig. 4) is provided with receiving ports 21 corresponding to the exhaust ports or openings on the cylinder head of the engine and an exhaust port 22 to be connected to the exhaust pipe of the automobile. The exhaust passage 2 is so arranged that the exhaust gas entered from each receiving port 21 is gathered at the exhaust port 22 to lead to the exhaust pipe. Needless to say, the intake passage 1 and the exhaust passage 2 are not inter-connected within the metallic body 3. Said water passage 5 is provided with an inlet port 51, a passage 5 which passes through the metallic body 3 and leads to an opening 52 which is formed in the inner wall of the intake passage 1 near the inlet port 11.
The metallic body 3 as described above is directly attached to the cylinder head of an engine with the outlet ports 12 of the intake passage 1 corresponding with the intake ports on the cylinder head and the receiving ports 21 of the exhaust passage 2 corresponding with the exhaust ports of the cylinder head. To do so the conventional intake manifold and the exhaust manifold are removed and the device of this invention is attached in place of the intake manifold and exhaust manifold for an in-line type engine.

The inlet port 51 of the water passage 5 is connected to the water tank 4 by means of a suitable supply conduit or tubing 6. A valve 7 is provided in the tubing 6 for regulating the supply of water, said valve can be manually or automatically operated in connection with the engine performance. The water tank 4 can be installed slightly above the level of the cylinder head to feed the water by gravity, or provided with a suitable supply pump, not shown, to be operated with the electrical power source within the automobile. The carburetor 9 is mounted onto the inlet port 11 of the intake passage 1. In order to protect the carburetor from excessive heat an adaptor 9A having cooling water flowing therethrough may be employed between the carburetor 9 and the metallic body 3, said cooling water may be circulated through the engine cooling system.

In the embodiment described above a diffuser 13 as shown in Fig. 6 is provided in each outlet port 12 of the intake passage 1. The diffuser 13 is adapted to create turbulence in the intake mixture to further facilitate mixing of steam with the intake fuel-air mixture. However, the device of this invention is operable without the diffusers.

The operation, function and advantages of the fuel saving device according to this invention will be described as follows:

The device as described is installed onto an automobile.
engine in the manner as shown in Fig. 1. Initially the valve 7 is closed until the engine is started and operated to a suitable operating temperature. Then the valve 7 is opened to allow the water in the water tank 4 to flow into the water passage 5 through the tubing 6. Since the exhaust gas from the engine flows through the exhaust passage 2 in the metallic body 3, which receives heat from the exhaust gas; the water in the water passage 5 is heated up to 100°C or higher to become steam before reaching to the opening 52. With the engine in operation a partial vacuum is created in the intake passage 1 through which the intake fuel-air mixture is drawn to the engine. The steam is also drawn through the opening 52, which is formed in the intake passage 1 and exposed to the partial vacuum in the intake passage 1, to mix with the intake fuel-air mixture being drawn to the engine. The steam, or the water in a gaseous state, will mix with the intake fuel-air mixture homogenously.

The rate of the supply of water, or steam, to the intake fuel-air mixture can be regulated by the valve 7 to obtain the optimum performance of the engine, which may be determined by trial and error method. The inventor's experiments revealed that supply of water, or steam, at the rate equivalent to 20 percent of fuel by volume, will give optimum performance. The effectiveness of the method and device according to this invention is proven by the inventor's experiments as follows:

Experiment 1.

The device as shown in Figs. 2 and 3 was mounted as shown in Fig. 1, to the engine of an automobile; the engine was a four-cylinder in-line, gasoline engine of 2,000 cc. A road test was conducted over a course of 1 Km in a three-trip drive at the speed of 40, 50, 60 Km/hr respectively. The fuel consumption per distance of travel (milage) on each trip in comparison with that taken from the test without the fuel saving device is as follows:
<table>
<thead>
<tr>
<th>Speed</th>
<th>Without the Fuel Saving Device</th>
<th>With the Fuel Saving Device</th>
<th>% Saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 Km/hr</td>
<td>13.3 Km/l</td>
<td>15.2 Km/l</td>
<td>12.5%</td>
</tr>
<tr>
<td>50 Km/hr</td>
<td>12.2 Km/l</td>
<td>14.6 Km/l</td>
<td>16.4%</td>
</tr>
<tr>
<td>60 Km/hr</td>
<td>11.8 Km/l</td>
<td>13.2 Km/l</td>
<td>10.6%</td>
</tr>
</tbody>
</table>

Experiment 2.

The device as shown in Figs. 2 and 3 was mounted as shown in Fig. 1, to the engine of an automobile; the engine was a four-cylinder in-line, gasoline engine of 2,310 cc. A road test was conducted over a 372 Km course between Taipei and Kaoshiung at an average speed of 70 Km/hr. The rate of fuel consumption was 8.5 Km/l.

A test without the device, but with the conventional intake and exhaust manifold, was conducted over the same course; the result was 6.81 Km/l.

This experiment shows a net result in fuel conservation of 24.8 percent.

Experiment 3.

The device as shown in Figs. 2 and 3 was mounted as shown in Fig. 1 to the engine of an automobile; the engine was a four-cylinder in-line, gasoline engine of 2,310 cc. A road test was conducted over a hilly course of 235 Kilometers in the northern part of Taiwan. A round trip test gave an average rate of fuel consumption of 24.75 Kilometers per gallon of gasoline.

Another test gave 23.61 Kilometers per gallon.

The same automobile was tested without the device of this invention with an average rate of fuel consumption of 20.68 Kilometers per gallon.

This experiment shows a net result in fuel conservation of 14.16 to 19.68% in a hilly course.

Although the embodiment of this invention and the experiments were made using a carburetor type gasoline engine, it is to be understood that device is also applicable to fuel...
injection type engines wherein the steam will be introduced to and mixed with the intake air; the fuel will be injected to the steam-air mixture and the end result will be the same as carburetor type engines. It is to be also understood that the fuel saving device of this invention is also applicable to compression ignition engines, or Diesel engines, because proper amounts of steam homogeneously mixed with the intake air will act to improve the combustion efficiency.

It is to be further understood that the method and device of this invention can be adapted to engines having cylinders in V arrangement; it is further equally applicable to engines having intake ports on one side and exhaust ports on the opposite side with slight modification as shown in Fig. 5.

Accordingly, while there have been shown and described a preferred embodiment of the invention, it will be understood that the invention may be embodied otherwise than as herein specifically illustrated or described, and that certain changes in the detail and construction may be made without departing from the principles of this invention within the scope of appended claims.
CLAIMS
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method for saving fuel for automobile engines in which intake air or intake fuel-air mixture is drawn to the engine by a suction effect, comprising the steps of:
   a) heating water with exhaust gas from the engine to become steam,
   b) introducing said steam to the intake air or intake fuel-air mixture through an opening provided in the passage of the intake air or intake fuel-air mixture, and
   c) drawing said steam through said opening with the suction effect of the intake air or intake fuel-air mixture,

2. A fuel saving device for automobile engines having a cylinder head, intake ports and exhaust ports, comprising:
   a metallic body having therein a intake passage, an exhaust passage and a water passage; said intake passage being adapted to direct intake air or intake fuel-air mixture to the intake port or ports of the engine, said exhaust passage being adapted to direct exhaust gas from the exhaust port or ports of the engine to the exhaust pipe; said water passage being adapted to direct water from a water supply source to said intake passage.

3. A fuel saving device as recited in claim 2, wherein said intake passage is provided with outlet ports corresponding, in number and in arrangement, with the intake ports on the cylinder head of the engine on which said device is used.

4. A fuel saving device as recited in claim 2 wherein said exhaust passage is provided with receiving ports corresponding in number and arrangement with the exhaust ports on the cylinder head of the engine on which said device is used.
5. A fuel saving device as recited in claim 2, wherein said water supply source is a water tank provided separately and having a supply tubing means connecting said water tank to said water passage, said supply tubing means having a valve for regulating the supply of water to said water passage from said water tank.

Dated this 30th day of March, 1981.

HYDRO ENERGY INDUSTRY COMPANY, LTD.
By its Patent Attorneys,

CLEMENT HACK & CO.

DRAWINGS
FIG. 3

FIG. 4
The following statement is a full description of this invention, including the best method of performing it known to me.

FIG. 5

FIG. 6