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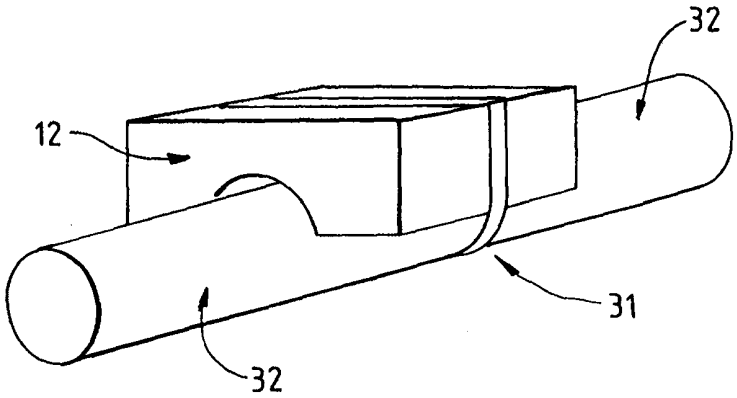
(54) Title: FUEL ACTIVATING DEVICE

(57) Abstract

This invention describes a fuel-activating device comprising a housing (12; 42) with a far infrared ray emitting body (11; 43) placed therein that provides for enhanced combustion of liquid fuels. The device can be installed externally on the fuel line (32; 50) before the point where fuel flows into a carburetor or fuel injection system or within the fuel line (32; 50). The result is improved fuel burning efficiency, increased engine power, and reduced harmful emissions.



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FUEL ACTIVATING DEVICE

Technical Field

This invention relates to a device comprising a far infrared ray emitting body in a case that can be mounted in association with the fuel line of an internal combustion engine for activating the fuel to be efficiently combusted in the engine.

Background Art

There have been several types of devices developed for increasing engine performance as a result of improved fuel efficiency. For example, one type of device induces a magnetic field in the fuel to break up the fuel into small particles (e.g. U.S. Pat. 5,271,369), the other employed techniques by catalytic cracking of long-chain liquid hydrocarbons (e.g. U.S. Pat. 5,092,303). However, these devices do not work satisfactorily. A far infrared ray generating composition was later added to the device employing magnetic field as an accessory for further improvement (e.g. U.S. Pat. 5,632,254). Another fuel activation device required contracting fuel with a functional ceramic emitting far infrared rays in a environment (e.g. U.S. Pat. 5,044,346). Such devices make implementation impractical and have little effect on fuel efficiency.

Summary of the Invention

Accordingly, one feature of this invention is to provide a device that activates fuel to enhance combustion efficiency. As a result, this device can increase the power or acceleration of an internal combustion engine and, at the same time, reduce harmful emissions.

Another feature of the present invention is to provide an easy-to-install and yet effective combustion enhancement device.

The present invention therefore provides a device mounted in association with a fuel line of an internal combustion engine for activating the fuel and for thereby achieving efficient combustion of the fuel, said device consisting essentially of a housing and a far infrared ray emitting body located within the housing whereby fuel in the fuel line is exposed to infrared emissions, said body being formed of far infrared ray emitting particles having an ultrafine

particle size, and a radiation capacity in the band of wavelengths between 8 and 14 microns, and wherein the fuel line in the region adjacent to the device is free of any significant magnetic influence.

In one form of the invention, these features are achieved by a device having a housing, and a far infrared ray emitting body disposed within said housing.

This device can be externally mounted on the nonmetal part (e.g. rubber) of a fuel line before the point where fuel flows into a carburetor or fuel injection system. The device is economical of fuel and installation of the device on the fuel line is easy, simple and safe.

In another form of the invention, these features are achieved by a device having a metal housing which defines an interior chamber, and a far infrared ray emitting body placed within said interior chamber.

The device can be installed in the fuel line before the point where fuel flows into a carburetor or fuel injection system. The device is economical of fuel and insertion of the device into the fuel line is easy, simple and safe.

Brief Description of Drawings

FIG. 1 shows the front view of one embodiment of the present invention with a far infrared ray emitting body in a semi-tubular form.

FIG. 2 shows the side view of the embodiment as described in FIG. 1.

FIG. 3 shows the top view of the embodiment as described in FIG. 1

FIG. 4 shows a view of mounting the device of the present invention on a fuel line.

FIG. 5 shows the front view of another embodiment of the present invention in a format with a pair of cases connected with a hinge and secured with a locking device.

FIG. 6 shows a view of mounting the device as described in Fig. 5 on fuel line.

FIG. 7 shows a view of another embodiment of the present invention with a far infrared ray emitting body in a spherical form.

FIG. 8 shows a sectional view of FIG. 7 taken along the line 8-8.

FIG. 9 shows a view of another embodiment of the present invention with a far infrared ray emitting body in a tubular form.

FIG. 10 shows a sectional view of FIG. 9 taken along the line 10-10.

FIG. 11 shows a view of another embodiment of the present invention with an exchangeable inlet/outlet portion.

FIG. 12 shows a view of inserting the device of the present invention into a fuel line.

Detailed Description of the Invention

The device of the present invention shown in Figures 1-6 comprises a case 12 that holds a far infrared ray emitting body 11. The case can be of any convenient shape and size. For ease of mounting on a fuel line, a semi-tubular shape is preferred. The material of the case can be plastic, metal, or any others. Among them, aluminum is preferred because of its high reflectivity to far infrared rays. Aluminum case works as a mirror that helps focus the far infrared rays on the fuel line. FIG. 1 shows a front view of the device having a semi-tubular far infrared ray emitting body 11 in an aluminum mounting case 12.

As an example of size, a semi-tubular far infrared ray emitting body 11 may have a typical length of 1.0 to 1.5 inches (2.5 to 3.8 mm approximately). The inner radius may be about 3/8 to ½ (9.5 to 12.7 mm) with a thickness of 1/8 inch (3.2 mm) or less for the wall. The aluminum housing 12 can be made in any shapes as long as it properly holds and protects the semi-tubular far infrared ray emitting body 11.

FIG. 2 and FIG. 3 show a side view and a top view of the device, respectively. The housing 12 provides an interior compartment for holding the far infrared ray emitting body 11. The far infrared emitting body is affixed to the housing wall with glue or by close fitting.

The far infrared ray emitting body 11 is composed of oxides selected from the group consisting alumina, silica, alumina hydrate, silica hydrate, zirconia, lithium oxide, magnesium oxide, calcium oxide, titanium oxide, or a mixture of said oxides. Based on our research results, ceramics containing iron oxides were less effective than others (or might even have a reverse effect that would require further studies) and should be avoided.

The present inventor has undertaken extensive studies to select a commercially available far infrared ray generating composition that possesses a strong radiation capacity in the desirable band of wavelengths, 8 to 14 microns (micrometers). As a result, the inventor found that the far infrared ray generating composition fabricated by the method involving inorganic powders having a particle size below 1,000 angstrom provided a larger radiation effect. Sample composition and fabrication method can be found in, for example, U.S. Patent

No. 4,886,972. Nevertheless, the inventor further found that only those far infrared emitting body comprising mixtures of compounds having an ultrafine inorganic powder with a particle size smaller than 100 angstroms would emit considerable radiation that could effectively enhance fuel combustion efficiency at a very significant level.

FIG. 4 shows the installation of the device. The device can be easily mounted externally on a fuel line 32 with wrap straps 31 or the like. Please note that the device must be mounted on the nonmetal part of the fuel line, e.g. a rubber fuel line, as the far infrared rays could not penetrate into a metal fuel line.

Another embodiment is shown in FIG. 5. It consists of a pair of cases that was described in Fig. 1. These two cases are connected by a hinge 13 and secured by a locking device 14. When used in pair, the aluminum cases 12 work as a resonator that helps concentrate the far-infrared energy within the radiation zone in the fuel line.

The device can be easily installed on the fuel line by mounting the device on a rubber part of the fuel line as shown in FIG. 6. No tool or modification of the fuel line is needed.

Example

A commercially available ceramic composition made in Japan was used to form the tabular infrared ray emitting body in the invention, with an inner diameter of about 3/8 inch (9.5 mm) and an outer diameter of about ½ inch (12.7 mm). The length was about 1.0 inch (25.4 mm). The core material of the composition was alumina hydrate, mixed with various oxides such as zirconia, lithium oxide, and titanium oxide. The composition had a desirable particle size of about 50 angstroms. The composition emitted infrared radiation in the wavelength region of about 8 to 14 microns. Two prototypes of the present invention were made and mounted on various cars for testing. A 1998 Grand Marquis with an odometer reading of 17,300 miles was used to test the effectiveness of the device. Preliminary results showed an average of 17% savings on gasoline consumption, with an increase in highway gas mileage from 26.8 mpg (mile per gallon) without device to 31.4 mpg with device installed. Reading with an exhaust analyzer, the amount of hydrocarbon (HC) reduced by 38% from a 0.208 gpm (grams per mile) without device to a 0.130 gpm with device installed. Carbon monoxide (CO) had dropped 35% from 2,709 gpm to 1.776 gpm.

According to the present invention, an external device comprising a mounting case, preferably in aluminum, and a far infrared ray emitting body having a particle size smaller

than 1,000 angstrom, preferably 200 angstrom or smaller, can effectively enhance combustion efficiency. As a result, this device will increase the power and acceleration of an internal combustion engine and reduce harmful emissions.

This device can be easily installed on nearly every car and burner in the world with little effort.

The device of the present invention show in Figures 7-12 comprises a metal housing that contains a far infrared ray emitting body. The housing can be of any convenient shape and size. For ease of insertion to a fuel line, a tubular shape is preferred. The housing material can be metal. such as steel, copper, or aluminum. Among them, aluminum housing is preferred because of its high reflectivity to far infrared rays and light weight. FIG. 7 shows the device having a tubular housing 42. The device is symmetrical along the vertical horizontal central lines. One nozzle 41 can be used as an inlet, while another nozzle 41 works as an outlet. The fuel flows into and out of the device through the nozzles 41.

As an example of size, a tubular housing may have typical length of 2 to 2.5 inches (5.1 to 6.4 mm approximately), with a typical outer diameter of about 3/4 inch (19 mm). A thickness of 1/16 (1.6 mm) or less is typical for the housing wall.

FIG. 8 shows a sectional view of the device. The housing 42 provides an interior compartment for holding the far infrared ray emitting body 43. The far infrared emitting body 43 is affixed to the housing wall 42 by several fixation pins 44.

The far infrared ray emitting body 43 is composed of oxides selected from the group consisting alumina, silica, alumina hydrate, silica hydrate, zirconia, lithium oxide, magnesium oxide, calcium oxide, titanium oxide, or a mixture of said oxides. Based on our research results, ceramics containing iron oxides were less effective than others. (Or might even have a reverse effect that would require further studies) and should be avoided.

The present inventor has undertaken extensive studies to select a far infrared ray emitting body possessing a stronger radiation capacity. As a result, the inventor found that the far infrared ray generating composition fabricated by the method described in U.S. Patent no. 4,886,972 provided a larger radiation effect. As cited in the said Patent, the most effective far infrared radiation could be obtained when inorganic powders had a particle size below 500 angstrom, and preferably below 200 angstrom. Nevertheless, the inventor further found that only those far infrared emitting body comprising mixtures of compounds having an ultrafine

inorganic powder with a particle size smaller than 100 angstroms would exhibit considerable radiation capacity that could effectively enhance fuel efficiency at a significant level.

Another embodiment is shown in FIG. 9. The housing 42 has a different shape to accommodate the shape of far infrared ray emitting body 43. FIG. 9 shows an infrared ray emitting body 43 in a tubular shape, with a sectional view shown in FIG. 10 and FIG. 11 illustrates another embodiment that contains exchangeable nozzles 41. The nozzles 41 in FIG. 11 can be made in various outer diameters to fit in most of domestic and imported cars. An O-ring 45 is used to prevent fuel leakage.

The device may be easily installed into the fuel line 50 by cutting the line and inserting the device in between as shown in FIG. 12. Clamps tying the lines to nozzles 41 of the deice are needed to prevent the deice from slipping off the fuel line.

Example

A commercially available ceramic composition made in Japan was used to form the infrared ray emitting body in the invention, at a diameter of about 7/16 inch (11mm). The core material of the composition was alumina hydrate, mixed with various oxides such as zirconia, lithium oxide, and titanium oxide. The composition had a desirable particle size of about 50 angstroms. The composition emitted infrared radiation in the wavelength region of about 3 to 14 microns. Four prototypes of the present invention were made and installed on various cars for testing. Preliminary results showed an average of 20% savings on gasoline consumption resulting from combustion efficiency enhancement. Reading with an exhaust analyzer, the amount of hydrocarbon and carbon monoxide had a significant drop after the deice had been installed to the car.

According to the present invention, a device comprising a metal housing, preferably aluminum, and a far infrared ray emitting body having a particle size smaller than 100 angstrom, preferably 50 angstrom or smaller, can effectively enhance combustion efficiency. As a result, this device will increase the power and acceleration of an internal combustion engine and reduce harmful emissions.

This device can be easily installed on nearly every car in the world with little effort.

This device of the present invention can also be applied to enhancing the tastes of a variety of drinks and foods in liquid form.

CLAIMS

1. A device mounted in association with a fuel line of an internal combustion engine for activating the fuel and for thereby achieving efficient combustion of the fuel, said device consisting essentially of a housing and a far infrared ray emitting body located within the housing whereby fuel in the fuel line is exposed to infrared emissions, said body being formed of far infrared ray emitting particles having an ultrafine particle size, and a radiation capacity in the band of wavelengths between 8 and 14 microns, and wherein the fuel line in the region adjacent to the device is free of any significant magnetic influence.
2. A device according to claim 1 mounted adjacent to the exterior of said fuel line.
3. A device according to claim 1 mounted within said fuel line.
4. The far infrared ray emitting body according to claim 1, wherein said ultrafine powder has a particle size 100 angstroms or below.
5. The device according to claim 1, wherein said far infrared ray emitting body takes a semi-tubular shape.
6. The device according to claim1, wherein said housing is made of aluminum.
7. The device according to claim 1, where said housing comprises first and second aluminum cases arranged in opposite relationship, with a fuel line extending between the first and second cases.
8. A device according to claim 7 wherein the particles are selected from the group consisting of alumina, silica, alumina hydrate, silica hydrate, zirconia, lithium oxide, magnesium oxide, calcium oxide, titanium oxide, or a mixture of said oxides.
9. A device according to claim 7 wherein said particle size is 1000 angstroms or less.
10. The far infrared ray emitting body according to claim 3, wherein said ultrafine powder has a particle size 100 angstrom or below.
11. The device according to claim 3, wherein said far infrared ray emitting body takes a spherical shape.

12. The device according to claim 3, wherein said housing has a tubular shape.

FIG. 1

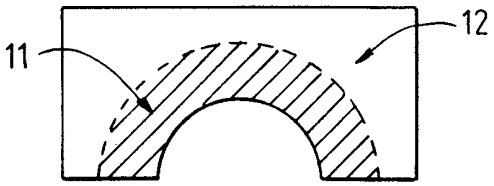


FIG. 2

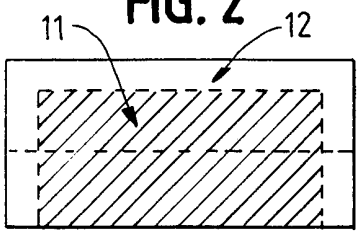


FIG. 3

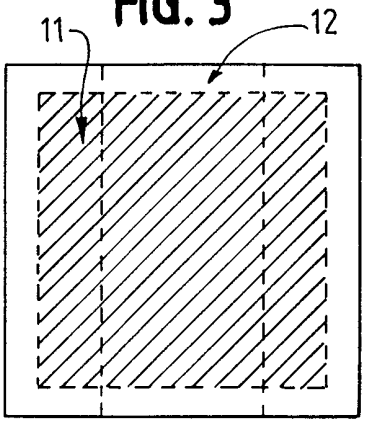


FIG. 4

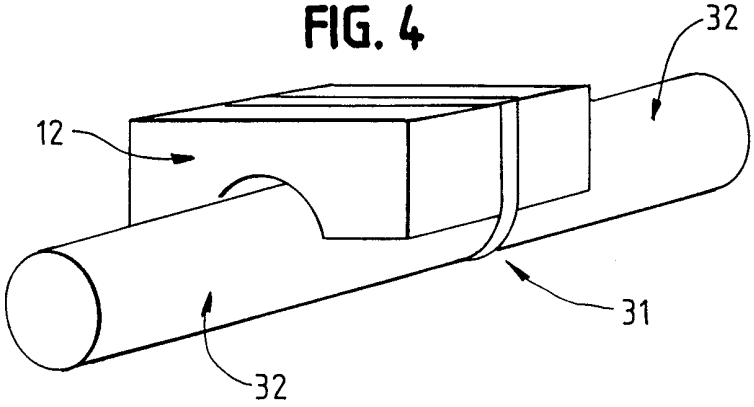


FIG. 5

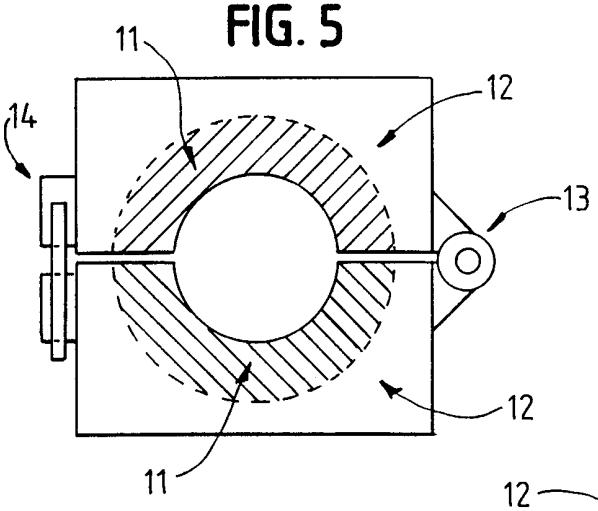


FIG. 6

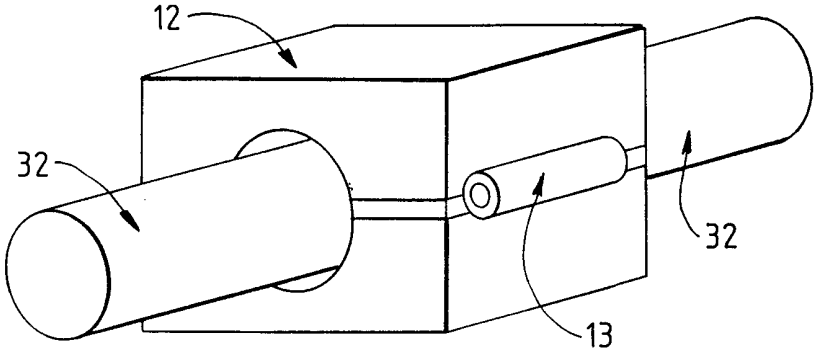


FIG. 7

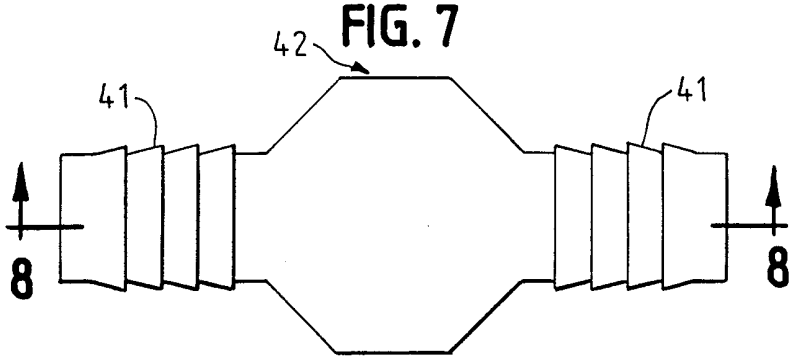


FIG. 8

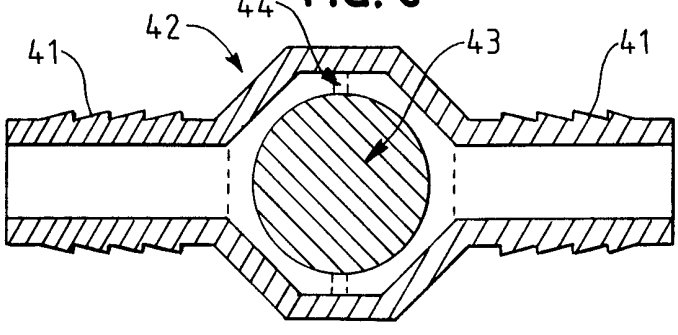


FIG. 9

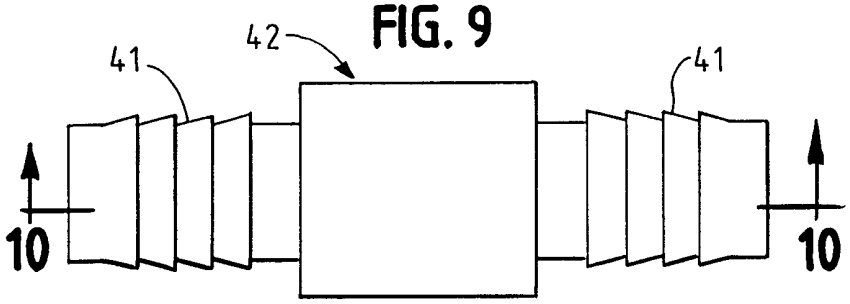


FIG. 10

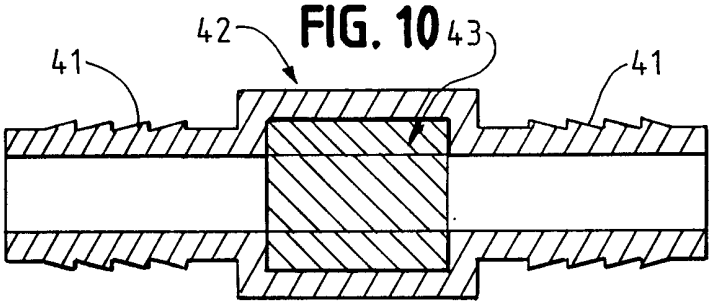


FIG. 11

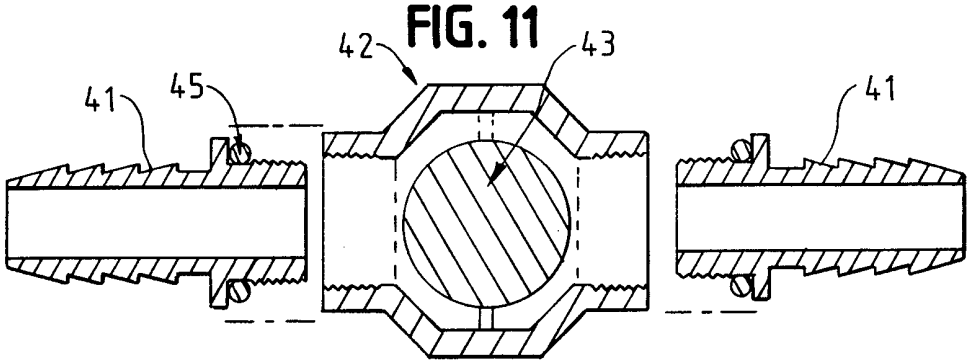
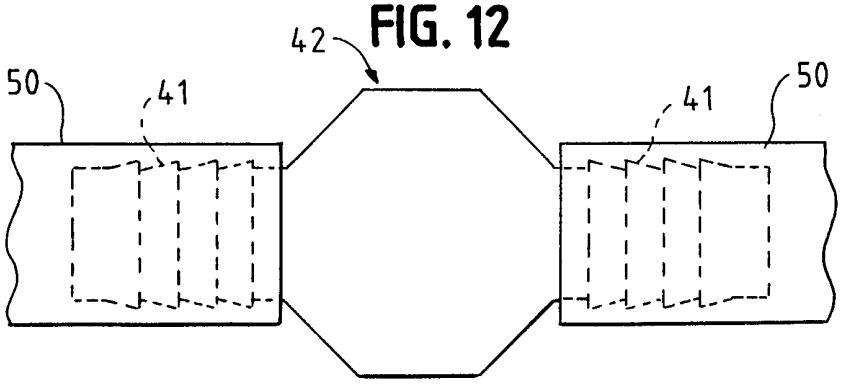


FIG. 12



INTERNATIONAL SEARCH REPORT

Int[illegible]nal Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F02M27/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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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 practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 669 456 A (BOZONO HIROYUKI ;MIZUNO HIROSHI (JP); NAKATANI YUTAKA (JP); FUJIMO) 30 August 1995 (1995-08-30) abstract column 3, line 13 -column 4, line 31; figures 1-3 ---	1,3,12
A	EP 0 384 943 A (TADA HIDEYO) 5 September 1990 (1990-09-05) abstract page 2, line 46 -page 3, line 26; figures 1,2,9 --- -/--	1,3,12

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
14 January 2000	21/01/2000

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 01, 31 January 1997 (1997-01-31) & JP 08 246967 A (TAKAGUCHI SOUREI), 24 September 1996 (1996-09-24) abstract ---	1,2,5,7
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 06, 30 June 1997 (1997-06-30) & JP 09 032664 A (YAMAGATA KATSUYOSHI), 4 February 1997 (1997-02-04) abstract -----	1,3,12

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Information on patent family members

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