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PN - [AU2017261592](#) A1 20180215

PR - AU20170261592 20171116; AU20160202796 20160502; AU20110286161 20110803; AU20100904799 20101028; AU20100903463 20100803

AP - AU20170261592 20171116

DT - I

CCI - [A23L19/03](#) ; [A23L33/135](#) ; [A23L33/14](#)

CUI - [A23K40/00](#)

CQI - [A23K1/001](#)

PA - JORROCKS PTY LTD

TI - Vacuum infusion for the inclusion of a food supplement into food products

AB - A method of vacuum infusion of a supplement in a porous food product comprising treating a porous food product having a majority of pore sizes of less than about 1000 pm in diameter with a supplement having a particle diameter size range less than the pore size range, wherein said supplement is present in a carrier, and said method is performed under suitable conditions and for a suitable time to achieve infusion of the supplement into the food product, the improvement comprising higher levels of supplement incorporation than with other pore size and particle diameter size ranges. WO 2012/016282 PCT/AU2011/000981 Title VACUUM INFUSION FOR THE INCLUSION OF A SUPPLEMENT INTO FOOD PRODUCTS 5 Field of the Invention The present invention relates to a method and composition for preparing dry pet food products including a specifically formulated dietary supplement. It is particularly related to products containing inactivated probiotics, probiotics, enzymes, Inactivated yeasts, botanical

extracts and dairy components. Background Animal (and some human) feeds typically are supplied as pellets or pieces ("kibble"). The Pellets are typically formed from a starch and/or protein containing base ingredient, e.g. wheat or corn, mixed with a variety of other ingredients. The starch or protein containing base ingredient has a functional as well as a nutritional role in the pellet. Its functional role is to bind all other ingredients together and to provide the textural and physical (most importantly the porosity) characteristics of the product. Binding of ingredients typically occurs because of the gelatinization of starch or the denaturation of protein. Both of these physical / chemical processes are usually carried out at **elevated temperature** and/or pressure. Those harsh conditions often result in the degradation of labile additives, such as probiotics and other dietary supplements. This problem has been overcome by the cold extrusion process disclosed in WO 2007/059588. However, the cold extrusion process can be time-consuming and often forms a "bottle-neck" in many processing plants. Thus, there is a need for an alternative process that will allow the incorporation of labile components into products prepared via other forms of the extrusion process without significant degradation of those components. WO 2012/016282 PCT/AU2011/000981 It is proposed that the installation of vacuum infusion technology as an adjunct to a standard dry pet food extrusion process will ensure that a **heat-labile** component may be delivered into the finished product with full functionality, whilst not causing any loss to the production capacity of the processing plant.

Liquid coatings are commonly added to the external surface of extruded products for a number of reasons including:

- 1) To improve product surface aesthetics (for example, the glossy coatings used on the surface of extruded rice snacks).
- 2) To improve product flavour (for example, the addition of flavourings greatly enhances the palatability of extruded pet food).
- 3) To increase the product energy density. (The addition of oils and fats to the product significantly increases the metabolizable energy of the product.)
- 4) To modify the product textural attributes. (The addition of a plasticizer, such as glycerol, to an extruded structure is one means of producing a "soft" texture.)
- 5) To allow the post-process addition of active ingredients or infusates. (Many of the most expensive functional ingredients, such as vitamins, minerals, pigments, etc are also **temperature** sensitive. Hence post-process addition can result in significant savings on formulation costs.)

The development of the vacuum infusion process is closely linked to the growth of the aquaculture industry. During the 1970's a number of the major feed manufacturers began to utilize extrusion cooking technology to replace the more traditional pellet milling processes. One of the major justifications for this change in processing technology was the deemed improvement in product quality and also the ability to produce feeds with an oil content in excess of 20 %. The initial processing was focused predominantly on single screw extruders (S.S.E.). Extensive research into the metabolism of various marine species (especially trout and salmon), during the early 1980's, showed that an increase in the Total Fat Content (up to at least 30 %) would be beneficial. It was difficult to add this amount of oil externally on the pellets. The incorporation of this level of fat into the formulation began to stretch the limits of the extrusion technology and this led to WO 2012/016282 PCT/AU2011/000981 the use of Twin Screw Extruders and also Specialty S.S.E. It was during this period that the Dinnissen Company (Holland) and BP. Nutrition (now known as Nutreco) began to collaboratively develop the vacuum infusion process for the addition of significant levels of fat, post-extrusion. The major benefit of this process was that significantly higher levels of oil could be incorporated into pellets produced via standard extrusion technology. In order to provide an

understanding of how this technology works, we now describe the fundamental processes that are involved in the liquid coating of porous substrates.

10 The Atmospheric Coating Process The adsorption of liquid coatings during the atmospheric coating process is primarily controlled by the action of capillary forces. The magnitude of a capillary force is determined by the radius of the capillary, R_p , and by the liquid surface tension, σ . The magnitude of the suction pressure is given by the following simple expression - $P_c = 2 \cdot \sigma \cdot \cos \theta / R_p$. This behaviour is shown in Figure 1 for the absorption of vegetable oil ($\sigma = 0.073 \text{ N m}^{-1}$ at $T = 25^\circ \text{C}$). The data clearly indicates that the use of very fine capillaries would be beneficial. The resultant flow rate within these fine capillaries would, however, be very slow.

20 The Fanning Equation may be used to estimate the pressure drop associated with this flow - $P_f = 2 \cdot f \cdot [L / (2 R_p)] \cdot \rho \cdot v^2$. The provision of larger pores would therefore ensure a more rapid uptake of the liquid coatings, due to the reduced pressure drop within the larger pores. The uptake of suspended infusates would also be promoted by the use of larger pores.

25 The subsequent leakage of liquids from the pellets (a common problem for high oil content products) would, however, also be promoted by the provision of larger pores, since the capillary force will not retain the liquid within the pore. One of the primary objectives during the manufacture of an expanded extruded product must therefore be to provide an optimal pore size distribution. The gross **30** means of monitoring this product attribute in the manufacturing environment is via the measurement of the product bulk density. WO 2012/016282 PCT/AU2011/000981 The measurement of bulk density alone is not enough, however. It is also necessary to give consideration to both the sectional expansion and longitudinal expansion. These parameters are shown schematically in Figure 2. These parameters are commonly monitored in an indirect manner in many applications **5** since $SEI = D_2 / d_2$ (common to measure the product diameter) and $LEI = f$ (piece length) (common to measure the cutter speed). Changes to the magnitude of either the sectional expansion index (S.E.I.) and / or the longitudinal expansion index (L.E.I.), even at a constant bulk density or Volumetric Expansion Index ($V.E.I. = S.E.I. \times L.E.I.$) will result in significant **10** changes to the pore morphology (i.e. the size, number and shape of the pores). These changes to the pellet internal characteristics will have an effect upon the coating characteristics of the product via an atmospheric coating process. The magnitude of the SEI and the LEI are influenced by both the ingredient composition and via the process parameters used during the manufacture of the **15** product.

The Vacuum Infusion Process As a result of the limitations of both the atmospheric coating process (as outlined above) and the extrusion process (unable to handle large amounts of added oil), an alternative means of Increasing the oil content of the finished product needed **20** to be found. This scenario ultimately led to the development of the vacuum infusion process. The design of a typical vacuum infusion process is presented in Figure 3. The mechanism via which the process proceeds is shown schematically in Figure 4 and may be described via the following steps: **25**

- 1) The required amount of product (typically pre-weighed in a weigh hopper) is charged into a vacuum vessel. The vessel is then sealed.
- 2) The vessel is then depressurized (a vacuum is drawn) to the required level (typically about 0.2 bar [abs.] or 80% Vacuum). This ensures that most of the air is removed, even from within the pores of the product. **30**
- 3) The required amount of liquid coating (which may or may not contain a quantity of infusates) is then sprayed into the vessel via a series of nozzles, whilst WO 2012/016282 PCT/AU2011/000981 the bed of product is being blended via mixing paddles. This ensures that all of the product surfaces become wetted.
- 4) The vacuum is then slowly released. The Rate of Pressure Rise, ΔP , is one of the most important process control points. In order for optimal

coating to 5 proceed, the external pressure must increase at a rate that is able to sustain the rate of flow of liquids into the pores. The rate of flow must also not exceed the rate of wetting of the pore inlets, 5) When the pressure within the vessel has returned to atmospheric pressure, the vessel contents may be discharged. 10 The above references to and descriptions of prior proposals or products are not intended to be, and are not to be construed as, statements or admissions of common general knowledge in the art. Preferred embodiments of the invention 15 In one aspect the present invention provides an improved method of vacuum infusion of a supplement into a porous food product comprising treating a porous food product having a majority pores of within a certain diameter size range with a supplement dispersed in a carrier wherein the supplement comprises particles the majority of which have a size range which is less than the pore size range, 20 wherein said method performed under suitable conditions and for a suitable time to achieve infusion of the supplement into the food product, the improvement comprising higher levels of supplement incorporation than with other supplement particle sizes. The term "a supplement" refers to specifically formulated dietary supplements, 25 particularly particulate supplements, such as products containing probiotics, inactivated probiotics, yeasts, inactivated yeasts, probiotics, enzymes, botanical extracts and/or dairy components. The probiotics may be selected from one or more of the following group used singly or in combination and used whole or in fractions of the whole bacterial 30 organism: *Bacillus coagulans*, *Bacillus licheniformis*, *Bacillus subtilis*, *Bitdobacterium* sp., *Enterococcus faecium*, *Lactobacillus acidophilus*, WO 2012/016282 PCT/AU2011/000981 *Lactobacillus casei*, *Lactobacillus fennentum*, *Lactobacillus johnsoni*, *Lactobacillus paracasei*, *Lactobacillus reuter*, *Lactobacillus ruminis*, *Lactobacillus* ,*hamnosus*, *Pediococcus acidifaciens*. The probiotics may be supplied in a live state, that is, capable of metabolizing 5 nutrients and proliferating. Probiotics may also be supplied in an inactivated state, that is, incapable of metabolizing nutrients and proliferating. Where probiotic bacteria are supplied in the inactivated state they still maintain an identifiably approximate physical formation or structure to that manifested in the live state. 10 The yeasts may include any of the strains of yeasts of the species *Saccharomyces cerevisiae* used singly or in combination, used whole or in fractions of the whole yeast organism. The yeasts may be supplied in an active state, that is, capable of metabolizing nutrients and proliferating. Yeasts may also be supplied in a 'inactivated' state, that is, incapable of metabolizing nutrients and 15 proliferating. Where yeasts are supplied in the inactivated state they still maintain the same physical formation or structure manifested in the live state. The prebiotics may include any of the following, singly or in combination: galacto oligosaccharide, lactulose, lactosucrose, fructo-oligosaccharide, raffinose, stachyose and malto-oligosaccharide. 20 The enzymes may include any of the following enzymes, singly or in combination: alpha-amylase, beta-amylase, cellulase, alpha-galactosidase, beta-glucanase, beta-glucosidase, glucoamylase, lactase, pectinase, xylanase, lipase and protease. The term "a porous food product" means a dry or semi-moist food product which 25 has pores or minute passages or interstices which make the product permeable to liquids. Typically this is this is dried pet food kibble or the like which has been produced by the direct expansion process after extrusion cooking or via the cold extrusion process. The porous food may comprise a variety of grains, legumes, pulses or vegetables 30 such as amaranth, quinoa, millet, bulgur, wild rice, cous cous, sooji, spelt, kamut, kasha, kaniwa, tapioca and the like. The term 'a majority pores of within a certain diameter size range' means WO 2012/016282 PCT/AU2011/000981

substantially 80% of the pores in that size range. Generally the majority of pores in such a product are 200 to 1000pm in diameter. The term "dispersed in a carrier" means that the particles are kept in suspension via agitation, preferably in vegetable oil and/or tallow. 5 The term "particles the majority of which have a size range which is less than the pore size range" means that substantially 85% of the particles are less than the pore size range. Preferably, the particles are < 250 pm and the mass average particle size is about 210 pm. The term "performed under suitable conditions and for a suitable time to achieve 10 infusion" means that the method is carried out under the appropriate conditions and for the appropriate time to achieve infusion. These parameters include the maximum vacuum attained (prior to the slurry being coated onto the product), the wet mixing time (during which the slurry is absorbed into the product via capillary forces) and the vacuum release rate (VRR). The accurate control of the VRR 15 ensures that the slurry is driven into the pores. The term "higher levels of supplement incorporation" means the processing of infusate slurries containing greater than 20% w/w particulate. In another aspect, the invention provides an improved method of vacuum infusion of a supplement in a porous food product comprising treating a porous food 20 product having a majority of pore sizes of less than about 1000pm, preferably between about 250 to about 600 pm in diameter with a supplement having a particle diameter size range less than the pore size range, wherein said supplement is present in a carrier, and said method is performed under suitable conditions and for a suitable time to achieve infusion of the supplement Into the 25 food product, the improvement comprising higher levels of supplement incorporation than with other pore size and particle diameter size ranges. In addition to the higher levels of supplement incorporation achieved with the method of the invention process times are greatly shortened. This means that the improved process of the invention allows the dried food to be produced at much 30 lower cost. The cold extrusion process results in a reduction of the average processing rate of the extruder by approximately 50%. The use of the vacuum infusion process allows for the extruder to be operated at its rated capacity. WO 2012/016282 PCT/AU2011/000981 The preferred dietary supplement for use in the invention is Y+. Y+ is a commercial product containing probiotics, inactivated probiotics, yeasts, inactivated yeasts, probiotics and enzymes. Preferably, the Y+ is incorporated into the finished product at a concentration of 5 1% w/w of the kibble. The dietary supplement is milled (using appropriate size reduction technology) to an average particle size less than 0.5mm or 500 pm. The milled supplement is then blended with beef tallow, poultry tallow, fish oil or vegetable oil to form a suspension (or slurry) containing not less than 10% w/w of 10 the supplement. The base product (consisting of one or more extrusion cooked kibble components) is added to the vacuum coater and agitated to ensure uniform mixing. An appropriate level of vacuum is drawn on the vessel. The suspension is then added to the coater, whilst continuing the agitation in order to ensure a 15 substantially uniform surface coating of the kibble. The vacuum is then slowly released in order to ensure the substantially uniform penetration of the supplement into the kibble. The optimal vacuum release rate can be determined experimentally. Details of preferred vacuum infusion coating requirements are given in Table 1 20 and the calculation of a prediction of the wettability of kibble pellets is shown in Table 2. Additional Considerations for Optimisation of Preferred Embodiments Ensure that pellets have a minimal moisture content (m < 20% w/w). Ensure that pellets are uniformly dried. **Case** hardened pellets will retard liquid 25 penetration due to the shrunken pores. Ensure that the pellet core **temperature** is less than 50 OC. This will prevent pellet moisture

from boiling during the vacuum process. Ensure that the vacuum release time is adequately slow. If liquids are drawn/driven into the capillaries more quickly than the surface wetting rate, voids will be formed within the pores. WO 2012/016282 PCT/AU2011/000981 It may be necessary to utilize a multi-stage process (drawing vacuum more than once) for some applications. Ensure that the liquid **temperature** (and hence the viscosity and surface tension) is optimal. 5 Providing an over-pressure on the liquid supply may augment the process performance. An external coat of solid fat may be used to seal up the pores after filling to ensure that leakage does not occur. The shelf life of the finished product can be extended by controlling the pH level of the pellets. Preferably, the pH should be less than 7 and it is particularly preferable for the pH to be about 6. The pellets may be prepared by using a liquid acid digest, typically obtained commercially from animal by-product renderers. Preferably, the liquid acid digest is neutralized (by a base, such as sodium hydroxide or potassium hydroxide) and then dried into a powder form. Detailed description of tests with a model system In order to gain a deeper insight into the fundamental mechanisms involved in this process a series of trials was completed using a model system. 20 The liquid used for the tests was vegetable oil (since it is liquid and has a low viscosity at room **temperature**). Jet milled icing sugar was incorporated in order to simulate the effect of an infusate addition. (The sugar concentration was varied from 6% to 32% w/w.) The density of the slurry was related linearly to the sugar concentration via $\rho_{\text{SLURRY}} = 0.915 + 0.004 \cdot \text{sugar}$ (g cm⁻³). (It was therefore possible to determine the amount of infused sugar and / or oil via changes in the slurry density.) The "pore size" was controlled by using woven filter cloths made of synthetic fibres. The **apparatus** is shown schematically in Figure 5. The vacuum used for all tests was initially set at 0.2 bar and the vacuum release rate was 0.1 bar per 10 seconds. WO 2012/016282 PCT/AU2011/000981 The testing method used for the investigation consisted of the following steps: The vials (4) for each test are pre-weighed (WVi). The filter mesh (of the required pore size) for each vial is pre-weighed (WFi) and then fitted to the vial. 5 The vacuum chamber is sealed and the pressure is reduced to P = 0.2 bar. A slurry is prepared, containing the required sugar concentration in vegetable oil. The valve is **opened** and the chamber is allowed to fill, such that the surface of the vial is covered by ~ 1cm of slurry. The vacuum is then released at a rate of 0.1 bar per 10 seconds, and the slurry is then drained from the chamber and the vials are removed for weighing. The following data is obtained: WTf = Final weight of the vial, filter and collected slurry Wff = Final weight of the filter and collected infusate Wvf = Final weight of vial and collected slurry 15 Vf = Volume of collected slurry The total infused weight (oil and sugar) is determined from the average of the four individual results at each slurry concentration, via $W = W_{\text{vf}} - (W_{\text{vi}} + W_{\text{fi}})$ The density of the collected slurry is given by $\rho_{\text{SLURRY}} = (W_{\text{vf}} - W_{\text{vi}}) / V_{\text{f}}$ The total infusate added is given by $M = \{ [\rho_{\text{SLURRY}} - 0.915] \cdot 10.0004 \} \cdot 20 (W_{\text{ff}} - W_{\text{fi}})$ The results obtained from the tests are best presented in a graphical form as shown in Figure 6. The data clearly shows that both the pore size (most significant) and also the slurry concentration have an impact upon the total infused weight of the finished product. The result may be modeled via $W = f [R_{\text{p}} - 0.0005, c - 0.7, \exp(R_{\text{p}})]$ ($r^2 = 0.87$). WO 2012/016282 PCT/AU2011/000981 Inspection of the slurry collected within the vials showed that two distinct layers existed. Initially the material passing through the cloth consisted of true slurry. As the test proceeded, however, the material became clearer. The cloths were acting as a filter and the coarser particles were being retained. This is given further validation when one considers the infusate weight alone. These data may be readily modeled via $M = f [R_{\text{p}}]$ ($r^2 = 0.96$).

The data obtained from these experiments clearly shows that the provision of an optimal pore size distribution is indeed critical to the adequate operation of a vacuum infusion process. The data also indicates that the amount of infusate that 10 may be added is independent of the slurry concentration. While the present invention has been described with reference to a few specific embodiments, the description is illustrative of the invention and is not to be construed as limiting the invention. Various modifications may occur to those skilled in the art without departing from the true spirit and scope of the invention 15 as defined by the appended claims.

"Comprises/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

WO 2012/016282 PCT/AU2011/000981 Vacuum infusion Coating Requirements Product Requirements Finished Product Required, F 1000.Q kg Additive Inclusion Level, [a] % w/w of Finished Product 1 1.D kg Slurry Coating Level, C.: .. 5 % w/w of Finished Product 75.0 kg Base Product Required, P 925.0 kg Brown Kibble 90.0 % 832.5 kg White Kibble . % 92.5 kg Coating Slurry Make up Oil, O 64.0 kg Supplement, S 11.0 kg 17.2% of Slurry Table 1 SUBSTITUTE SHEET (RULE 26) RO/AU WO 2012/016282 PCT/AU2011/000981 Prediction of the Wettability of Pellets Washburn Equation $t = 8 * u * z^{21} (s R,)$ Fluid Viscosity, u 0.06 Ns m² Fluid Surface Tension, s 0072 N m' Pellet Diameter, d 0 mm 0.008 m Pore Length, z 4.0 mm 0.004 m Pore Radius, R_p . 50.0 micron 0.00005 m $t = 2.13$ s Modified Washburn Equation $t = hK * a * (1-E) * u * z^2 / [E * s * C_{osa}]$ hK 005 2 3 a 4000 m m E 0.3 -0.2 < E < 0.5 cos a:1.,; t 3.73 s Table 2 SUBSTITUTE SHEET (RULE 26) RO/AU WO 2012/016282 PCT/AU2011/000981 Mesgtof Pore 8bw a. Capillary Pressure 2m00 0 20 40 60 so 100 120 140 Pore size (micron) Figure 1 - Effect of Pore Size on Capillary Suction Pressure -1in- WO 2012/016282 PCT/AU2011/000981 Figure 2 - Product Expansion Characteristics vs v 1L10 Do SECTIONAL LONGITUDINAL EXPANSION EXPANSION INDEX INDEX INDEX $VEt = SEI.LEI$ $SEI = (Do/Dd)^2$ $LEI = Ve/Vd$ $VEI = (DENSITY)^{-2/7}$ WO 2012/016282 PCT/AU2011/000981 Figure 3 - Typical Vacuum Infusion process equipment 5 FINISH PRODUCT MICROCO PONENTS FLAVU RING/ -T'GEST151 VACUUM SYSTEM FINISHED PRODUCT SUBSTITUTE SHEET (RULE 26) RO/AU WO 2012/016282 PCT/AU2011/000981 Extruded/polleted product. Under normal atmospheric conditions, the product is full of air. Depressurisation forces the air out of the product. The liquids are sprayed onto the product under vacuum conditions. Air pressure is allowed to return to normal, and the liquids and suspended active ingredients are sucked into the core of the product. 5 Figure 4 - The Vacuum Infusion Process SUBSTITUTE SHEET (RULE 26) RO/AU WO 2012/016282 PCT/AU2011/000981 to vacuum* wump raw Poper MOMi UM sad t Umh Figure 5 - Design of the Experimental Test Rig for simulation of the Vacuum Infusion Process 517 - WO 2012/016282 PCT/AU2011/000981 Infused Weight of Oil plus Sucrose vs Pore Size as a function of Sugar Concentration a. -g25 10 21 33 43 53 67 so 105 Pore Size (micron) Figure 6 - Infused Weight of Oil plus Sugar vs. Pore Size as a function of Sugar Concentration - 6/7 - WO 2012/016282 PCT/AU2011/000981 Infused Weight vs Pore Size 20 40 60 so 100 t 0 #6 2 es2 x ' 15 a a X19 Pore Size (micron) Figure 7 - Effect of Pore Size upon the Total Infusate Weight -7(7- WO 2012/016282 PCT/AU2011/000981 The claims defining the invention are as follows: 1. A method of vacuum infusion of a supplement in a porous food product comprising treating a porous food product having a majority of pore sizes of less than about 1000pm, in diameter with a supplement having a particle diameter size range less than the pore size range, wherein said supplement is present in a carrier, and said method is performed under suitable conditions and for a suitable

time to achieve infusion of the supplement into the food product, the improvement 10 comprising higher levels of supplement incorporation than with other pore size and particle diameter size ranges 2. The method of claim 1 wherein the majority of pore sizes are between about 250 to about 600 pm in diameter. 3. A method of vacuum infusion of a supplement in a porous food product comprising treating a porous food product having a majority pores of within a certain diameter size range with a supplement dispersed in a carrier wherein the supplement comprises particles the majority of which have a size range which is 20 less than the pore diameter size range, said method performed under suitable conditions and for a suitable time to achieve infusion of the supplement into the food product, the improvement comprising higher levels of supplement incorporation than with other supplement particle sizes. 25 4. The method of claim 3 wherein the particle size is around 500pm. 5. The method of any one of claims 1 to 4 wherein the supplement comprises probiotics, inactivated probiotics, yeasts, inactivated yeasts, probiotics and/or enzymes. SUBSTITUTE SHEET (RULE 26) RO/AU WO 2012/016282 PCT/AU2011/000981 6. The method of claim 5 wherein the supplement is Y+. 7. A porous food product produced by the method of any one of claims 1 to 6. 5 8. The porous food product of claim 7 in which the supplement is incorporated at a concentration of at least 1.1% w/w of finished food product. SUBSTITUTE SHEET (RULE 26) ROIAU

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PN - [CN205740930U](#) U 20161130
 PR - CN20162413990U 20160509
 AP - CN20162413990U 20160509
 DT - I
 PA - SINOPEC PETROLEUM ENG TECHNOLOGY SERVICE CO LTD; PETROLEUM ENG TECH RES INST OF SINOPEC OFFSHORE OIL ENG CO LTD
 TI - Tubular sulphur deposit entrapment device
 AB - The utility model provides a tubular sulphur deposit entrapment device, including a confined box, be equipped with corrugated pipeline in the box, the both ends of pipeline are all worn out the box with the end of giving vent to anger and are communicate with external for the inlet end and the end of giving vent to anger, inlet end, the end of giving vent to anger is equipped with **heatable** and catches the sulphur net, the box leaves on one side of the inlet end has the discharge gate, **open** the end one side of giving vent to anger there is the feed inlet, still includes thermodetector, differential pressure sensor and pressure sensor, thermodetector can the internal portion's **temperature** of detection **case**, differential pressure sensor can detect the inlet end of pipeline and the pressure differential between the end of giving vent to anger, pressure sensor is located the end of giving vent to anger of pipeline. This device can maximumly contain the element sulphur desorption in the sulphur natural gas with the **height** when using to reduced and taken place the sedimentary risk of sulphur in the **apparatus** of low reaches. This device has still that simple structure, working effect are reliable, low in manufacturing cost's advantage.

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PN - [KR20160064799](#) A 20160608
 PR - KR20140168932 20141128

AP - KR20140168932 20141128

DT - I

CNOI - [A62C3/04](#) ; [B65F1/06](#) ; [B65F1/14](#) ; [B65F1/16](#) ; [H02S10/00](#)

CCA - [Y02W30/10](#)

CNOA - [Y02W30/43](#)

PA - SOLARIS CO LTD [KR]

TI - MULTI-FUNCTIONAL LITTER BIN SYSTEM

AB - The present invention relates to a multi-functional litter bin system. More specifically, the present invention relates to the multi-functional litter bin system which has effects of extinguishing fire at an early stage since the same has a fire extinguishing **apparatus** automatically discharging water when **heat** exceeds a predetermined **temperature** installed therein; has the effects of facilitating a recovery of waste since a detachable inner accommodation container is separately provided in a main body of the litter bin; has the effects of facilitating a location of the litter bin in a dark area, and preventing accidents since a lighting means is installed to shed light on an inlet during night time to the pedestrians, bicycles, or vehicles crashing into a litter bin, wherein the lighting means is able to be turned on and off; and has the effects of being used conveniently, cost-effectively, and eco-friendly since all the devices installed in the litter bin are powered by solar energy. According to the present invention, the multi-functional litter bin system comprises: the main body unit having the **opened** top and an inner space in a predetermined size; a cover unit having at least one inlet, provided at a predetermined **height** to be detachably coupled to an upper portion of the main body unit; a power supply unit generating power as the same as a solar panel to generate an electromotive force by receiving sunlight; a sensor unit detecting movements around the inlet; the lighting unit receiving power from the power supply unit and shedding light to the inlet in **case** that the sensor unit detects any movements; the fire extinguishing **apparatus** having a water container with a predetermined amount of water filled therein, discharging the water stored in the water container when **heat** and flames exceeds a predetermined **temperature** ; and a control unit controlling the power supply unit, the sensor unit, and the lighting unit.

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PN - [KR101407316B](#) B1 20140627

PR - KR20130002745 20130110

AP - KR20130002745 20130110

DT - I

CT - || STSE (B1)
[KR900007933B](#) B1 19901023 [] (DAI NIBBONG JYOCYUGIKU CO LTD [JP]);
[KR20070097374](#) A 20071004 [] (SAM HWA IND CO LTD [KR]);
[KR100861704B](#) B1 20081006 [] (HANDOO IPEM CO LTD [KR]);
[JPH05115238](#) A 19930514 [] (NICHU GIKEN KOGYO KK, et al)

CNOI - [A01M13/003](#) ; [A01N25/18](#) ; [A01M1/2066](#) ; [A01M1/2088](#)

CCA - [Y02A40/268](#)

CNOA - [A01M2200/01](#) ; [Y10S43/00](#)

PA - TECON CO LTD [KR]

- TI - INDIRECT **HEATING** TYPE FUMIGATION AND SMOKING **APPARATUS** FOR CONTROLLING PESTS
- AB - In the present invention, disclosed is an indirect **heating** type pest controlling device by fumigation and smoking for preventing pest through indirectly **heating** chemicals by using solid or liquid fuel as a **heating** source in a plant growing facility such as a green house. The pest controlling device comprises a main body having an **opened** upper part and a concave container accommodating part inside thereof; a chemical **case** positioned at the upper part of the main body and containing chemicals for preventing pest; a **heating** member for delivering **heat** to the chemical **case** to **heat** the chemicals; a fuel container positioned at the container accommodating part of the main body, including an **opened** upper part for forming a fuel intake and adjusting fire according to the size of the fuel intake and the **height** of the fire, and containing fuel for **heating** the **heating** member; and a supporting member having one side combined with the upper part of the main body for the **heating** member to be positioned distantly from the fire intake of the fuel container and the other side for supporting the **heating** member, and dropping the **heating** member for closing an air passage connecting the upper part of the main body and the fuel container when atmospheric **temperature** exceeds a predetermined **temperature** . The present invention can stably control combustion amount for indirectly **heating** the chemicals with adequate combustion amount requested by fumigation and smoking step and prepare a safety device to prevent **heated** high **temperature** fuel from being leaked, thereby preventing fire.

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- PN - [JP2013188768](#) A 20130926
- PNFP - JP5484502B B2 20140507
- PR - JP20120055405 20120313
- AP - JP20120055405 20120313
- DT - I
- FI - B22C13/08&B; B22C13/12; B22C15/24&B; B22C15/24&C; B22C9/10&G
- FT - 4E093/QC10; 4E094/AA06; 4E094/AA44
- PA - (A)
RYOBI LTD; WINS TECH KK
- TI - (A)
CORE MANUFACTURING **APPARATUS**
- AB - (A)
PROBLEM TO BE SOLVED: To provide a core manufacturing **apparatus** capable of uniformly blowing and filling sand into a plurality of molding chambers of dies.
SOLUTION: A core manufacturing **apparatus** includes a pair of dies 1a, 1b forming a plurality of molding chambers 2; a **heating** means for **heating** the dies 1a, 1b to a required **temperature** ; sand tanks 5, 6; and blowing units 7, 8 located between the sand tanks 5, 6 and the dies 1a, 1b and receiving the quantitative supply of sand A, B from the sand tanks 5, 6 to blow and fill the sand A, B into the plurality of molding chambers 2 between both dies 1a, 1b. Each of the blowing units 7, 8 includes an outer **case** 35; a main blow pipe 36 receiving the supply of sand from the sand tanks 5, 6; and a plurality of branch pipes 37 branched downward by the number corresponding to the molding chambers 2 from the lower end of the main blow pipe 36. In each branch pipe 37, a

blow hole 38 at the lower end is provided in a required **height** position close to and directly above a sand filling port 39 penetratingly provided in a bottom wall part 35 of the outer **case** 35, corresponding to an **opening** 3 of each molding chamber 2.

6/36 © EPODOC / EPO

PN - [KR20130060506](#) A 20130610

PNFP - KR101292660B B1 20130802

PR - KR20110126599 20111130

AP - KR20110126599 20111130

DT - I

CT - || STSE (B1)
[JPH0330515U](#) U 19910326 [];
[JP2003165370](#) A 20030610 [] (TOYODA GOSEI KK)

CNOI - (A)
[B60N3/104](#) ; [B60N3/106](#) ; [B60N3/108](#)

PA - (A)
KOREA POLYTECH UNIV IND ACAD [KR]; LEE KYEONG WON [KR]; CHOE BYEONG CHEON [KR]; YU JEONG SEOK [KR]

TI - (A)
APPARATUS FOR CUP HOLDER IN VEHICLES
- (B1)
apparatus for cup holder in vehicles

AB - (A)
PURPOSE: A cup holder device for a vehicle is provided to easily put in or take out a cup by adjusting a **height** and to be used in various places by detachably attaching a device to the cup settling part of a vehicle. CONSTITUTION: A cup holder device(100) comprises a fixing part(20), a **height** adjustment part(40), a cup insertion part(50), a fixing member (60), a control part(70), a **heat** generation part, and a **heat** transfer member(90). The fixing part comprises a groove(21) with an **opened** top. The fixing part is detachably attached to a cup settling part(1) of a vehicle. The **height** adjustment part is rotatably inserted into the groove. The **height** adjustment part is joined to a joint screw part(30) for vertically reciprocating along the joint screw part in the rotation direction of the fixing part in order to adjust the **height** of a cup holder device. The cup insertion part comprises a predetermined inner space for inserting a cup(2). The cup insertion part is joined to the top surface of the **height** adjustment part. The fixing member is joined to the top surface of the cup insertion part and unmovably supports the cup. The control part is joined to the top surface of a **case** and lowers or rises the **temperature** inside the cup insertion part. The **heat** generation part generates **heat** according to a signal from the control part. The **heat** transfer member delivers the **heat** to the cup insertion part.

7/36 © EPODOC / EPO

PN - [WO2013058154](#) A1 20130425

PR - JP20110227599 20111017

AP - WO2012JP76229 20121010

DT - **

CT - |JP| ISR (A1)
[JPH0914780](#) A [Y];
[JP2004155299](#) A [Y];
[JPH07285318](#) A [Y];
[JPH08282263](#) A [Y];
[JP2002130870](#) A [Y];
[JPH06341732](#) A [A]

CCI - [B60H1/00785](#) ; [B60H1/00835](#) ; [B60H1/00885](#) ; [F25B6/04](#) ; [F25B40/00](#)

CQI - [B60H1/00021](#)

CCA - [F25B2313/0293](#) ; [F25B2313/0294](#) ; [F25B2400/0403](#) ; [F25B2400/0409](#) ;
[F25B2400/0411](#) ; [F25B2400/0417](#) ; [F25B2400/0419](#) ; [F25B2600/111](#) ; [F25B2600/112](#) ;
[F25B2700/1931](#) ; [F25B2700/1933](#) ; [F25B2700/2104](#) ; [F25B2700/2106](#) ;
[F25B2700/21151](#) ; [F25B2700/21152](#) ; [F25B2700/2117](#) ; [F25B2700/21171](#)

PA - SANDEN CORP [JP]

TI - AIR CONDITIONING **APPARATUS** FOR VEHICLE

AB - Provided is an air conditioning **apparatus** for a vehicle which, by ensuring the necessary amount of dissipated **heat** in a radiator during a dehumidification cooling operation, makes it possible to reliably ensure that the **temperature** of air being supplied to a passenger compartment is the set **temperature** . When the calculated **opening** degree (SW) of an air mixing damper (16) is a predetermined **opening** degree or greater, the valve **opening** degree of a condensing-pressure-regulating means side of a first control valve (24) is made smaller than when the **opening** degree (SW) is less than the predetermined **opening** degree. This makes it possible to **elevate** the condensing pressure of a refrigerant in a radiator (15) and increase the **temperature** of the radiator (15) in a **case** where the amount of **heating** in the radiator (15) is insufficient during a cooling operation and during a humidification cooling operation; therefore, the amount of **heating** needed to **heat** air being blown into a passenger compartment can be ensured, and it becomes possible to reliably ensure that the **temperature** of air being supplied to the passenger compartment is the set **temperature** .

8/36 © EPODOC / EPO

PN - [KR100274805B](#) B1 20010115

PR - KR19980016789 19980511

AP - KR19980016789 19980511

DT - I

PA - KWANGJU INST SCI & TECH; SAMSUNG ELECTRONICS CO LTD

TI - OPTICAL FIBER COATING **APPARATUS**

AB - PURPOSE: An optical fiber coating **apparatus** is provided to adjust a coating thickness of a metallic coating material applied to an optical fiber and to control a potential formation of oxide film by controlling flow rate of the metallic coating material and subjecting a liquid state at high **temperature** of the metallic coating material to be changed into a cooled and solid state. CONSTITUTION: A **case**(100) comprises a space (115) into which a metallic coating material is stored by screwing a first **case**(110) with a second **case**(120). A nozzle(113) is detachable coupled to the bottom of the **case** and

has a discharge hole(113a) for discharging the metallic coating material. An **open**-and-close member(200) is **elevatingly** coupled to the **case** and thereby selectively **opening** or closing the hole. A gas supplier(400) is attached to the lower end of the **case** to spay an inert gas around the outlet of the hole. A **heater** (500) gives an amount of **heat** to the **case** in order to maintain the viscosity of the coating material.

9/36 © EPODOC / EPO

PN - [JPH07176493](#) A 19950714
 PR - JP19930344446 19931217
 AP - JP19930344446 19931217
 DT - I
 FI - C30B25/00; C30B25/00+ZNM; H01L21/203&M; H01L21/205
 FT - 4G051/BA04; 4G051/BA11; 4G077/TA04; 4G077/TA11; 5F045/AA03; 5F045/AA04; 5F045/AA05; 5F045/AA06; 5F045/BA03; 5F045/BA05; 5F045/BA10; 5F045/BB02; 5F045/BB04; 5F045/BB08; 5F045/BB09; 5F045/BB10; 5F045/BB12; 5F045/BB14; 5F045/DA52; 5F045/DQ10; 5F045/EA03; 5F045/EA50; 5F045/EB02; 5F045/EB08; 5F045/EB09; 5F045/EB10; 5F045/EB12; 5F045/EB14; 5F045/EC01; 5F045/EC07; 5F045/EC09; 5F045/EE01; 5F045/EE04; 5F045/EE12; 5F045/EF02; 5F045/EF09; 5F045/EF17; 5F045/EG02; 5F045/EG03; 5F045/EJ04; 5F045/EJ09; 5F045/EJ10; 5F045/EK07; 5F045/EK08; 5F045/EK20; 5F045/EK27; 5F045/EM10; 5F045/EN04; 5F045/EN05; 5F045/FA01; 5F045/FA07; 5F045/GB01; 5F045/GB05; 5F045/GB06; 5F045/GB09; 5F045/GB13; 5F045/GB16; 5F045/GB19; 5F045/HA22; 5F103/AA04; 5F103/BB06; 5F103/BB21; 5F103/BB43; 5F103/BB46; 5F103/GG01; 5F103/HH03; 5F103/PP15; 5F103/RR01
 PA - NISSIN ELECTRIC CO LTD
 TI - THIN FILM FORMING **APPARATUS**
 AB - PURPOSE:To execute both an MBE method and a CVD method in the same **apparatus** by **openably** providing a chamber having a low vacuum in an ultra- high vacuum chamber, and providing a substrate installing unit and a material gas introducing system in the low vacuum chamber. CONSTITUTION:In the **case** of a low vacuum, a lower cylinder 11 is lifted, brought into contact with an upper cylinder 10 to form a low vacuum chamber, which is evacuated in vacuum by a low vacuum exhaust pump 18. A wafer 13 and a susceptor 12 are **heated** to suitable temperatures by a **heater** 14, material gas is introduced from a gas introducing tube 6, and a film is formed by a CVD method. Then, in the **case** of an ultra-high vacuum, a gate valve 19 of a low vacuum pipe 15 is closed, a vertical **elevation** mechanism 20 is moved down, and the cylinder 11 is separated from the cylinder 10. A high vacuum exhaust pump 27 is started to evacuate an ultra-high vacuum chamber 1 to a desired ultra-high vacuum. The wafer 13 is **heated** to a suitable **temperature** by the **heater** 14, the gas is introduced from the tube 6, the gas is **heated** by a **heater** 8 to a molecular beam, and a thin film is formed on a wafer 3 by an MBE method.

10/36 © EPODOC / EPO

PN - [JPH07148413](#) A 19950613
 PR - JP19930299971 19931130
 AP - JP19930299971 19931130

DT - I

CCA - [Y02C10/08](#)

FI - B01D53/04&F+ZAB; B01D53/04&220; B01D53/34&135Z; B01D53/62; B01D53/81; B01D53/82; B01D53/92&240; B01D53/92&350; B01D53/92&352; B01D53/96

FT - 4D002/AA09; 4D002/BA04; 4D002/BA13; 4D002/CA07; 4D002/DA45; 4D002/EA08; 4D002/HA08; 4D012/CA03; 4D012/CA10; 4D012/CB12; 4D012/CD04; 4D012/CD07; 4D012/CJ05; 4D012/CK03

PA - NIPPON DENSO CO

TI - **APPARATUS** FOR CONTROLLING AIR QUALITY

AB - PURPOSE:To materialize downsizing and energy saving of a system which utilizes effectively the exhaust **heat** of an external **heat** source for an adsorption tower such as an engine. CONSTITUTION:In a regeneration mode, the exhaust **heat** of an engine 13 is introduced into an insulation **case** 15 through an exhaust **heat** introduction pipe 16 by **opening** a solenoid valve EV5 to **heat** an adsorption tower 12. At the same time, air remaining in the adsorption tower 12 is discharged outside a car room through a solenoid valve EV3, a vacuum pump 11, and a solenoid valve 4 to evacuate the adsorption tower 12. In this way, the **temperature** of the adsorbent in the tower 12 is **elevated** so that carbon dioxide is desorbed from the adsorbent to be removed with the regeneration capacity **elevated**.

11/36 © EPODOC / EPO

PN - [JPH1089701](#) A 19980410

PR - JP19960266794 19960916

AP - JP19960266794 19960916

DT - I

FI - F24C7/04&B; H05B3/74

FT - 3K092/PP03; 3K092/QA02; 3K092/QB27; 3K092/RA03; 3K092/RC20; 3K092/RD11; 3K092/SS05; 3K092/TT22; 3K092/UA17; 3K092/UA18; 3K092/UC07; 3K092/VV15; 3K092/VV21; 3K092/VV25; 3K092/VV40; 3L087/AA03; 3L087/AB09; 3L087/AB11; 3L087/AC01; 3L087/AC08; 3L087/AC18; 3L087/AC21; 3L087/AC26; 3L087/CA09; 3L087/CB07; 3L087/CC03; 3L087/DA16; 3L087/DA24

PA - SENGOKU KK

TI - HALOGEN LAMP COOKING **APPARATUS**

AB - PROBLEM TO BE SOLVED: To provide a halogen lamp cooking **apparatus** capable of cooking food in a hot pan which requires high **temperature** and relatively longer cooking time. SOLUTION: In a halogen lamp cooking **apparatus**, there is formed a gap G in a space between the peripheral edge of a hot pan 30 and the **opening** peripheral edge of the top of a main body **case** 1, thereby **elevating** a cooling action against the inside of the main body **case** 1 by blowing off cooled air from the gap G. A **heat** shielding plate 9 is provided on the lateral side of a **heat** shielding **case** 5 which is located below the hot plate 3 and houses a halogen lamp 2 and a reflection plate 4, thereby forming a ring-shaped space B where cooled air is supplied to the ring-shaped space B from an air generation device and the cooled air which has passed the ring-shaped space is adapted to flow out from the gap G. A **heat** shielding plate 9 is provided so as to shield thermally the bottom on the rear side of the main body **case** 1 and the side air outlet of

the main body **case 1** for the hop plate 3, thereby thermally shielding the bottom on the rear side of the main body **case 1** and the side air outlet of the main body **case 1** for a hot plate 4.

12/36 © EPODOC / EPO

PN - [JP2000079911](#) A 20000321
 PR - JP19980247316 19980901
 AP - JP19980247316 19980901
 DT - I
 FI - B65B31/02&B
 FT - 3E053/AA06; 3E053/BA05; 3E053/CA01; 3E053/CB02; 3E053/FA01; 3E053/GA20; 3E053/JA10
 PA - HOSHIZAKI ELECTRIC CO LTD
 TI - VACUUM-PACKAGING **APPARATUS**
 AB - PROBLEM TO BE SOLVED: To provide a vacuum-packaging **apparatus** capable of packaging an article to be packaged in a thermally adhesive vacuum-packaging bag and sealing the bag in a vacuum state without bringing about the deterioration of a lubricating oil even in the **case** where the article contains a large amount of water vapor. SOLUTION: A vacuum-packaging **apparatus** heat-seals an **opening** of a thermally adhesive vacuum-packaging bag placed on a base by using a **heat**-sealing means after deaerating the interior of a vacuum chamber defined on the base so as to be put into a vacuum state with the aid of a vacuum pump 5. In this **apparatus**, a switch S3 for the warming-up operation of the vacuum pump 5 is provided for **elevating a temperature** of a lubricating oil in the vacuum pump 5. This warming-up operation switch S3 is used for causing the vacuum pump 5 to perform warming-up operation independently at the time of **opening** a lid and, when the warming-up operation switch S3 is turned ON, a relay X6 acts, and a warming-up operation timer TM3 is operated by a preset period of time, thus operating the vacuum pump 5.

13/36 © EPODOC / EPO

PN - [JPH0798151](#) A 19950411
 PNFP - JP3310065B B2 20020729
 PR - JP19930244434 19930930
 AP - JP19930244434 19930930
 DT - I
 FI - F23N5/02&350F; F24H1/00&304C; F24H1/00&604F; F24H1/10&301D; F24H1/10&302K
 FT - 3K005/AA06; 3K005/AB13; 3K005/AB14; 3K005/AC01; 3K005/AC05; 3K005/BA03; 3K005/BA05; 3K005/DA04; 3K005/EB05; 3K005/FA03; 3L024/CC01; 3L024/CC19; 3L024/DD02; 3L024/DD16; 3L024/DD22; 3L024/DD27; 3L024/DD46; 3L024/GG03; 3L024/GG04; 3L024/GG05; 3L024/GG06; 3L024/GG07; 3L024/GG25; 3L024/GG46; 3L024/HH01; 3L024/HH22; 3L024/HH26; 3L034/EA02
 PA - (A)
 TOTO LTD; NIPPON UPRO KK
 TI - (A)
 HOT-WATER SUPPLY **APPARATUS**

AB - (A)

PURPOSE:To quantitatively control the **heating** in such a manner as, during **heating** of the water in a bathtub by an additional-**heating heat** exchanger, to make the **temperature** of a **heat** exchanger for hot water supply approach an objective point so as to **heat** up the bathwater quickly. CONSTITUTION:An amount-of-**heating**-controlling means 109 inputs an amount of **heating** F to a **heating** part-selecting means 110 and a proportional valve-controlling means 113. The **heating** part-selecting means 110 selects either single combustion or simultaneous combustion by comparing, on condition that a **temperature elevation**-detecting means 103 does not detect the **heated** state, the amount of **heating** F with the minimum valve **opening** of the proportional valve in the **case** of simultaneous combustion. According to this selection, switch valvecontrolling means 111, 112 respectively control switch valves. To obtain **heating** by the amount of **heating** F in accordance with the selected mode of either single combustion or simultaneous combustion the proportional valve-controlling means 113 controls the valve **opening** of the proportional valve. As a result, while the bathwater is being **heated** by the additional-**heating heat** exchanger, the amount of **heating** of the hot-water supply **heat** exchanger can be made much larger within the limitation of keeping the stagnant water therein from the boil. This method enables **heating** up the bathwater quickly.

14/36 © EPODOC / EPO

PN - [JPS6230543](#) A 19870209

PR - JP19850169239 19850731

AP - JP19850169239 19850731

DT - I

CCI - [B01J3/06](#)

FI - B01J3/06&N

PA - MITSUBISHI METAL CORP

TI - **APPARATUS** FOR GENERATING ULTRAHIGH PRESSURE AND HIGH **TEMPERATURE**

AB - PURPOSE:To increase production and to prolong the service life of the titled **apparatus**, by providing a cylindrical **heater** to the inner surface of a reaction vessel main body made of a **heat** resistant insulating material and providing two conductive electrode plates to the **opening** parts at both ends of the cylindrical **heater** so as to close said **opening** parts. CONSTITUTION:For example, a reaction vessel 1' is incorporated in a girdle type ultrahigh pressure and high temp. generator having an inner diameter of 40mm and molded bodies S' each having a dimension of 3.5mm **height** X18mm diameter are treated in order to prepare a cubic boron nitride base sintered material. In this **case**, 10 or more molded bodies per one charge can be stably sintered. In the reaction vessel 1', a cylindrical **heater** 6 made of graphite having a dimension of 45mm **height** X 25mm outer diameter X 1.5mm thickness is provided so as to be internally contacted with a vessel main body 5. Further, the single surfaces of thin graphite plates 7, 7 are contacted with both end surfaces of the **heater** 6.

15/36 © EPODOC / EPO

PN - [JPS5668800](#) A 19810609

PNFP - JPS6222080B B2 19870515

PR - JP19790146236 19791112

AP - JP19790146236 19791112

DT - I

FI - F28F27/00; F28F27/00&511G

FT - 3L067/EA18

PA - (A)
EBARA MFG

TI - (A)
CONTROLLER FOR **APPARATUS** FOR HIGH **TEMPERATURE** GAS

AB - (A)
PURPOSE: To completely intercept a high **temperature** gas in the **case** when stopping the running of an **apparatus** and expand a controlling range by a method wherein a liquid sealing means and its working means are mounted to a high **temperature** gas flow path of a **heat** exchanger, etc. utilizing exhaust gas, and the flow rate of the exhaust gas is controlled by the rise and fall of the sealing liquid. CONSTITUTION: When the **temperature** of the secondary fluid chamber 5 of the **heat** exchanger 1 abnormally rises, a **temperature** detector 17 detects the rise, and emits signals to **open** a valve 12, the sealing liquid in a tank 11 is flowed into a liquid sealing device 6, and the surface of a liquid 8 is raised to decrease the **height** (h) of an **open** section 10. Thus, the flow rate of a high **temperature** fluid is diminished, and the **temperature** of the secondary fluid chamber 5 drops. When the **temperature** drops, the valve 12 is closed; when it drops too much, a valve 15 is **opened**, the sealing liquid is discharged and the flow rate of the high **temperature** fluid is increased. When stopping the **apparatus**, the surface of the liquid 8 is raised only by a head section necessary for intercepting the high **temperature** fluid from a lower end of a partition wall 9 as seen in 8'. Thus, the high **temperature** fluid is completely intercepted when stopping the **apparatus**, the controlling range is expanded, and the load of the **apparatus** can be reduced.

16/36 © EPODOC / EPO

PN - [JP2000269152](#) A 20000929

PR - JP19990074107 19990318

AP - JP19990074107 19990318

DT - I

FI - H01L21/205; H01L21/22&511S

FT - 5F045/AA20; 5F045/AC15; 5F045/BB15; 5F045/DP19; 5F045/EB02; 5F045/EB10; 5F045/EC01; 5F045/EC08; 5F045/EF20; 5F045/EK06

PA - KOKUSAI ELECTRIC CO LTD

TI - SEMICONDUCTOR MANUFACTURING **APPARATUS**

AB - PROBLEM TO BE SOLVED: To prevent adhesion of a vaporizing gas to a lower **temperature** part on the lower end of a reaction pipe. SOLUTION: In a semiconductor manufacturing **apparatus** there is installed a reactive pipe main body 10 which connects an inlet pipe 20 and an exhaust pipe 50 for a processing gas to the interior of a wafer **heating heater** 220, and a wafer 200 mounted on a boat 210 is made to enter and exit through an **opening** at the lower end of the reaction pipe main body 10. In this **case**, at a prescribed position in a lower part in the interior of the reaction pipe

body 10 positioned at a side higher than the **heater** 220, there is provided a sealing flange 73 defining a space in the reaction pipe body 10 on a side higher than its own position as a high **temperature** atmospheric chamber, and there are provided an exhaust pipe 50 and a connection part 51 of the reactive pipe body 10 at a side higher than the **height** provided with this seal flange 73.

17/36 © EPODOC / EPO

PN - [JPH02247072](#) A 19901002
 PR - JP19890063546 19890317
 AP - JP19890063546 19890317
 DT - I
 FI - B22D27/04&G
 PA - TOYOTA MOTOR CORP
 TI - METHOD AND **APPARATUS** FOR CONTROLLING **TEMPERATURE** OF METALLIC MOLD
 AB - PURPOSE: To make temp. of a metallic mold variable in the wide range by arranging cooling water basin temporarily storing the cooling water in the metallic mold and making water level in the cooling water basin variable based on temp. of the metallic mold. CONSTITUTION: At the time of pouring molten metal into cavity 3 in the metallic mold 1, the temp. of the molten metal 1 is raised and the difference between the target temp. of the metallic mold 1 and the detected temp. of the metallic mold 1 with a temp. detecting means 39, is developed, and based on signal from the temp. detecting means 39, a solenoid valve 37 connected with a drainage pipe 17 having low **opening height** is made to close. The cooling water level in the cooling water basin 7 is raised and the cooling water is drained through a drainage pipe 15 having high **opening height**, and the water level in the cooling water basin 7 is held to the high level L. In this **case**, as the cooling water of quantity, by which the water level is raised, is directly brought into contact with the metallic mold 1, **heat** exchange between the cooling water and the metallic mold 1, is increased and cooling capacity of the metallic mold 1 is improved. In the **case** the temp. of the metallic mold 1 rapidly rises, the other solenoid valve 23 in a flow rate adjusting means 19 is made to **open**, too, and supplying quantity into the cooling water basin 7 is doubled and the responsibility to lowering of the temp. is improved.

18/36 © EPODOC / EPO

PN - [JPS57126920](#) A 19820806
 PNFP - JPS5953330B B2 19841224
 PR - JP19810013530 19810130
 AP - JP19810013530 19810130
 DT - I
 CCI - [C21D9/08](#)
 FI - C21D1/00&112D; C21D9/08&J; F27B9/30
 FT - 4K034/AA12; 4K034/AA16; 4K034/BA06; 4K034/EA11; 4K034/EB41; 4K042/AA06; 4K042/BA13; 4K042/DB07; 4K042/DD05; 4K042/DF01; 4K042/DF02; 4K042/EA01; 4K050/AA02; 4K050/BA00; 4K050/BA02; 4K050/CA04; 4K050/CA09; 4K050/CE09; 4K050/CG10

PA - (A)
KUBOTA LTD

TI - (A)
APPARATUS FOR HEAT-TREATMENT OF PIPE BODY

AB - (A)
PURPOSE:To perform **heat**-treatment of a cast iron pipe with excellent thermal efficiency, by arranging a carrier for the cast iron pipe and an engaging roller for rotation of the cast iron pipe inside a **heating** furnace, and introducing air for cooling the bearing of the roller into the **heating** furnace. CONSTITUTION:A cast iron pipe 2 is carried along a direction shown as (a) by chain conveyer 3 located on the furnace bottom wall 4 in the chamber 1 of a **heating** furnace, to convert the cast iron pipe into a ferrite structure by **heating** and then slowly cooling. On the way, the pipe is engaged with an engaging roller 5 projected from an **opening** 4a at the furnace bottom wall 4 by an **elevator** 8, so that the cast iron pipe 2, being rotated at the same position with rotation of the roller 5, is **heated** for a fixed period. After the laps of the fixed period, the engaging roller 5 is lowered, and the cast iron pipe 2 is carried by the chain conveyer 3 again. The cast iron pipe 2 comes in contact with the next engaging roller and **heated** in the same way. Thus, the cast iron pipe 2 is **heated** and discharged outside the furnace in succession. In this **case**, air, which comes at a high **temperature** after cooling the bearing of the engaging roller 5, is introduced into the chamber 1 of the **heating** furnace to inhibit diffusion of high-**temperature** in-furnace air outside the furnace chamber. Thus, the reduction of thermal efficiency in the **heating** furnace is prevented.

19/36 © EPODOC / EPO

PN - [GB190715458](#) A 19080706

PR - GBT190715458 19070704

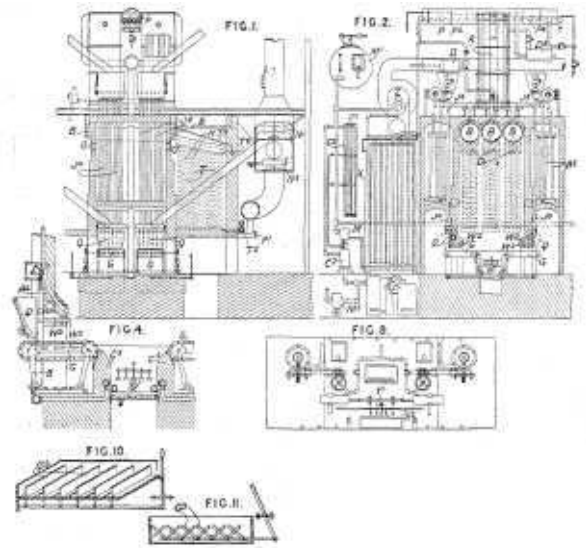
AP - GBD190715458 19070704

DT - I

PA - KITCHEN JOSEPH MOSES WARD [US]; BERNUTH OSCAR VON [US]

TI - Improvements in and connected with Furnaces and Gas Producers

AB - 15,458. Kitchen, J. M. W., and Bernuth, O. von. July 4. Steam-generator furnaces ; pulverulent and small fuel fittings ; mechanical stoking ; grates ; ashes, collecting and removing. - Consists of a furnace plant capable of burning low-grade fuel for generating steam or for making producer or water gas for use in internal-combustion engines or elsewhere. Each unit, of which there are preferably two arranged back to back,



comprises a specially-formed grate surmounted by a high combustion chamber with adjacent **heating**-chambers through one of which the gases pass on their way to the chimney or other outlet, together with fuel-feed devices and means for supplying air both above and below the grate. The **apparatus** comprises in addition, airsupply **heating**-devices, water-distilling and condensing **apparatus**, sectional steam generators, steam superheaters, ash-dischargers, and means for the independent or simultaneous control of the various auxiliary motors. Figs. 1 and 2 show sections at right-angles. Soft coal, which is supplied by shoots to hoppers Q, is fed therefrom to two chain grates G, which deliver it, partly coked, to a central grate G<1> at a lower level. Coal dust is delivered by shoots J<4>, with the help if necessary of hot gases injected into the shoots, on to fire-brick arches W<3> at the sides of the combustion chamber and above the grates G, and hot air by tuyeres W<2> just below. Producer &c. gas is formed owing to the passage of air or steam through the relatively deep bed of fuel on the grate G<1> and, if the upper air supply be stopped, can be drawn off for use as required. In any **case**, the gases pass from the combustion chamber through **openings** O near the top, into a **heating**-chamber H at the front and flow downwards therethrough to dampers controlling the passage to the chimney &c. The bottoms of the **heating**-chamber H and of similar chambers at the

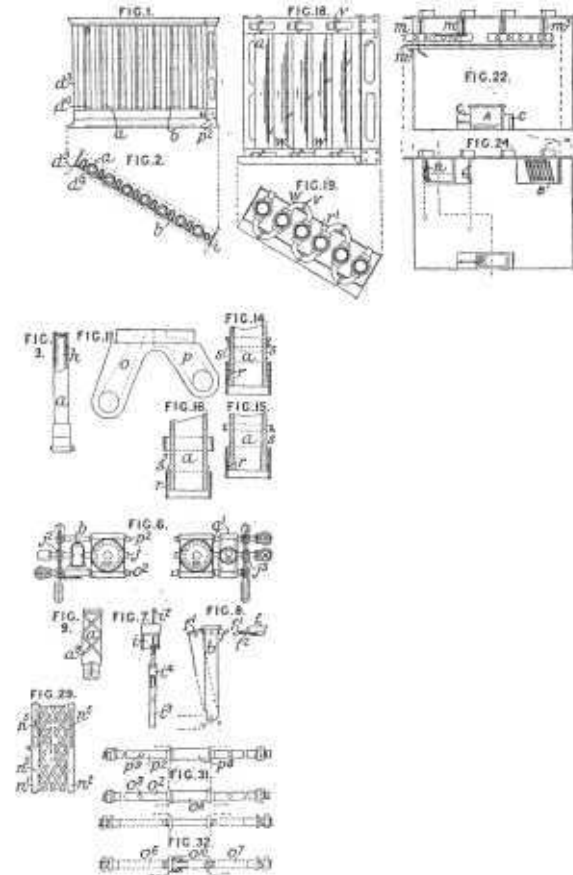
sides of the combustion chamber are sufficiently high to allow of access to the lower parts of the combustion chamber walls. The bottom of the **heating**-chamber is formed of non-conducting, metallic-framed slabs hinged to **open** readily for cleaning. The piston-valves $F_{<1>}$ controlling the outlet to the flue can likewise be readily removed for cleaning purposes. The grates G, Fig. 4. are mounted on two-part frames B. The chain links are curved to the radius of the sprocket-wheels so as to run in close contact with the walls $C_{<5>}$ of the central grate and thus cause the complete removal of the fuel. The bars of the lower grate $G_{<1>}$ are oscillated by **apparatus** shown in Fig. 9. Arms on the grate bars are coupled to a bar, which is moved one way or the other alternately by means of an hydraulic cross-head Y' and jerked back to the central position by springs $S_{<2>}$. The back of each hopper Q, from which the upper gates G are supplied, is hinged at the top and formed with a hinged lower portion. The back can thus be moved by means of a cam to regulate the discharge from the hopper. Forced draught is supplied by a fan Z, and is supplied above the grate through brickcased tuyeres $W_{<2>}$ and also immediately below the central grate G' . The tuyeres $W_{<2>}$ communicate with a distributing-box through valve-controlled pipes $A_{<4>}$, Fig. 4. Induced draught is produced wholly or in part by a fan $N_{<1>}$ driven by a turbine $N_{<2>}$, Fig. 1. The various auxiliary hydraulic motors for the grates, fans, &c. are operated by a supply having

no connexion with the furnace and can thus be driven quite independently of the state of the fires &c. Impure water is **heated** by exhaust steam in a tank P having partitions P' decreasing in **height** towards the outlet end. The steam thus produced is forced by a pump D<3> through a condenser R in which the **heating** of the forced draught is in part effected. The water from the condenser R is forced by a pump D into the air **heater** X. The pressure water for operating the auxiliary motors and feed-water for the boilers is pumped by means of the independent plant shown in Fig. 2. This plant comprises a gas-producer C', an internal combustion engine C<2> and water pump M, and an internal - combustion engine and compressor M<3>. Water is pumped to an **elevated** tank M', from which it is supplied to the various auxiliary motors. Waste steam from the jackets of the combustion engines, or from other sources, is forced by the compressor M<3> through the superheaters B<2>, and may be mixed with the steam from the generators. Exhaust from the combustion engines is introduced into an economizer C<3> at levels corresponding to the **temperature** of the material to be **heated**. The ashes are received on an ash-discharger, Figs. 10 and 11, consisting of a number of centrally pivoted, normally horizontal slats linked to each other and fitted with a deep upstanding rib G<3>. Thus on tilting the slats, only the lower layer of ashes is discharged. Passages below the level of the grates allow of the

introduction of ash-trucks. The air for induced draught is **heated** by passing in succession through chambers at the side of each combustion chamber on its way to the ash-pit. The air for forced draught is **heated** by being drawn by the fan Z through a water cooler X and then forced through a condenser R. In the **heating**-chamber H are the tubes T of a water-tube boiler, connected in sections to upper drums B which are situated at the top of the combustion chamber. Feed-water is supplied from a tube T<2> to the lower ends of the sections, and circulation pipes T<5>, T<6> connect the drums with the outer ends of the upper headers. The sections are supported partly by the pipe T<6> and partly by chains. A steam superheater B<2>, Fig. 2, is situated in one of the chambers at the side of the combustion chamber, and is **heated** by hot gases drawn through the chamber by a fan.

PN - [GB190424356](#) A 19051110
PR - GBT190424356 19041110
AP - GBD190424356 19041110
DT - I
PA - WALLACE CHARLES WILLIAM
TI - An Improved Method of
and **Apparatus** for Regulating
the **Temperature** and the
Humidity of the Air in Rooms,
Passages and other Enclosed
Spaces and applicable for
Promoting or Assisting
Ventilation in the same.

AB - 24,356. Wallace, C. W. Nov. 10.
Air, cooling, **heating**, and
moistening; air, drawing-off and
supplying, methods of.-In a
system of **heating**, cooling, or
ventilating rooms, passages,
halls, and the like, the humidity
of the air in the rooms or the like
is regulated by the employment
of special forms of
radiators, **heating** or cooling
pipes, and arrangements thereof.
Two forms of radiators are
shown in Figs. 1 and 2 and Figs.
18 and 19, respectively. Figs. 22
and 24 show one wall of a hall
or other apartment fitted
with **heating** or cooling and
ventilating appliances. The other
Figures show details of
constructions. The radiators are
formed of metal tubes b and
porous tubes a arranged
alternately. The metal tubes b
may be provided with ribs d'
having extension pieces d<3>.
Wire netting or a wire frame may
be inserted between the pieces
d<3>. Each porous tube, as
shown in Fig. 3, has a central
tube h, which is **open** at its
upper end and connected at its
lower end to a water-outlet pipe
p', Fig. 1, by a passage p located
in a bottom piece shown in Fig.



11. This Figure also shows the passage o by which the annular space between the inner tube h and the outer porous tube is connected to the water-supply pipe o², Fig. 6, passing through the bottom piece. The outer porous tubes are connected to the bottom pieces by rims or joint connections r, several forms of which are shown in Figs. 14, 15, and 16. Filling s³ of plaster of Paris, leather, india-rubber, or the like, or a compression spring s', may be placed between the tube a and the rim r, which then receives a screw cap or ring s. The rim r may be made separate from, or integral with, the bottom piece. The porous pipes a, Fig. 9, may have interior linings of perforated or galvanized metal to prevent a deposit from forming on the pipes. The pipes may also be provided with exterior wirework a⁹ to diminish the breakage. At the end of the radiator, a special pipe i is provided to regulate the level of the water in the porous tubes. This pipe, shown in detail in Fig. 7, is provided with an inner tube i³ which passes through a stuffing-gland i⁴ and is **open** at the top. The **height** of the top of the inner tube is regulated by a rod i' which passes through a cap on the top of the tube i. The tube i is provided with a bottom piece q¹, Fig. 6, by which it communicates with the flow and return tubes o', p'. The metal tubes b communicate with a pipej which is secured to the framework of the radiator at opposite ends by left-hand threaded nuts j² and right-hand threaded nuts j³. By

loosening these nuts, the pipes b may be inclined as shown in Fig. 8. A top piece f<1>, connected by rods f<2> or the like to the top f, is adapted to fit over the top connecting- pipe of the pipes b so as to hold the pipes in an inclined position. Figs. 31 and 32 show alternative forms of pipe connections p', o<2>. The inner tubes o', p' extend the length of the radiator, the outer tubes o<8>, p<8> serving to space the bottom pieces apart. The inner tubes, which have holes o<9>, p<9> for water communication with the bottom pieces, end in shoulders so that they may be clamped in position by nuts. As shown in Fig. 32, the pipes o<2>, p<2> are adapted to be fitted in short lengths between the bottom pieces. The pipe o<6> is formed of two parts, one part o<7> being connected to the other through a screwed cap o<10> engaging the nipped end of the part o<7>. The last section of piping has its ends screwed in the same direction, instead of in opposite directions as in the **case** of the intermediate sections. In the radiator shown in Figs. 18 and 19, porous tubes a are connected through T-pieces r<1> to quadrant-shaped tubes w which are united by flanges v. The tubes may be lined with a metal casing and non-conducting composition. For ventilating a room or hall, a radiator A and ventilating-box C, Fig. 22, are arranged in front of an air entrance. The air inlet is regulated by the trellis shutter shown in Fig. 29. The trellis is connected by pairs of pins n<5> to side supports n<1>, n'. The upper pair of pins n<5> connect

the trellis to blocks which slide in grooves in the side supports. The tops of the ventilating-box C and radiator A are also provided with hit-and-miss gratings to regulate the admission of hot air to the room. Compound porous **heating**-pipes m are supported in the upper part of the hall above a trough m' which catches any drip water. The pipes m have inner perforated pipes m<1> through which the water supply passes. The compound tube m is supported above the trough by a crosspiece fixed to the supporting-bracket m<3>. In the arrangement shown in Fig. 24, a radiator B which may have inclined tubes is arranged in front of the air outlet controlled by a trellis shutter n. The room may be cooled by passing the air on its way to the ventilating-box C over cooling-pipes arranged in the basement. The Provisional Specification also describes a system of ventilating underground passages and spaces by placing hotwater or cold - water radiators of the above construction in the upcast and downcast air flues. When a warehouse or the like is adjacent to a set of boilers used at intervals, the **apparatus** described above may be provided with extensions of the porous pipes, which may be shut off when not required.

PN - [GB783666](#) A 19570925

PR - USX783666 19550217

AP - GB19550033985 19561128

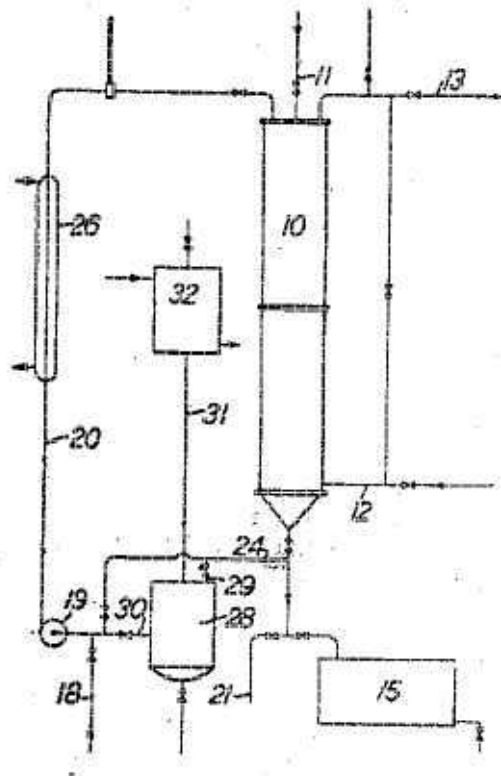
DT - *

CCI - [C08C1/00](#)

PA - US RUBBER CO

TI - Improvements in method of cleaning equipment fouled with latex coagulum

AB - 783,666. Cleaning rubber latex equipment: rubber solvents. UNITED STATES RUBBER CO. Nov. 28, 1955 [Feb. 17, 1955], No. 33985/55. Class 70. Equipment used for handling or processing rubber latex and which has become coated with a rubber coagulum, is cleaned by subjecting the coagulum to the action of a rubber solvent containing a small amount of a prooxidant softener for rubber in the presence of available oxygen, at an **elevated temperature**. In the **apparatus** shown, rubber latex containing ammonia as a preservative flows from a source 11 down a tower 10 against an upward current of moisture-saturated air or other suitable gas flowing via pipes 12 and 13, said air or gas sweeping the ammonia out of the latex so that deammoniated latex may be stored in a vessel 15. In due course two distinct forms of rubber are deposited in the tower, one of which is of soft buttery consistency and is easily removable and the other of which is of tough, stringy agglomerates that are difficult to remove. At frequent intervals the process is stopped and the buttery deposits in the tower 10 are removed by introducing a dilute aqueous solution of an



aqueous alkali through an inlet 18 ; and delivering it by a pump 19 through a pipe 20 and **heater** 26 to the top of the tower 10. The alkali flows down the tower to loosen and dissolve said buttery deposits, the solution being then recirculated or discharged to waste through the line 21. At less frequent intervals, the more difficult to remove coagulum of rubber is treated with a chemical softener for rubber contained in a rubber solvent, the treatment being made in the presence of available oxygen and preferably at an **elevated temperature** as well as with mechanical agitation. The softener may be a pre-oxidant or an oxidation catalyst such as one of the mercaptans of which phenylhydrazine is preferred. The amount of softener used is from about 0.5 to about 5 per cent on the weight of the solvent. The solvents employable include all solvents for rubber and their mixtures. A trace of oxygen is supplied in the form of air or gaseous oxygen or in the form of a peroxy compound. The **temperature** should preferably be between 40 and 200 C. Mechanical agitation may be caused by (a) refluxing the solution in which **case** the reflux leaches the coagulum, or (b) filling the tower with the solution and bubbling in air from the bottom of the tower, or (c) pumping the solution continuously from the bottom to the top of the tower, and (d) stirring, in the **case** of autoclaves or tanks. When the volume of cleaning liquid is large, the system preferably includes a solution vessel 28 connected to

the cleaning liquid return line 24 by a line 29 and at its lower portion to the inlet side of the pump 19 by a line 30. The circulating cleaning liquid passes through the vessel 28 and chunks of coagulum loosened from the tower 10 settle at the bottom of the vessel 28. A breather line 31 which is **open** to the atmosphere is also connected to the top of the solution vessel 28. A reflux condenser 32 may be included in the breather line. Specification 775,536 is referred to.

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PN - [GB1012804](#) A 19651208

PR - US19620212682 19620726

AP - GB19630028636 19630719

DT - **

CCI - [C03B27/0417](#) ; [C03B27/056](#) ;
[C03B29/025](#) ; [C03B29/10](#) ;
[C03B35/14](#) ; [C03B40/005](#) ;
[C03C17/06](#)

CCA - [C03C2217/263](#) ; [C03C2218/17](#)

PA - PITTSBURGH PLATE GLASS CO

TI - Method and **apparatus** for supporting a sheet of **heat-deformable** material, such as glass

AB - <PICT:1012804/C1/1> <PICT:1012804/C1/2> <PICT:1012804/C1/3> A method of supporting a sheet of glass in an upright position during treatment at **elevated temperature**, comprises resting the lower edge of the sheet on a solid support, and supporting the sheet laterally by applying hot gases on opposite surfaces thereof. In one **apparatus** for carrying out the method as applied to tempering glass sheets, the glass sheet passes

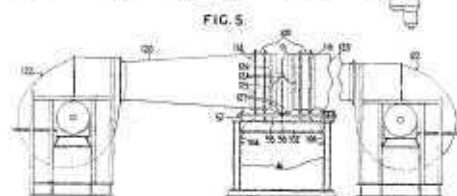
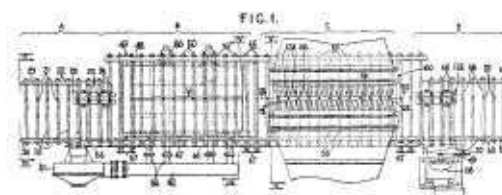
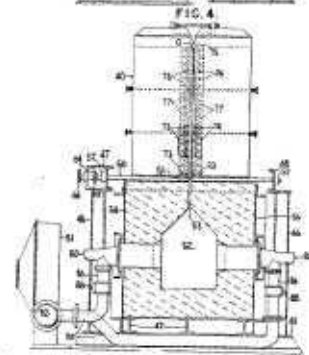


FIG. 4: A detailed cross-sectional view of the glass tempering apparatus, showing the glass sheet (10) being supported by a frame (28) and passing through a heating zone (32) and a quenching zone (34). The sheet is held in place by rollers (30) and guides (31). The diagram illustrates the internal structure and the flow of the glass sheet through the apparatus.



through four sections A-feeding, **B-heating**, C-quenching, and D-delivery. A-Feeding.-The bottom edge of a sheet of glass is placed in the circumferential grooves 21 of horizontal support rolls 20, and is held upright by passing through a framework 28 having freely rotatable rolls 32. From this section the sheet is moved along by the driven rolls 20 into section B- **Heating**. The bottom edge of the glass is retained in aligned grooves 51 of rolls 50, the sheet of glass passing into a furnace 40 having side walls in which are thin plates 72, 74 defining a restricted passage 75 for the glass to pass through, and being connected at their lower ends to a narrow **opening** 53 which is at the apex of a plenum chamber 52 situated below the rolls 50.

Radiant **heater** elements 76 are fixedly spaced from the outer sides of plates 72, 74. The plenum chamber 52 is fed with a mixture of air and gas which is fired in burners 80, the quantities of each being controlled so that flow of the hot gases which then passes upwardly on either side of the glass sheet is strictly controlled at a known pressure, the pressure on either side being balanced against the other so as to maintain the sheet vertical.

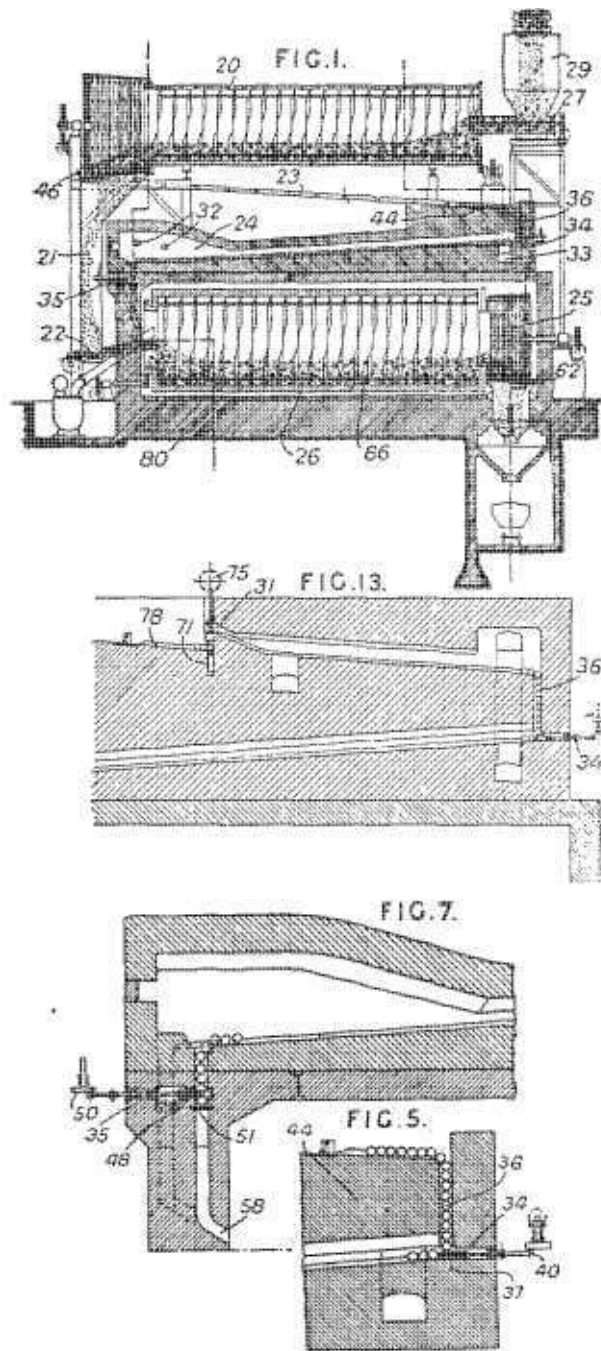
The thus **heated** sheet is then passed to section C-Quenching.

The glass sheet is fed into circumferential grooves 56 in rolls 55, the grooves being provided with insulated liners. The sheet is positioned between vertical frames 100 which contain plenum chambers 114, 116 spaced on each side of the

sheet, each chamber containing a series of slotted **openings** 118 through which cold air supplied to the chambers is blown to quench the sheet quickly. Oblique baffles 124 extending inwardly and upwardly about halfway up each chamber give the air a vertical component of flow, coupled with other similarly disposed baffles 127 at the base of the chamber, thus maintaining the sheet vertical, especially by carefully controlling the pressure of the air on each side of the sheet. The thus tempered sheet is then passed out into the delivery section D which is similar in all respects to section A. The rolls 20, 50, 56 and 58 are all chain driven from a single motor. In using the above **apparatus** to anneal glass sheets, the plenum chambers of the quenching section are sub-divided along their length so that air at different temperatures may be blown on to the sheet to cool it at a rate defined by its appropriate annealing curve. This method may also be used for coating glass sheets in which **case** a glass sheet pre-coated with a frit or enamel is passed through the **apparatus** to fire the coating and thus make it adhere to the glass. In an example, there is sprayed on to the glass an enamel frit having the composition bentonite 1.2 gms. cryolite 0.8 gms., boric acid 0.3 gms. methanol 10 c.c., n-propanol 15 c.c., water 75 c.c., sodium pyrophosphate 0.1 gm., aluminium powder 10 gms. The enamel is fired at 1250 DEG F. by passing the coated sheet through the above **apparatus**.

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- PN - [GB203444](#) A 19230913
- PR - GB19220017834 19220628
- AP - GB19220017834 19220628
- DT - *
- CCI - [C10B49/16](#) ; [C10B1/10](#)
- PA - HEINRICH KOPTERS
- TI - Improvements in coking and carbonizing processes and **apparatus** more particularly for low-**temperature** carbonization
- AB - 203,444. Koppers, H. June 28, 1922. Addition to 184,144, [Class 55 (i), Coking &c.]. **Heating** systems and **apparatus**.-In the **apparatus** described in the parent Specification the closed revolving tubular retort is replaced by an **open-ended** drum 26 adapted to revolve in a closed chamber 80, the chamber 80 being surmounted by and preferably combined in one compact structural unit with the ball- **heating** furnace 24 and a pre-**heating** drum 20. The drum 20 is charged with green fuel and with balls which have already passed through the distilling drum 26, the drum 26 being fed with the preheated fuel from the drum 20 and with the **heated** balls direct from the furnace. The drums are each provided internally with a screw thread which compels the fuel to travel from the inlet to outlet end of the drums, the outlet ends having a grid extension 25, and bars 86 which assist in mixing the balls with the charge and in breaking down any incrustation. The balls from the furnace 24 pass through a regulating device 35 to the drum 26 and meet the pre-

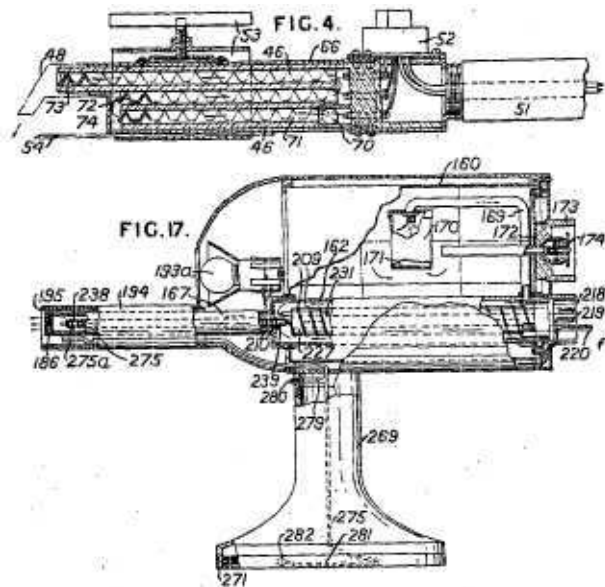


heated fuel fed to the drum by a screw conveyer 22, the whole travelling through the drum to the grid 25 where the coke falls through into a hopper and the balls continue to run forward into a channel 62. From this channel the balls are conveyed in an **elevator** to the fuel-charging hopper 29, passing through a regulating screw conveyer 27, where they mix with fresh fuel and pass through the pre-**heating** drum 20 to the outlet grid which allows the coal to fall down a shoot 21 to the screw conveyer 22, the balls continuing to a shoot 46, channel 23, vertical slot 36 and a regulating device 34 to the **heating** furnace. The regulating device 34 comprises a slide 37, situated at the bottom of the slot 36, reciprocated by a crank 40 and so arranged that when the slide moves to the right the balls in the slot will descend a distance equal to about the diameter of one ball, and upon reversal of motion the bottom row of balls will be pushed into the furnace. To ensure that the regulating device is charged uniformly with balls, a second distributing device comprising a flat bar 44 reciprocated by crank gear is provided. The regulating device 35 comprises a reciprocating slide 48 provided with fork-like projections operated by a crank 50 and arranged to deliver the bottom row of balls on to a reciprocating cross slide 51 provided with an **opening** which allows the balls to fall down an inclined plane and through an **opening** 58 to the drum 26. The furnace is provided with **openings** 32, 33 for

the **heating** gases and products of combustion respectively, and, if desired, the furnace may embrace a part of the channel 23 in which **case** a further regulating device comprising a slide 71, Fig. 13, raised and lowered by a crank 75, is provided which transfers the balls from the regulator 44 and inclined plane 78 to the inlet **opening** 31 of the furnace. Additional **heating** of the drum 26, either external or internal, may be resorted to for the prevention of radiation losses &c.

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- PN - [GB648957](#) A 19510117
 PR - GB19460017670 19460612
 AP - GB19460017670 19460612
 DT - *
 CCI - [F22G1/16](#)
 PA - STEAM TORCH CORP
 TI - Superheating vapours by electricity
 AB - 648,957. Electric **heating**; vapour burners. ROSS, I. D. H. (Steam Torch Corporation). June 12, 1946, No. 17670. [A Specification was laid **open** to inspection under Sect. 91 of the Acts, Dec. 14, 1946]. [Classes 39(iii) and 75 (i)] [Also in Groups XXIII and XXIX] Vapours such as steam are electrically superheated by passing them through a narrow elongated space containing an elongated bare resistor structure emitting radiant **heat** at a **temperature** higher than the **temperature** of the vapour passing through the space, the cross-sections and lengths of the space and of the resistor structure being so proportioned



that substantially all the vapour passing through the space is compelled to flow in contact with and in intimate proximity to the bare resistor structure so that substantially all the vapour leaving the outlet end of the space has been superheated. The use of a bare resistor enables high **temperature** superheated vapour to be produced which may be used for paint removing, sterilizing, exterminating insects and disinfecting. In a paint remover (see Group XXIII), as shown in Fig. 4, a multihole ceramic superheater member 46 is contained in a metal housing 66 having a handle 51 and nozzle 48. The superheater has three rows of circular canals 71 through which three separate resistance wires, 72, 73, 74 are threaded. The loops of the wire coils may be triangular in shape to permit maximum radiation inside the canals. Steam from a suitable generator is delivered by hose through a connection 70 and circulates past the three coils 74, 72, 73 in turn. A multiheat switch 52 enables only one, or two or all three elements to be energized and thus the properties of the emerging steam varied. The superheater canals may alternatively be square in section, in which **case** circular helical coils are used. An exchangeable scraper 54 for picking up the paint melted by the steam is firmly held by a clamp 53. The steam flow in the delivery hose may be kept dry by an intermediate **heater** unit (Fig. 3, not shown), or alternatively a **heater** wire running the length of the hose itself may be mounted inside the hose and

insulated therefrom by ceramic beads (Fig. 2, not shown). A portable superheater for domestic use is shown in Fig. 17. It comprises a boiler 160 through the lower part of which passes a vapour duct 162 communicating with a vapour nozzle 167. It is filled through an aperture 172 closed by a screwed-in filler cap 173 provided with a safety valve 174. A steam dome 170 having a perforated inlet 171 is located centrally in the boiler so that the **apparatus** when filled with a cup of water may be even turned upside down without admitting water to the vapour duct. The dome 170 communicates with the duct 162 by way of a bent pipe 169. The **heating** element consists of two helically coiled resistance wires 209, 210 which are interconnected and whose common terminals 218, 219, 220 permit three different **heat** loadings to vary the **heat** of the steam by changing the position of the supply socket. The wires 209, 210 are wound on ceramic tubes 227, 239 having **elevated** edges 231, 238 respectively to hold the coils in place while permitting maximum radiation. The **apparatus** may be used for spraying a liquid which is contained in a hollow handle portion 269 (see Group XXIX). The steam discharging from the nozzle draws the liquid up a pipe 275 and sprays it. The **apparatus** when tanked with alcohol can also be used as a blow torch. a simple Bunsen burner being fastened to the nozzle tip. Specifications 444,807, [Group XX], and 473,401 are referred to. Reference has been directed by

the Comptroller to Specification
444,807, [Group XX].

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PN - [GB984563](#) A 19650224

PR - GB19600016374 19600509

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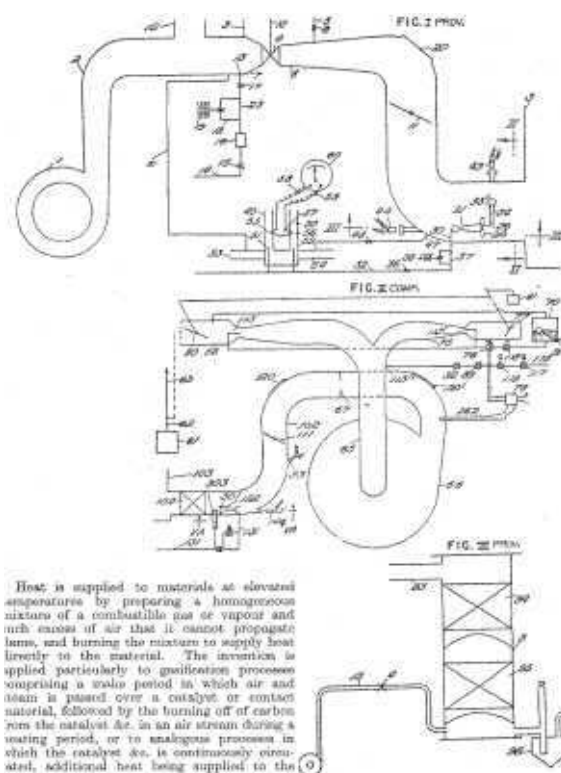
DT - *

CCI - [F22B1/04](#)

PA - NORTH THAMES GAS BOARD

TI - Improvements in or relating to
the supply of **heat** to materials
at high temperatures

AB - <PICT:0984563/C4-C5/1> <PICT:
0984563/C4-C5/2> <PICT:
0984563/C4-C5/3> **Heat** is
supplied to materials
at **elevated** temperatures by
preparing a homogeneous
mixture of a combustible gas or
vapour and such excess of air
that it cannot propagate flame,
and burning the mixture to
supply **heat** directly to the
material. The invention is
applied particularly to
gasification processes
comprising a make period in
which air and steam is passed
over a catalyst or contact
material, followed by the
burning off of carbon from the
catalyst &c. in an air stream
during a **heating** period, or to
analogous processes in which
the catalyst &c. is continuously
circulated, additional **heat** being
supplied to the catalyst &c.
during the **heating** period, for
example where the use of light
oils in the feed stock results in
the carbon deposited in the
catalyst &c. being insufficient on
burning off to maintain it at
reaction **temperature**, by the
burning of a weak mixture as
above. The gas or vapour used



may be petroleum gas or light distillate, methane in the form of fire-damp or sewage gas, or blast furnace or producer gas of low hydrogen content, or mixtures of such materials. The air used may be admixed with flue gases, in which **case** the calorific value of the mixture used which for safety would not otherwise be raised above about 30 B.T.U. per cu. ft. may be increased by enrichments to up to 45 B.T.U. per cu. ft. subject to the oxygen content of the "air" not exceeding 13%. **Apparatus** for carrying out the process comprises, Fig. 1, a fan 1 delivering air to a main 2 which is connected to a catalyst chamber 3 and has a branch 12 leading to other parts of the plant. The main 2 has a cyclically operated valve 4 linked to a steam valve 6 such that scavenging steam is admitted to the main when valve 4 is closed during the make period. The valve 4 is positioned in Venturi 7, 8, furnished with tubes 9, 10 for measuring gas flow. The main contains a butterfly valve 11 and an explosion vent 20 closed by metal foil. Fuel, such as primary flash distillate is supplied in advance of the valve 4 through a batwing jet 13 the supply pipe 14 to which contains a main cock 15, a valve 17 **openable** only when valve 4 is **opened** and the measuring tubes 9, 10 indicate at least a specified minimum flow, a preheater 16, and a solenoid-controlled by-pass valve 19. At the delivery end of the main 2 are mounted a pair of Venturi mixing tubes 21 supplied with fuel from piping 32 containing a valve 36

controlled to **open** and close with the valve 17. The tubes 21 each have a jet 30 supply of fuel to which from piping 32 passes through a fixed orifice 37 or a solenoid valve-controlled bypass 38. The front ends of the tubes 21 are so shaped as to create a vortex in the issuing gas and maintain a stable flame thereat. The flames are maintained by sparkplugs 34 and the correct functioning of these is monitored by photo-electric cells 43 having relays which close the fuel valves 17, 36 if either spark fails while valve 4 is **open**. The presence of flames in the tubes 21 is detected by photo-electric cells 44 relays connected to which operate to close the solenoid-controlled valves 38 in the fuel supply lines to the jets 30. The control devices on the **apparatus** are so adjusted and interconnected as to provide for enriching the gas flow through the two Venturi tubes 21 to slightly different extents and allowing an increase in the main fuel supply through valve 17 until one of the tubes 21 flames and the other does not; in addition, any excessive increase in the main fuel supply (or decrease in air supply), liable to cause explosion in the main stream, produces flaming of both tubes 21 and, through operation of the cells 44, the cutting down of the main fuel supply or putting the plant on stand-by. **Apparatus** for indicating the calorific value of the gas in the main 2 comprises sampling tubes 41, 47 connected in advance of the valve 4 and close to the tubes 21 respectively, the

tubes leading to identical burners 51, 52 in flues 49, 50, which contain the elements 55, 56 of a thermocouple connected to a voltmeter 60 with a central zero. A positive reading of the voltmeter during the blow period indicates the extent of enrichment of the supplied gas; a negative reading during make indicates leakage of fuel through the valve 17 requiring putting the **apparatus** on stand-by. In a modification, usable with flash distillate only, preheated or other fuel is sprayed downwardly on to a steam-**heated** trough which volatilizes any liquid which does not immediately vaporize the spray nozzle and trough being placed in advance of the main air supply valve and of a constriction having impulse tubes so connected as to allow **opening** of the fuel valve only when the air flow is above a minimum. This arrangement is stated to be sufficient safeguard provided the fuel valve is leakproof and is set to provide a blast of no more than 20 B.T.U. per cu. ft. at minimum air supply. In a further modification, Fig. IV, a fan 66 draws flue gases from a stack 63 having an oxygen analyser 62 and air from a duct 75, and delivers the mixed gases, with added fuel, to a catalyst vessel 103 past a main control valve 104 and adjacent detecting and control devices. The flue gas duct 65 and duct 75 contain interconnected dampers moved by a motor 81 operated by the oxygen analyser 62 to maintain the oxygen content of the blast constant. Fuel is supplied from a tank 70 to jets 113, 1131 in

constrictions in the ducts 65, 75, and to one or more auxiliary jets 11311 by a line 114, the main fuel line being controlled by a valve 118 linked to the main gas valve 104 and by a valve 76 held **open** by a solenoid and shut, by de-energizing the solenoid, by a thermocouple 262 if the **temperature** at the outlet to the fan exceeds 270 DEG C. The line 114 is controlled by a hand-adjusted valve 92, a solenoid-operated valve 89 similar to, and for the same purpose as, the valve 76, a main valve 117 interlocked with the main gas valve to **open** only when the latter is **open** (with a lag to allow the gas mixture to be stabilized), and a fine control valve 119 controlled by the detector devices. These devices comprise a pair of Venturi tubes 122 mounted side-by-side on a baffle plate 301 and supplied with fuel through lines 131 from a common line having a main valve **opened** only with the main gas valve. The fuel lines 131 are set to supply slightly different quantities of fuel and have by-pass lines held **open** by solenoid valves. Gas passing through the tubes 122 is ignitable by burners 303 and the flames so produced are detected by photo-electric cells 144. The arrangement is such that any increase in fuel content of the gas stream or any reduction in gas supply, which causes one or both tubes 122 to ignite results, through the detection of flame by the cells 144, in reducing or closing the main fuel supply. In addition, a photo-electric cell 93 in the main duct 102 and a smoke detector in the stack 63 are arranged to

close the valves 76, 89, if flame or smoke respectively are detected in those parts. Fig. VII shows plant for making town's gas from steam and oil delivered through a duct 93 to a catalyst bed 94 and checker brick packing 95. If the fuel used is a light distillate too little carbon is deposited on the catalyst during the make to maintain the **temperature** during the blow phase; **apparatus** 13 according to the invention may then be used to produce, for blowing, a non-flaming gas-fuel mixture which ignites when its **temperature** is raised in the packing 95 and burns completely in the catalyst bed 94. A like mixture may be used in place of the air blast in moving bed catalyst gas-forming **apparatus** in which such a blast is used to circulate the catalyst.

26/36 © EPODOC / EPO

PN - [GB401356](#) A 19331113

PR - NLX401356 19310521

AP - GB19320013746 19320512

DT - *

PA - JOHAN PIETER WIBAUT; HERMAN JOHANNES DEN HERTOOG JR

TI - Improvements in or relating to the manufacture of pyridine derivatives

AB - Halogenated pyridines are prepared by treating the vapour of pyridine with gaseous chlorine or bromine, or the vapour of a bromopyridine with gaseous bromine, at an **elevated temperature**, the reactants being brought to the reaction **temperature** before mixing. When brominating pyridine at temperatures below 300 DEG C., it is necessary to employ a contact substance of large surface area, e.g. pumice, asbestos, silica gel and charcoal, and a mixture of 3- bromo- and 3 : 5-dibromopyridines is then formed; at a **temperature** of 500 DEG C., however, the contact substance may be dispensed with and a mixture of 2-bromo- and 2 : 6-dibromopyridines results. When bromopyridines are brominated at 300 DEG C., the course of the reaction depends upon the contact substance employed; using pumice or other surface catalyst, substitution is favoured in positions 3 and 5, but when the surface catalyst is impregnated with cuprous or cupric bromide, substitution takes place in positions 2 and 6; again, when ferrous, ferric or zinc bromide is used to impregnate the surface catalyst, substitution in positions 3 and 5 is favoured. Bromination of bromopyridines at 500 DEG C. in the

presence of a surface catalyst leads to substitution in positions 2 and 6 if positions 3 and/or 5 are occupied, whilst substitution takes place in position 4 if positions 2 and 6 are already occupied. The chlorination of pyridine at 200--300 DEG C. in the presence of a surface catalyst gives rise mainly to 2-chloropyridine but also to 2 : 6- and 3 : 5-dichloropyridines and pentachloropyridine. Examples are given of the bromination of pyridine and of 2-bromo- and 2 : 6-dibromopyridines in an **apparatus** comprising a vertical reaction tube filled with pieces of pumice and provided with an inner tube fitted at its upper end with a dropping funnel, the said tube extending two-thirds of the way down the reaction tube. The pyridine compound is supplied by a dropping tube to the top of the reaction tube, which latter is **heated** to the required **temperature** . In the **case** of the treatment of the bromopyridines, the pumice is impregnated with cuprous bromide and ferrous bromide respectively. The sample furnished under Sect. 2 (5) consists of 2-chloropyridine, prepared by passing pyridine vapour and chlorine at 300 DEG C. over asbestos in the **apparatus** above described; 3-chloro-, 3 : 5-dichloro- and pentachloro-pyridines are also formed and are separated. The Specification as **open** to inspection under Sect. 91 describes also the chlorination of 2-aminopyridine by the above method, and the treatment of 2 : 6-dibromo-pyridine with aqueous ammonia to form 2-amino-6-bromopyridine and 2 : 6-diaminopyridine. This subject-matter does not appear in the Specification as accepted.

27/36 © EPODOC / EPO

PN - [GB484136](#) A 19380502

PR - ATX484136 19360509

AP - GB19370012928 19370506

DT - *

CCI - [C01F5/00](#)

PA - VERWERTUNG CHEMISCH TECH VERFA

TI - Improvements in or relating to methods for the production of pure magnesium compounds, more particularly magnesium oxide

AB - In the extraction of magnesite and like minerals with acids such as hydrochloric or nitric acid, the acid is caused to act on lumps of the raw material in a gaseous state in the presence of steam at **elevated** temperatures of the order of 100-500 DEG C., whereby highly concentrated solutions or aqueous melts of the salts extracted are obtained. Hydrogen and chlorine may be directly combined adjacent the **apparatus** and the **heat** of formation of the hydrochloric acid be thus utilized; the acid preferably carries sufficient free chlorine to oxidize iron and manganese present in the raw material. Decomposition may be effected in a tower, the lye collecting at the base of the tower being recirculated if desired to increase its concentration. From the solution of magnesium chloride finally obtained, impurities can be removed by caustic magnesite, calcium compounds by addition of sulphates or sulphuric acid, and pure magnesium chloride be then crystallized out. The crystals may first be **heated**, if desired in vacuo, to produce the tetrahydrate, and then be decomposed at 300-1000 DEG C. with superheated steam to obtain magnesium oxide and recover hydrochloric acid for re-use. The Specification as **open** to inspection under Sect. 91, comprises also the following subject-matter: the removal of calcium from magnesium chloride solution by addition of sulphates or sulphuric acid, the solution having a specific gravity of at least 1,35 and the **temperature** being at least 70 DEG C.; the decomposition of

magnesium chloride in a shaft furnace with superheated steam passed in at the base of the shaft; and the decomposition of calcined dolomite or magnesite by acting on a water suspension thereof with liquid or gaseous acid supplied at such a rate and in such quantity that only the calcium is dissolved. In the last **case**, a tank containing the suspension may have supported therein an **open**-ended tube into which the gaseous acid, which may be nitric acid, is passed. This subject-matter does not appear in the Specification as accepted.

28/36 © EPODOC / EPO

PN - [GB1490404](#) A 19771102

PR - FR19740010113
19740325; FR19750005306
19750220

AP - GB19750012334 19750325

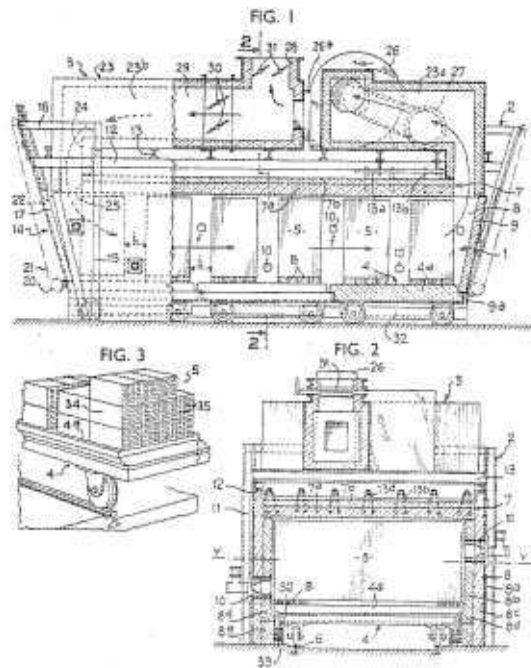
DT - **

CCI - [F27B17/0033](#) ; [F27B9/20](#) ;
[F27B9/26](#) ; [F27B9/36](#) ; [F27D7/00](#)

PA - SATRACO

TI - PROCESS AND **APPARATUS** FOR
BAKING CERAMIC PRODUCTS

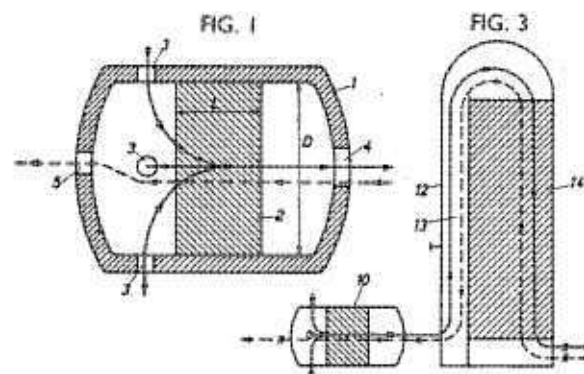
AB - 1490404 **Heat** treatment
furnaces SATRACO 25 March
1975 [25 March 1974 20 Feb
1975] 12334/75 Heading F4B
[Also in Division B8] In an
intermittent or batch type
furnace for baking ceramic
products such as hollow bricks
or tiles and comprising an
elongate baking enclosure 1 of
rectangular cross-section
charged with a plurality of
stacks 5 of products supported
at equally spaced intervals i on
wagons 4, a fan unit 3 is
provided to ensure a
longitudinal flow of gases in the
enclosure from one end thereof
to the other, and burners 10 are
located in the two lateral
enclosure walls 8 to discharge a
regulatable stream of **heat** into
the spaces i between adjacent
stacks 5 in a direction
perpendicular to said
longitudinal gas flow direction.
Each lateral wall 8 is provided



with a series of burners 10 disposed alternately at two different heights, the arrangement being such that each space i is supplied with a stream of **heat** from two burners 10 at different heights. The wagons 4 are provided with lateral vertical plates 32 which move, for sealing purposes, in slideways 33 filled with sand. A support frame 2 surrounding the enclosure 1 comprises uprights 11 disposed along the lateral walls 8, longitudinal members 12 and cross members 13 extending above the enclosure roof 7. Suspended from the cross members 13 are longitudinal bars 13a carrying hooks 13b suspending the roof 7 which comprises a refractory layer 7a surmounted by an insulating layer 7b. Opposite ends of the enclosure 1 are closed by means of inclined slidable doors 9 movable by a winch 20. The fan unit 3 comprises a fan 26 and two interconnected ducts 23 the ends of which communicate with the interior of the enclosure via **openings** 25 in the roof 7 adjacent the doors 9. Sets of flaps 30 and 31 are provided to respectively regulate the amount of gas recycled to the furnace and the amount allowed to escape via a stack 28, so as to maintain a constant pressure within the enclosure during baking. In use when the furnace has been fully charged with stacks 5 of products and the doors 9 closed, preheating is effected by igniting and regulating the burners 10 to give an increasing stream of **heat**, the **heat** furnished by the burners becoming constant when

the baking **temperature** is reached. Cooling of the baked products is achieved by supplying the burners solely with air. When the ceramic products comprise hollow bricks (see Figs. 3-6), the bricks are disposed in superposed identical layers up to the desired **height**. In the **case** of flat, arcuate or Z-shaped tiles, the wagons are each provided with a pair of superstructures (48, Figs. 7-9, not shown) composed of horizontal slabs (49) and longitudinal pillars (50) to define a series of **openended** horizontally extending rectangular passages (51) for receiving the tiles. In an alternative embodiment (Fig. 10, not shown) each superstructure comprises a series of removable cassettes (58) composed of refractory material and having a number of projections extending inwardly to support wall tiles (60) in a horizontal position and spaced apart vertically.

29/36 © EPODOC / EPO
 PN - [GB1218825](#) A 19710113
 PR - LU19670053126 19670306
 AP - GB19680010960 19680306
 DT - *
 CCI - [C21B9/00](#)
 PA - VEITSCHER MAGNESITWERKE
 ACTIE [AT]
 TI - REGENERATIVE BLAST-
 PREHEATING **APPARATUS**
 AB - 1,218,825. Thermal regenerators.
 VEITSCHERMAGNESITWERKE-A.G.
 6 March 1968 [6 March, 1967],
 No. 10960/68. Heading F4K. The
 combustion air for a blast
 furnace is raised to an **elevated**
temperature in a regenerative



arrangement comprising a regenerative blast **heater** 12 and another regenerator 10 having a regenerative mass made of a material (e.g. magnesite bricks) having a higher **temperature** and pressure resistance than the regenerative mass of the blast **heater** 12 which may consist of fireclay bricks having an alumina content of 39-42%. Fig. 3 shows one arrangement of the two regenerators, the blast furnace gases (full arrowed line) giving up some **heat** or being wholly or partially burnt in regenerator 10 and giving up further **heat** or having combustion thereof completed in regenerator 12; and the blast furnace air (dotted arrowed line) being preheated in the mass 14 of regenerator 12 and being further **heated** in regenerator 10. Valve and ducting means (not described in detail) may be provided such that, if required (a) the air may by-pass the regenerator 10 (Fig. 4); (b) the blast furnace gases may be completely burnt in the stove 12 (the regenerator 10 then being inoperative); (c) the gases may be completely burnt in the regenerator 10, and in this **case** the regenerator 12 need have no burners. Fig. 1 shows one form of the regenerator 10 consisting of a refractory enclosure 1 which is arranged in a sheet metal housing (not indicated) and contains a **heat** storage mass 2. Blast furnace waste gas together with combustion air enters the **heater** through **openings** 3 in which burners are arranged. The partially or wholly burnt gases pass out at 4 to the regenerator or regenerator stove 12. On

reversal preheated air from the regenerator 12 enters the regenerator 10 at 4 and after flowing through the **heated** mass 2 passes out at 5 to the blast furnace. The regenerative mass 2 may be divided into two parts (Fig. 2).

30/36 © EPODOC / EPO

PN - [GB1459582](#) A 19761222

PR - FR19730008450 19730309

AP - GB19740009682 19740304

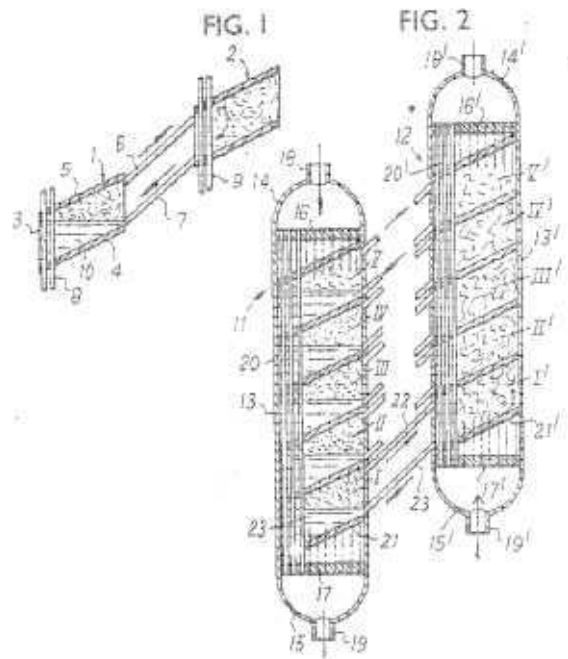
DT - **

CCI - [F28D15/0266](#)

PA - FIVES CAIL BABCOCK

TI - **HEATEXCHANGER**

AB - 1459582 **Heat** exchangers; **heat** pipes; steam generators FIVES-CAIL BABCOCK 4 March 1974 [9 March 1973] 9682/74 Headings F4A F4S and F4U In an **apparatus** such as a steam generator wherein **heat** is exchanged between a primary fluid and a secondary fluid via a **heat** transfer fluid which, moving in a closed circuit, is alternatively vaporized by the primary fluid and condensed by the secondary fluid, the **heat** transfer fluid circuit is contained in a unit e.g. as shown in Fig. 1, comprising a vaporizing chamber 1 interconnected by flow and return conduits 6, 7 with a condensing chamber 2, one or both of said chambers being constructed as a module enabling them to be stacked so that a compound vaporizer (e.g. 11) and/or a compound condenser (e.g. 12) may be formed by a stack of the respective chambers (e.g. 1 or 2). In Fig. 2 tubes 20 convey the primary fluid (e.g. sodium)



through the vaporizing chambers I-V of the unit 11, and tubes 20 convey the secondary fluid (e.g. water being converted into steam) through the condensing chambers I-V of the unit 12. In this **case** the **heat** transfer fluid may comprise diphenyls or triphenyls vaporizing at an **elevated temperature** of say 500 C. In one alternative arrangement (Figs. 4-6), the condensing chambers (26) each comprise an annular chamber in which the vaporized **heat** transfer fluid is condensed by the secondary fluid flowing through **open-ended** tubes (37, Fig. 4) of narrow elongate cross-section extending through said chamber; the condensate being revaporized in a cylindrical chamber (25) containing a primary fluid coil (28). A plurality of the condensing chambers (26) are stacked to form a condensing unit (Fig. 6). An alternative form of **heat** transfer fluid evaporator (Figs. 7, 8) consists of interconnected, superimposed chambers each containing a body (44) of liquefied **heat** transfer fluid in which is immersed banks of straight tubes (45) extending between headers (46, 47). Primary fluid flows in turn through all the tube banks which are interconnected by U-bends (48). An alternative form of condenser for the **heat** transfer fluid (Figs. 9, 10) similarly consists of separate chambers in which the **heat** transfer fluid vapour is condensed by the secondary fluid flowing through series-connected tube groups in

said chambers, each tube group comprising tubes extending between headers.

31/36 © EPODOC / EPO

PN - [GB916316](#) A 19630123

PR - GB19600005256 19600215

AP - GB19600005256 19600215

DT - **

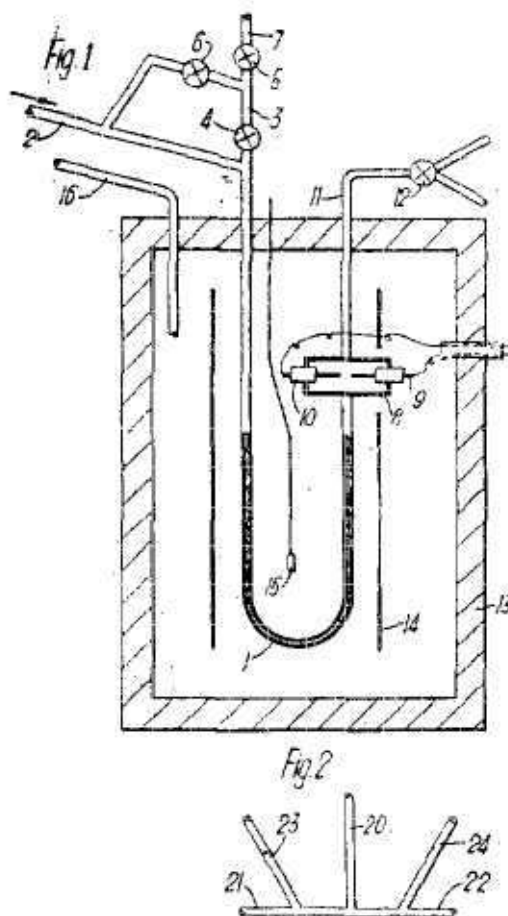
CCI - [C22B9/02](#) ; [G01N30/30](#)

CCA - [G01N30/58](#) ; [G01N2030/3084](#) ; [Y02P10/234](#)

PA - MONSANTO CHEMICALS

TI - Vapour-phase purification process for metallic and semi-metallic substances

AB - <PICT:0916316/III/1> <PICT:0916316/III/2> Metallic or semi-metallic substances are purified by passing the vapour thereof into a gas chromatographic column at an **elevated temperature** and collecting the purified product. The elements Li, Na, K, Ag, Cu, Be, Mg, Ca, Sr, Ba, Zn, Cd, Hg, Al, Ga, In, Tl, Si, Ge, Sn, Pb, As, Sb, Bi, Se, Te, Mg, Pd and Ce are referred to and may subsequent to purification be used as components of semi-conductors, e.g. gallium and indium arsenides, indium and aluminium antimonides, gallium, indium and boron phosphides, cadmium sulphide and selenide, bismuth and mercury tellurides, bismuth antimony telluride, silver antimony telluride and mercury cadmium telluride. Thus gallium or indium arsenide may be prepared by passing a stream of purified Ga or In vapour into contact with a rod of the corresponding arsenide in an atmosphere of As vapour. Intermetallic compounds are



also referred to. The process may be used to reduce the proportion of an impurity to a desired level in semi-conductor substances, e. g. to reduce the P content of Si to a level at which it is an N-type semi-conductor or the B content of Si to a level at which is a P-type semi-conductor. Specified temperatures are from 500 DEG -3000 DEG C. and the column may be made of stainless steel, carbon, ZrO₂, Re, Ta, W, SiC, Mo, Nb, Ru or Ir; it is preferred, and may be essential, when using high temperatures to operate the column in an oxygen-free atmosphere. Specified solid stationary phases are SiC, Al₂O₃ and SiO₂ aerogel; specified liquid stationary phases are Sn, Fe, Ni, Co, Cr, Hf, Pt, Rh, Th, Ti, V and Zr which may be supported on a packing of a material referred to above as a material of construction or on MgO or SiC: it is preferably in a form of large surface area, e.g. foamed or sintered. Vapours of liquid stationary phase condensing with the products are removed conventionally. A and He may be used as carrier gases, and if in the conditions they are inert, N₂ and H₂ may be used.

Superatmospheric or reduced pressure may be employed. The following combinations are mentioned: (a) separation of Cd and Hg at 800 DEG C., (b) purification of Zn from Cd at 1000 DEG C., (c) purification of In from unspecified impurities at 1500 DEG C.; in each **case** using argon and SiC solid stationary phase. Fig. 1 shows an **apparatus** suitable for use in the invention: the carrier gas is passed in at 2 and after removing air, a sample

is placed in chamber 3 between valves 4 and 7. In an example a 2mg. sample was used. The column 1 is then **heated**, as shown by tubular SiC radiant **heaters** 14, the **temperature** being indicated by thermocouple 15 (e.g. an Ir-Pt, Re-W or carbon thermocouple; optical pyrometers can also be used). Other suitable methods of **heating** the column are by means of electrical **heating** wires wrapped round it, induction **heating** (e.g. with a carbon column) and resistance **heating**. A chamber 13 formed of insulating material, e. g. graphite, MgO, foamed SiC or vermiculite firebrick is provided; alternatively an enveloping reflector, e.g. of Zr can be used. The chamber is connected at 16 to a supply of argon. Valves 4 and 6 are **opened** after the column has reached operating **temperature** and the sample drops into the column and is vaporized. The vapours pass through detector 8 which comprises an earthed container of stainless steel or tantalum having electrodes 9 supported on silicon nitride, boron nitride or alumina plugs 10: one electrode is connected to a 700 volt D.C. potential and the other to the grid of an electrometer amplifier connected to a potentiometric recorder. If thermal ionization is insufficient, the vapour may be subjected to a stream of alpha particles or electrons. Other detectors based on changes in dielectric constant or X-ray absorption may be employed. The vapours then pass through outlet tube 11 having

electric **heating** wiring and lagging to valve 12 by means of which it may be directed to alternative stainless steel condensers. If desired the valve 12 may be within the chamber 13. Fig. 2 shows an alternative device to valve 12 for use at higher temperatures. The column outlet is connected to tube 20 and is directed either to outlet 21 or 22 connected to the condensers by means of adjustable streams of argon which are passed down tubes 23, 24. If preferred an electrostatic precipitator may be employed to collect the products. It is stated that semi-continuous operation can be obtained by injecting a fresh sample when the preceding sample has passed through the column (e.g. automatically or semi-automatically) and that continuous separation may be achieved by arranging for the liquid or solid stationary phase continuously to move down the column.

PN - [GB455604](#) A 19361021

PR - GB19350001996 19350121

AP - GB19350001996 19350121

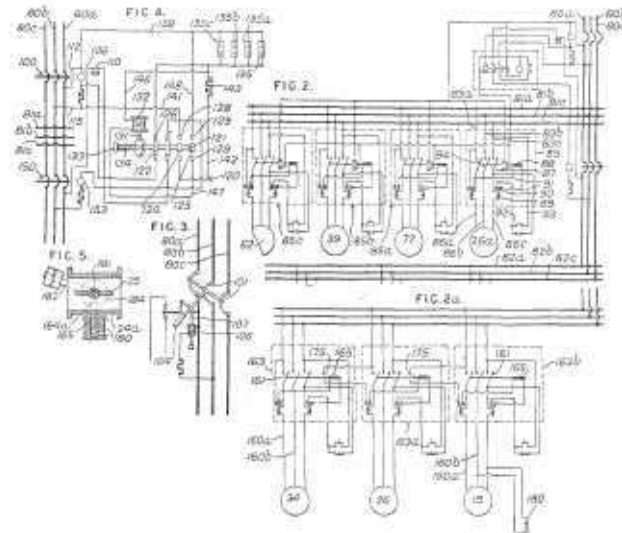
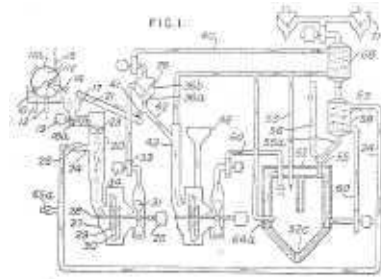
DT - *

CCI - [F23G7/001](#) ; [F23G5/50](#)

PA - WILLIAM ALFRED DUNDAS; PHILIP HARRINGTON

TI - Improvements in method of and **apparatus** for disposing of sewage and other municipal waste

AB - 455,604. Disposal of sewage. DUNDAS, W. A., 1234, Cherry Street, Winnetka, Illinois, and HARRINGTON, P., 3240, North Lake Shore Drive, Chicago, both in U.S.A. Jan. 21, 1935, No. 1996. [Class 34 (ii)] [See also Groups XII and XXXVII] A method of treating sewage and other municipal waste includes the steps of drying the material by contact with a stream of hot gas while it is in loosely suspended condition without mechanical support, comminuting the material, burning the dried material and utilizing **heat** derived from the combustion for supplying **heat** to the gas. Various forms of **apparatus** are described with electrical means for controlling motors of conveyers and fans. Liquid waste 10, Fig. 1, is passed through a cloth covered vacuum drum 11a divided into chambers 11c whereby a partial vacuum is maintained during rotation of the drum in connection with suction pipes 12. Sewage adheres to the surface of the drum till it reaches a scraper 14 and is assisted by pressure from a pipe 15 to be free of the drum and fall into a hopper 17. A quantity of previously dried



sewage is mixed with it, being conveyed on a belt 21. The mixed material is fed by a screw 18a driven by a motor 19 to a drying tower 20 where it is ground by rotary chopping devices 23 and falls through the tower where it meets a stream of hot air through a conduit 24. The air is **heated** to about 1500 F. developed in the incinerating stages. The **heated** air is controlled by a valve 25 and on meeting with wet material is cooled to a safe **heat** of 800- 900 F. The material then passes to a pulverizing and drying mill 27 in which a series of discs 29 and beater arms 30 pivoted thereon are mounted to rotate about a shaft 28 which also carries a fan 31 driven by a motor 28. Finely divided material, air and steam pass upwards past a motor driven fan 33 into a separator 36 provided with cone-shaped walls 36a, 36b. Vapour is discharged through a conduit 40 but solid matter passes partly to a conduit 41 to the belt-conveyer 21 and partly to a conduit 42 and thence to a drying tower 43 similar to that at 20. Lump coal may be supplied by a hopper 46 and ground by the pulverizer beneath. Ground material passes by a conduit 50 to an enclosed incinerating furnace 52. A conduit 53 delivers **heated** air adjacent the conduit 50 for the purposes of combustion. Ash drops out at 52c. Hot gases pass out at 55 either to the atmosphere at 56 or at 56a to a preheater 58. Air is drawn in at 64a round the wall of the furnace and upwardly, by a conduit 60 through coils 59, **heated** by furnace gases, and

thence by a conduit 24 to the tower 20. Cold air enters by a damper 65a. Dampers 57 and 65a **opening** to the atmosphere may be electrically controlled responsive to **temperature** conditions. A second preheater 68 may be added and other separators 71 for ash. The motors for driving the conveyer, first and second stage pulverizers, exhauster fans, preheater fans and induced draught fans have interlocking control to prevent clogging with wet sludge or burning due to hot gases in an empty tower &c. Three phase electric current supply is used but two phase or direct may serve. Three electric conductors 80a, 80b, 80c, Fig. 2, lead from a three phase source to two series of bus-bars 81a, &c. 82a, &c. The series 81a supplies motors for preheater fans, induced draught and second stage pulverizer, while bus-bars 82a &c., supply motors for the conveyer, first pulverizer and exhauster. As regards the motor 26a driving the second pulverizer the three bus-bars 81a &c., are connected through three conductors 83a &c. and contactors 84 of a starter 85 with conductors 86a &c. connected with the motor terminals. The starter 85 has its contactors 84 connected for operation by a rod 87 actuated by a series of mechanical connections leading to a closing coil 88. This coil is connected across one phase of the circuit through overload relay coils 89, contacts 90, conductor 91, momentarily contacting push button 92 and conductor 93. The contactors are selfmaintained.

In **case** of an overload on the motor 26a excess current through conductors 86a, 86c and relays 89 **open** contacts 90 and de-energize coil 88 **opening** contactors 84 to **open** the motor circuit. In a similar way starters 85a &c., establish control of motors 72, 39, 62. A circuit breaker 100 is interlocked with circuits of starters 85, 85a, &c., through a reset-relay 120, Fig. 4. When any one of the motors 26a, 39, 62 or 72 is thrown out of operation by any one or more of the circuit breakers, the coil 106 of the circuit breaker 100 is automatically short circuited by deenergizing coils 88 and to eliminate the short circuit and permit the breaker 100 to be again closed the reset relay 120 is operated. Assuming the contact members 101, Fig. 3, are **open** as when the sludge disposal system is not in operation, the first step to eliminate the short circuit and permit the closing of the circuit breaker 100, Fig. 4, is to turn the handle 133 of the reset relay, rotating the shaft 121 through 90 until the contact member 122 breaks connection between the stationary contacts 126. With the **opening** of the connection between the contacts 126 by rotation of the handle 133 the short circuit of the coil 106 is eliminated so that when the contacts 101, Fig. 3, are closed by the manipulation of the handle 104, the coil 106 may be energized thereby to operate the latch 107 to hold the circuit breaker in its closed position. Assuming one or more of the motors 26a, 39, 62 and 72 have been stopped and all the motors

have been subsequently started in operation again with the **opening** of all the contacts 135, 135a &c., Fig. 4, it is then necessary to energize the coil 132 to effect the resetting of the relay 120 and this is brought about by current from the line conductor 80a through conductors 112, 138, 148 contacts 129, 125, conductor 147, coil 132, conductors 146, 144, resistor 143, conductor 142, contacts 124, 128, conductors 141, 115 back to line 80b. When the coil 132 is thus energized, the plunger 131 is **elevated** and the cam and shaft return to normal under the spring 134. To prevent any of the motors 19, 26 or 34, Fig. 1, or any connected to 82a &c., starting before all of the motors 26a, 39, 62, 72 have been started, a circuit breaker 150, Fig. 4, is connected to the line conductors 80a, &c. at a point between the connections which are made to the bus-bars 81a, &c., and the connections which are made to the bus-bars 82a &c. This circuit breaker is similar in construction to the circuit breaker 100. The coil 153 is connected to the closed circuit between the conductors 80a, 80b at the time the reset relay 120 has been reset following the **opening** of all the contacts 135, 135a, &c., and the starting of all the motors 26a, 39, 62, 72 so that the circuit breaker 150 may then be operated to close the circuit to the bus-bars 82a &c., thus the coil 153 will be energized and will latch this circuit breaker in its closed position. Thus the circuit breaker cannot be closed until after the

previous closing of the circuit breaker 100 with the resulting operation of closing the contacts 110. The contactors 161, Fig. 2a, constitute parts of the motor starter 163 which is substantially similar to the motor starter 85, shown in Fig. 2. The motor 26 for driving the pulverizer 29 is operated by a starter 163a and the motor 19 by a starter 163b. These starters are similar to the starter 163 except that interlocking connections are provided so that the starter 163a cannot be operated until the starter 163 has been actuated to start the motor 34 and the starter 163b cannot be operated until the starter 163a has been started to actuate the motor 26. Connections are made from the starter 163b to the contact 175 of the starter 163a so that the starter must be actuated to close the circuit of the motor 26 before the starter 163b may be actuated to close the circuit of the motor 19 and establish a circuit through the coil 165 of the starter to prevent hot gas flowing into the drying tower 20, Fig. 1, and pulverizer 27 in **case** any of the motors break down. The damper 25 is automatically controlled by a coil 180, Fig. 2, between conductors 160b and 160c leading to the motor 19. As shown in Fig. 5, the damper 25 is mounted on a shaft 181 in a section 24a of the conduit and has a weighted arm 182 normally closing the damper. After manual **opening** it can be held by a cam 184 with a notch 184a engaging a plunger 185 which serves to latch it while operating as the core of the coil 180. When the coil is de-

energized the plunger 185 falls and the damper closes shutting off the tower 20, Fig. 1. Similarly the same result is brought about if either of motors 26, 34 is stopped.

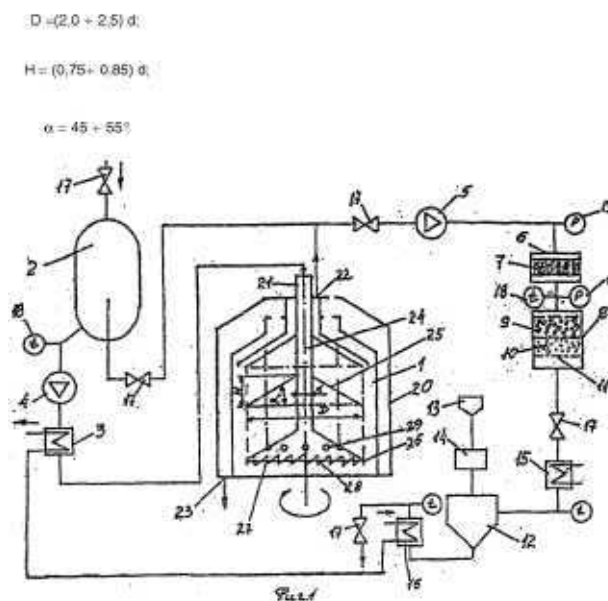
33/36 © EPODOC / EPO

- PN - [EP0282276](#) A1 19880914
- PNFP - EP0282276 B1 19920708
- PR - US19870025470 19870313
- AP - EP19880302035 19880309
- DT - *; Rep
- CT - || STSE (A1)
[US4272383](#) A 19810609 [XD] (MCGREW JAY L)
- CTNP - || STSE (A1)
[X] - J.J.McCARTHY: "TECHNOLOGY ASSESSMENT OF THE VERTICAL WELL CHEMICAL REACTOR", February 1982, section 1, pages 1-5, US-EPA report nr. 600-2-82-005/NTIS report nr. PB82-230335, Washington, DC., Springfield, VA., US,
- CCI - [B01J3/002](#) ; [B01J3/042](#) ; [C02F11/083](#)
- PA - (A1)
VERTECH TREATMENT SYSTEMS INC [US]
- TI - (A1)
Apparatus and method for effecting chemical reactions.
- (B1)
APPARATUS AND METHOD FOR EFFECTING CHEMICAL REACTIONS
- AB - (A1)
A reaction **apparatus** (20) having an externalized **heat** exchange mechanism by which **heat** may be added to or withdrawn from a reactant mixture. In one aspect, a cased well (24) extends into the earth in which at least one reaction vessel (50) is suspended from a support plate (40) at substantially ground level surface (22). The reaction vessel comprises an outer closed-end tube (55) in which an inner **open**-end tube (60) is disposed in a concentric manner to define an annulus (70) which is in flow communication with the bore of the inner tube. Substantially parallel to the reaction vessel and also suspended from the ground level support plate, is a conduit (45) which extends into the chamber defined by the well-casing. A mixture of reactants is injected into the annulus of the reaction vessel to form a hydrostatic column which exerts substantial fluid pressure at a reaction zone in the lower part of the reaction vessel. A **heat**-transfer medium is **heated** to an **elevated temperature** and then flowed through the conduit into the chamber (30) where the hot **heat**-transfer medium envelops the reaction vessel. **Heat** is transferred from the **heat**-transfer medium to the reactant mixture through the wall of the outer closed-end tube. In the **case** of an exothermic reaction, when the **temperature** of the reactants reaches a selected level, the reaction process gives off **heat** which is withdrawn by the **heat** exchange medium. As the reactants form reaction products, the reaction products are flowed from the annulus through the bore (65) of the inner tube back up to ground surface level. In another

aspect more than one reaction vessel is suspended in a single chamber in a single subterranean shaft. In still another aspect each reaction vessel comprises an inner **open**-end tube concentrically arranged inside a larger intermediate closed-end tube which is then surrounded by a larger tube to form a **heat** exchange annulus. Also suspended in the chamber with the reaction vessel is a conduit through which **heat**-transfer medium is pumped into the chamber during operation. The chamber is partitioned into an upper portion and a lower portion by packing assemblies or by pressurizing the upper portion with an inert gas. As **heat**-transfer medium flows into the chamber it is confined to the lower portion of the chamber and forced upwardly through the **heat** exchange annulus which is in **heat**-transfer relation to a hydrostatic column of reaction products in the inner reaction vessel annulus.

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- PN - [EA200200127](#) A1 20020627
- PNFP - EA003518 B1 20030626
- PR - RU19990117061
19990805; WO2000RU00238
20000620
- AP - EA20020000127 20000620
- DT - I
- CCI - [F02M37/223](#) ; [F02M31/16](#)
- CCA - [Y02T10/126](#) ; [F02B3/06](#)
- PA - (B1)
MISHIN ALEXANDER IVANOVICH
[RU]
- TI - (B1)
METHOD FOR COMBINED
PROCESSING OF DIESEL FUEL AND
VORTEX **APPARATUS**
- AB - (B1)
1. A method of complex
treatment of diesel fuel
including **heating** diesel fuel,
homogenization and separation
in centrifugal force field in a
rotor-disc vortex **apparatus** and
fine filtration at a filtering
porous partition of hydrophobic
material, characterized in
that **heating** of diesel fuel is
carried out during the process of
circulation in a closed circuit
including a **heat** exchanger and
a rotor-disc vortex **apparatus**
of **open** type and additional
filtration is carried out by a
multilayer filter-reactor

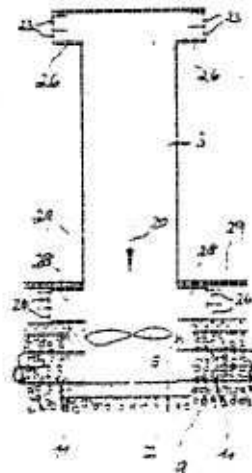


comprising granules of multifunctional catalyst, alkylating aromatic compounds, and a layer of a fill of powder of transitional metals or their oxides. 2. A method in accordance with claim 1, characterized in that additional filtration is carried out at **temperature** of fuel being treated 25 - 45 degree C and at pressure drop at a filter-reactor to 0.2 MPa, and activated carbon impregnated with salts of Na, Ca, Mg, Mn or rare-earth metals or high-silica zeolite in hydrogenous form with addition of metal promoter of Cu Ba-LIBM, NaY, Co Na Y, CaNaY type, and a layer of fill is made in form of a porous structure with rectification fineness 0.5 - 1.5 micron of powder of Fe, Ni, Cu, Cr, Ag, V, W, Mo or their oxides. 3. A method in accordance with claim 1, characterized in that after fine filtration at a filtering porous partition of hydrophobic material and at a multilayer filter-reactor fuel being treated is **heated** and stabilizing additives on the basis of surface-active substances are added with subsequent cooling of treated fuel before storage to environmental **temperature**. 4. A method in accordance with claims 1, 3, characterized in that **heat** extracted at cooling of treated fuel is used for **heating** diesel fuel before the rotor-disc vortex **apparatus**. 5. A vortex **apparatus** of rotor-disc type for complex treatment of diesel fuel comprising a **case** with inlet and outlet pipe connections in inner cavity of which a rotor with a set of conical trays with holes round

the periphery zone is installed, characterized in that the inner cavity is connected with environment, the conical trays are made with destruction edge in form of flanging with slots and bends at the following correlation of geometric parameters: $D = (2,0 - 2,5) d$; $H = (0,75 - 0,85) d$; $\alpha = 45 - 55$ degree where: D = diameter of the large (lower) base of the conical tray; H = **height** of the conical tray; d = diameter of the small (upper) base of the conical tray; α = angle between the generator and the large (lower) base of the conical tray.

35/36 © EPODOC / EPO

- PN - [DE3229225](#) A1 19840216
- PR - DE19823229225
19820805; DE19823222400
19820615
- AP - DE19823229225 19820805
- DT - *; Rep
- CCI - [A01G9/243](#) ; [F24F5/0046](#) ;
[F28D20/0052](#)
- CCA - [Y02E60/142](#) ; [Y02P60/124](#) ;
[Y02A40/266](#)
- PA - MOLLERUS JOSEF DIPL ING
- TI - Process for energy-saving **temperature** control of a closed room, and **apparatus** for performing the process
- AB - The **temperature** prevailing in a closed room is controlled to save energy, in that a mass which stores **heat** is brought into contact with the air in the room and brought to the **temperature** of the latter, the **temperature** of the reservoir being if necessary made use of to control the **temperature** within the room. Air is sucked out of the inner room at a **height** different



from that at which it is fed back again from the reservoir to the room. The ventilating pipes are provided at their free ends, in the room to be **temperature** - controlled, with flaps which are displaceable by the air stream. The design of the free ends of the ventilating pipes and the arrangement of the flaps provided there is such that the flaps respectively work in pairs, so that on one hand in each **case** an air inlet and air outlet are **opened**, and on the other hand in each **case** an air inlet and air outlet are closed, as long as the corresponding fan runs.

<IMAGE>

36/36 © EPODOC / EPO

PN - [CA1306847](#) C 19920901

PR - US19870025470 19870313

AP - CA19880557004 19880121

DT - I

CCI - [B01J3/002](#) ; [B01J3/042](#) ; [C02F11/083](#)

PA - VERTECH TREATMENT SYSTEMS INC [US]

TI - ASYMMETRIC **HEAT** EXCHANGE REACTION **APPARATUS** AND METHOD FOR EFFECTING CHEMICAL REACTIONS

AB - 208J.114 In accordance with the present invention there is provided a reaction **apparatus** having an externalized **heat** exchange mechanism by which **heat** may be added to or withdrawn from a reactant mixture. In one aspect, the present invention includes a cased well which extends approximately 5000 feet vertically into the earth in which at least one reaction vessel is suspended from a support plate at substantially ground level surface. The reaction vessel comprises an outer closed-end tube in which an inner **open**-end tube is disposed in a concentric manner to define an annulus which is in flow communication with the bore of the inner tube. Substantially parallel to the reaction vessel and also suspended from the ground level support plate, is a conduit which extends into the chamber defined by the well-casing. In the method of the present invention, a mixture of reactants, preferably diluted municipal waste, is injected into the annulus of the reaction vessel to form a hydrostatic column which exerts substantial fluid pressure at a reaction zone in the lower part of the reaction vessel. A **heat**-transfer medium, such as oil, is **heated** to an **elevated temperature** and then flowed through the conduit into the chamber where the hot **heat**-transfer medium envelopes the reaction vessel. **Heat** is transferred from the **heattransfer** medium to the reactant mixture through the wall of the outer closedend tube. In the **case** of an exothermic reaction, when the **temperature** of the reactants reaches a selected level,

the reaction process gives off **heat** which is withdrawn by the **heat** exchange medium. As the reactants form reaction products, the reaction products are flowed from the annulus through the bore of the inner tube back up to ground surface level. In another aspect more than one reaction vessel is suspended in a single chamber in a single subterranean shaft. In still another aspect of the present invention, a reaction **apparatus** is provided in which each reaction vessel comprises an inner **open**-end tube concentrically 2086.114 arranged inside at larger intermediate closed-end tube which is then surrounded by a larger tube to form a **heat** exchange annulus. Also suspended in the chamber with the reaction vessel is a conduit through which **heat**-transfer medium is pumped into the chamber during operation. The chamber is partitioned into an upper portion and a lower portion by packing assemblies or by pressurizing the upper portion with an inert gas. As **heattransfer** medium flows into the chamber it is confined to the lower portion of the chamber and forced upwardly through the **heat** exchange annulus which is in **heat**-transfer relation to a hydrostatic column of reaction products in the inner reaction vessel annulus.