

CHEMICAL TECHNOLOGY

The Process of Activated Sintering of Tungsten with Palladium Additives

G. V. SAMSONOV and V. I. YAKOVLEV, *Porosh. Metall.*, 1967, 7, (7), 45-49
0.05-1.0% amounts of Pd in the form of aqueous PdCl₂ solution were added to 75 μ W powder and, after mixing, drying, sieving, reduction, and sieving, were compressed and sintered in H₂, a process which gave the highest density of >17g/cm³ at 0.2% Pd and 1600°C. These samples had microhardness <300 kg/mm² and compressive strength 105 kg/mm². The activating effect of Pd occurred by transfer of nonlocalised electrons from Pd to W with an accompanying decrease in free energy and increase of statistical weight of the stable electron configurations of the Pd and W atoms.

GLASS TECHNOLOGY

Creep of Alloys of Platinum with Rhodium at Temperatures 1350-1500°C

I. I. NOVIKOV, F. S. NOVIK, E. I. RYTVIN, S. S. PRAPOR and E. N. LOVINSKAYA, *Izv. Vysshikh Ucheb. Zaved., Tsvetnaya Metall.*, 1967, (4), 132-135
Strip samples of 7, 10 and 15% Rh-Pt were examined for creep by metallography at 1350, 1400 and 1500°C and at 0.2, 0.15 and 1.3 kg/mm² for up to 5 h. Graphs of test results show that creep increases with temperature. Creep was most intense at 1500°C, 1.3 kg/mm² and 7 and 10% Rh-Pt alloys failed after 90 and 240 min. in these conditions. No other failure occurred at other temperatures and loadings for any alloy. Creep decreases with greater Rh content. 10% Rh-Pt is recommended for glass-melting as 15% Rh-Pt is more expensive but not much stronger.

NEW PATENTS

METALS AND ALLOYS

Tungsten-base Alloys

MALLORY METALLURGICAL PRODUCTS LTD.
British Patent 1,090,561

Tungsten alloys with improved tensile strength and ductility are produced by incorporating 0.5-10 wt.% Ru. Small amounts of Mo, Ni and Fe give another range of alloys of high strength and ductility.

Experience in Industrial Determination of Glass Viscosity at a Tank Furnace Feeder

M. V. OKHOTIN, E. I. RAEVSKAYA and A. I. TUZIKOV, *Steklo Keram.*, 1967, 24, (12), 16-18
Cylindrical Pt electrodes of diameter 10 mm were placed 40 mm apart in the furnace and 20 mm deep in the molten glass. The viscosity of the glass was calculated from the resistance measured between the electrodes. A Pt:Rh-Pt thermocouple measured the temperature, whose fluctuations are matched by fluctuations of viscosity.

ELECTRICAL AND ELECTRONIC ENGINEERING

Fluorescence of Rhodium-activated Aluminium Oxide

G. BLASSE and A. BRIL, *J. Electrochem. Soc.*, 1967, 114, (12), 1306-1307
Fluorescence emission of 0.1-1.0 at.% Rh-activated Al₂O₃ consists of a broad band in the far red at 680 nm, probably due to the spin-forbidden ³T_{1g}-¹A_{1g} transition but other Rh³⁺-activated aluminates had very weak photoluminescence.

TEMPERATURE MEASUREMENT

Apparatus for Measuring the Hall Effect of Low-mobility Samples at High Temperatures

N. Z. LUPU, N. M. TALLAN and D. S. TANNHAUSER, *Rev. sci. Instrum.*, 1967, 38, (11), 1658-1661
A thermocouple is a more desirable sensor than a resistance thermometer for high stability of the sample temperature and a Pallador I thermocouple with output 60 μ V/deg C was found to be suitable. The double a c measuring method uses a c at 510 Hz with a 2 Hz magnetic field.

Treatment of Palladium and Palladium-base Alloys

JOHNSON, MATTHEY & CO. LTD.
British Patent 1,091,051

When placed under conditions of stress these materials tend to give "discontinuous yield" due to the presence of Si in the material. This defect is now prevented by adding an alloying element which more readily combines with Si than Pd, e.g. Ca, Ba, Sr, Ti, Zr, etc.

Alloys for Pen-point Manufacture

W. C. HERAEUS G.M.B.H. *British Patent* 1,097,815
The pen-points, specifically ball pen-points, are made from alloys of 0-50% Os, 20-45% Ir, 5-20% Ru, 0-25% Pt, Pd and/or Rh and 0-15% of a Group VIII base metal or metals, such as Co.

Dental Gold Alloy

J. F. JELENKO & CO. INC. *U.S. Patent* 3,340,050
Au alloys for dental crowns and bridges, which can be porcelain-enamelled, are coarse-grained and contain 0.1-1.1% Ni, 0.1-1% Al, 0.5-4% Ag, 1-10% Pt, 1-10% Pd and the balance (80-90 wt.%) Au. These alloys can withstand high temperatures.

Platinum Claddings for Refractory Metals

JOHNSON, MATTHEY & CO. LTD.

Belgian Patent 697,292

Articles comprise refractory metal cores, such as Nb, Ta, Cr, or an alloy thereof, or Mo, which do not form volatile oxides at the operating temperature nor form alloys with the Pt or Pt alloy cladding at melting points below this temperature. A barrier layer between core and cladding consists of a compatible refractory carbide, silicide, boride, sulphide, nitride, or oxide, e.g. a rare earth metal oxide, carbide or nitride.

ELECTROCHEMISTRY

Electrode for Electrolysis

ASAHI KASEI K.K.K. *British Patent* 1,099,434
Explosive bonding is used to bond Pt, Ir, Rh or Pd (or their alloys) to a corrosion-resistant metal, such as Ti, Zr, Ta and their alloys, for electrolysis electrode production.

Activation of Platinum

JOHNSON, MATTHEY & CO. LTD.

German Patent 1,236,302

Particularly active electrodes for use in the electrolysis of brine are produced by exposing a Ti electrode plated with Pt group metal or alloy, in particular Pt, Pt-Rh or Pd-Ag, to the action of Hg vapour or alkali metal amalgam vapour, the Hg coating being distilled off after it has been deposited to leave the surface in a highly active state. This corresponds to *British Patent* 957,703.

ELECTRODEPOSITION AND SURFACE COATINGS

Deposition of Platinum

INTERNATIONAL NICKEL LTD.

British Patent 1,097,010

A chemical plating bath which deposits Pt in a highly active catalyst form consists of an aqueous alkaline solution containing, 2-20g/l Pt, cal-

culated as $\text{Pt}(\text{OH})_4$, 0.1-1g/l N_2H_4 , enough soluble alkali metal hydroxide to give a pH of at least 8 and 0-1 mole of a complexing stabiliser containing a trivalent N atom, e.g. EDTA. Pt alloys with Ir and Ru can also be deposited by introducing NH_4 salts of the alloying metals, such as $(\text{NH}_4)_3\text{RhCl}_6$.

Platinum-Iron Diffusion Alloys

E. I. DU PONT DE NEMOURS & CO.

U.S. Patent 3,342,628

A Pt-Fe alloy diffusion coating on a ferrous metal article is produced by immersing the article in a molten bath containing a mixture of CaCl_2 with 0.5-50 wt.% Ca and a source of Pt. The temperature is between 800°C (1000-1200°C) and the melting point of the alloy. The alloy coating is formed during immersion. The Pt may be present as metal powder or an easily reducible compound.

Electrodeposition of the Platinum Metals

GENERAL ELECTRIC CO. (N.Y.)

U.S. Patent 3,351,541

Bright ductile coatings are obtained from 1-50 g/l Pt metal dissolved in an aqueous solution of at least 100 g/l of a Li or alkaline earth halide. The bath is used at 30-110°C and 10-200 mA/cm². A typical bath contains 400 g/l LiCl and 9 g/l H_2PtCl_6 .

Platinum or Platinum Alloy Coatings

JOHNSON MATTHEY & CO. LTD.

French Patent 1,488,295

A Pt dispersion giving adherent coatings is produced by reducing PtO_2 , optionally mixed with up to 50% of one or more other Pt metal oxides (except Os), while in a 2-5 C aliphatic alcohol.

Electrodeposition of Platinum or Palladium

JOHNSON, MATTHEY & CO. LTD.

German Patent 1,182,924

A Pt or Pd plating bath consists of an aqueous solution of a complex nitrito-palladite compound of given general formula. Numerous examples are given, the preferred bath comprising dinitrosulphato-platinous or -palladous acid, $\text{H}_2\text{Pt}(\text{NO}_2)_2\text{SO}_4$ or $\text{H}_2\text{Pd}(\text{NO}_2)_2\text{SO}_4$. This corresponds to *British Patent* 897,690.

JOINING

Bonding Together of Metals or Alloys

JOHNSON, MATTHEY & CO. LTD.

British Patent 1,093,136

Two dissimilar metals are bonded by an intermediate layer consisting of a refractory ceramic and a metal soluble only in one of the two metals. Thus when refractory metals are bonded to a Pt metal, the bonding metal is soluble in the Pt metal and may be Au.

Metal-Ceramic Joints

NORTH AMERICAN PHILIPS CO.
U.S. Patent 3,339,267

Hermetic sealing is achieved by applying to the ceramic a thin layer of Ta, Nb, or V, then applying a layer of Pd or Pt by cathodic sputtering and finally fusing the metallised surface to a metal body. 3,340,025 is similar with a layer of wetting metal selected from Re, Mo-Ru and Mo-Rh.

HETEROGENEOUS CATALYSIS

Selective Catalytic Hydrogenation of Crotonaldehyde

JOHNSON, MATTHEY & CO. LTD.
British Patent 1,089,835

C₃H₇CHO is produced by the hydrogenation of crotonaldehyde in the liquid phase using a Pd metal catalyst deposited on a support, preferably Al₂O₃, C or a ceramic material.

Improvements in Catalytic Hydrogenation

UNIROYAL INC. *British Patent* 1,090,177
Selective hydrogenation of a conjugated diene to the corresponding olefine is catalysed by PtS₂, PdS₂ or RuS₂. Their degree of selectivity is very high.

Preparing Cyclohexylhydroxylamine

ABBOTT LABORATORIES *British Patent* 1,092,027
This compound is produced by the selective hydrogenation of nitrocyclohexane using Pt and/or Pd in the presence of a "selectivity" agent, i.e. an amine or related compound. Thus Pd/C can be used with cyclohexylamine.

Improvements in Hydrogenation Catalysts

INVENTA A.G. *British Patent* 1,094,257
The life of Pt catalysts used in acidic media can be prolonged by preventing the accumulation of Ag or Si. These elements cause deactivation and can be removed with HF. Si contents can be reduced by eliminating all SiO₂ glass surfaces.

Manufacture of Acetaldehyde

FARBWERKE HOESCHT A.G.
British Patent 1,098,371
CH₃CHO is produced when C₂H₄ and elementary O₂ are reacted in the presence of PdO. The PdO may be supported on an inert support.

Motor Fuels and Jet Fuels

TEXACO DEVELOPMENT CORP.
British Patent 1,098,659
A fraction boiling at 400–900°F is cracked over a Group VI or VIII metal or oxide catalyst. When the catalyst is not sulphided a motor fuel fraction is recovered while 60% or more sulphidation gives a jet fuel fraction. Suitable catalysts are Pt or Pd on an oxide support.

Production of Dienes

DISTILLERS CO. LTD. *British Patent* 1,098,697
A compound containing conjugated double bonds is produced from an olefine by reaction with O₂ over a Pt group metal deposited on a support having a surface area greater than 10 m²/g. A carboxylic acid may also be present and the preferred catalyst contains Pd or Rh. Butadiene can be produced from C₄H₈ in this way.

Production of Pyridines

ALBRIGHT & WILSON (MFG.) LTD.
British Patent 1,099,189
C₅H₅N or a substituted pyridine is produced from a δ valerolactam at 200–800°C in the presence of a catalyst causing single stage dehydration and dehydrogenation. The preferred catalysts consist of a Pt metal on a SiO₂ and/or Al₂O₃ support.

Production of Esters of Unsaturated Alcohols

DISTILLERS CO. LTD. *British Patent* 1,101,224
These esters are produced by oxidising a 2–6 C olefine in the liquid phase with O₂ in the presence of a carboxylic acid and an elemental Pt group metal (preferably Pd) deposited on an activated C having a surface area greater than 50 m²/g.

Vinyl Acetate Production

KNAPSACK A.G. *British Patent* 1,101,726
The vapour phase reaction of C₂H₄, CH₃COOH and O₂ or air at 120–250°C and 1–10 atm is catalysed by Pd on a support; this catalyst is produced by reducing a Pd salt to metallic Pd in the presence of SiO₂, Al₂O₃, SiO₂-Al₂O₃, AlPO₄ and/or C. The catalyst is treated for at least one hour with air and/or N₂ at 120–350°C and 1–10 atm gauge before use.

Urethane Production

IMPERIAL CHEMICAL INDUSTRIES LTD.
U.S. Patent 3,338,956
The production of urethanes by the reaction of CO, an alcohol or phenol and a nitro compound is catalysed by a Group VIA, VIIA or VIIIA metal, especially Rh.

Hydrocarbon Hydrocracking

UNION OIL CO. *U.S. Patent* 3,342,725
A crystalline zeolite catalyst support is doped with a sulphided hydrosol of Pd in NH₃ and then the product heated to decompose zeolite NH₄ ions. The activity of the catalyst (which may contain another Group VIII metal instead of Pd) is greatly improved.

Reduced Activity Platinum Catalyst

GENERAL ELECTRIC CO. *U.S. Patent* 3,344,111
Stable mixtures of a Pt catalyst and an unsaturated polysiloxane are produced by introducing an unsaturated nitrile into the mixture to reduce the catalyst activity.

Production of Styrene

S. C. SCHUMAN *U.S. Patent 3,344,201*
The reaction of C_6H_6 and elementary S to produce styrene is catalysed by a transition metal sulphide, e.g. RuS_2 .

Heavy Hydrocarbon Cracking Catalyst

ESSO RESEARCH & ENGINEERING CO.

U.S. Patent 3,346,482

A new catalyst consists of a crystalline aluminosilicate having pore openings of 6–15 Å, a $SiO_2-Al_2O_3$ ratio of 2.5:1.4 and a Na_2O content of less than 10 wt.% on which is deposited at least 1 wt.% of a Pt metal, e.g. Pd. See also 3,346,512.

Stabilisation of Platinum Group Metal Reforming Catalysts

MOBIL OIL CORP.

U.S. Patent 3,347,782

Supported Pt metal catalysts are stabilised, and simultaneously made more selective, by adding a N compound to the feedstock which will yield NH_3 in the reforming conditions.

Polycyclic Aromatic Isomerisation

STANDARD OIL CO. OF ILLINOIS

U.S. Patent 3,349,140

Cis isomers are produced in a higher proportion when polycyclic ring compounds are hydrogenated using Ru on a non-hydrogenating support at 25–200°C and a pressure \geq 3000 psig.

Dicyclohexylamine Production

ABBOTT LABORATORIES

U.S. Patent 3,351,661

Phenol and NH_3 are reacted with H_2 at an elevated temperature and pressure with at least 0.02% metallic Pd catalyst, based on the phenol. The catalyst may be supported.

Olefin Double Bond Isomerisation

ETHYL CORP.

U.S. Patent 3,352,938

α -Olefines are converted to β -olefines by isomerisation in the presence of 5 wt.% of a mixture of 1 part Ru and 5–10 parts Pd on an activated charcoal support. 3,352,939 is similar except that an aldehyde is used for promoting the reaction and the Pt metals generally (except Os) can be used.

Hydrogenation of Unsaturated Aldehydes

JOHNSON, MATTHEY & CO. LTD.

French Patent 1,489,504

The addition of H_2 to these aldehydes is catalysed by Pt, e.g. Pt/C, in alcoholic solution with an alkaline base or alcoholate as initiator.

Vinyl Acetate Production

KNAPSACK A.G.

German Patent 1,252,662

The reaction of C_2H_4 , CH_3COOH and molecular O_2 is catalysed by metallic Pd activated with 1–60 atom% metallic Au, based on the g. atoms of Pd plus Au.

Production of Unsaturated Esters

STAMICARBON N.V.

Dutch Appln 66.08,559

The reaction of olefines, organic acids and O_2 is catalysed by a supported catalyst containing Pd and either Pt, Rh or Ru, preferably with a ratio by weight of 300:1 to 3:1, Pd: second noble metal. SiO_2 forms a suitable support.

HOMOGENEOUS CATALYSIS

Production of Esters

IMPERIAL CHEMICAL INDUSTRIES LTD.

British Patent 1,091,042

Esters of monocarboxylic acids are produced by reacting a vinyl halide with an alkyl or cycloalkyl hydroxy compound and CO in the presence of a Group VIII metal and bromide and/or iodide ions. $PtCl_4$ and $PdCl_2$ are suitable sources of the Group VIII metal.

Organosilicon Polymers

DOW CORNING CORP.

British Patent 1,093,898

Silacyclobutanes are polymerised by a Pt catalyst, e.g. H_2PtCl_6 .

Salts of Higher Alkyl Sulphates

MITSUBISHI CHEMICAL INDUSTRIES LTD.

British Patent 1,099,196

Surfactants are produced by reacting a 10–24 C olefine with CO and H_2 in the presence of a Rh catalyst, hydrogenating the product to give higher alcohols, sulphating the alcohols and neutralising the product. The Rh catalyst can be metallic, an inorganic salt or an organic derivative such as $RhCl(CO)(PPh_3)_2$ or Rh acetylacetonate.

Methyl Alkyl Ketones

EASTMAN KODAK CO.

British Patent 1,099,348

A 3–8C α -olefine is reacted with an aqueous oxidising composition containing $CuCl_2$ and a catalytically active Pd compound to give a complex which hydrolyses to produce the required methyl alkyl ketone. Pd carboxylates, $PdCl_2$ and H_2PdCl_4 are suitable catalysts.

Catalysts

JOHNSON, MATTHEY & CO. LTD.

British Patent 1,099,406

Catalysts for chemical reactions such as hydrogenation are an intimate homogeneous mixture of the oxides of Pt and Ru, e.g. made by Adam's method and not by physical mixing, and have a Pt content of 90–20 wt.% and a Ru content of 10–80 wt.%.

Production of Ethers

IMPERIAL CHEMICAL INDUSTRIES LTD.

British Patent 1,100,023

Alkyl alkenyl ethers are produced by reacting a 1-olefine with a substantially anhydrous solution

of a salt or coordination compound of Pd in an alcohol and then removing the ether. The catalyst may be PdCl₂, palladous acetate, lithium chloropalladite or allyl palladous chloride.

Oxidation of Ethylene

BRITISH CELANESE LTD. *British Patent 1,100,901*
Acetic anhydride is produced by the reaction of C₂H₄ and O₂ in an CH₃COOH solution of a Pd salt, a Cu or Fe salt capable of oxidising the Pd metal formed, acetate ions and Cl ions, to give vinyl acetate which is then reacted with CH₃COOH in the presence of Pd ions and Cl ions to give acetic anhydride and CH₃CHO.

Production of Allyl Acetate

IMPERIAL CHEMICAL INDUSTRIES LTD.
British Patent 1,101,055
Allyl acetate is produced when propylene is contacted with a Pd salt in the presence of CH₃COOH, an alkali, alkaline earth, or Cu acetate, O₂ and a Cu salt. A preferred Pd salt is the acetate. See also 1,101,056.

Terpene Isomerisation

INTERNATIONAL FLAVOURS & FRAGRANCES INC.
U.S. Patent 3,344,171
Myrcene and related compounds are isomerised at 60–165°C in the presence of Rh, Ir, RhCl₃ and/or IrCl₃ and HCl.

Tetrafluorohydrazine Preparation

AEROJET-GENERAL CORP. *U.S. Patent 3,350,172*
A liquid difluorocarbamate is oxidised to N₂F₄ using, among a range of possible oxidising agents, salts of simple or complex cations containing Os⁸⁺, Pt⁴⁺, Ru⁸⁺ and Ir⁸⁺.

Hydroquinone Production

LONZA LTD. *U.S. Patent 3,355,503*
C₂H₂, CO and H₂ are reacted, at certain temperatures and pressures in an organic solvent with trimeric Ru carbonyl as catalyst. The solvent must not contain mobile H atoms.

Butadiene-Piperylene Copolymerisation

INSTITUT FRANCAIS DU PETROLE, DES CARBURANTS ET LUBRIFIANTS *French Patent 1,488,982*
These monomers are copolymerised in aqueous emulsion by contact with a Rh compound, e.g. chloride, nitrate, ammonium chlororhodate or sodium chlororhodate.

Hydrogenation Catalysts

JOHNSON, MATTHEY & CO. LTD.
Belgian Patent 701,238
An aqueous solution of HRh(NH₃)₅SO₄ is used for hydrogenating unsaturated carboxylic acids at 60°C. Acrylic, crotonic and maleic acids may be hydrogenated. An advantage of this catalyst is its solubility in H₂O.

FUEL CELLS

Fuel Cell

ROBERT BOSCH G.M.B.H. *British Patent 1,097,314*
A new cell which can operate at about 100°C has a known O₂ electrode, a metallic Pt catalyst fuel electrode and uses dilute H₂SO₄ as the electrolyte.

Fuel Cell Electrode

FUJI DENKI SEIZO K.K. *British Patent 1,100,102*
A H₂-permeable membrane electrode is made from an alloy of Pd with at least one Group IB element and at least one other Group VIII element. The amounts are preferably 2–39.9% Group IB element, 0.1–20% Group VIII metal and at least 60% Pd. A typical tubular alloy membrane of 2 mm diameter and 0.06 mm thickness is made from an alloy of 65% Pd, 10% Ag, 20% Au, 1% Pt, 2% Rh, 1.8% Ru and 0.2% Fe.

Non-porous Hydrogen Diffusion Fuel Cell Electrodes

LEESONA CORP. *U.S. Patents 3,337,368–9*
The fuel cell consists of a non-porous hydrogen diffusion Pd membrane anode, a porous cathode and an aqueous electrolyte. The anode can be pure Pd and in a cell circuit, e.g. with a Pt cathode, has unusual metering characteristics.

Fuel Cell Electrode

STANDARD OIL CO. OF ILLINOIS
U.S. Patent 3,354,060
An electrode of low activation polarisation is obtained by plating Pt and Cu on to a support and removing some of the Cu to give a mixed porous layer of Pt/Cu.

ANODIC PROTECTION

Anodic Protection

IMPERIAL CHEMICAL INDUSTRIES LTD.
British Patent 1,100,685
A cathode for an anodic protection system has a conducting base of Ag or C, etc., with a deposited layer of a metal having a low H₂ overvoltage, such as Au, Ir, Rh, Pt or Pd.

CHEMICAL TECHNOLOGY

Sintered Uranium Dioxide-Iridium Composition

U.K. ATOMIC ENERGY AUTHORITY
U.S. Patent 3,342,744
UO₂ ceramics which do not exhibit columnar growth when subjected to severe temperature gradients at 1600–2000°C are produced by adding 0.1–4 wt.% of Ir. The Ir can be added in solution, e.g. as ammonium chloroiridite, to the UO₂ slurry.

Separation of Hydrogen by Permeation

TYCO LABORATORIES INC. *U.S. Patent* 3,350,846
A membrane permeable to H₂ is formed by coating a Group VB metal layer on both sides with non-porous films of Pd or Pd alloy. Thus a Nb, V or Ta foil can be coated with Pd-Ag.

Diffusion Cell for Separating Hydrogen from Gas Mixtures

JOHNSON, MATTHEY & CO. LTD.
German Patent 1,252,186
Diffusion cell for the separation of H₂, consisting of flat, internally supported envelopes of Pd etc. connected to a H₂ collecting tube, each such envelope being symmetrically arranged with respect to a plane containing, or normal to, the axis of the collecting tube.

GLASS TECHNOLOGY

Metal Laminates

OWENS-CORNING FIBERGLAS CORP.
British Patent 1,100,949
These laminates are especially used for orifice plates in glass fibre production. They consist of a first layer of alloy with at least 75% Rh and less than 25% Pt bonded to a second layer containing at least 60% Pt and less than 40% Rh.

Alloys for Contact with Molten Glass

JOHNSON, MATTHEY & CO. LTD.
French Patent 1,488,455
Alloys resisting high temperatures, e.g. likely to come into contact with molten glass contain 60-97 wt.% Pt, 2-25 wt.% Rh and 1-10 wt.% Au.

Platinum Metal-coated Refractory Metals

JOHNSON, MATTHEY & CO. LTD.
Dutch Appln 67,05,561
Articles which are to be used successfully at elevated temperatures, e.g. in molten glass, can consist of a Pt metal or alloy coating on a refractory metal or alloy core provided that (a) the core metal or alloy does not form a volatile oxide at the operating temperature and (b) the core metal or alloy does not alloy with the Pt metal or metals to give a product melting at the operating temperature.

ELECTRICAL AND ELECTRONIC ENGINEERING

Electrical Resistance Elements

CTS CORP. *British Patent* 1,091,916
A film of resistance material is produced on a ceramic base by applying a mixture of a glass matrix and an Ir and/or Ru oxide and firing the film. Preferably 2-70 wt.% metal oxide is present.

Sparking Plug Electrodes

JOHNSON, MATTHEY & CO. LTD.
British Patent 1,099,387
French Patent 1,490,828
Sparking plug electrodes, without a fibrous structure and resistant to Pb and its compounds at high temperature, are made from Ru powder or a Ru-Ir alloy powder of specified particle size. All particles must be in the range 1-76 μ and the 10-20 and 20-30 μ particles must represent, respectively, 20-35% and 30-50% of the powder weight. This corresponds to *U.S. Patent* 3,331,685.

Thermionic Valves

PHILIPS ELECTRONIC & ASSOCIATED INDUSTRIES LTD.
British Patent 1,100,420
The valve cathode is a dispenser-type cathode with a porous metal surface which is coated with Re, Ir or Os in the areas opposite the anode grid.

Electrical Resistance Composition

INTERNATIONAL BUSINESS MACHINES CORP.
U.S. Patent 3,337,365
The resistor is produced on a non-conductive base such as glass by applying 100 parts PdO, 144 parts PdCl₂ or 86.8 parts Pd metal and 23.3-279 parts AgCl or an equivalent amount of AgBr or AgI, 0-400 parts finely divided glass and 0-50 parts Bi₂O₃ or Pb₂O₃. This is then fired.

Gold-Palladium Conductors

E. I. DU PONT DE NEMOURS & CO. INC.
U.S. Patent 3,347,799
Conducting coatings are produced on a dielectric ceramic base by firing on a mixture of 8-25% finely divided Pd, 55-84% finely divided Au and 8-37% finely divided vitreous binder.

Thallium Oxide Resistor Glaze

AIR REDUCTION CO. INC. *U.S. Patent* 3,352,797
The electrical noise, moisture resistance and thermal stability are improved by adding RuO₂ to a TiO₂ glass resistor.

TEMPERATURE MEASUREMENT

Noble Metal Thermoelectric Wires

DEUTSCHE GOLD- & SILBER- SCHEIDEANSTALT
U.S. Patent 3,349,467
Pt metal wires of high hot strength are produced by converting a Pt compound at a high temperature below 500°C to a powder with a particle size below 10,000 mesh/cm². The powder is compressed to a compact, the compact sintered at 1300-1500°C and then the sintered compact cold worked to a wire without an intermediate anneal. The wire is subsequently stress relieved at 1300-1500°C.