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Selected Patents Related to Thermal Spraying

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Applications

Aircraft Wheel Part Having Improved Corrosion Resistance. A steel member having wear and corrosion resistance through a combination of coatings is disclosed, the steel member being a hardened and tempered steel member having a high tensile strength, at least one selected portion of the steel member coated by thermal spraying with a tungsten carbide-cobalt composition to provide wear and corrosion resistance, the tungsten carbide-cobalt composition being approximately 78-90% tungsten carbide and approximately 10-19% cobalt, and a sacrificial ceramic-metallic coating on the steel member to provide corrosion resistance for the steel member. A method of coating a steel member is also disclosed.

US 7475762: Kaczynski David K., Chan Jimmy C., and Day Martin S. Company: Honeywell International Inc. Issued: January 13, 2009.

Carbon Sputtering Device. Problem to be solved: To suppress the generation of nodules and prevent abnormal discharge and the reduction of the film forming rate caused by sputtering and to realize carbon sputtering for a long time. Solution: In a device in which, in a vacuum treating chamber, the surface of a cathode faced to a substrate is provided with a target of carbon or a composite material of carbon and silicon, the circumference of the target is covered with an earth shield, furthermore, the front circumference of the target is surrounded by a deposition preventive board, and, by plasma generated in front of the target, the target is sputtered to form a carbon thin film on the substrate, the opening edge parts and the bent parts of the earth shield and the deposition preventive board are formed into round shapes, and furthermore, coating layers large in surface ruggedness such as aluminum thermal spraying layers are formed on the earth shield and the deposition preventive board.

JP 4233702: Ikeda Satoshi, Kawamura Hiroaki, and Ishikawa Michio. Company: Ulvac Corp. Issued: March 3, 2009.

Cathode Container for Sodium-Sulfur Battery, Method for Forming Sprayed Coating on Inner Circumferential Surface of Cathode Container, and Quality Judgment Method for Sprayed Coating. Problem to be solved: To provide a cathode container for a sodium-sulfur battery having sprayed coating for corrosion protection having high corrosion resistance and high durability. Solution: In the cathode container for the sodium-sulfur battery having the sprayed coating on the inner circumferential surface, cross section metallographic structure of 10 μm unit of thickness of the sprayed coating is dense lamellar structure 3 comprising at least three flat sprayed particles 1. The sprayed coating on the inner circumferential surface of the cathode container for the sodium-sulfur battery is Cr-Fe alloy powder containing 65% or more Cr, containing 1.5% or less O_2 in metal powder, and is formed by plasma spraying in the atmosphere metal powder for spray coating which is crushed massive metal powder having a particle size of 75 μm or less.

JP 4234936: Ando Takashi. Company: NGK Insulators Ltd. Issued: March 4, 2009.

Coating Member and Its Producing Method. Problem to be solved: To provide a coating member in which blow holes developed during depositing a coating by thermal spraying are reduced and consequently the strength of the deposited coating is enhanced. Solution: The coating member is composed of a base material made of Al, and of a coating made of Cu, on the surface of the base material, deposited by the thermal spraying. The coating is made fine by collision of solid against the surface of the coating. The blow holes developed by the deposition of the coating by the thermal spraying are reduced with the fining treatment, and the strength of the coating can be improved.

JP 4216453: Shindou Takahiko, Suyama Akiko, Udagawa Takeshi, Ando Hideyasu, and Ito Yoshiyasu. Company: Tokyo Shibaura Electric Co. Issued: January 28, 2009.

Copper Circuit Formed by Kinetic Spray. The invention concerns a copper-based circuit having an electrically insulative substrate, a bond layer including silver formed over select portions of the substrate according to a desired shape of the circuit, and an electrically conductive layer including plastically deformed particles of copper deposited on the bond layer. Furthermore, the invention also concerns a process for forming a copper-based circuit, wherein the process includes the steps of providing an electrically insulative substrate, forming a bond layer including silver over select portions of the substrate according to a desired shape of the circuit, and depositing copper on the bond layer by the steps of introducing copper particles into a pressurized carrier gas, forming the pressurized carrier gas and the copper particles into a supersonic jet, and directing the jet toward the bond layer formed over the substrate such that the jet has a velocity sufficient to cause plastic deformation of the copper particles onto the bond layer, thereby forming an electrically conductive layer on the bond layer.

US 7476422: Elmoursi Alaa, Lautzenhiser Frans P., Campbell Albert B., and Smith John R. Company: Delphi Tech Inc. Issued: January 13, 2009.

High Strength Amorphous and Microcrystalline Structures and Coatings. The present invention thus provides an improved method for coating turbine engine components. The method utilizes a cold high velocity gas spray technique to coat turbine blades, compressor blades, impellers, blisks, and other turbine engine components. These methods can be used to coat a

variety of surfaces thereon, thus improving the overall durability, reliability and performance of the turbine engine itself. The method includes the deposition of powders of alloys of nickel and aluminum wherein the powders are formed so as to have an amorphous microstructure. Layers of the alloys may be deposited and built up by cold high velocity gas spraying. The coated items displayed improved characteristics such as hardness, strength, and corrosion resistance coating turbine engine components.

US 7479299: Raybould Derek and Madhava Murali N. Company: Honeywell Int Inc. Issued: January 20, 2009.

High Temperature Hearth Roller. Problem to be solved: To reduce the lowering of wear resistance and build-up resistance even in the case of using in a high temp. line by executing thermal-spray of the mixture of heat resistant alloy powder and ceramic oxide powder having specifized compositions onto the outer peripheral surface of a roller. Solution: This thermal-spray of a thermal-spraying material having a mixed composition of a heat resistant alloy powder and a ceramic oxide is executed onto the conveying surface of the hearth roller. The heat resistant alloy has the composition composed of <+6% C, <+10% Cr, 20-70% Co or Ni, 8-50% Al and <+20% one or more elements selected among W, Mo, Ta, Nb and Fe and it is desirable to mix in the ratio of 10-70 pts.wt. of the ceramic oxide powder to 100 pts.wt. of the heat resistant alloy powder. The ceramic is made to be one or more kinds selected among Y_2O_3, ZrO_2-CaO, ZrO_2-Y_2O_3, Al_2O_3, ZrO_2-Al_2O_3. It is desirable that the thickness of the thermal sprayed film is in the range of 50-300 μm. This hearth roller has excellent reaction resistance to manganese oxide and sticking resistance to the iron powder.

JP 4229508: Ko Akira and Takasaki Nobuhiro. Company: Dai Ichi High Frequency Co Ltd. Issued: February 25, 2009.

High-Temperature Superconductive Element Based on Nano Material and Its Preparation. This invention relates to a thermal super-conductive element based on nano material and preparing method thereof. Firstly high thermal conductivity nano composite metal powder, diamond powder or metal oxide, the grain size of which is 10-100 nm, are prepared, then are made to form a coating by plasma spraying technology, and then one of the metals is made to evaporate by laser evaporation technology to form an nano or submicro structure on the coating surface. The heat exchange element with thermal super-conductive characteristic made thereby has the advantages of high thermal conducting rate, low thermal resistance, long service life, high efficiency and compact structure.

CN 100455975: Gao Xuenong, Ding Jing, and Yang Xiaoxi. Company: Univ South China Science & Eng. Issued: January 28, 2009.

Insulated Roll for Conveying Steel Strip. Problem to be solved: To provide a long-life, inexpensive insulated roll which is free from the crack of insulating rings themselves and the exfoliation or damage to an insulating coating due to a shock or thermal effect at the time of transferring a hot-rolled steel strip at the high temperature of approximately 1200 °C. Solution: The insulated roll for conveying a steel strip has a plurality of insulating rings around a mandrel cooled with cooling water supplied from the outside. The roll for conveying the steel strip is excellent in insulation performance by conducting thermal spraying for sealing voids on the inner circumference and side face of the insulating rings.

JP 4227562: Sugimoto Haruhisa. Company: Nippon Steel Corp. Issued: February 18, 2009.

Method for Manufacturing Metal-Ceramic Composite Material with Poreless Surface. Problem to be solved: To provide a method for manufacturing a metal-ceramic composite material having a poreless surface due by surface treatment. Solution: The method for manufacturing a metal-ceramic composite material with a poreless surface comprises, manufacturing a composite material with ceramic powder or ceramic fiber which is a reinforcement, and with aluminum or an aluminum alloy which is a matrix, forming a metal film on the surface of the composite material by thermal spray coating or the like, and polishing the surface of the formed metal film.

JP 4243437: Odano Chokusui, Higuchi Takeshi, Harada Tamotsu, and Shimojima Hiromasa. Company: Taiheiyo Cement Corp, Celanx KK. Issued: March 25, 2009.

Method for Manufacturing Voltage-Dependent Resistor. Problem to be solved: To solve the problem of degradation in overvoltage protection capability of a voltage-dependent resistor due to a void that results from exfoliation of part of the electrode material together with a mask, provided on a sintered compact for formation of an electrode-free ring-shape region along the outer circumference of the sintered compact, when the mask is removed upon completion of electrode formation in a voltage-dependent resistor manufacturing process. Solution: An electrode material is thermally sprayed at an angle roughly square to the outer circumference of a sintered compact, without a mask on the sintered compact outer circumference, for formation of an electrode-free ring-shape region along the sintered compact outer circumference.

JP 4218935: Umehara Kiyokazu and Iizawa Harumichi. Company: Tokyo Shibaura Electric Co. Issued: February 4, 2009.

Method for Providing a Plastic Coating by Means of Spraying, Device Used for Said Method and Use of the Layer Thereby Produced. The invention relates to a method for providing a plastic coating by means of spraying. According to said method, a layer of metal, non-metal or oxide materials is applied to a plastic element or a plastic layer is applied to a base material by means of high-pressure spraying while adding the powdered material by means of a gas-controlled powder feeder.

EP 1237662: Dvorak Michael. Company: Dvorak Advanced Coating Solutions. Issued: March 18, 2009.

Method of Preparing Ceramic Coating by Flame Heat Spray Painting Thermit Packaged Silicon Carbide Particles. The present invention relates to a preparation method for ceramic coating of flame thermal spraying thermite coated silicon carbide grain, which comprises the steps of that: firstly, the ferric oxide powder and the aluminum powder are compounded to form thermite; and then the thermite, the alumina grain and the silicon carbide grain are compounded and rebuilt by macromolecule anchoring agent to form the spherical compounded grain with a

three layers packaged structure, that is an inner layer of silicon carbide, a middle layer of thermite and an outer layer of alumina; finally, the spherical compounded grain is loaded in the powder bucket of the spraying gun, and the thermal spraying is executed by means of oxy-acetylene flame to form ceramic coating. In the present invention, the spraying raw materials are rebuilt and compounded, so that the silicon carbide grain will not contact with the flame directly in the oxy-acetylene flame thermal spraying process, which effectively prevent the silicon carbide grain from thermal sublimation in high temperature, thereby the silicon carbide grain can sediment onto the surface of the substrate uniformly and compactly so as to obtain the high performance ceramic thermal spraying coating of alumina enhanced by silicon carbide.

CN 100448800: Yang Jianqiao Yang. Company: Univ Shanxi Science & Tech. Issued: January 7, 2009.

Niobium-Based Compositions and Coatings, Niobium Oxides and Their Alloys Applied by Thermal Spraying and Their Use as an Anticorrosive. The novelty proposed herein describes the application of niobium-based compositions and coatings, niobium oxides and their alloys capable of associations with other oxides and alloys by means of the thermal spraying technique for the purpose of an anticorrosive protection in highly corrosive environments, mainly those which present high temperatures, show presence of gases such as H_2S, SO_2, CO_2, as well as organic and inorganic acids, commonly found in industrial centers.

EP 1546424: Miranda Luiz Roberto M., Carvalho Ladimir J., and Goncalves Pereira Antonio C. Company: UFRJ. Issued: January 14, 2009.

Plasma Corrosion Resistant Thermal Spraying Member, and Its Production Method. Problem to be solved: To provide a plasma corrosion resistant thermal spraying member reduced in the total gas discharge amount in a working temperature region, attaining a prescribed vacuum in a short time, exerting little influence on etching and a film deposition process, and capable of improving the yield of a device. Solution: The plasma corrosion resistant thermal spraying member is obtained by depositing a yttria sprayed coating on a base material by a plasma spraying method. The total gas discharge amount in the temperature region from 50 to 240 °C is $<+120$ $\mu L/cm^2$.

JP 4209277: Yokoyama Masaru, Ichijima Masahiko, and Kobayashi Yoshiaki. Company: Toshiba Ceramics Co. Issued: January 14, 2009.

Roll Member for Hot-Dip Metal Coating Bath, and Its Production. Problem to be solved: To provide a roll having a surface structure hardly causing adhesion of plating dross to roll surface and also easy of peeling off of the plating dross and also to provide a method of forming a film on the roll surface. Solution: The surface of a base material composed of steel is coated with WC-Co cermet by thermal spraying. Then, the surface of the resultant WC-Co cermet sprayed coating is coated with a slurry consisting of a mixture of chromium oxide-containing aqueous Solution and nitride, followed by heating and burning. By this procedure, fine pores existing in the surface of the WC-Co cermet sprayed coating or near the surface layer of the coating are coated and filled with the burnt mixture.

JP 4224150: Tani Kazumi, Harada Yoshio, and Miyajima Nariyoshi. Company: Tocalo Co Ltd. Issued: February 12, 2009.

Rotationally Symmetrical Thermomechanical Part of a Turbomachine, Annular Knife Edge Sealing and Its Manufacturing Method. The thermomechanical piece has an annular leak prevention unit presenting in radial direction a height variable along its circumference by forming several teeth between which a gap is provided. The leak prevention unit is coated with an abrasive material by laser projection. Each tooth presents a height progressively increasing from the gap to a tip and progressively reducing from the tip to the following gap, and forms a break for the height of the leak prevention unit. An independent claim is also included for a method of fabricating an annular leak prevention unit.

EP 1785649: Mons Claude and Vigneau Joel. Company: Snecma. Issued: March 25, 2009.

Strontium Titanium Oxides and Abradable Coatings Made Therefrom. Abradable coatings are provided. The coatings comprise SrTiO in combination with a ceramic, such as ytrria stabilized zirconia, or SrTiO in combination with an MCrAlX, such as NiCoCrAlY. The abradable coatings are suitable for use in high temperature environments found in gas turbine engines. Also provided are metal articles coated with such coatings, and abradable assemblies.

US 7504157: Huddleston James B., Zatorski Raymond, and Mozolic Jean. Company: H.C. Starck GmbH. Issued: March 17, 2009.

Surface Gradient Protective Coating and Its Preparing Method. The invention relates to surface gradient protecting coat and manufacturing method. It uses protecting coat system design to adjust MoB and CoCr basis component content proportion without changing its essential component, make damping transition thermal spray coating material, and gain gradient thermal spray coating. The gradient protecting coat of the invention can obviously increase coating anti thermal shock property, and corrosion-resisting properties. Thus it can be used as surface protecting coat for the immerged and stable rollers used in continuous dip coating high aluminum zinc production line.

CN 100453700: Bi Gang Tan. Company: Shanghai Baogang Equipment Ins. Issued: January 21, 2009.

Thermoelectric Conversion Module and Its Manufacturing Method. Problem to be solved: To provide a thermoelectric conversion module whose production yield is high, whose reliability and conversion efficiency are high, which has a structure capable of being made easily large-sized and whose performance is high. Solution: The thermoelectric conversion module is composed of an electrically and thermally insulating form in which a plurality of through holes are formed, and in which a plurality of grooves for electrodes used to connect the through holes are formed. The conversion module is composed of p-type thermionic elements and n-type thermionic elements which are arranged alternately on the through holes at the form. The conversion module is composed of metal masks which are fixed to bottom faces of the grooves for the electrodes at the form. The conversion module is composed of thermal spraying electrodes which are buried in such a way that the p-type

thermoelectric elements and the p-type thermoelectric elements are electrically connected to each other in series on the grooves for the electrodes at the form. The form, the thermoelectric elements, the metal masks and the thermal spraying electrodes are fixed and bonded integrally.

JP 4225662: Nagai Atsushi, Nagao Keigo, Ozora Yasumasa, Fujii Kazuhiro, Inoue Toru, Kamakura Hiroki, and Sakurada Toshio. Company: Ube IndustriesKyushu Electric Power. Issued: February 18, 2009.

Wear Resistant Ceramic Composite Coatings and Process for Production Thereof. A coated article is provided by a thermal spraying process, wherein a feedstock including an oxide ceramic and a non-oxide ceramic is deposited on a target surface of the article to provide a wear-resistant coating. The feedstock is provided by mixing carbide and/or boride ceramic powder with an oxide ceramic powder prior to thermal spraying.

SE 531291: Kartik Shanker and Grazyna Kraj Andrea. Company: Standard Aero Ltd. Issued: February 17, 2009.

Wear Resistant Layer for Downhole Well Equipment. The present disclosure provides a method, system, apparatus, and related alloy to provide a protective wear coating on a downhole component for a well through a synergistic use of a thermal spraying process in combination with a novel iron-based alloy. The thermal spraying process melts the material to be deposited while a pressurized air stream sprays the molten material onto the downhole component. The coating operation takes place at low temperatures without fusion or thermal deterioration to the base material. The wear resistance is increased while providing a lower coefficient of friction by the wear resistant layer relative to a coefficient of friction of the downhole equipment without the wear resistant layer. In at least one embodiment, the disclosed process using the iron-based alloy can apply a much thicker coating than heretofore has been able to be applied without spalling and without necessitating an intermediate buffer layer.

US 7487840: Gammage John H., Daemen Roger A., and Scott Joe L. Company: Wear Sox L P. Issued: February 10, 2009.

Diagnostics and Characterization

Measuring System for Determining Charging Gas Flow with Powdered Aggregate, Particularly for Thermal Spraying Machine, Involves Forming System by Combination of Optional Gas Quantity Flow and Coriolis Inertia Force Flow Measuring Devices. The method involves forming a system by a combination of an optional gas quantity flow measuring device with a coriolis inertia force flow measuring device. The flow passage is free of built-in fitments and the coriolis inertia force flow measuring device is mounted upstream to a feeding unit for feeding the powdery additive in the gas flow and for producing a homogenous multiphase flow of the additive or gas mixture.

DE 102007017760: Dirscherl Markus. Company: Innovaris Gmbh & Co KG. Issued: January 2, 2009.

Feedstock

Non-Crystalline Wear Preventive Arc Sprayed Powder Core Filament Material. This invention relates to an electrical arc-coating abrasion-resistant amorphous thread like material with powdery core. The powdery core comprises: CrB powder 50-70 wt.%, Mo powder 1-5 wt.%, TiC powder 2-10 wt.%, Si powder 3-9 wt.%, Ni powder 3-7, and Fe. The sheath of the thread-like material is made of stainless steel band, preferentially 430 stainless steel band with thickness of 0.35 mm and wide of 16.5 mm. The powdery core added is 25-48% of total material. The final thread-like material has phiv of 2.0 mm. This invention utilizes electrical arc-coating technique to form a uniform, dense and amorphous coating layer on the cooled steel base. The thread-like material thus obtained has good wear and corrosion resistance. The boiler protected with this thread-like material has long service life.

CN 100455695: Zeng Defu. Company: Qiuguan Tech Co Ltd. Issued: January 28, 2009.

Pre- and Post-Treatment

Technique and Equipment for Spray Coating Weld Face of Large Flat Heat Exchange Tube. This invention relates to process and apparatus for welding seam surface spraying of large flat heat exchange pipe. The process comprises: rolling, welding and molding steel belt with aluminum coated on a single face to obtain large flat heat exchange pipe, sending into a welding seam surface spraying apparatus, rolling the welding seam surface and surrounding matrix surface with a matrix surface treatment roller, spraying Al-Si alloy onto the welding seam surface and surrounding matrix surface with an arc spraying apparatus, and rolling the spraying layer with a spraying layer treatment roller. To avoid the deformation of the large flat heat exchange pipe due to the rolling of the matrix surface treatment roller and the spraying layer treatment roller, a front supporting roller and a back supporting roller are added below the large flat heat exchange pipe, clamping rollers are added to the left and right sides of the large flat heat exchange pipe, and adjusting mechanisms are added to the left and right sides of the matrix surface treatment roller and the spraying layer treatment roller. This invention can improve the bonding strength between the welding seam surface and surrounding matrix surface, and the Al-Si spraying layer, as well as the compactness and surface quality of the Al-Si spraying layer.

CN 100465328: Xu Jinli Wu. Company: Shuangliang Air Conditioning. Issued: March 4, 2009.

Underlayer for Thermal Spray Treatment on Surface of Carbon Fiber Reinforced Plastic Material. Problem to be solved: To improve functions of an underlayer for forming thermal spray coating of metal, cermet or ceramics on a carbon fiber reinforced plastic material (a CFRP material), in order to reform the surface properties, so that the underlayer may not be deteriorated by heating in a thermal spray step and can acquire a high adhesion between the CFRP material and a thermal spray coating. Solution: The underlayer for thermal spraying on the surface of the carbon fiber reinforced plastic material is an intermediate coating layer of a metal having superior adhesiveness to both of the CFRP material and a thermal spraying material, such as Cu, Cr and Fe. The intermediate coating layer is formed by electroplating the metal on the material and then etching the electroplated intermediate coating layer with an electrical current having polarity reverse to that of the electrical

current used for electroplating, to roughen the surface of the intermediate coating layer into a surface roughness (Rz) of 10 to 30 μm.

JP 4206012: Otsubo Fumiaki, Izaki Hideaki, and Takeda Shuhei. Company: Yoshikawa Kogyo Kk. Issued: January 7, 2009.

Spraying Systems and Methods

Appts. for Guiding and Contacting Spray Wires in Electric-Arc Spray Device—Has Longitudinally Slit Contact Nozzles. Appts. consists of two nozzles slit longitudinally in their front region, with each wire fed through the internal bore of the corresp. nozzle. Appts. has a wrapper element covering the region of the nozzles and having a central opening for passage of the spray wires. Furthermore, the inner sides of the nozzles rest on sliding surface arranged centrally on an axially movable gas spray nozzle. Both the gas spray nozzle and the wrapper element are made of a dielectric material. Region of the inner surface of the contact nozzle is pref. located in the flow path of the spray gas. Wrapper element of the contact nozzles is pref. tightened by a nut or a similar device against a shoulder element. Slit in the nozzle region is pref. located roughly perpendicular to the bearing area of the wrapper element. Wrapper element can be shaped as a part of annular nozzle for supplying another stream of spray gas. Wrapper element can also be shaped so that its central opening is located either over the spray wires over the cylindrical part of the contact nozzles.

DE 4102158: Matthaeus Heinz Dieter. Company: Sulzer Metco OSU GmBH. February 12, 2009.

Arc Spraying Apparatus for Spray Painting Heterogeneous Metal. The utility model discloses an electric arc spraying device for dissimilar metal spraying, which comprises a power supply, an electrode, an airflow spray pipe, a nozzle, a wire feeding mechanism and two wire feeding wheels. The electric arc spraying device is characterized in that the radius ratio of the wire feeding wheel to the wire feeding wheel is controlled to be 1:1 to 1:5, the arc area entering speed of a relatively high melting wire and a relatively low melting wire respectively conveyed by the wire feeding wheel and the wire feeding wheel is controlled to ensure the stability of two wires starting arc in the arc starting area and the continuous normal running of the electric arc spraying device, thereby obtaining the dissimilar metal functional electric arc spraying coating according to the set requirements; the design is scientific and compact, an alloy or a pseudo alloy coating can be prepared by directly adopting dissimilar single wire electric arc spraying, thereby solving the long-standing problem that the electric arc spraying device only sprays homogeneous metal, and breaking through the key problem of the development of the current method for preparing special functional alloy or pseudo alloy coating by the electric arc spraying.

CN 201183817: Bingzhong Li, Peng Li, Zhihong Dong, and Haicheng Zhang. Company: Wuhan Res Inst. of Materials Pr. Issued: January 21, 2009.

Combined Arc Spraying Gun Capable of Delivering Powder. The utility model relates to a composite type electric arc spraying gun capable of feeding powder. The spraying gun is characterized in that the upper part of the spraying gun body is provided with a powder feeding device; the lower part of a powder feeding passage of the device is connected to an inner chamber of the spraying gun and is vertical to a compressed air passage; a manual flow control valve for adjusting the dropping amount is arranged on the middle of the powder feeding passage; the top of the powder feeding passage is connected to the bottom of a feed barrel; the feed barrel is provided with a piston sealed with the inner wall of the feed barrel; and a connecting rod mechanism by manual pressurization is arranged on the piston. The spraying gun can break the limitation that the prior spraying gun can only use wire material for electric arc spraying, broadens the application range of the electric arc spraying and has the characteristics of novel powder feeding mode, convenient operation and use, wide applicability, simple and reliable structure, low cost, etc.

CN 201180154: Rong Tan, Xiangyun Jiang, and Jikun Wei. Company: Univ Kunming Science & Tech. Issued: January 24, 2009.

Device for Plasma Spraying Wedge-Shaped Items. Field: metallurgy. Substance: invention refers to devices for wedge-shaped items plasma spraying and can be implemented for applying wear resistant coating on teeth of excavator bucket. An arresting device consists of two parts with upper and lower limiting straps and of limit switches of lengthwise reciprocal motions of the plasmatron. The mechanism of transversal reciprocal and vertical motions of the plasmatron consists of a holder, of a cylinder with a piston attached thereto, in the cavity of which a lock is secured, kinematically connected with a slider, and of a limiting finger of lengthwise motions of the plasmatron screwed into side walls of the piston; the said finger is designed to stop against working surfaces of upper and lower limiting straps. The plasmatron and a scale bar are stationary fixed in the lower part of the cylinder. The manipulator swinging mechanism is connected to the slider of the mechanism of lengthwise reciprocal motion of the plasmatron by means of a mechanical link consisting of a screw adjusting horizontal position of the sprayed surface and of a pusher with a spring inserted into the cavity of the screw. Effect: applying qualitative coating due to operation consistency of mechanism of plasmatron lengthwise reciprocal motion and swinging mechanism of manipulator at spraying coating onto cutting edge of wedge-shaped item.

RU 2347846: Akin Shin Sergej Ivanovich. Company: G Obrazovatelnoe Uchrezhdenie. Issued: February 27, 2009.

Injection Type Plasma Spraying Device for Producing Hydroxyapatite Bioactivity Coating. The utility model relates to a suspending liquid injection type plasma spraying device which prepares a hydroxyapatite biologically active coating and comprises a plasma ejection gun and also comprises a spraying material suspending liquid storage container, a suspending liquid conveying system and a suspending liquid injection system, wherein the suspending liquid storage container is a pressurized tank or a container with the high energy ultrasonic wave oscillating function, the conveying system comprises a conveying power device and a conveying pipe which is matched and connected with the conveying power

device, a small diameter guiding tube in the injection system is installed on a fixed seat which is connected with the plasma ejection gun through an adjusting component, the suspending liquid is injected into the small diameter guiding tube through compressed air in the pressurized tank in the conveying power device or an electronic peristaltic pump, the small diameter guiding tube injects the suspending liquid directly and radially into central high temperature area of plasma flame in a linear type shooting flow mode, and the hydroxyapatite biologically active coating with even structure is generated on the metal foundation bed surface. The suspending liquid injection type plasma spraying device has simple structure and easy operation, and saves raw materials.

CN 201195743: Fang Wu, Xiaoguang Liu, Yanfeng Xiao, Lei Song, Yao Wu, Yi Huang, and Jiyong Chen. Company: Univ Sichuan. Issued: February 18, 2009.

Masking an Engine Block During Coating Application. Embodiments of the invention use a gas flow to prevent adherence of a coating to portions of an engine block adjacent to a cylinder bore being coated with the coating. Embodiments may be particularly useful for applying a coating on the inner surface of the cylinder bores in one cylinder bank while protecting cylinder bores in an opposing cylinder bank, e.g., in a V-type engine. One method of applying a coating to an engine block comprises spraying the coating on an inner surface of a first cylinder bore of the engine block. The method further comprises shielding a second cylinder bore of the engine block from the sprayed a coating with a gas flow while spraying the coating on the inner surface of the first cylinder bore.

EP 1685910: Takahashi Hideo, Ogino Takashi, Kougo Kazuhiro, Sugiyama Kiyokazu, and Kanai Koichi. Company: Nissan Motor. Issued: March 25, 2009.

Modified High Efficiency Kinetic Spray Nozzle. A modified high efficiency kinetic spray nozzle is disclosed. The modified nozzle has a rapid expansion rate in the diverging region relative to prior art nozzles, which enables one to achieve much higher particle velocities without an increase in the main gas temperature. Preferably, the expansion rate of the supersonic nozzle in a portion of the diverging region is at least 1 mm^2 per millimeter, more preferably 2 mm^2 per millimeter, more preferably 5 mm^2 per millimeter, with a most preferable expansion rate being 10 mm^2 per millimeter.

US 7475831: Steenkiste Thomas H. V., Han Taeyoung, and Gillispie Bryan. Company: Delphi Technologies, Inc. Issued: January 13, 2009.

Nozzle for Cold Spray and Cold Spray Apparatus Using the Same. Disclosed is a nozzle for cold spray and a cold spray apparatus using the same. The nozzle for cold spray includes a hollow-type nozzle section. The nozzle section includes a convergence inlet section in which the cross-sectional area is converging, a throat area connected to the convergence end point of the inlet section, and an outlet section connected to the end point of the throat area. The nozzle for cold spray is provided with a spray tube located inside the convergence inlet section, the spray tube having a spray hole formed at its end point in such a way as to be placed at the throat area or the outlet section beyond the throat area. The speed of the powder flow at the outlet end point of the outlet section reaches 300-1200 m/s.

EP 1700638: Ko Kyung Hyun, Lee Ha-Yong, Lee Jea-Hong, Lee Jea-Jeong, and Yu Young-Ho. Company: SNT Co Ltd. Issued: March 4, 2009.

Plasma Spraying Gun. The utility model relates to a plasma gun which comprises a nozzle, electrodes, a gun body, a gun sleeve, an air inlet pipe, an electrode cooling water inlet pipe and an electrode cooling water outlet pipe. The plasma gun is characterized in that an external gun body, at least a cooling water input pipe and at least a cooling water output pipe are arranged outside the gun body and connected with the nozzle through an external gun sleeve; a hollow cavity is formed between the external gun body and the gun body, a spacing ring is arranged in the hollow cavity which divides the hollow cavity into an upper hollow cavity and a lower hollow cavity, and water holes are arranged on the spacing ring to enable cooling water to flow into the upper hollow cavity from the lower hollow cavity; the cooling water input pipe is inserted into the hollow cavity, and the cooling water input pipe is penetrated through the spacing ring to be communicated with the lower hollow cavity to enable the cooling water to directly flow into the lower hollow cavity; the cooling water output pipe is communicated with the upper hollow cavity to enable the cooling water to flow out the cooling water output pipe. The plasma gun has the advantages of heating and manufacturing metal nanometer materials, thermally protecting, heating or melting various difficultly molten metals and continuously working in the environment of high temperature.

CN 201185505: Hanqi Wu and Jianxin Zhang. Company: Changzhou Optical Gaging Produ. Issued: January 21, 2009.

Powder Sending Unit in High Pressure for Cold Spray. The invention relates to a cold spray coating high pressure powder feeder, belongs to the material surface modification installment technology area. Including the powder box, the awl groove, the gas and powder turnover bolt, the Three contact and the high pressure tube; one end of the three contact connects the high pressure gas source, the other two ends of the three contact separately connects the high pressure tube and the feeder inlet bolt, the high pressure tube connects the three contact and the balance gas inlet bolt with the worm firmware, the balance gas inlet bolt connects the top of the powder-box, the interior end of the awl groove opens two inner worms along the same mid axes and separately connects the powder outlet bolt and the feeder bolt, the power-box connects the awl groove by the thin worm. The merit lies, the powder feeder structure is simple, reliable the powder outlets evenly, the energy conservation and have no environmental damage.

CN 100457286: Xianglin Zhou, Jishan Zhang, Hua Cui, and Xianyong Su. Company: Univ Beijing Technology. Issued: February 4, 2009.

Special Equipment for AC-DC Arc Metallic Spraying. The invention discloses a dedicated device for AC and DC electric arc metal spray coating. It includes air compressor, thread delivering machine, painting gun, electric control circuit, and AC and DC power supply. The feature is that the thread pressing and thread delivering adjusting structure is set on thread delivering machine, and the painting gun could control the spraying injection angle. It

has advanced structure, good capability and improves the level and quality of dedicated device for spray coating.

CN 100460551: Liang Yiming. Company: Liang Yiming. Issued: February 11, 2009.

Thermal Barrier Coatings and Bondcoats

Ceramic Thermal Barrier Coating. A ceramic thermal barrier coating for coating the surface of a component of a nickel-based superalloy, and an adhesive coating optionally applied thereon, preferably a gas turbine component, includes zirconium oxide (ZrO_2) stabilized by yttrium oxide (Y_2O_3) and production-related impurities, as well as at least one high-temperature and oxidation resistant intermetallic compound, for example NiAl, YRh, ErIr, the volume fraction of which decreases continuously or in stages as the distance from the surface of the component/the adhesive coating increases. Advantageously, a less steep stress gradient is produced by gradually varying the composition of the thermal barrier coating. This leads to an increased expansion tolerance of the thermal barrier coating and thus, on the one hand, to an increased lifetime under thermal loading (no flaking) and, on the other hand, the possibility of applying thicker thermal barrier coatings, and therefore of using the coated components at higher temperatures. It relates to a ceramic thermal barrier coating which is used to coat heavily thermally loaded components, for example rotor blades of a gas turbine.

EP 1902160: Nazmy Mohamed Youssef. Company: Alstom Technology Ltd. Issued: March 18, 2009.

Coating Suitable for Use as a Bondcoat in a Thermal Barrier Coating System. A coating suitable for use as a bondcoat for a thermal barrier coating system includes about 5 to about 10 wt.% of aluminum (Al), about 10 to about 18 wt.% of cobalt (Co), about 4 to about 8 wt.% of chromium (Cr), about 0 to about 1 wt.% of hafnium (Hf), about 0 to about 1 wt.% of silicon (Si), about 0 to about 1 wt.% of yttrium (Y), about 1.5 to about 2.5 wt.% of molybdenum (Mo), about 2 to about 4 wt.% of rhenium (Re), about 5 to about 10 wt.% of tantalum (Ta), about 5 to about 8 wt.% of tungsten (W), about 0 to about 1 wt.% of zirconium (Zr), and a remainder of nickel (Ni) barrier coating system for a component that is exposed to high temperatures, such as a gas turbine engine component (e.g., blades, vanes, etc.). More particularly, the present invention relates to a coating including a low aluminum content, where the coating is suitable for use as a bondcoat in a thermal barrier coating system.

US 7476450: Maloney Michael J., Seetharaman Venkatarama K., and Litton David A. Company: United Technologies Corp. Issued: January 13, 2009.