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(54) Title: SHOCK ABSORBER WITH BIODEGRADABLE HYDRAULIC FLUID AND BIODEGRADABLE FLUID FOR SHOCK ABSORBER OF ANY NATURE

(57) Abstract: New shock absorber of any nature with biodegradable fluid, comes to replace with great advantages the hydraulic fluid currently used in shock absorber that possess a mineral base, or derivations of it, that do not have biodegradable properties and also low thermal stability, being that this new fluid provides improvement of the functional development and life span among other advantages. This new Biodegradable Hydraulic Fluid for Shock absorber can has a synthetic base of the Group V or the Glycol Group, in solution or not, presenting high thermal stability and low viscosity variation, besides having a biodegradable characteristic. The viscosity and density must be compatible with the application of hydraulic fluid for shock absorber, might having fractions of specific additives, such as antifoam, anticoagulants and anti eferescants and still antioxidants and others. Where there is a gasket seal with plasma application, being obtained through the composition of several gases. It can also be presented as a monitoring device for wear and tear of automotive shock absorber, with a Sensor of Cycle Performance with Magnetic Spring, with or without proportional valve with electronic control device of the absorption factor.



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SHOCK ABSORBER WITH BIODEGRADABLE HYDRAULIC
FLUID AND BIODEGRADABLE HYDRAULIC FLUID FOR SHOCK ABSORBER
OF ANY NATURE.

The present report describes a new fluid to be used in shock
5 absorber of any nature and shock with biodegradable hydraulic fluid, in which
the fluid described here will replace with great advantages the currently used
mineral-based hydraulic fluid, and their variations, in today's shock absorber,
that have no biodegradable properties and also low thermal stability, being that
this new fluid improves functional development and increase in durability among
10 other advantages. This Biodegradable Hydraulic Fluid for Shock absorber can
have a synthetic base of the Group V or Glycol group, in solution or not,
presenting high thermal stability a low viscosity variation, beside having a
biodegradable characteristic. The viscosity and density must be compatible with
the application of hydraulic fluid for shock absorber, enabling fractions of
15 specific additives, such as anti-foam, anti-freeze and anti-effervescent among
others.

Millions of shock absorber are produced daily worldwide and the
fluid contained in them is released into the environment, without proper
collection and disposal. The mineral fluid that is currently used does not have a
20 biodegradable capacity, hence polluting the environment due to improper
collection; generally this fluid is lost in the environment throughout the life span
of the shock absorber still in use. In Brazil 1 200 0000 units are produced per
month, being that for these shock absorber around 300 ml are used per shock,
resulting in a total of approximately 360,000 liters per month to be discarded,
25 being a huge source of environmental pollution.

The state of technique is well known for hydraulic shock absorber, be them monotube, bitube and/or tritube, for any application and among these application specially the automotive area. The common point among the several types of hydraulic shock absorber is that they consist of a usually cylindrical tube denominated pressure tube, in which a sliding piston is fitted in its interior with a triggering Rod through axial displacement, where the piston is responsible for the division of the tube into two chambers, being an extension and a compression chamber. The absorption force offered by the shock absorber is given through the passage control of hydraulic fluid between the extension and compression chambers, this control can be pre-defined through the combination of components that constitute the piston and still, when available, through a base valve in the pressure tube or a variable control valve of flow or pressure, being activated mechanically or electrically. These shock absorbers are filled with a hydraulic fluid with physical and chemical characteristics determined by technical guidelines. Such hydraulic fluid generally fills both pressure chambers, in some cases having the need to add an external reservoir chamber, or still, depending on the model and the application, the addition of a chamber attached externally to the pressure tube, thus consisting, in the bitubular shock absorber, in which the oil volume the fills the reservoir chamber be capable to supply the difference in volume between the extension and compression chambers in function of the variation of material volume in the rod of the shock absorber, through axial displacement. In the same manner the tritube shock absorber are constituted presenting the same function characteristics for the different application is destined to perform.

There are some documents that describe compositions for the use in shock absorber; however none of these compositions possess the characteristics of a biodegradable and high thermal stability fluid at the same time, besides increasing performance and the life span of the shock absorber, according to the object of the present patent. Among these documents the following are worth mentioning: The JP2008/248160 from 10.16.2008, the WO0012646 from 03.09.2000, the US 6037403 from 03.14.2000 and the JP11002045 from 01.06.1999, that describe the formulation of hydraulic fluids specifically for shock absorber and their functioning characteristics, however as mentioned above, none of them have a biodegradable fluid that possess high thermal stability at the same time.

Still the document WO2006/099022 from 09.21.2006, which describes a biodegradable hydraulic fluid for dockyard equipments, and the documents: PI - 0004663-9, BIODEGRADABLE HYDRO SOLUBLE FLUID FOR CUTTING OPERATIONS AND METAL MANUFACTURING, which refers to the object of the present patent to a biodegradable hydro soluble fluid for cutting operations and metal manufacturing, specially developed to revolutionize the technology, nonexistent to that point, offering highly advantageous economical gains, high environmental gains and considerable decrease in healthcare/social security costs, being basically constituted by a fluid (01) produced with a mixture of tall oil (02), fatty acids and esters of vegetable oils (03) (predominantly esters of linoleic acid), ethylenediamine of coconut vegetable esters (04), tea (05), non nitrogenated nor sulphured antioxidants (06), biodegradable preservatives (07) and aqueous solution (08); PI - 0006564-1, ELECTRO THERMAL CONDUCTOR FLUID DEVICE, which refers to the

present invention an unseen and functional electro thermal conductor fluid, composed of non toxic, non pollutant vegetable, low production cost, biodegradable, high heat and electricity conduction, obtained from the maceration of tobacco leaves, herbaceous plant from the solanaceas family and the eucalyptus globules, from the myrtaceae family, and, water, oil or other fluid that when placed in a container, sealed or not, of tin or copper, in contact with a graphite or stainless steel electrode and connected to electric energy, replaces with great advantages the existing electrical resistance; and the PI0202361-0, COMPOSITIONS OF AN OIL BASED BIODEGRADABLE DRILLING FLUID AND DRILLING PROCESS FOR OIL AND GAS WELLS. In which compositions of oil-based biodegradable drilling oils are described, that have an oily phase composed of preferably by methyl esters of carboxylic acids from soybean oil, an aqueous phase finely dispersed in the oily phase by specific emulsifiers and another series of additives with specific performance functions in order to produce the used inverted emulsion and the drilling process that comprises the composition of the invention is equally described. In which describe biodegradable hydraulic fluids, but none of these formulations describe the fluid presented here, its application for shock absorber and that is biodegradable with a high thermal stability at the same time, with the functioning characteristics with better shock performance.

Next, a preferential description, but non-restrictive of manufacturing the present shock absorber with biodegradable fluid, its components and workings, as well as the formulation of the fluid, object of this patent, which the same can vary to be adequate to the quantity of the main type of components of this formulation for each model of shock absorber that will be

used; describing at least two possibilities to make the described object possible and the way it works and its applications.

The shock absorber with Biodegradable Hydraulic Fluid and the Biodegradable Hydraulic Fluid for shock absorber of any nature, object of the present patent is an any nature shock absorber, specially for automobiles, characterized as a monotube, bitube and/or tritube shock absorber, for any application; and among these applications specially for the automotive industry, containing a fluid with a biodegradable composition, preferably of low toxicity, with the viscosity to stand a pressure of up to 300 Bar, operation temperature from -50 to 150 ° C. Being a fluid essentially composed by a base that can water soluble or not, in a way that it would constitute a biodegradable formulation. Where the formulation soluble in water is consisted of a Glycol Base, with cinematic Viscosity at 100 °C, $\text{mm}^2.\text{s}^{-1}$, ASTM D 445 from 2.000 to 10.00; Flash Point, °C, ASTM D 92 minimum of 90, and Pour Point, °C, ASTM D 97, maximum of -45, plus inhibitors of corrosion, or anticorrosive and antifoam; and the non-soluble formulation in water is consisted of a Basic Oil Base of Group V, with cinematic Viscosity at 100 °C, $\text{mm}^2.\text{s}^{-1}$, ASTM D 445 from 2.000 to 10.00, viscosity rate, ASTM D 2270 minimum of 100, Flash Point, °C, ASTM D 92 minimum of 150 and Pour Point, °C, ASTM D 97 maximum of -45, plus antioxidant and antifoam additive. In which the inhibitor of corrosion or anticorrosive has the purpose of avoiding aging of the final product (fluid) by oxidation, due to, the action of the oxygen in the air and, combined with, the temperatures during the work regimen and the antifoam inhibits foaming and keeps the physical integrity of the fluid. In which the corrosion inhibitors and antioxidants can be: Corrosion Inhibitor VP-1749, Hostacor, ADDCO-ST 5000,

ALOX, NAUGALUBE. Bardahl LPP, Bardahl Anticorrosive, Maxlub AR, Maxlub ACA, Maxlub Biocut, Maxlub RET and/or others; and the Antifoam can be: Dow Corning Q7-9120 Spray, Bardahl Max All and/or others.

The shock absorber with Biodegradable Hydraulic Fluid, can be
5 presented as a monitoring device for wear and tear of automotive shock absorber, it consists in a electro-electronic device, placed strategically in shock absorber, monitoring the number of relevant cycles, which is the performance of the suspension in function of the irregularities presented in general pavement, and that can effectively cause some damage in the suspension components,
10 this information can be made available to the driver to inform when the exchange of a component is recommended.

The shock absorber with Biodegradable Hydraulic Fluid can also be presented as a Sensor of Performance Cycles with Magnetic Spring; it consists in an electro-electronic device, placed strategically in the shock
15 absorber to detect the performance movements in a determined movement, especially vertically.

The shock absorber with Biodegradable Hydraulic Fluid, can also be presented or not with a proportional valve as an electronic control device of the absorption factor.

20 The shock absorber with Biodegradable Hydraulic Fluid and Biodegradable Hydraulic Fluid for shock absorber of any nature, object of the present patent, as described above, has a unique and unseen formulation for the State of Technique, configuring great advantages compared to all the other fluids for shock absorber known in the market so far. Among the performance
25 improvement factors offered by the biodegradable hydraulic fluid, for better yield

in terms of durability, noise and friction application of the gasket seal with plasma, obtaining through the composition of several gases, for example nitrogen, hydrogen and fluoride, not restricted to these elements with variations between them and other gases. The application of plasma over the polymer that constitutes the gasket seal is also highlighted as solution to eventual chemical interferences or adverse reactions that the polymers, rubbers or other materials currently used in manufacturing the seals, rings can suffer with the direct and indirect contact with the biodegradable hydraulic fluid for shock absorber, not being a restrictive condition for the use of the object of the present patent.

Among these advantages are: the fact that it shines in comparison to the common mineral hydraulic fluid in relation to its thermal stability and low viscosity variation between a range from -50°C to 150°C or higher range, decrease in internal friction due to lower reaction between the several materials used internally in the hydraulic shock absorber, lower aeration and/or emulsification between internal fluid and gas usually present in shock absorber, better performance and stability in absorption strength, besides having as main physical characteristics the biodegradability and low or null toxicity rate, not being harmful to the environment.

Therefore, by the composition characteristics, application and functioning, described above, it can be clearly noticed that the SHOCKS WITH BIODEGRADABLE HYDRAULIC FLUID AND BIODEGRADABLE HYDRAULIC FLUID FOR SHOCK ABSORBER OF ANY NATURE, is a new fluid for the State of Technique which is full of conditions of innovation, unseen inventive activity and industrialization, deemed Worthy of a Patent of Invention.

CLAIMS

1 – SHOCK ABSORBER WITH BIODEGRADABLE HYDRAULIC FLUID AND BIODEGRADABLE HYDRAULIC FLUID FOR SHOCK ABSORBER OF ANY NATURE, shock absorber with biodegradable fluid with low toxicity, for
5 any application, specially for the automotive industry, **characterized by** being a shock absorber of any nature being monotube, bitube and/or tritube shock absorber, containing a fluid with a Biodegradable composition, with the viscosity to stand a pressure of up to 300 Bar, operating temperature from -50 to 150 ° C; which the Fluid is essentially composed by a base that can be either soluble or
10 non-soluble in water, consisting in a biodegradable formulation; which the water soluble formulation is constituted of a Glycol Base, with a cinematic Viscosity at 100 °C, $\text{mm}^2.\text{s}^{-1}$, ASTM D 445 from 2.000 to 10.00, Flash Point, °C, ASTM D 92 minimum of 90, and Pour Point, °C, ASTM D 97, maximum of -45, plus inhibitors of corrosion, or anticorrosive and antifoam; and the non-soluble in
15 water formulation is constituted by a Basic Oil Base of Group V, with cinematic Viscosity at 100 °C, $\text{mm}^2.\text{s}^{-1}$, ASTM D 445 from 2.000 to 10.00, viscosity rate, ASTM D 2270 minimum of 100, Flash Point, °C, ASTM D 92 minimum of 150 and Pour Point, °C, ASTM D 97 maximum of -45, plus antioxidant additive and antifoam; which the inhibitors of corrosion and antioxidant additives can be:
20 Corrosion Inhibitor VP-1749, Hostacor, ADDCO-ST 5000, ALOX, NAUGALUBE. Bardahl LPP, Bardahl Anticorrosive, Maxlub AR, Maxlub ACA, Maxlub Biocut, Maxlub RET and/or others; and where the Antifoam can be: Dow Corning Q7-9120 Spray, Bardahl Max All and/or others; which they possess a gasket seal with plasma application, obtained through the composition of several gases.

2 – SHOCK ABSORBER WITH BIODEGRADABLE HYDRAULIC FLUID AND BIODEGRADABLE HYDRAULIC FLUID FOR SHOCK ABSORBER OF ANY NATURE, shock absorber according to claim 1, **characterized by** being able to be presented as a monitoring device for wear and tear of automotive shock absorber, being an electro-electronic device, placed strategically on the shock absorber, monitoring the number of relevant cycles, that are the performance of the suspension in function of the irregularities presented by general pavement, with this information available in some way to the conductor of the vehicle.

3 – SHOCK ABSORBER WITH BIODEGRADABLE HYDRAULIC FLUID AND BIODEGRADABLE HYDRAULIC FLUID FOR SHOCK ABSORBER OF ANY NATURE, shock absorber according to claim 1, **characterized by** being able to be presented as a Sensor of Cycle Performance with Magnetic Spring, an electro-electronic device, placed strategically in the system where there is the need to detect the performance movements of a determined movement, specially vertically.

4 – SHOCK ABSORBER WITH BIODEGRADABLE HYDRAULIC FLUID AND BIODEGRADABLE HYDRAULIC FLUID FOR SHOCK ABSORBER OF ANY NATURE, shock absorber according to claim 1, **characterized by** can be presented or not as a proportional valve as electronic control device of the absorption factor.