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ENGINEERING AND EQUIPMENT

No. 36

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USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ENGINEERING AND EQUIPMENT

No. 36

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USSR UDC 532.533

NONLINEAR AERODYNAMIC CHARACTERISTICS OF AIRFOILS OF ARBITRARY OUTLINE FORM

Moscow AEROMEKHANIKA [Aeromechanics, Collection of Articles] in Russian, Izd-vo-Nauka, 1976 pp 9-24

BELOTSERKOVSKIY, S. M., and NISHT, M. I., Moscow

[Abstract] The object of this study are monoplane airfoils of arbitrary outline form moving through a nonviscous incompressible medium at a given average velocity and with the boundary conditions allowed to vary arbitrarily after some instant of time t = 0. The three-dimensional nonsteady problem is formulated in a rigid system of rectangular coordinates and solved numerically on a digital computer, after it has been discreticized in the general case of separation flow. The special cases of nonsteady and steady nonseparation flow are also considered. Illustrative examples of rectangular and triangular airfoils are shown (their geometry characterized by three dimensionless parameters) for which the formation of trails has been computed by this method. Figures 9; references 26: 16 Russian, 10 Western.

USSR UDC 532.533

MINIMUM-DRAG AIRFOILS

Moscow AEROMEKHANIKA [Aeromechanics, Collection of Articles] in Russian, Izd-vo Nauka, 1976 pp 24-31

ZHIGULEV, V. N., Moscow

[Abstract] The conventional theoretical model of an aircraft wing, namely an infinitesimally thin foil of arbitrary outline form and an arbitrary distribution of the angles of attack is considered here in a stream of a nonviscous gas. The classical theory is modified by stipulating a bounded velocity distribution also at the front edge, so as to be able to realize a suction force. The problem of "recovering" the suction force is treated here as a variational one, equivalent to the problem of minimizing the drag force by optimizing the distribution of the angles of attack, and the theorem of stream reversibility under nonlinear flow conditions is applied here. From the general solution are then derived some basic characteristics of minimum-drag airfoils. Figures 2; references 4 (Russian).

USSR UDC 532.533

EXPERIMENTAL STUDIES OF AIR DIFFUSERS

Moscow AEROMEKHANIKA [Aeromechanics, Collection of Articles] in Russian, Izd-vo Nauka, 1976 pp 87-98

BOSHENYATOV, V. B., GILYAZETDINOV, B. N., and ZATOLOKA, V. V., Novosibirsk

[Abstract] An efficient air diffuser installed in a supersonic stream must tap a jet of maximum cross section and then compress it as much as possible. A successful design of such diffusers is based on tests in wind tunnels at high values of the Reynolds number, because a turbulent boundary layer can withstand higher pressure gradients and jumps without separation than can a laminar boundary layer. Such tests were conducted over the transition range in a pulse-type supersonic wind tunnel. The stream pattern at the inlet to a plane, a divergent, and a convergent diffuser model was photographed by the shadow method and separation of the boundary layer, with the Mach number ranging from 7.6 to 13.1, was recorded during 50-60 ms test runs, sufficiently long for the Reynolds number to drop to its critical value. Temperature and pressure were also measured, with and without a cooler. The results of this study confirm that the optimum attainable diffuser performance depends largely on the separation characteristics of the boundary layer, following a definite transient period, and that these characteristics are affected by the diffuser geometry. Figures 11; references 12: 10 Russian, 2 Western.

USSR UDC 532.533

EFFECT OF FLOW PERTURBATIONS ON THE TRANSITION OF A LAMINAR SUPERSONIC BOUNDARY LAYER TO A TURBULENT ONE

Moscow AEROMEKHANIKA [Aeromechanics, Collection of Articles] in Russian, Izd-vo Nauka, 1976 pp 153-164

KHARITONOV, A. M., Novosibirsk

[Abstract] Systematic studies were made at the Institute of Heat and Mass Transfer (Siberian Division of the USSR Academy of Sciences) to determine the influence of many factors on the boundary-layer transition. Of special concern were the effects of changes in the Mach number and in the singular Reynolds number $N_{R1} = (V/\nu)_{\infty} m^{-1}$ in supersonic wind tunnels ($N_{M\infty} = 3\text{-}7$). The experimental methods in this study were based on thermal flux, skin friction, and total-pressure measurements, followed by a statistical evaluation of data. An increase in the Mach number has been found to lengthen the transition zone and to raise accordingly the value of the local Reynolds number. The effect of changes in the singular Reynolds number on the critical Reynolds number and thus on the transition zone has been found to derive from acoustic perturbations originating in the boundary layer along the tunnel walls within the test section. Figures 13; tables 2; references 18: 11 Russian, 7 Western.

USSR UDC 532.533

THE PARADOX OF AN INFINITE VELOCITY OF PERTURBATION WAVES IN THE HYDRODYNAMICS OF A VISCOUS HEAT-CONDUCTING MEDIUM AND IN THE HYDRODYNAMICS OF FAST PROCESSES

Moscow AEROMEKHANIKA [Aeromechanics, Collection of Articles] in Russian, Izd-vo Nauka, 1976 pp 289-299

KHON'KIN, A. D., Moscow

[Abstract] A one-component viscous heat-conducting medium is considered whose state is describable by three hydrodynamic variables (mass density, mean-mass velocity, and density of internal energy), all subject to the law of conservation. Equations of heat and mass transfer in the case of fast processes are then derived by the Chapman-Enskogi method, different than the classical Fourier and Navier-Stokes equations. The paradox of an infinite velocity of perturbation waves is eliminated and the equation of heat propagation is of the hyperbolic kind, while the equations of hydrodynamics depart from classical form when describing steady processes at perturbation wave fronts and viscous interaction between a shock wave and a boundary layer. An extension to multicomponent media leads to a wave equation (telegraph equation) describing the process of isothermal diffusion. No new physical properties are appear in addition to the classical viscosity, thermal conductivity, and specific heat. Furthermore, in many special cases these new equations reduce to classical form. References 15: 7 Russian, 8 Western.

USSR UDC 629.7.024.32

DISTRIBUTION OF PRESSURE OVER THE SURFACE OF AN EVENLY PERVIOUS BLUNTED WEDGE

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY MASHINOSTROYENIYE in Russian No 6, 1977 pp 73-75 manuscript received 6 Jan 76

POLYAYEV, V. M., POMOGAYEV, F. F., and TSVETKOVA, M. V., Moscow Higher Technical School imeni N. E. Bauman

[Abstract] Results are presented from experimental studies of supersonic flow around a blunted porous wedge with air injection into the airstream. Graphs are presented of the distribution of the pressure coefficient and the relative pressure along the axis of the model. The tests were performed in a hypersonic wind tunnel using air moving at $M_{\infty} = 6$ with Reynolds number per unit length $Re_{\infty} = 5.5 \cdot 10^7$ M^{-1}. The gas injection intensity level was defined by the quantity $\overline{(\rho V)}_{in}$, the ratio of specific mass consumption of injected air to specific mass flow rate of the undisturbed stream. The consumption of injected air was between 0 and 0.055, thus defined. The model had five drain apertures on each side, located along the axis of symmetry on the generatrix at a distance of 21mm from the leading edge, used to determine the static pressure.

The experimental studies showed that gas injection leads to a significant redistribution of pressure on the surface of the wedge. Uniform injection through the surface, even at $\overline{(\rho V)}_{in} < 0.02$, leads to a significant change in surface pressure, particularly in the vicinity of the tip.

USSR UDC 532.529

DYNAMIC BEHAVIOR OF A FREE LIQUID SURFACE UNDER FORCED VIBRATIONS IN A NEAR-ZERO GRAVITY FIELD

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 13 No 5, May 77 pp 102-107 manuscript received 8 Dec 75

GANIYEV, R. F., LAKIZA, V. D., and TSAPENKO, A. S., Institute of Mechanics, Academy of Sciences of the Ukrainian SSR, Kiev

[Abstract] A study was made concerning the behavior of a periodically perturbed liquid-gas interface in a near-zero gravity field. Translucent cylindrical shells containing a liquid (water, oil) and air were used as test models. Each experiment was performed in a flight laboratory moving along a parabolic trajectory in space and, for comparison, repeated on earth. Of interest is the anomalous behavior of the free surface in a near-zero gravity field, where low-frequency excitation produces no subharmonic oscillations but a random motion or simultaneous multimodal oscillations with a distinct axial mode at fundamental frequency, eventually leading to discontinuities. Of interest is also the anomalous behavior of large bubbles in a near-zero gravity field, namely their translatory motion deep into the liquid by way of a capillary jump and with the attendance of simultaneous multimodal pulsations. Of interest is, finally, the resonance effect during high-frequency transverse vibrations of the container. The surface of a low-viscosity liquid (water) forms here a cavity, but only at frequencies within a very narrow range. The interface of two immiscible liquids remains unperturbed when one of them has a high viscosity (oil), while the free surface of the latter forms a funnel--also at frequencies within a very narrow range. These phenomena must be taken into account in the solution of relevant problems in weightlessness dynamics. These phenomena can also be utilized in the development of various space technologies such as treatment of metals (degassing) in the liquid state, forming of metals, etc. Figures 7; references 4 (Russian).

USSR

CRITICAL ILLUMINATION OF INSTRUMENTS INSTALLED ON ARTIFICIAL EARTH SATELLITES

Moscow KOSMICHESKIYE ISSLEDOVANIYA in Russian Vol 15 No 2, Mar/Apr 77 pp 269-273 manuscript received 16 Dec 75

LYZHIN, A. M., and SOKOLOV, G. A.

[Abstract] Some optical instruments installed on board an artificial earth satellite cease to perform when their axis passes through a certain critical angle to the direction of sun rays. This problem of critical illumination is analyzed here quite generally, by reducing the boundary conditions from vector form to a trigonometric inequality of the first order. This rather simple method is applied to a few specific cases, namely: an optical instrument rigidly mounted on a satellite whose one axis points toward the center of the earth and other axis is normal to the orbital plane, a change in the orientation of the satellite, a scanning instrument whose rotational speed is much higher than the rate of change of its orientation relative to the binormal, and an instrument mounted so that its axis always hits a given point on earth. The solution belongs to the class of transcendental ones and requires iteration. It can be obtained in explicit form for stationary satellites or, with certain approximations, also to satellites moving in highly elliptical orbits. References 4 (Russian).

USSR UDC 551.509.616

A METHOD OF ABATING HURRICANES (TYPHOONS)

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 568033 11 Aug 71

VUL'FSON, N. I., LEVIN, L. M., and SEREGIN, YU. A., Order-of-Labor's-Red-Banner Institute of Applied Geophysics

[Text] A method of abating hurricanes by inducing within their cloud system downward movement opposing the natural circulation, with the distinguishing feature that, for a more nearly complete suppression of the hurricane energy within the center zone, the downward movements are induced serially is not larger than 5-10 km steps around concentric circles approximately 10-15 km apart from one another and away from the "eye" of the hurricane and for lengths of time not exceeding a period of upward movements within the action zone.

USSR

UDC 629.113:621.822

CAST SEPARATORS FOR TRUCK TRANSMISSION BEARINGS

Moscow AVTOMOBIL'NAYA PROMYSHLENNOST' in Russian No 6, Jun 77 p 32

PETUKHOV, S. A., and KRETOVA, V. F., All-Union Scientific Research, Planning and Technological Institute of the Bearing Industry

[Abstract] New designs of truck transmissions for heavy ZIL trucks utilize roller bearings with type 664916D, 664914D and 464913D separators. A technology has been developed for production of these separators by pressure casting of an aluminum alloy. This greatly simplifies mechanical working and increases the metal utilization factor. Best results have been achieved with a new Al-Zn alloy and type AK12M2 alloy, particularly the latter. Mechanical working of the cast separators instead of tubular blanks has reduced the number of operations from 17 to 6. The separators have achieved the design life of 1028 hours, and the decision has been made to equip all future transmissions with the new cast separators.

USSR UDC 621.643/699.841.001.24

EFFECT OF SOIL CONDITIONS ON THE PERFORMANCE OF UNDERGROUND PIPELINES DURING SEISMIC PERTURBATIONS

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 6, Jun 77 pp 13-14

GEKHMAN, A. S., SPIRIDONOV, V. V., and FIGAROV, N. G., All-Union Scientific Research Institute for the Construction of Trunk Pipelines

[Abstract] Soils carrying buried pipelines may not only be the sources of seismic perturbations but also participate in the oscillatory motion of such pipelines. Failures of underground pipelines, especially large-diameter ones, have most often been found to occur in dynamically unstable frozen or thawed soils, as a result of alternating compression and tension due to seismic waves traveling along such pipelines. Failures due to flexural deformation and shearing forces occur much more seldom, and then mainly at the junctions with other equipment or in pipe elbows. An analysis of the oscillation mechanism in a long straight pipeline indicates two possible modes of behavior: oscillations due to forces generated by the state of stress of the soil or oscillations in a soil which resists them. The problem is formulated here mathematically for the worse first case: a pipeline deeply embedded in an isotropic elastic soil oscillating together with it without slippage. References 4 (Russian).

USSR UDC 621.643(204.1).001.24

CHECKING THE STRENGTH OF UNDERWATER PIPELINE ASSEMBLY UNDER AXIAL TENSION

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 7, Jul 77 pp 26-27

NIKITIN, A. A., All-Union Scientific Research Institute for the Construction of Trunk Pipelines

[Abstract] Installation of underwater pipelines by the free immersion technique results in large curvatures at low depths. For the purpose of reducing this curvature, axial tension is applied to such a pipeline during assembly. A simple method is shown here for evaluating the strength of such an assembly which takes into account not only the applied tension relative to the flexural stiffness but also the elasticity of the bed under the floating segment of a pipeline. Both shearing forces (buoyancy and gravity) are included in the calculation, with a resulting inflection of the immersed pipeline segment, and the moment diagram is determined according to relations derived from the differential equations of equilibrium between floating and sinking segments. The maximum stress is determined according to the energy theory of strength and, with a stipulated safety factor the structure is checked for breakaway of the floating segment from the supporting base. The method is illustrated on a specific numerical example. Figures 2; tables 2; references 4 (Russian).

USSR UDC 621.643.002.2/551.345.001.5

FREEZING OF AN UNDERGROUND GAS PIPELINE AND PROGNOSTICATION OF CHANGES IN THE CONDITION OF UNDERGROUND WATER

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 7, Jul 77 pp 22-23

KOVAL'KOV, V. P., and KRIVOSHEIN, B. L., Scientific Research and Planning Institute of Power System Control in Petroleum and Natural Gas Construction; IVASHKOVA, V. K., and SOLOV'EVA, M. P., Scientific Research Institute of Constructional Physics at the All-Russian Central State Construction Office

[Abstract] Environmental protection, namely maintenance of the natural state of underground water, is now a major consideration in the layout of pipelines. It thus becomes necessary to determine the allowable subzero temperature at the outside surface of a buried pipe carrying refrigerated natural gas along routes through permanently frozen and thawed soil. This problem was solved here by proper simulation and the use of a hydrointegrator. Seasonal freezing-thawing isopleths have been plotted for 0.7 m deep underground water above Urengoy and Surgut pipelines 1420 mm in diameter. On the basis of such an analysis, these pipelines are found ecologically satisfactory under northern climatic conditions when operated at a surface temperature between 0° and -2°C. Figures 2; no references.

USSR UDC 624.131.5

DESCRIBING THE SUBCRITICAL BEHAVIOR OF ARGILLACEOUS SOIL BY THE THEORY OF PLASTIC HARDENING

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO in Russian No 6, Jun 77 pp 31-36

STAROV, A. V.

[Abstract] In the theory of plastic hardening one expresses the strain tensor as the sum of a plastic and a reversible component, one assumes the existence of a "load surface," in the principal-stresses domain, which separates the region of reversible strains from the region of elastoplastic strains, and one represents the increment of plastic strain by a vector normal to that surface in a quasiequilibrium process within the subcritical range. A stress-strain analysis of argillaceous soil on the basis of this theory and experimental data has confirmed the validity of these premises, also that the "load surface" is a regular smooth one within the subcritical range. A significance effect of the third invariant stress parameter, even under a hydrostatic load, and an appreciable anisotropy of plasticity under a nonhydrostatic load. As the critical state is approached, the "load surface" shifts and eventually separates from the origin of coordinates in the principal-stresses domain. Figures 5; references 10: 9 Russian, 1 Polish.

USSR UDC 627.8.042.7

DETERMINING THE WATER LEVEL FLUCTUATIONS IN A RESERVOIR UNDER SEISMIC CONDITIONS AS IN THE CASE OF THE ZHINVALI HYDROELECTRIC POWER PLANT

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO in Russian No 6, Jun 77 pp 18-21

GVELESIANI, T. L.

[Abstract] The problem of water level fluctuations due to seismo-tectonic shifts under a reservoir has been treated as a boundary-value problem involving an incompressible fluid, with such a shift assumed to occur most likely in the direction where it will produce the highest waves. The problem has been solved on the basis of both empirical and alaytical relations so that the amplitude and the period of surface waves as well as the maximum rise of the water level can be determined from the dimensions (volume) and the kinematic characteristics of the residual ground deformations. Such an analysis, with specific numerical data, yields for the water reservoir of the Zhinvali hydroelectric power plant now under construction the following estimates: maximum rise of the water level at the dam 2.7 m, period of water level fluctuations 3-14 min, and amplitude of surface waves not higher than 1 m. Figures 3; references 13 (Russian).

USSR UDC 621.311.21.004.1

INTRODUCTION OF ADVANCED PRACTICES AT DNEPROSTROY

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO in Russian No 6, Jun 77 pp 12-13

TERESHCHENKO, G. N.

[Abstract] At the Dneprostroy standards research station much attention is paid to replacement of manual labor in construction by tools and machines, and to proper instruction of the personnel in these mechanized operations. One area where such advanced methods are put in practice is the preparation of cement molds with associated carpentry work and subsequent removal of boards. A second area is scaffolding for penstock and draft-tube construction, where a telescopic crane on a carriage moving inside the tube has been successfully used. A third area is the technology of new structural materials such as, for example, rolled channel glass. The economic effect of these innovations is tremendous, during the Ninth Five-Year plan alone they have saved over 250,000 rubles and about 20,000 man-days in subsections of the Dneprostroy. Figures 3.

USSR UDC 621.791.052:539.4.016.3

PROPERTIES OF ELECTRIC-SLAG WELDED JOINTS IN TYPES 20KHNMF STEEL AT VARIOUS TEMPERATURES

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY MASHINOSTROYENIYE in Russian No 6, 1977 pp 136-141 manuscript received 27 Sep 76

DYMSHITS, A. V., and VINOKUROV, V. A., Moscow Higher Technical School imeni N. E. Bauman

[Abstract] The probability of failure of elements in large welded structures of 20KHNMF steel can be decreased by using heat treatment both before and after welding. Four versions of combinations of heat treatments were studied: 1) annealing at 850-870C before welding, tempering at 620-640C after welding; 2) normalization at 900-920C with subsequent tempering at 650C before welding, tempering at 620-640C after welding; 3) annealing at 850-870C before welding, normalization at 900-940C with subsequent tempering at 630-650C after welding; 4) normalization at 900-920C with subsequent tempering at 650C before welding, normalization at 900-940C with subsequent tempering at 630-650C after welding. The results of impact and static load testing (loading rate about 0.02mm/s) did not correlate with each other as a function of temperature. The results of static testing of prismatic specimens with 3-point concentrated bending at 0.02mm/s showed rather brittle behavior of the metal in the 20-400C temperature interval, which agrees with the observed fractures in the process of welding or heat treatment of actual large parts under plant conditions. The temperature interval of most brittle behavior of the metal is practically the same for all zones of the welded joints and for all combinations of heat treatment. The interval of elevated temperatures at which the metal shows the greatest tendency toward brittle fracture is independent of notch sharpness. The best combination of heat treatment is annealing before welding at 850-870C, normalization at 900-940C and tempering at 630-650C after welding. References 2 (Russian).

USSR UDC 621.187.322:628.1.001.5

WATER CLEANING OF FURNACE BAFFLES IN A 500-MW BOILER AGGREGATE BURNING NAZAROV COAL

Moscow ELEKTRICHESKIYE STANTSII in Russian No 7, Jul 77 pp 28-32

VASIL'YEV, V. V., GAVRILOV, A. F., and SHNAYDER, V. K., All-Union Institute of Heat Engineering imeni F. E. Dzerzhanskiy, Nazarov State Regional Electric Power Plant

[Abstract] Cleaning the baffle tubes of a boiler furnace with water, rather than with steam, is found to be most effective in improving and stabilizing their thermal efficiency. This is conclusion on the basis of tests performed in a 500-MW boiler aggregate burning Nazarov coal. Baffle tubes covered with coal dust were sprayed with jets of industrial water from nozzles of various diameters ranging from 8 to 20 mm under pressures up to 12 kgf/cm^2. An analysis of temperature, temperature fluctuation, and thermal efficiency measurements indicate that a 12 mm diameter nozzle sweeping the jet at a rate of 0.4 radian/s yields the best results. The results also indicate the feasibility of using double-clearance baffle tubes for boilers which burn slag forming solid fuel. Figures 8; references 7: 6 Russian, 1 German.

USSR UDC 621.926:662.765:536.423.45.001.24

DEW POINT OF EXHAUST GASES FROM PULVERIZERS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 5, May 77 pp 7-9

MIKHAYLOV, N. M., and GLUSHKINA, B. S., All-Union Institute of Heat Engineering

[Abstract] During changes in the operating conditions, the temperature of exhaust gases from a pulverizer of moist coal may drop below the dew point and thus cause intensive corrosion of pipes as well as machinery. Sulfur oxides (especially SO_3) contained in the combustion products raise the dew point but, being completely adsorbed by ash and residual fuel particles, cannot serve as an effective indicator. The dew point, unless measured directly with special precision instruments, can be determined only from the amount of water vapor present in the exhaust gases. Accordingly, a semiempirical relation between the dew point and the moisture content in the fuel and the air content in the exhaust gases has been established. A curve can now be easily plotted with only the initial moisture content in the fuel and the initial exhaust temperature known. In order to avoid corrosion, it has also been found necessary that the exhaust temperature be maintained at least 5°C above the dew point and the insulation of pipes as well as machinery be always kept in repair. Figures 2; tables 1; references 5 (Russian).

USSR UDC 621.311.22.002.51.004.13

TESTING THE OPERATION OF MODEL PK-39-II BOILER ON EKIBASTUZK COAL UNDER MINIMUM SAFE LOAD LEVELS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 5, May 77 pp 2-5

TUPITSYN, S. P., and POZGALEV, G. I., Central Scientific Research, Planning, and Design Boiler and Turbine Institute imeni I. I. Polzunov

[Abstract] Operation of the 300 MW Reftin State Regional Electric Power Plant under reduced load levels may cause extinction of the flame and shutdown of a combustion chamber. One of the symmetric bipartite model PK-39-II boiler aggregates burning Ekibastuzk coal with fuel oil as standby and equipped with crushers operating in one, two, three, or four stages was tested under steady conditions for up to 7 h at load levels ranging from 0.49 to 0.62 nominal and under transient conditions (fault, shutdown, load changes from 0.55 to 0.63 nominal or reverse). An evaluation of the performance characteristics indicates that operation at down to 0.6 nominal load is feasible without auxiliary firing with fuel oil. Further load reduction is limited not so much by instability of the combustion process as by difficulties in maintaining sufficient steam superheat. Firing with fuel oil at the minimum safe load levels does not better stabilize the combustion process but, instead, results in incomplete combustion of coal dust, both chemically and mechanically. Figures 1; tables 1; references 1 (Russian).

USSR UDC 536.253:532.542.4.001.24

CALCULATION OF THE HEAT TRANSFER TO A TURBULENT STREAM OF AIR IN A CIRCULAR PIPE CONSIDERING THE VARIATION IN HEAT PHYSICAL PROPERTIES WITH TEMPERATURE

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ENERGETIKA in Russian No 4, Apr 77 pp 136-139 manuscript received 18 May 76

GALIN, N. M., and YESIN, V. M., Moscow Power Engineering Institute

[Abstract] The statement of the problem of calculating the heat transfer to a turbulent stream of gas in pipes at high temperature heads has been characterized by assumptions simplifying the system of differential equations generated and by the turbulent viscosity model selected. This article summarizes the state of the art in this area of engineering, presenting formulas and graphs obtained by earlier authors. Systematic calculations are performed using three models for turbulent viscosity with varying degrees of completeness of consideration of convective terms in the equations of motion and of energy. The results produced indicate the contribution of convective terms and the boundaries of applicability of the models studied. A model based on the turbulent energy balance equation leads to results which agree with experimental data for both heating and cooling. The results of experimental studies indicate that the ratio Nu/Nu_o depends not only on the ratio of metal to fluid

temperature, but also on Reynolds number and wall temperature. References 14: 9 Russian, 5 Western.

USSR UDC 662.997.517

USE OF FOCONS [CONVERGING LENSES] AND FACLINES [FOCUSING LENSES] FOR CONCENTRATING THE RADIATION SCATTERED BY SKY REGIONS AROUND THE SUN

Tashkent GELIOTEKHNIKA in Russian No 4, Apr 77 pp 14-21 manuscript received 4 May 76

BARANOV, V. K., Leningrad

[Abstract] The problem of harnessing scattered solar radiation is analyzed on the basis of experimental data for a clear sky, a lightly overcast sky, and a heavily overcast sky. As concentrators are used focons or foclines and their geometric characteristics are also taken into account. These devices yield 5-15% more than concentrated direct radiation, and with a silicon cell as the receiver there is almost no difference in the spectral content between direct and scattered radiation. Figures 2; tables 3; references 9: 7 Russian, 2 Western.

USSR UDC 536.24:621.564

GENERALIZATION OF EXPERIMENTAL DATA ON HEAT TRANSFER AND HYDRODYNAMICS IN INTERNALLY FINNED TUBES CARRYING BOILING FREON-22

Moscow KHOLODIL'NAYA TEKHNIKA in Russian No 7, Jul 77 pp 22-28

D'YACHKOV, F. N., KALININ', I. M., and KROTKOV, V. N., All-Union Scientific Research Institute of Refrigeration Machinery

[Abstract] On the basis of experimental data, semiempirical relations obtained by various authors are verified for the calculation of heat transfer coefficients and pressure gradients in heat exchangers carrying boiling Freon-22. Measurements were made in internally finned tubes, separately within the incipient boiling zone and within the full boiling zone. The theoretical part of this evaluation follows the principles of dimensional analysis and fundamental laws of hydrodynamics and heat transfer. The experimental data are then correlated on the basis of the turbulent-turbulent flow model, taking into account such complicating factors as the presence of lubricant in the refrigerant, a nonuniform distribution of the liquid-vapor mixture, superheating of Freon vapor within the end zone of the heat-exchanger tubes, and local hydraulic drag effects. Figures 5; tables 1; references 11: 5 Russian, 6 Western.

USSR UDC 621.983.1

A METHOD OF PRODUCING INGOTS FOR FORMING HOLLOW PARTS FROM HYPERPLASTIC ALLOYS

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564050 27 Oct 75

KAZACHKOV, I. V., SALIKHOV, S. YA., OKHRIMENKO, YA. M., SMIRNOV, O. M., and TSEPIN, M. A., Ufa Aviation Institute imeni Ordzhonikidze, Order-of-Labor's-Red-Banner Moscow Institute of Steel and Alloys

[Text] A method of producing ingots by making them nonuniformly thick, with the distinguishing feature that, for improving the quality of parts, the thickness is made to vary gradually to a minimum in the zones most heavily loaded during forming, and then deforming them until the thickness becomes uniform.

USSR UDC 621.774.72

A METHOD OF PRODUCING SPHERICAL HINGES

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564051 3 Nov 75

MATSUKIN, YU. G., and KRYZHNYY, G. K., Kharkov Aviation Institute

[Text] A method of producing spherical hinges for joining tubes so that the ends of tubular elements of equal diameters are formed from inside by the pressure of the load transmitting medium in the die, with the distinguishing feature that, for improving the quality of the joint and making feasible a joint between not easily deformable materials, the forming is effected by expanding the end of one of the tubular elements in a cylindrical die until its outside diameter has increased by twice the wall thickness and then boring its inside surface from the line of cylindrical-to-conical transition through a distance equal to twice the arc of the spherical segment of the outer other element in a meridional cross section in the finished joint, then joining the two elements and forming them in the main die, and removing the portion of the ingot material separated by boring.

USSR UDC 621.762.4.04

A METHOD OF PRODUCING TITANIUM INGOTS

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 27, 25 Jul 77 Patent No 565777 2 Jan 75

KHRISTENKO, G. G., KONONENKO, V. G., MORGOLENKO, A. S., KUSHNARENKO, S. G., SEMENOV, V. YE., BUKIN, YU. M., KOROSTELEVA, A. A., LADUKHINA, O. S., OGNEV, R. K., and OLESOV, YU. G., Kharkov Aviation Institute

[Text] A method of producing titanium ingots which includes comminution of titanium sponge and molding of briquets, with the distinguishing feature that, for improving the quality of ingots, the briquets are molded to a density of at least 4 g/cm^3, then heated to 420-450°C, and finally stamped at a high speed.

USSR UDC 621.185.5

WEAR-RESISTANT WELD-ON FOR EXHAUST-FAN BLADES

Moscow ELEKTRICHESKIYE STANTSII in Russian No 5, May 77 pp 79-80

POPOV, V. S., GORDIYENKO, V. N., and STETSENKO, A. I., Zaporozhe Machine Design Institute, State Administration of the Dnepropetrovsk Oblast Power System Management

[Abstract] A technology has been developed for protecting blades of exhaust fans against gas erosion, by welding on a single layer of coating from a grade PP-AN170 powdered-metal wire with grade AN20 flux in a welding machine with a step-down converter delivering 300-350 A at 36-38 V. The electrode feed rate is 83 m/h and the welding rate is 16 m/h. Laboratory tests indicate that such blades are subject to gas erosion on their entire inside surface as well as around the leading edges. The treatment has been found to extend the service life of model DO-31.5 exhaust fans to 4 years between blade replacements. Figures 4; references 2: 1 Russian, 1 Western.

USSR UDC 621.311.22:662.613.13.004.14

FEASIBILITY OF USING THE ASH FROM KANSKO-ACHINSK COALS FOR PRODUCTION OF CALCIUM CARBIDE AND CALCIUM CYANAMIDE

Moscow ELEKTRICHESKIYE STANTSII in Russian No 7, Jul 77 pp 24-25

DUBINSKIY, YU. N., Institute of Physicochemical Processing of Raw Minerals, Siberian Division of the USSR Academy of Sciences

[Abstract] A feasibility study was made on the use of ash from Kansko-Achinsk coals, an ecological hazard when dumped as waste, for production of calcium carbide as a source of acetylene and for synthesis of calcium cyanamide as a nitric fertilizer. An analysis of the process characteristics, including heat balance and economics, indicates that already low-calcium ash can yield up to 90 liters/kg of acetylene. High-calcium ash should yield even more acetylene at a lower cost. The synthesis of calcium cyanamide must still be further refined from the standpoint of agronomic-technical criteria. Figures 3; references 4 (Russian).

USSR UDC 621.181:621.187.142-192.001.5

RELIABILITY OF A WATER ECONOMIZER IN GAS-OIL BOILER AGGREGATES WITH NATURAL CIRCULATION

Moscow ELEKTRICHESKIYE STANTSII in Russian No 8, Aug 77 pp 31-34

TSAGARELI, YU. A., and CHANTLADZE, L. D., Main State Administration of the Georgian SSR Power System Management

[Abstract] The causes of damage to economizer tubes with natural water circulation, and of subsequent boiler shutdown, are analyzed on the basis of data on eight model TGM-94 boilers which have operated in the Tbilisi State Regional Electric Power Plant for almost 100,000 h. Comprehensively tabulated statistics as well as temperature distribution curves and microstructural examination of tube fractures indicate three main categories of failure causes in the following order of significance: surface overheating above 450°C allowed for carbon steel, thermal fatigue and cracking of welded joints, water erosion by jets leaking through pinholes in adjacent tubes. Most vulnerable to damage are wall-mounted economizer sections, then convective heat-exchanger sections, and least its suspended sections. Further experiments have shown that the problem can be overcome by installing forced circulation. Figures 5; tables 1; references 7 (Russian).

USSR UDC 621.18:662.753.325:661.98.002.23

A COMPOUNDED METHOD OF REDUCING THE EXHAUST OF NITROGEN OXIDES

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 77 pp 12-14

KRUTIYEV, V. A., EFENDIYEV, T. B., GORBANENKO, A. D., AFANAS'YEVA, L. A., ZBORSHCHENKO, A. D., LEVIN, M. M., and ZIBRIN, D. A., All-Union Institute of Heat Engineering imeni F. E. Dzerzhinskiy, Kharkov Branch of the Central Design Office of the Main Administration for Repair of Electric Power Plant Equipment, Krasnodarenergo

[Abstract] A method is proposed for reducing the exhaust of nitrogen oxides in boiler furnaces by combining recirculation of the flue gases with two-stage combustion of fuel oil in the burner. The recirculated gases serve here a dual purpose, namely to separate a part of the oxygen from the fuel so that incomplete combustion occurs and then to mix with the secondary air stream as well as with the combustion products so that the process temperature becomes lower. In practical experiments at the Kharkov plant recirculating 30% of the gases and subsequent two-stage combustion with a small amount of excess oxygen has reduced the concentration of nitrogen oxides in the exhaust gases from the usual 0.03-0.05 vol.% to 0.008-0.01 vol.%. Figures 4; tables 1; references 3 (Russian).

USSR

ALLOYING A STEEL WITH COMPOSITES BASED ON TUNGSTEN BORIDE BY THE ELECTRIC-SPARK PROCESS

Kishinev ELEKTRONNAYA OBRABOTKA MATERIALOV in Russian No 1, Jan/Feb 77 pp 19-22

KOVAL'CHENKO, M. S., VERKHOTUROV, A. D., BODROVA, L. G., ALFINTSEVA, R. A., and NIKITYUK, A. F., Kiev

[Abstract] A study was made of the electric-spark process for alloying grade St 45 steel with composites consisting of a W_2B_5 base, a 70 Cr - 30 Ni binder, and an AlN dispersion (added for improving the heat resistance). The ingredients of the composite had been appropriately pulverized during mixing, whereupon the mixture was sintered, decarburized, and stress relieved prior to alloying. The alloying process was implemented with an EFI-ELEKTROM-10 machine operating in six different modes and with plates of the target grade St 45 steel serving as the cathode. The performance of this process was evaluated on the basis of anode erosion and cathode buildup, measured as functions of the binder content and as functions of time, also on the basis of the mass transfer coefficient and the grain size distribution in the erosion product. The results of this study indicate that with a composite containing 10-20% chromium binder the mass transfer coefficient is already quite high, while the anode erosion is minimum and thus the erosion resistance is maximum within this range. The optimum case hardening is obtained by mild treatment, or by more severe treatment for periods not exceeding 2 min/cm^2. Metallographic examination, microhardness tests, x-ray phase analysis, and x-ray microspectroscopic measurements have revealed that the case consists of a "white" layer containing Me_2MeB_2 ternary compounds, which make it very hard, and an intermediate layer of a different composition. Figures 4; references 5 (Russian).

USSR

PREDICTION OF DAILY LOAD SCHEDULE FOR POWER SYSTEMS BY MEANS OF THE PREDICTION OPERATOR

Yerevan IZVESTIYA AN ARMYANSKOY SSR, SERIYA TEKHNICHESKIKH NAUK in Russian Vol 20 No 2, 1977 pp 22-31 manuscript received 28 Apr 76

GRIGOR'YAN, YU. G., GASPARYAN, K. V., and D'YAKOV, A. F., Armenian Scientific Research Institute for Electric Power

[Abstract] An algorithm is presented for prediction of the daily load schedule of a power system. Random factors influencing the accuracy of the prediction include meteorological conditions and the rates of annual increase in loads, which factors are not considered in this work. The results of calculations performed for one power system showed that the maximum load of the day is predicted most accurately (error on the order of 1%), and this is the factor of greatest general interest. Accuracy of prediction can be improved by considering

weather conditions and the increase in annual load factor. An appendix presents a typical example of a program written in FORTRAN-4 for prediction of the daily load schedule of a power system. The prediction is performed in sequence for each hour. References 2 (Russian).

USSR UDC 62-501.72

APPLICATION OF THE METHOD OF REGULARIZATION FOR THE SOLUTION OF THE PROBLEM OF CONTROL OF MANIPULATORS

Moscow IZVESTIYA VYSSHIK UCHEBNYKH ZAVEDENIY MASHINOSTROYENIYE in Russian No 6, 1977 pp 53-58 manuscript received 12 Nov 76

YUSHCHENKO, A. S., and SHIGORIN, L. P.

[Abstract] Determination of the relative coordinates or speeds of relative movement of elements of a manipulator according to a predetermined rule defining the movement of its terminal clamp involves definite computational difficulties resulting from the mathematical incorrectness of the statement of the problem. Various approximate methods have been suggested for its solution. This article presents yet another approximate method, based on the method of regularization of incorrect problems. This method allows an approximate solution to be produced and a control algorithm to be formulated. The relationship of the method to other known methods for solution of this problem, its advantages and disadvantages are discussed. A method is suggested for selection of a regularizing functional allowing minimization of the expenditure of power by the manipulator drive. The algorithm which is developed can be used both for digital computer control of automatic manipulators (robots) and in combined-type systems. In those cases when it is possible to write out the matrix and inverse matrix of the solution in explicit form, the method has the advantage over the method of linear programming of requiring simpler computer hardware. The shortcomings of the method include the lack of any general recommendations for selection of certain parameters as well as the difficulties related to the need to limit other parameters, not encountered in the method of linear programming. An example is appended. References 5: 4 Russian, 1 Western.

USSR UDC 66-502

ONE SOLUTION OF THE PROBLEM OF AUTOMATIC DISTRIBUTION OF POWER

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY MASHINOSTROYENIYE in Russian No 6, 1977 pp 49-53 manuscript received 30 Sep 76

ILYUKHIN, YU. V., and LOBACHEV, V. I.

[Abstract] The problem of automatic distribution of available power among the tracking drives of manipulators is solved by the introduction of connections limiting the action of the drives on the independent power supply to the desired level which guarantees normal functioning of the power supply. The purpose of the present investigation is to determine whether the total effect of a tracking drive system on the power supply can be limited in such a way that the connections introduced to the system for this purpose will not reduce the efficiency of the man-machine system. An algorithm is suggested for adjustment of such systems, providing for automatic distribution of available power. The algorithm was tested using an experimental installation consisting of a 3-element manipulator with tracking electrohydraulic drives for the choke control elements of the shoulder, elbow, wrist and hand portions of the tracking drive. The experimental data confirmed the possibility in principle of constructing manipulator tracking drive systems with automatic power distribution among the drive units by limitation of the total effect of the drive units on the power supply. References 4 (Russian).

USSR UDC 621.91.01

METHOD OF INCREASING THE ACCURACY OF MANUFACTURE OF STRIP-DRAWING ROLLS USED IN OPTICAL-MECHANICAL PRODUCTS

Leningrad OPTIKO-MEKHANICHESKAYA PROMYSHELENNOST' in Russian No 4, Apr 77 pp 49-51 manuscript received 20 Aug 76

TARTYNSKIY, I. M.

[Abstract] A new method has been developed for manufacture of electric-insulation strip drawing rolls. A teflon pipe is pressed onto a roughened metal roll, then the teflon layer is worked on a special type 1Ye61M high-precision lathe to the size called for by the blueprint. The new method of manufacture of strip-drawing rolls with electrically insulated coating was introduced to production in 1975 and has a number of advantages. It increases the quality of manufacture of the rolls, reduces the processing cycle time, eliminates unhealthy operations, reduces the cost of manufacture and allows automation of the production of strip-drawing rolls. References 5 (Russian).

CZECHOSLOVAKIA

USE OF RECENT RESEARCH RESULTS IN THE DESIGN OF HIGH PRODUCTIVITY BROACHES

Prague STROJIRENSKA VYROBA in Czech Vol 25 No 4, 21 Apr 77 pp 284-288

HANA, Josef; SKODA, Departmental Enterprise, Plzen, Plant NARADI

[Abstract] Broaches form a new type of machining equipment. They may be used economically in large scale production; for small batches of production their use is not economical. Although operation of a machine is not expensive, its first cost is very high. Design of the machines revolves around the selected method of cutting chips removal. A new design of broaches is now offered by the plant NARADI of the SKODA works. These machines have a relatively fast rate of operation, and a long life of the cutting edge. Materials with hardness of up to 950 MPa can be machined on this equipment. The author offers some empirical formulas for the calculations of circular pitches. Latest cutting edges made of sintered silicon carbide allow working with materials with hardness of up to 1400 MPa. The broach is made of high speed cutting steel No 19 861. Figures 10; references 1 (Czech).

CZECHOSLOVAKIA

NEW METHODS FOR ROUGHING LARGE INVOLUTE GEARS

Prague STROJIRENSJA VYROBA in Czech Vol 25 No 4, 21 Apr 77 pp 293-296

SRAIL, Ladislav; SKODA, Departmental Enterprise, Plzen, Plant NARADI

[Abstract] The diameter of the gears classified as large lies between 12 and 50 meters. Such gears are used in power plants, rolling mills, and for driving gears of large rotating kilns. Such gears must be manufactured of high strength materials and with great accuracy. The roughing may be conducted on special hobbing cutters, on side-mill cutters, or on trunnion cutters. The side-milling cutters may operate with a graduated profile for involute gears with diameters of up to 30 meters. For gears larger than this, up to 45 meters diameter, the cutting edges are staggered and made of fast cutting steels. For the largest diameters of up to 50 meters cutting edges made of silicon carbide by the Ingersoll Corporation of the USA are needed. Best side milling cutters are marketed by Ingersoll Rand. Trunnion cutters are cheaper than the other types, but offer a lower accuracy of machining. Helical cutting gears are used with this type of mill. Rates of operation of the various types of mills are given by the author. Figures 7; references 3: 2 Czech, 1 Western.

USSR

STUDY OF THE CYCLICAL DURABILITY OF HEAT-TREATED STEELS

Yerevan IZVESTIYA AN ARMYANSKOY SSR, SERIYA TEKHNICHESKIKH NAUK in Russian Vol 20 No 2, 1977 pp 3-13 manuscript received 11 May 76

OLEINIK, N. V., and STAKYAN, M. G., Yerevan Polytechnical Institute

[Abstract] Results were studied from cyclical testing of specimens of steel types 45 and 40 Kh both smooth and with a stress concentrator, annealed, normalized, improved and hardened with both constant and varying loading modes. The main factors influencing durability are stress concentration and hardness of the specimens. A method is suggested for calculating the cyclical ratio of durabilities of steels with various heat treatments, allowing the effect of hardening on durability to be estimated depending on the type of heat treatment, structural and usage factors and, by strictly considering these factors, the service life of parts to be calculated with preassigned probability of failure-free operation. References 2 (Russian).

USSR

UDC 621.57.048:621.564.25:536.24

EXPERIMENTAL DETERMINATION OF THE EFFECTIVENESS OF FINS FOR BOILING OF FREON-22 IN PIPES

Moscow KHOLODIL'NAYA TEKHNIKA in Russian No 6, 1977 pp 13-18

D'YACHKOV, F. N., All-Union Scientific Research Institute for Refrigeration Machinery

[Abstract] The results are presented from experimental determination of the effectiveness of internal radial fins of 5- and 10-channel pipe. A method is presented for determining the primary characteristics, such as effectiveness of fins, mean local heat transfer over fin surface, mean local heat transfer for internal surface of pipe and effectiveness of the contact between the inserted fins and pipe surface, as well as the variation of these quantities with heat flux density. It is shown that fin effectiveness is 34-37% for 10-channel fins, 45-50% for 5-channel fins. Fin effectiveness is primarily influenced by the temperature mode of operation of the pipe. High intensity of heat exchange, characteristic for internally finned pipe, results primarily from their design peculiarities (small equivalent diameters), so that at low values of M hydrodynamic modes are realized which are characteristic of high values of local heat transfer. References 7 (Russian).

USSR UDC 662.67

PROBLEMS OF THE USE OF FUEL SHALES FOR THE PRODUCTION OF ELECTRIC POWER

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, ENERGETIKA in Russian No 4, Apr 77 pp 54-51 manuscript received 1 Nov 76

EPIK, I. P., Academy of Sciences, EstSSR

[Abstract] The maintrends in the development of the economy of the USSR for 1976-1980 call for a growth in the power-production potential of the country primarily due to the use of inexpensive solid fuel, nuclear power and hydroelectric power. Fuel shales are to be more widely used in addition to oil and gas. The power utilization of fuel shales will not, however, be significantly expanded in the next five years. This means that the actual percentage of utilization of fuel shales in the total fuel balance of electric power plants will continue to decrease. In order to increase the share of fuel shales in overall power production, it will be necessary to expand the utilization of shale-ash waste of thermal electric power plants for lime treatment of soils in agriculture and for the production of construction material. Fly ash from the combustion of powdered shale at power plants can be used for this purpose. The total capacity of power systems for production of ash for this purpose (four million tons per year) is presently only 50% utilized. Expansion of the use of shales will also require that a large, experimental installation for processing of shales be put in use at the Estonian Regional Electric Power Plant, to develop the technology for combined utilization of shales and also to determine the cost, technological, ecological and other characteristics necessary for the making of correct decisions concerning the desirability of broad utilization of fuel shales from various deposits in the country. The improvement of the usage qualities of high-capacity shale dust steam generators must be improved and planning principles developed for a 500 MW semipeak power unit. References 6 (Russian).

USSR UDC 669.018.25:539.4:621.923.4:621.921.34

CHANGES IN THE STRENGTH OF THE HARD GRADE VK15 ALLOY DURING GRINDING WITH DIAMOND WHEELS

Moscow VESTNIK MASHINOSTROYENIYA in Russian No 5, May 77 pp 52-53

KABANOVSKIY, L. N., SMAGLENKO, F. P., PANICH, A. N., ALEKSANDROVA, L. I., and LOSHAK, M. G.

[Abstract] A study was made at the Institute of Superhard Materials (Academy of Sciences, Ukrainian SSR) to determine the effect of grinding with diamond wheels on the strength of the hard grade VK15 tool alloy. Tests were performed on a model 3G71 planer with APP 250x10x3x75 wheels (type 2720-0122 according to GOvernment STandard 16167-70) using grade M-04 metallic binder of grade ASV 125/100 metallized diamond grains and a lubricant-coolant fluid. On

the basis of a planned 3-factor (depth of cut, longitudinal feed velocity, transverse feed velocity) 2-level (upper and lower) experiment, the effect of these process parameters on the fatigue limit and on the residual stresses was then evaluated. The fatigue limit was defined as the number of cycles to fracture. The distribution of residual stresses was estimated from the maximum compressive and tensile stresses and the embedment depth of the neutral zone. A regression analysis of the test data, based on including pairwise interaction, indicates that the severity of grinding affects the strength of the product and increases the variability of its strength characteristics. The results can be useful for establishing the optimum parameters of the flat diamond grinding process. Figures 1; tables 3; references 5 (Russian).

USSR UDC 621.951.1.001.3:669.15'74-194:621.95.025.7.«401.7»

DURABILITY OF HARD-ALLOY DRILLS FOR MACHINING GRADE G13L STEEL

Moscow VESTNIK MASHINOSTROYENIYA in Russian No 5, May 77 pp 58-59

ZAYTSEV, V. I.

[Abstract] Grade G13L manganese steel after quenching cannot be machined with high-speed drills. A study was made to determine the physical nature of drill wear. Standard drills with bits made of the hard grade VK8 alloy were tested at cutting speeds ranging from 23 to 71 m/min and 0.045 to 0.16 mm/rev. Both the worn drill surfaces and the G13L chip surfaces were then examined by x-ray diffraction and under an electron microscope. These examinations have revealed that at lower cutting speeds the wear is essentially abrasive, caused by carbides and nonmetallic inclusions in the steel part. At higher cutting speeds (and temperatures) the carbide phase in the steel part softens and the drill material becomes more ductile, resulting in wear through mutual adhesion and subsequent diffusion, i.e., mass transfer. On the basis of this evidence, operating within the transition range from adhesive-fatigue to diffusive wear (42 m/min and 0.07-0.1 mm/rev) are recommended for maximum tool life. A still better drill performance can be obtained by using bits of grades TT10K8B or TT7K12 instead of VK8 alloy. Figures 3; references 2 (Russian).

USSR UDC 621.9.06-229.316.6-182.8:539.4

EXPERIMENTAL DETERMINATION OF THE TIGHTENING FORCE ON CLEATS IN UNIVERSAL-ASSEMBLY ROUND JIGS

Moscow VESTNIK MASHINOSTROYENIYA in Russian No 6, Jun 77 pp 62-64

KHOLOD, G. P., and ISHCHUK, A. F.

[Abstract] The reliability of universal-assembly round jigs depends on maintaining the location of holes, within specified tolerances, during drilling of parts. This, in turn, requires an adequate tightening of the cleats between washers. The movement of a cleat across the groove is limited by the groove walls, and along the groove it is limited by friction in the bolt joint. The latter movement is most critical with respect to jig accuracy. A study was made to determine the relation between tightening force and cleat displacement, within the 300-500 kgf/cm^2 pressure range. Cleats and washers of grade 12KhN3A steel (Rockwell C hardness 58-62) were tested, with a surface roughness 0.30-0.22 um and 0.58-0.40 um respectively. The residual displacement, after repeated loading and unloading cycles, could be reduced to less than 0.25 um with a tightening axial force of 4000-5000 kgf, corresponding to a tightening torque of 11-13 kgf·m on M12x1.5 bolts of grade 38KhA steel (Rockwell C hardness 38-42). Figures 3; table 1; references 2 (Russian).

USSR UDC 669.141.246

A NEW GRADE 10N6G4ML HIGH-STRENGTH MARTENSITIC STEEL FOR INVESTMENT CASTING

Moscow VESTNIK MASHINOSTROYENIYA in Russian No 6, Jun 77 pp 68-69

KISELEV, V. D., GINZBURG, S. K., ORLOV, YE. D., and SHUL'MAN, V. M.

[Abstract] The martensitic age hardenable grade 10N6G4ML cast steel is the first in this group. It offers high strength and toughness combined with high reliability and immunity to brittle fracture. It can be either quenched (preferably from 1050 and 970°C with air cooling and subsequent stress relieving by low-temperature temper within 200-300°C) or slowly age hardened. The chemical composition is $\leq$ 0.1% C, 2.5-4.5% Mn, 4.5-5.5% Ni, 1.2-1.6% Mo, 0.03-0.06% Al, and 0.02-0.08% Ti. The critical transformation temperatures are A_{c1} = 550°C and A_{c3} = 810°C. The absence of oxidizing elements facilitates the casting process. The tensile strength is 106-118 kgf/mm^2, depending on whether the steel has been produced in an induction furnace or in an electric-arc furnace, it can be raised to 130 kgf/mm^2 by age hardening or to 160-170 kgf/mm^2 by alloying with aluminum, copper, and titanium. Most hardening occurs at 450-490°C within 6-10 h. The steel is also weldable without preheating with a manual torch and electrodes of grade 08Kh24N6ATMF steel wire for closure of casting flaws, or with an argon torch and grade 08Kh3G2SM steel rods for joining to

other grades of structural steel. The machinability of grade 10N6G4ML steel (in drilling, in milling, and on a lathe) is comparable the same as that of grade 40Kh steel. Figures 2; tables 2; no references.

USSR UDC 621.643:620.197.6.001.5

EFFECT OF FILLERS ON THE LINEAR COEFFICIENT OF THERMAL EXPANSION OF EPOXIDE COATINGS

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 7, Jul 77 pp 23-25

SANZHAROVSKIY, A. T., and ZINEVICH, A. M., All-Union Scientific Research Institute for the Construction of Trunk Pipelines

[Abstract] Pipelines are now being insulated with polymer film coatings which contain inorganic fillers. A study was made to determine how the shape and the concentration of filler particles affect the linear coefficient of thermal expansion and the modulus of elasticity of grade ED-5 epoxide resin cured with polyethylene-polyamine. As filler were used glass powder consisting of quasi-spherical grains 5-10 nm in diameter or glass fiber cut to 0.2, 0.5, 1.0, and 2.0 mm long needles. The results indicate that adding up to 50 wt.% of glass powder decreases the thermal expansivity of the material down to half, almost equally in the vitreous and in the high-elasticity state, and greatly increases its stiffness. Adding 5-10% glass fiber increases the stiffness slightly but decreases the thermal expansivity greatly, especially in the high-elasticity state. Figures 3; no references.

USSR UDC 621.791.3

A SOLDIER FOR JOINING PARTS MADE OF VERY HARD MATERIALS

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 567574 4 Jul 75

DRUY, M. S., GOLUBEVA, A. A., LYSANOV, V. S., EFROS, M. G., ANDREYEV, V. I., DUKAREVICH, YA. Z., PAVLOV, V. S., SAMOYLENKO, A. S., and LEVIN, F. S., All-Union Scientific Research Institute of Abrasives and Grinding

[Text] A solder for joining parts made of very hard materials, preferably of polycrystalline materials based on boron nitride or diamond, containing copper, manganese, phosphorus, titanium, and an element selected from the tin-cadmium-lead-bismuth group, with the distinguishing feature that, for the prevention of cracking of the polycrystalline material as well as of its floating and dropping

of the soldering temperature, there is also chromium added and the quantitative composition of the solder is as follows (in pct.wt):

Chromium	25-45
Copper	25-55
Manganese	10-30
Element of the Sn-Cd-Pb-Bi group	2-10
Titanium	1-7
Phosphorus	0.1-1.5

USSR UDC 621.791.042.2

A COMPOSITION OF WELDING WIRE

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 27, 25 Jul 77 Patent No 565794 1 Feb 74

ARAVIN, B. P., BELYAYEV, N. V., VAYNERMAN, A. YE., GAYDAY, P. I., KOTOV, V. V., KOZLOV, V. V., OSETNIK, A. A., OSTASHEVA, G. B., POKROVSKAYA, G. N., and FEDOROV, V. N.

[Text] A welding wire composed of aluminum, manganese, nickel, iron, vanadium, boron, and copper, with the distinguishing feature that, for improving the strength characteristics of the seam metal in combination with excellent plastic properties and a high corrosion resistance, the quantitative composition is as follows (in pct.wt):

Aluminum	6-8
Manganese	8-14
Nickel	1-4
Iron	0.5-4
Vanadium	0.01-0.2
Boron	0.01-0.1
Copper	remainder

USSR UDC 621.791.042.2

A COMPOSITION OF WELDING WIRE

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 27, 25 Jul 77 Patent No 565795 26 Jan 76

ASNIS, A. YE., SHNEYEROV, YA. A., SLUTSKAYA, T. M., VIKHLEVSHCHUK, V. A., TYURIN, A. YE., LEVCHENKO, YE. S., KONDRASHKIN, V. A., CHERNOGRITSKIY, V. M., and UDOD, P. P., Institute of Ferrous Metallurgy, Order-of-Lenin and Order-of-Labor's-Red-Banner Institute of Electric Welding imeni Ye. O. Paton

[Text] A welding wire usable without extra protection, containing carbon, manganese, silicon, aluminum titanium, cerium, zirconium, and iron, with the distiniguishing feature that, for a resilient welding seam at subzero temperatures, the wire also contains yttrium and all ingredients in the following amounts (in pct.wt):

Carbon	0.1-0.25
Manganese	0.6-1.5
Silicon	0.3-0.9
Aluminum	0.15-0.5
Titanium	0.05-0.15
Cerium	0.03-0.1
Zirconium	0.05-0.15
Yttrium	0.05-0.3
Iron	remainder

USSR UDC 621.791.042.4

A COMPOSITION OF AN ELECTRODE CLADDING

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 27, 25 Jul 77 Patent No 565796 21 Nov 75

KAKHOVSKIY, N. I., LIPODAYEV, V. N., GLOBIN, N. K., YERMILOV, V. A., KAKHOVSKIY, YU. N., NASTENKO, G. F., UKOLOVA, YE. N., FARTUSHNYY, V. G., ZAKHAROV, L. S., SANNIKOV, V. I., BRIL', B. S., and STARICHENKO, YE. N., Order-of-Lenin and Order-of-Labor's-Red-Banner Institute of Electric Welding imeni Ye. O. Paton

[Text] A composition of the electrode cladding preferred for welding of corrosion-resistant alloys and steels, containing marble, fluorspar, rutile concentrate, hematitte, metallic manganese, metallic molybdenum, and vanadium, with the distinguishing feature that, for a higher resistance of welded joints to integranular corrosion, the cladding contains also chromium oxide and mica and all ingredients in the following amounts (in pct.wt):

Fluorspar	25-30
Rutile concentrate	27-32
Hematite	3-8
Metallic manganese	10-14
Metallic molybdenum	4-5
Vanadium	3-8
Chromium oxide	8-12
Mica	2-3
Marble	remainder

USSR UDC 621.311.25:621.039

HIGH-TEMPERATURE ACCELEROMETERS BASED ON LITHIUM NIOBATE FOR VIBROACOUSTIC INSPECTION OF EQUIPMENT IN ATOMIC ELECTRIC POWER PLANTS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 7, Jul 77 pp 44-46

GTYAZEV, G. V., DUBOVIK, M. F., KRASYUK, V. YA., IVANOV, YU. S., and DROGAYTSEV, YE. A., Kharkov Branch of the All-Union Institute of Heat Engineering imeni F. E. Dzerzhinskiy, Nongovernmental Enterprise "Monokristallreaktiv"

[Abstract] Preventative vibroacoustic inspection of heat-exchanger equipment in atomic electric power plants operating at 350-400°C is difficult, because conventional piezoceramic transducers are rated for temperatures not exceeding 200°C and quartz transducers are not sufficiently sensitive. For this reason, new piezoelectric materials have been sought and evaluated. These include lithium niobate and its most promising single-crystal modification. The performance characteristics of an experimental accelerometer were: sensitivity 20 mV/div, relative transverse sensitivity below 2%, natural frequency in the mounting 6.3 kHz, operating temperature range 20-375°C, temperature error within this range ±10%, and capacitance together with the connecting cable 500 pF. Preferable are single crystals with a very low impurity concentration and dislocation density in a single-domain structure, especially for LF or VLF transducers operating in either the tension-compression or the shear mode. The quality of crystals must be checked prior to their assembly, which can be done on the basis of electrical resistivity measurements. Figures 1; tables 1; references 9: 6 Russian, 2 Western, 1 German.

USSR UDC 621.181.7-233.16:621.791.011.001.5

PROPERTIES OF WELDED JOINTS BETWEEN SPIKES MADE OF GRADE Kh6SYu STEEL AND PIPES MADE OF GRADE 12Kh1MF STEEL

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 77 pp 77-78

SAVKIV, S. V., TSYUPKA, P. N., and ZHAROVSKIY, M. S., L'vov Administration for Repair of Electric Power Plant Equipment

[Abstract] Arc-welded joints made in an argon atmosphere between spikes of the martensitic-ferritic grade Kh6SYu steel, with a higher resistance to scaling, and pipes of grade 12Kh1MF steel for stokers in boiler furnaces were evaluated in the laboratory by absolute quantitative spectral analysis as well as by metallographic examination. Hardness, strength, plasticity, and resistance to cracking were all found to be adequate to ensure the desired operational reliability. Figures 5; references 2 (Russian).

USSR UDC 539.374

A STUDY OF THE WAVE PROCESS DUE TO IMPACT LOADING OF COPPER WIRE

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 13 No 5, May 77 pp 122-126 manuscript received 8 Sep 75

DOMBROVSKIY, G. A., and LITVINOV, G. V., Kharkov

[Abstract] Grade PEL1 enameled lacquer-proof copper wire was tested under impact loading, after it had been hardened by predrawing. The oscillograms are shown here together with a theoretical analysis. The latter assumes that the relation between tension and strain under static loading holds also true under dynamic conditions. It utilizes the already known solution to the problem of an axially loaded thin cylindrical rod of finite length whose one end is rigidly constrained and to whose other end a constant velocity is suddenly imparted. The parametric exact solution to this problem is applied here by piecewise approximation of various nonlinear ranges of the static tension-strain diagram, whereupon the velocity distribution in the time-space(length) domain is determined. A comparison between numerical calculations and oscillograms taken at low impact velocities indicates a close correspondence in this case. Figures 5; references 4 (Russian).

USSR UDC 539.4.015:669.018.44

FATIGUE STRENGTH OF THE GRADE EI867 HEAT-RESISTANT NICKEL ALLOY IN RELATION TO ITS STRUCTURAL INSTABILITY

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 13 No 5, May 77 pp 96-101 manuscript received 30 Apr 76

PALIYENKO, YE. YA., Institute of Mechanics, Academy of Sciences of the Ukrainian SSR, Kiev

[Abstract] The grade EI867 heat-resistant nickel alloy is used for blades of gas turbines, which in service are subject to stress cycles at high temperatures. For the purpose of a performance evaluation, a study was made to determine the relation between the fatigue strength of this material and its phase structure. Initial structures were established in standard specimens by preliminary aging at temperatures within the service range. These specimens were then cycled symmetrically under pure flexure by rotation, some for 500 h and some for 4000 h. The dispersion or the coalescence of γ'-phase and carbides under such a load was tracked by microhardness and hardness measurements. The results of this study reveal that underaging at 700°C raises the endurance limit, structural changes at 800°C stabilize the fatigue characteristics, and treatment at 900-950°C causes overaging with a subsequent lowering of the endurance limit. Figures 4; tables 1; references 5 (Russian).

USSR

EFFECT OF GLOW-DISCHARGE TREATMENT OF A STEEL SURFACE ON THE ADHESION AND THE POROSITY OF VACUUM-DEPOSITED TEFLON-3 COATINGS

Kishinev ELEKTRONNAYA OBRABOTKA MATERIALOV in Russian No 1, Jan/Feb 77 pp 43-45

ZADOROZHNYY, V. G., RAFALOVICH, D. M., and ROYKH, I. L., Odessa

[Abstract] A study was made to determine how the adhesion and the porosity of vacuum-deposited Teflon-3 coatings on grade 08KP steel depend on the method of surface prefinishing. Prior to coating, the steel surface was treated by six different methods: 1) washing with ethyl alcohol, 2) chemical etching, 3) dressing with emery paper, 4) heating to 600°C in vacuum by passage of an electric current and subsequent cooling, 5) glow-discharge treatment, and 6) heating to 600°C in vacuum by passage of an electric current and subsequent glow-discharge treatment. The coatings were deposited by the sputter-evaporation process. Specimens pretreated by the last method were then tested for the effect of current density, treatment time, and glow-discharge voltage on the coating porosity and adhesion. All specimens were tested for corrosion resistance, i.e., coating porosity under conditions simulating a salt-spray chamber and in an industrial atmosphere containing 0.1% SO_2. The adhesion of coatings was determined mechanically, on the basis of $\pm 180°$ bending cycles. According to the results of this study, maximum adhesion and minimum porosity (coating thickness 5 um) are obtained after surface pretreatment by the last of the six

methods. In this case the parameters of the glow-discharge do affect the adhesion as well as the porosity of subsequently deposited Teflon-3 coatings. It has also been established that 10 um thick nonporous vacuum-deposited Teflon-3 coatings do adequately protect steel products against corrosion. Figures 2; tables 1; references 9: 4 Russian, 1 German, 4 Western.

USSR UDC 669.295:539.4

STRENGTH TESTING OF DISKS AND ECCENTRIC-TENSION SPECIMENS OF A MEDIUM-STRENGTH TITANIUM ALLOY

Moscow VESTNIK MASHINOSTROYENIYA in Russian No 6, Jun 77 pp 36-40

LAKEYEV, B. N., VASIL'CHENKO, G. S., KARPIN, YE. B., and MOTUZENKO, A. I.

[Abstract] The stress concentration factor is a basic criterion which determines the applicability of linear fracture mechanics to problems of material defectiveness and behavior. A study was made to determine this factor for a medium-strength titanium alloy used in turbomachine components. Notched disks and rectangular plates under eccentric tension were tested first for the rate of fatigue cracking and then for ultimate strength at various temperatures. The resistance to cracking was calculated according to several different theories and the stress concentration factor accordingly in each case. All values of the latter came close to 570 $kgf/mm^{1.5}$, about the same as for grade 34KhMA martensitic steel but constant throughout the temperature range from +20 to -60°C. Figures 7; tables 4; references 8: 4 Russian, 4 Western.

USSR UDC 533.6.013.42

A WEAK INTERNAL SHOCK WAVE ACTING ON AN ELASTIC SPHERICAL SHELL

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 13 No 5, May 77 pp 73-78 manuscript received 1 Apr 76

BABYEV, A. E., and KUBENKO, V. D., Institute of Mechanics, Academy of Sciences of the Ukrainian SSR, Kiev

[Abstract] A thin elastic spherical shell is immersed in and filled with acoustic media. A weak shock wave originating at any point inside strikes the shell surface and causes transient vibrations of the latter which are transmitted to both acoustic media. This problem is solved with the aid of the Laplace integral transformation and a series expansion of the shell deflection with respect to its natural modes. The general analytical solution is then applied to the special case of a step wave or exponentially decaying wave

originating at the center. A numerical evaluation, for a steel shell immersed in water and filled with water or air, indicates that both the shell deflection and the pressure on the shell surface increase with time. Figures 5; references 9 (Russian).

USSR UDC 539.374

INSTABILITY OF A THIN-WALLED CYLINDRICAL SHELL DURING PLASTIC EXPANSION

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 13 No 5, May 77 pp 60-66 manuscript received 19 Feb 76

DEL', G. D., and ODING, S. S., Voronezh Polytechnic Institute

[Abstract] Plastic deformation of a thin cylindrical shell is considered. As the criterion for loss of stability is established the subtangent of the flow curve, whose minimum value corresponds to local necking before fracture. A numerical analysis of the solution to the stability equations indicates, and experimental evidence confirms, that the critical strain is higher under pressure applied by a rigid forming tool than under internal hydrostatic pressure. Figures 3; references 11: 10 Russian, 1 Western.

USSR UDC 539.3

APPROXIMATE FORMULAS FOR CALCULATING THE LOWEST NATURAL FREQUENCIES OF REINFORCED CYLINDRICAL SHELLS

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 13 No 5, May 77 pp 43-51 manuscript received 19 Apr 76

ZARUTSKIY, V. A., Institute of Mechanics, Academy of Sciences of the Ukrainian SSR, Kiev

[Abstract] Approximate formulas for calculating the natural frequencies of reinforced cylindrical shells are derived from the general solution to the equations of motion for structurally orthotropic shells. The results of an analysis of this solution are used for a simplification of formulas which take into account the discrete distribution of reinforcement members. The relative flexural stiffness of stringers and hoops serves as the criterion for distinguishing three categories of shells: 1) with strong stringers and weak ribs, 2) with weak stringers and strong ribs, 3) with strong stringers and ribs. In the limiting case of the lowest natural frequency all three categories can be reduced to a single universal equation, for which ten different sets of boundary

constraints are considered here. Furthermore, the numerical results pertaining to nine specific specimens are compared here with the exact solutions. Tables 3; references 11 (Russian).

CZECHOSLOVAKIA

ONE-COMPONENT SYNTHETIC ANAEROBIC BITUMENS SUITABLE FOR SOME METHODS OF CORROSION PREVENTION

Prague STROJIRENSKA VYROBA in Czech Vol 25 No 5, 15 May 77 pp 345-349

STYRAND, Jan; STYRANDOVA, Alexandra; AOZ, Presov

[Abstract] Vibration corrosion and corrosion in electrically conductive solutions pose great industrial problems. Losses due to corrosion reduce rates of production and are responsible for economical losses. The authors discuss the application of a synthetic bituminous product "Aldurit" marketed by the Chemical and Metallurgical Works at Usti nad Labem, Czechoslovakia. Application of an Aldurite coating to a metal prevents its contact with atmospheric oxygen, and with other corrosive compounds. However, even when Aldurit is mechanically pressed on a metal surface only some 30 percent of the surface forms a bond with the metal. Introduction of an Alderit solution of a suitable viscosity under the layer of the synthetic compound increases the coating of the metal surface to practically 100 percent. Under experimental conditions described by the authors Alderite protected steel against wet SO_2 at 35°C. Examples of protection of gears in automobiles and trucks by Alderite are presented. Substantial protection of bearings is achieved by suitable Alderit coatings of the assemblies. Metal parts of breaks are also advantageously protected by Alderit. Tables 2; references 4 (Czech).

USSR

ULTRAVIOLET PHOTOMETRY OF THE PLANET MARS FROM THE "MARS-5" SATELLITE

Moscow KOSMICHESKIYE ISSLEDOVANIYA in Russian Vol 15 No 2, Mar/Apr 77 pp 255-260 manuscript received 17 Aug 76

KRASNOPOL'SKIY, V. A., KRYS'KO, A. A., and ROGACHEV, V. N.

[Abstract] A two-channel ultraviolet photometer had been installed on the Mars-5 space probe, to operate at the wavelengths 2600 and 2800 Å. As a result of measurements, it has been possible to plot the photometric profiles of the Mars atmosphere at the limb, i.e., the brightness factor as a function of the sighting altitude in February 1974. An optical model of the Mars atmosphere is now constructed mathematically. It includes the gaseous component scattering according to Rayleigh's law, an absorbing ozone layer, and an upper aerosol layer in addition to the lower aerosol layer. If this upper aerosol layer were disregarded, the temperature of the atmosphere, based on the density of the gaseous component, would be 90°K and much below the CO_2 condensation point. If the aerosol density were assumed to be increasing continuously all the way to the surface, the atmosphere would be opaque and the calculated profiles would differ appreciably from the measured ones. The discovery of an ozone layer in the equatorial zone of the Mars atmosphere and an analysis of its characteristics are the most important result of these experiments. Figures 3; references 17: 5 Russian, 12 Western.

USSR

UDC 621.438.55

A METHOD OF TESTING TURBINE BLADES

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 567996 29 Dec 75

YERMOLIN, G. P., and BYCHKOV, V. I.

[Text] A method of testing turbine blades by exciting flexural vibrations, with the distinguishing feature that, for determining the overheat temperature of blades, a resonance and two lateral frequencies are established corresponding respectively to the maximum vibration amplitude and half the maximum amplitude, whereupon the coefficient of internal friction is calculated according to the relation

$$\tan \phi = \frac{F_2 - F_1}{\sqrt{3}\, F_0}$$

where F_0 is the resonance frequency and F_1, F_2 are the lateral frequencies, this value then being compared with the given value and the amount of blade overheat determined on this basis.

USSR UDC 534.232

A METHOD OF MEASURING THE STREAM VELOCITY OF A MEDIUM

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564602

STEFANOV, S. R., TROKHAN, A. M., TRUBETSKAYA, G. S., and KHOKHULYA, YU. P.

[Text] A method of measuring the stream velocity in which heat markers are established and the stream velocity is determined from their drift, with the distinguishing feature that, for higher measurement accuracy, the heat markers are produced by a modulated ultrasonic wave and the velocity of this wave is measured simultaneously, the minimum velocity being the velocity through the medium when the latter is stationary and the velocity deviation at the modulation frequency determining the component of the stream velocity normal to the direction of wave propagation.

USSR UDC 621.186.3:621.643.411.4:658.588.001.5

VULNERABILITY OF WELDED STEAM PIPE JOINTS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 8, Aug 77 pp 37-40

GOFMAN, YU. M., and POGREBINSKIY, F. K., State Administration of the Svedlovsk Oblast Power System Management

[Abstract] A study was made to determine the factors affecting the vulnerability of welded steam pipe joints designed for strength. Stress measurements and stress analysis indicate two main categories of defects in pipe material which meets all chemical, mechanical, and metallurgical specifications: one due to external overloads caused by faulty installation and one due to theoretically high stresses produced by self-compensation of thermal expansion. Figures 5; references 2 (Russian).

USSR UDC 621.226.5

SPECIAL PERFORMANCE CHARACTERISTICS OF HYDRAULIC CONVERTERS WITH FLAT BLADES ON THE PUMP IMPELLER AND ON THE TURBINE RUNNER

Moscow VESTNIK MASHINOSTRYENIYA in Russian No 5, May 77 pp 9-12

NARBUT, A. N., and NIKITIN, A. A.

[Abstract] The performance characteristics of modern high-quality hydraulic converters are near optimum so that any simplification of the blade design must be weighed against a possible degradation, especially of the hydraulic efficiency. Three variants of ultimate simplification have been considered, namely: 1. flat pump and turbine blades, 2. radial pump blades and flat turbine blades, 3. radial pump and turbine blades. A kinematic analysis supported by experimental data indicates that flat pump and turbine blades can yield almost the same performance as conventional twisted blades. Under certain additional constraints on the system parameters, a nearly optimum performance is also attainable with the two other variants of blade design. Figures 4; tables 1; references 4 (Russian).

USSR UDC 621.4/6:533.6

THE THEORY OF A TWO-PHASE JET APPARATUS

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY MASHINOSTROYENIYE in Russian No 6, 1977 pp 79-85 manuscript received 12 Jul 76

TSEGEL'SKIY, V. G.

[Abstract] Earlier works involving two-phase jet apparatus have assumed that a homogeneous, thermodynamically and mechanically equilibrium gas-liquid mixture is formed in the mixing chamber by the time the output is reached. This work derives equations for the ejection of a turbulent, quasistable, uneven flow in the jet apparatus. The gaseous component is a gas-vapor mixture, which enters the mixing chamber through a subsonic or supersonic nozzle, while the liquid enters through a central nozzle. At the output of the mixing chamber, a turbulent two-phase gas-liquid stream is formed. Solution of the ejection equations produces two values of mean velocity of the mixture in the output cross section of the mixing chamber, and two corresponding values of pressure and temperature with preassigned parameters of state and velocity of the gas and liquid components in the input cross section of the mixing chamber, known coupling coefficients, degree of condensation, mean tangential stress, radius of gas bubbles and geometry of the jet apparatus. The influence of a portion of the coupling coefficients can be ignored, a problem which must be analyzed separately for each type of jet apparatus. Future reports will demonstrate that in practice in designing gas-liquid jet apparatus only the coupling coefficients for the liquid in the output cross section of the mixing chamber need be considered. References 4 (Russian).

USSR UDC 662.997:621.472:536.7.001.24

SOME RESULTS OF AN EXPERIMENTAL STUDY OF STIRLING ENGINES

Tashkent GELIOTEKHNIKA in Russian No 4, Apr 77 pp 34-37 manuscript received 11 Mar 75

UMAROV, G. YA., TRUKHOV, V. S., KLYUCHEVSKIY, YU. YE., TURSUNBAYEV, I. A., ORDA, YE. P., and VOGULKIN, N. P., Physicotechnical Institute imeni S. V. Starodubtsev, Academy of Sciences of the Uzbek SSR

[Abstract] A Stirling engine is regarded as one of the most promising dynamic converter of solar energy. A design method has been proposed by which the heater, the regenerator, and the refrigerator can be optimized so as to yield the maximum overall cycle efficiency. A test stand has also been developed for experimental evaluation of such an engine and for verification of the design procedure. On the basis of indicator diagrams and brake tests as well as measured power and efficiency versus pressure and speed, it appears feasible to build a Stirling engine for converting solar energy with an efficiency of 25% at power levels of the order of 1 kW. Figures 3; references 4 (Russian).

CZECHOSLOVAKIA UDC 536.48.09:546

CRYOGENIC TECHNOLOGY FOR APPLICATIONS OF SUPERCONDUCTIVITY

Prague ELEKTROTECHNICKY OBZOR in Czech Vol 66 No 2, Feb 77 pp 88-94

KAISER, Zdenek; Ferox, National Enterprise, Decin

[Abstract] The paper describes results achieved in Czechoslovakia in the technology of liquid helium temperatures. Czechoslovak research facilities are comprehensive and work in most fields of advanced cryogenics can be undertaken. Two helium liquefiers developed at Ferox are described. Type ZRH 9 (shown in an illustration) uses primary cooling step with liquid nitrogen. Capacity of the unit is 10 liters per hr at a power supply of 30 W at 4.5°K. The circuits of the liquefier are controlled automatically; a non-lubricated helium compressor is used. The ZRH 50 helium liquefier has a capacity of 30 to 70 liters per hr of liquid helium; power supply is 150 W at 4.5°K. Two piston expanders are used, and if one is out of service, the other can continue to operate. An overall view of this machine, and its flow diagram are shown. The non-lubricated compressors are manufactured by CKD Prague. A photograph of a compressor is presented. Storage and shipping containers for liquid helium are described and documented by a photograph, a Table and a diagram. General practice is to provide liquid nitrogen in the jacket space of the vessels. Several designs of helium cryostats are shown. These contain liquid helium in the inside vessel, and liquid nitrogen in the jacket. Such cryostats are used in the design of superconductive generators for the cooling of the rotating superconductive windings by liquid helium. The cryostatic equipment for this application must be designed with full automation, and a capacity sufficient to remove all the heat released in the generator. Czechoslovakia is one of the leading countries of the COMECON in this sphere of technology. Figures 9; tables 2.

USSR

UDC 620.179.16

AN ULTRASONIC ECHO-PULSE THICKNESS GAUGE

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 567952 15 Dec 75

KRINICHNYY, P. YA., MIGAL', I. G., and CHISTYAKOV, V. I.

[Text] An ultrasonic echo-pulse thickness gauge consisting of a synchronizer, a connected to it generator of sounding pulses, a generator of strobing pulses, an echo-transmitter probe and an amplifier connected to the sounding generator, a detector connected to the amplifier output, a first coincidence circuit whose first input is connected to the strobing generator and second output is connected to the detector, a second coincidence circuit and a first driven multivibrator whose inputs are connected to the output of the first coincidence circuit and the multivibrator output is connected to the second input of the second coincidence circuit, a second driven multivibrator connected to the output of the second coincidence circuit, a decoder, and an indicator connected to the latter, with the distinguishing feature that, for a higher measurement accuracy, the gauge also includes two differentiating circuits whose inputs are respectively connected to the outputs of the two multivibrator, and a tapped delay line whose inputs are connected to the output of one differentiating circuit and to a threshold stage inserted between this delay line and the decoder.

USSR UDC 621.397.13:629.78

THE TELEVISION EQUIPMENT OF EXPERIMENTAL SATELLITES

Moscow TEKHNIKA KINO I TELEVIDENIYA in Russian No 3, Mar 77 pp 43-45

SELIVANOV, A. S., TUCHIN, YU. M., OVODKOVA, S. G., and SEREGIN, V. A.

[Abstract] A description is presented of the TV hardware installed on the "Meteor" series of satellites. The first satellite carrying this hardware was launched on 9 July 1974, the second--on 15 May 1976. A photograph of the hardware package is presented, plus a block diagram of the apparatus and a functional diagram of the ground station equipment. The hardware carried by the satellite includes: 4-channel low-resolution optical-mechanical scanners and 2-channel medium resolution optical-mechanical scanners, two of each; two magnetic recording devices, two timers, two master oscillators, two decimeter wave band transmitters, two meter wave band transmitters and two antenna switches. Both of the scanning devices are based on a single-line mechanical scanning system, with scanning transverse to the trajectory of motion of the satellite. In the low resolution scanner there is a rocking mirror at the input to the optical system, scanning over 106 degrees at 4 lines per second, with reverse travel occupying 25% of scanning time. At an orbital height of about 950 km, the width of the strip covered on the earth surface is about 3000 km, with a resolution at the nadir of 1.0 X 1.6 km per TV element. The signal is formed in four spectral channels, three in the visible area, one in the near infrared. In the medium-resolution device, the image is scanned by a rotating mirror pyramid moving at constant angular speed. The angle of vision is 90 degrees, giving a strip width on the ground of about 2000 km. The scanning rate is 48 lines per second, reversed travel occupies 25% of scanning time, and resolution at the nadir is 240 m per TV element. This device operates in two spectral channels--one visible, one infrared. Photomultipliers are used as the transducers in both devices, operating in the logorithmic mode. Functioning of the satellite and ground-based equipment is briefly described. References 8: 7 Russian, 1 Western.

USSR UDC 531.717

A DEVICE FOR MEASURING DISPLACEMENT

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 567938 18 Jun 75

SEN'KEVICH, V. G., DANILOV, S. P., and ZININ, V. A., Order-of-Labor's-Red-Banner Kuybyshev Aviation Institute imeni Akad. S. P. Korolev

[Text] 1. A device consisting of a self-excited oscillator, coaxial induction coils at a fixed distance apart and connected to the frequency setting circuit of the oscillator, a reference oscillator, and a relative-displacement pulse

shaper, with the distinguishing feature that, for more efficient measurements, the device also includes a commutator whose inputs are connected to the induction coils and output is connected to the input of the self-excited oscillator, while the relative-displacement pulse shaper consists of two difference circuit and one ratio circuit, the first difference circuit being connected to the output of the self-excited oscillator, the inputs of the second difference circuit being connected respectively to the output of the self-excited oscillator and the output of the reference oscillator, and the output of the second difference circuit being connected to the input of the ratio circuit. 2. The same device, except that the control inputs of the commutator, of the difference circuits, and of the ratio circuit are connected to a synchronizing oscillator.

USSR UDC 681.327

AN ASSOCIATIVE MEMORY DEVICE

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564656 23 Jul 75

TRUSFUS, V. M., and MATVEYEV, V. B., Order-of-Labor's-Red-Banner Kazan Aviation Institute imeni A. N. Tupolev

[Text] An associative memory device consisting of memory registers, an interrogation register, and detectors, with the distinguishing feature that, for faster response, the device also includes comparators for the memory registers by the number of symbols, the first inputs of the comparators being connected to the outputs of the corresponding memory registers, their second inputs being connected to the corresponding outputs of the interrogation register, the third inputs of like comparators being tied together and connected to the first outputs of the given comparators, except the latter ones, tied together and connected to the second outputs of following comparators, the fifth inputs of the comparators, except the former ones, tied together and connected to the third outputs of the preceding comparators, and the third outputs of the latter comparators connected to the detector inputs.

USSR UDC 654.9

AN AUTOMATIC FIRE ALARM

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564649 26 Mar 76

BLOKHIN, S. V., and GOLYASHKIN, V. V., State Scientific Research Institute of Aviation Engineering Operation and Maintenance of Civil Aviation

[Text] An automatic fire alarm system consisting of probes connected to the input of an amplifier, and alarm circuits for indication of fire and of fault along the communication line, with the distinguishing feature that, for higher reliability, the system also includes an inverter, a trigger, a switch, and a differential circuit, the input of the latter being connected to the first output of the amplifier and its output being connected to the first input of the trigger as well as, through the inverter, to the second input of the trigger, the trigger output is connected to the first input of the switch, the output of the amplifier is connected to the second input of the switch, and the outputs of the switch are connected respectively to the fire alarm circuit and to the communication-fault alarm circuit.

USSR UDC 531.383

DETERMINING THE PRECESSION FREQUENCY OF A TWO-ROTOR GYROSCOPE IN A TORSIONAL SUSPENSION

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 13 No 5, May 77 pp 108-111 manuscript received 9 Sep 75

DMITRIYEV, A. YU., NIKITIN, A. N., NIKOLENKO, I. V., PYATETSKIY, V. A., and SOSNITSKIY, S. P., Kiev State University

[Abstract] A two-rotor gyroscope is considered with each of the two sensing elements torsionally suspended and both elastically coupled. With the base assumed stationary relative to the earth and the latter regarded as a sphere of radius R, the differential equations of motion are referred to geographical coordinates. An appropriate expression is given for the kinetic energy of the device and another one for its potential energy. The latter accounts for the stiffness of both the torsional suspensions and the coupling bars. The dynamic equilibrium and the natural frequencies of the system are then determined in accordance with the linear precession theory. Figures 2; references 4 (Russian).

USSR UDC 62-752.2

A DAMPER OF PRESSURE PULSATIONS

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 27, 25 Jul 77 Patent No 566053 6 Oct 75

VAYSBLAY, O. I., MAVLYUDOV, R. A., NIZAMOV, KH. N., LOMAKIN, R. P., and GUDKOV, G. S.

[Text] 1. A damper whose cavity with liquid and cavity with gas are separated by an elastic element resting on the liquid side against a perforated insert, with the distinguishing feature that, for damping any pressure fluctuations in aggressive high-temperature or cryogenic fluids, the elastic element is made in the form of a metallic membrane concentrically corrugated, while the perforated insert has rigid detents duplicating the membrane profile. 2. The same damper, except that the detents on the insert are made of a fusible material such as a thermoplastic.

USSR

UDC 621.979.132

A CAM DRIVE FOR A PRESS

Moscow OTKRYTIYA IZOBRETENIYA PRMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564173 8 Dec 75

BELOSHITSKIY, V. V., KORNILOV, V. V., and YABLOKOV, V. I., Rybinsk Aviation Engineering Institute

[Text] A cam drive for a press consisting of a camshaft directly interacting with a plunger mounted in the housing and of a pinion, with the distinguishing feature that, for increasing the stiffness of the camshaft and reducing the wear on the guide bushings, it is furnished with an epicyclic gear train whose sun gear is keyed to the housing while the follower gear is mounted in the housing on bearings and meshes with the drive pinion, the necked-down journal of the camshaft supported on bearings in a hole through the follower gear and keyed at the end to a planet pinion tied to the sun gear. 2. The same cam drive, except that the first circle of the sun gear has a diameter equal to the plunger travel and twice as many teeth as the planet pinion, while the eccentricity of the camshaft and the distance from the center of the hole through the follower gear to the axis of rotation of the follower gear are both equal to one fourth of the plunger travel.

USSR

UDC 621.785.532:621.787.4

A DEVICE FOR DYNAMIC HARDENING TREATMENT OF PARTS

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 567591 19 Apr 76

SHCHETININ, G. M., KARMANSKIY, V. P., and SMIRNOV, V. A., Order-of-Labor's-Red-Banner Kazan Aviation Institute imeni A. N. Tupolev

[Text] 1. The same device according to Patent No 318467, except that, for improving the productivity, the device is furnished with an extra internal mold insert to form a second curvilinear channel, both channels being interconnected. 2. The same device, except that the insert is equipped with interchangeable deflectors.

USSR UDC 621.694.2

A GAS-JET EJECTOR

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 567853 24 Nov 72

DVORNIKOV, A. F., DVORNIKOV, A. A., and DVORNIKOV, V. A.

[Text] A gas-jet ejector consisting of an active nozzle, a displacement chamber, a diffuser connected to the discharge tube, and a heat-exchanger blanket, with the distinguishing feature that, for a more thermodynamically stable ejector performance in the vertical position achieved by heating the walls of the displacement chamber with a low-boiling liquid as the working medium in the blanket, the blanket encloses the displacement chamber and the diffuser as well as part of the discharge tube, while being filled with the liquid up to the level of the diffuser outlet.

USSR UDC 66.067.322

A FILTER FOR PURIFICATION OF FLUIDS

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 27, 25 Jul 77 Patent No 565684 20 Dec 74

KRUPIN, V. V., VOLYNSKIY, V. V., DOBRUNOV, YU. V., KOLOBOV, G. A., SADOVSKIY, N. G., and VOVK, S. T., All-Union Scientific Research and Planning Institute of the Titanium Industry

[Text] A filter consisting of a cylindrical case filled with the filtering agent, a distributor system placed concentrically inside the case, inlet and outlet ducts for the treated fluid, and inlet ducts for the regenerated fluid on level with the top of the filtering column, with the distinguishing feature that, for a more efficient regeneration of the fluid and a longer service life of the filtering agent, the inlet ducts for the regenerated fluid are equipped with nozzles whose longitudinal axes are inclined at an acute angle to the horizontal and are tangent to the cylindrical surface of the distributor, and the filtering agent is a granulated metal such as, for instance, a titanium alloy.

USSR UDC 66.074.3

AN APPARATUS FOR PURIFICATION OF HIGH-TEMPERATURE GASES

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 27, 25 Jul 77 Patent No 565689 20 Feb 76

DUDAREV, YU. I., and BELOV, B. A., All-Union Scientific Research and Planning Institute of the Aluminum, Magnesium, and Electrode Industry, Irkutsk Branch

[Text] 1. An apparatus consisting of a housing lined with a refractory material, a hopper for feeding the filtering agent, and gas inlet and outlet ducts, with the distinguishing feature that, for a more effective purification by regulating the height of the filtering column and for a lesser comminution of the filtering agent, the hopper is built in the form of a telescopic tube consisting of two elements movable relative to one another, the lower one of which has double walls with holes in the outer wall. 2. The same apparatus, except that, for ensuring a uniform gas distribution around the periphery, the gas inlet duct is built in the form of an annular chamber whose longitudinal section is a frustum of a cone.

USSR UDC 621.18.004.69:662.753.325:661.98.002.23

TESTS OF A MODEL TGMP-314 BOILER AFTER RECONSTRUCTION AIMED AT REDUCING THE EXHAUST OF NITROGEN OXIDES

Moscow ELEKTRICHESKIYE STANTSII in Russian No 4, Apr 77 pp 14-16

SHTAL'MAN, S. G., VIKHREV, YU. V., ABRYUTIN, A. A., KEMEL'MAN, G. N., GORBANENKO, A. D., and BABIY, V. I., All-Union Institute of Heat Engineering imeni F. E. Dzerzhinskiy

[Abstract] The gas-air duct in the TMGP-314 boiler aggregate at the Kostroma State Regional Electric Power Plant was reconstructed, for the purpose of reducing the exhaust of nitrogen oxides produced by combustion of sulfurous fuel oil in low excess air. As a result of recirculating up to 40% of the flue gases mixed with air through the combustion zone across the entire burner section, the concentration of nitrogen oxides dropped from 0.035 vol.% to 0.018 vol.% at full load. At partial loads, i.e., lower burner temperatures increasing the recirculation was not as effective. Figures 3; no references.

USSR UDC 662.997:663.634(540)

A PHOTOELECTRIC REVERSE-OSMOSIS DISTILLATOR

Tashkent GELIOTEKHNIKA in Russian No 4, Apr 77 pp 54-59 manuscript received 10 Jul 76

SAVCHENKO, I. G., TARNIZHEVSKIY, B. V., KOTINA, T. M., and ROZHIDESTVENSKIY, A. M., All-Union Order-of-Labor's-Red-Banner Scientific Research Institute of Current Sources

[Abstract] The use of photoelectric converters for distilling mineralized sea or underground water is further explored, mainly because such converters are becoming less costly. An evaluation was made of using them in the reverse osmosis process, which requires in addition a filter press and a membrane. Grade GM cellulose acetate treated with magnesium perchlorate has been found most suitable as membrane material. The still inadequate quality of such membranes and the still insufficient power capacity of photoelectric devices are the major obstacles to a successful operation, as the experimental data indicate. At the same time, however, the test results have definitely established the feasibility of photoelectric water distillation as a competitive alternative to conventional methods. Figures 2; tables 1; references 13: 10 Russian, 3 Western.

POLAND UDC 534.133.004.14.536.55

MODEL 511B DIGITAL QUARTZ THERMOMETER

Warsaw POMIARY AUTOMATYKA KONTROLA in Polish Vol 23 No 2, Feb 77 pp 50-51

ROZWADOWSKI, Mieczyslaw, and CZARNECKI, Andrzej

[Abstract] The model 511B digital instrument developed by the Department of Piezoelectronics at the Institute of Telecommunication and Radio Engineering is the first one built in Poland which gives temperature readings based directly on the oscillation frequency. Its temperature probe is a quartz resonator whose resonance frequency depends linearly on the temperature from -80 to +200°C (within 0.8°C and within only 0.15°C over the range from -40 to +200°C), owing to the biplanar orientation of the specially cut quartz plate, and the large slope of this temperature-frequency characteristic renders such an inherently very stable probe also very sensitive. The frequency of the resonator-probe determines, in turn, the frequency of its oscillator to which signals are transmitted through a coaxial half-wavelength cable so that the accuracy of measurements will not be affected by the length of the connection. The output signal of this oscillator has thus been made temperature dependent. It is then mixed with a reference signal from a local instrument oscillator whose frequency corresponds to 0°C. The difference frequency, proportional to the measured temperature, is counted during 10 ms while the gate to the counter is open. The open-gate period and thus the counting time can be adjusted so as to match the probe sensitivity. A 4-digit readout is provided through TTL logic. The maximum error of the instrument is $\pm$0.07% plus 0.8°C (or 0.15°C) due to some nonlinearity in the probe, its resolution is 0.1°C, and it does not require special grounding devices. The overall size is 100x228x324 mm. Figures 2; tables 1; no references.

USSR

A PROBING TURBULENT DIFFUSION PHOTORECORDER

USSR Authors Certificate No 561117

[Translated from Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI in Russian No 21, 1977 p 146]

DZHUS, V. YE., Leningrad Hydrometeorological Institute

[Text] A probing turbulent diffusion photorecorder including a stabilizer, sealed body with photorecording device, light source, program mechanism and power supply and ballast dumping mechanism is distinguished by the fact that to decrease the measurement time and increase recording accuracy, it is equipped with a bar with a bracket located at an angle of 90-135° relative to each other, the bar being connected at one end to the lower portion of the body, at the other end to the ballast dumping mechanism, and at the end of the bracket is a nozzle for spraying of dyed water.

USSR

A MAGNETOGRAPH

USSR Authors Certificate No 561920

[Translated from Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI in Russian No 22, 1977 p 85]

ALEKSANDROVICH, S. V., SKOMOROVSKIY, V. I., and STEPANOV, V. YE., Siberian Institute of Terrestrial Magnetism, The Ionosphere and The Propagation of Radio Waves

[Text] 1. A magnetograph containing a polarization optical system, a spectrograph, a differential photometer and a recording system, is distinguished by the fact that to increase the sensitivity of measurement, the polarization optical system includes a birefringent plate, which spatially divides the cross polarized components of the light flux; the photometer includes light guides acting as switching elements.
2. A magnetograph as in claim 1, is distinguished by the fact that to eliminate the false field signal appearing as a result of the superimposition of light beams from the different limbs of the spectral line, the photometer includes thin-film slit masks.

USSR UDC 681.782.2:681.787.8

THE UIP UNIVERSAL INTERFERENCE-POLARIZATION INSTALLATION

Leningrad OPTIKO-MEKHANICHESKAYA PROMYSHELENNOST' in Russian No 4, Apr 77 pp 19-21 manuscript received 20 Aug 76

LEYKIN, M. V., IVANOVA, N. V., KHESIN, G. L., ZHAVORONOK, I. V., SAKHAROV, V. N., OMEL'CHENKO, D. I., and ORLOV, G. N.

[Abstract] The universal interference-polarization installation is designed for the study of the stress-strain state of structures, parts of machines and other objects subjected to static and dynamic loads using transparent models or optically sensitive coatings. An extensive set of interchangeable attachments allows the installation to be adjusted to work in various optical systems. Measurements of the angle of the primary stresses and the optical path difference are performed on an object under either static or dynamic loading. It can be used as a polariscope or interferometer, and can also record information holographically, assuring complete determination of the stress or strain tensor components in the object being studied. The polariscope, interferometer, holographic system and system utilizing dynamic loading of the object are described. Series manufacture of the UIP will begin in 1978. References 3 (Russian).

USSR UDC 551.48.018.1

AN ULTRASONIC LEVEL GAUGE WITH DIGITAL READOUT

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564538 30 Mar 76

OGORODNIKOVA, N. V., SERBINOV, I. A., and SHPINEV, V. V.

[Text] An ultrasonic level gauge consisting of a time-base pulse generator, a receiving-exciting device with an actuator attachment, an acoustic receiving-transmitting transducer, a kipp relay, a delay element, a strobe-pulse shaper, a generator of counting pulses, a time selector, a counter, and a register, with the distinguishing feature that, for more reliable measurements, the device also includes a coincidence circuit with diodes connected digitally between the counter and the register, its one input connected to the output of the kipp relay, its other input connected to the output of the strobe-pulse shaper, and its output connected to the inputs of the diode control circuits.

USSR UDC 53.089.6

A TEST STAND FOR CHECKING LIQUID-LEVEL GAUGES

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564539 12 Mar 76

ALIMOCHKIN, G. K., and FEDOROV, B. L., Leningrad Institute of Aviation Instruments

[Text] A test stand consisting of a reservoir filled with liquid, a mechanism for immersing the probe of the checked gauge, the output of this probe being connected to the input of an immersion depth indicator, and a programmed changer of the speed of the immersion mechanism, with the distinguishing feature that, for higher checking accuracy and for shorter checking time, this programmed speed changer includes a calibration-curve presetter connected to the output of the immersion depth indicator and to one of the comparator inputs, while the other two inputs of the latter are connected respectively to an additional tolerance presetter and to the probe of the checked gauge, and the comparator output is connected to the probe immersion mechanism.

USSR UDC 534.232

AN ULTRASONIC DEVICE FOR MEASURING THE STREAM VELOCITY OF A MEDIUM

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564601 12 Mar 76

STEFANOV, S. R., TROKHAN, A. M., and KHOKHULYA, YU. P.

[Text] An ultrasonic velocity measuring device consisting of a transmitter and a receiver facing each other, an amplifier of electrical oscillations, and a register, with the distinguishing feature that, for improving the measurement accuracy, the device also includes an amplitude modulator, a frequency discriminator, and a synchronous detector, the output of the modulator being connected to the amplifier and to one of the detector inputs, the output of the discriminator being connected to the second detector input, the discriminator input being connected to the intermediate stage between transmitter and amplifier, and the detector output being connected to the register.

USSR

UDC 531.768

A LINEAR ACCELEROMETER

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564604 26 Feb 76

ZHDANOVSKIKH, M. A., SYROYEZHKIN, YE. V., MUFAZALOV, F. SH., and ZHDANOVSKIKH, G. A., Ufa Aviation Institute imeni Ordzonikidze

[Text] A linear accelerometer consisting of a magnetic circuit with a measuring coil and a core, with the distinguishing feature that, for higher measurement accuracy, the magnetic circuit is built in the form of three coaxial hollow cylinders with permanent magnets at the ends, one located between the outer and the inner cylinder and one located between the center and the inner cylinder so that the magnetic fluxes of both combine in the magnetic circuit, while one segment of a short-circuit coil is wound over the entire length of the center cylinder normally to its longitudinal axis and short-circuited through the other segment of this coil wound, together with the measuring coil, along the axis of the outer and the center cylinder embracing both, and the movable annular core is placed between these two cylinders.

USSR

UDC 620.179.14

AN EDDY-CURRENT TRANSDUCER

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 568007 7 Apr 76

MALANICHEV, YU. A., BUROV, V. N., STEBLEV, YU. I., SHATERNIKOV, V. YE., ABOIMOV, M. A., and POLULEKH, A. V., Order-of-Labor's-Red-Banner Kuybyshev Aviation Institute imeni Akad. S. P. Korolev

[Text] An eddy-current transducer consisting of a current coil and a measuring coil in parallel planes, with the distinguishing feature that, for a more reliable product inspection, the transducer includes also a second current coil located eccentrically relative to the first one but the axes of all three coils lying in the same plane, the dimensions of the coils and the distances between them being

$$0{,}5\sqrt{d_1^2+d_2^2+8h^2} < S_1 < \frac{d_1-d_2}{2};$$

$$0{,}5\,|d_1-d_3| < S_2 < 0{,}5\sqrt{d_1^2+d_3^2+8h^2},$$

where h is the distance between the planes of the measuring coil and the first current coil,

S_1, S_2 are the distances between the axis of the measuring coil and the respective axes of the two current coils,

d_1, d_2, d_3 are the diameters of the measuring coil, of the first current coil, and of the second current coil respectively.

USSR UDC 620.179.16

A PROBE HEAD FOR ULTRASONIC INSPECTION

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 568013 4 Jan 76

GREBENNIKOV, V. V., and LEBEDEV, N. YE.

[Text] A probe head consisting of a housing and inside two transmitting as well as at least two receiving piezo cells with a fixed angle of incidence of ultrasonic waves, with the distinguishing feature that, for a better quality of product inspection, the distance between the transmitting piezo cell is made

$$L=\frac{H}{2n+1}(\operatorname{tg}\alpha_1+\operatorname{tg}\alpha_2),$$

and between the receiving piezo cells is made

$$l_N=\frac{HN}{2n+1}(\operatorname{tg}\alpha_1+\operatorname{tg}\alpha_2)-2H\operatorname{tg}\alpha_2,$$

where H is a parameter characterizing the range of possible sample thicknesses measured by the head,
L is the distance between the transmitting piezo cells,
N is the number of a given receiving piezo cell,
l_N is the distance between the transmitting piezo cells and one receiving piezo cell,
n is the number of receiving piezo cells,
α_1 is the angle of incidence of ultrasonic waves from the transmitting piezo cells,
α_2 is the angle of incidence of ultrasonic waves to the receiving piezo cells.

USSR UDC 621.128

A DEVICE FOR MEASURING WIND VELOCITY

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 568022 22 Jan 76

AFINOGENOV, L. P., and POPOV, M. V., Order-of-Labor's-Red-Banner Central Geophysical Observatory imeni A. I. Voyeykov

[Text] A device for measuring wind velocity, consisting of an ultrasonic generator connected to an amplifier through a switch and controlled by a multivibrator, and receivers connected to amplifier-shapers, with the distinguishing feature that, for improving the accuracy and ensuring the linearity of measurements, the device also includes function converters of thetime or the phase

to a number of pulses, these converters consisting each of a switch, a pulse counter, and an AND circuit in series, it also includes a generator of counting pulses whose output is connected to the inputs of the switches in the function converters, the opening inputs of these switches being connected to the multivibrator outputs and the closing inputs of these switches being connected to the inputs of the amplifier-shapers of the respective receivers, it also includes a measuring circuit consisting of a generator of measuring pulses, a switch, a counter, and a logic circuit (for opening the switch for the period of time when one counter is full and the other is not) in series, and it also includes a circuit for identifying the sign of the velocity and consisting of a sign trigger whose input is connected to the output of a switch, the outputs of the counters in the function converters being connected to the respective inputs of the logic circuit and to the switch of the sign identifying circuit, and the counter input of the switch in the measuring circuit being connected to the output of the generator of measuring pulses.

USSR UDC 531.768

AN ACCELEROMETER

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 27, 25 Jul 77 Patent No 566185 24 Dec 75

GALKIN, YU. S., GRIGOR'YEV, G. A., ZORIN, V. A., KAGAN, M. G., KORYAGIN, A. V., PISAREV, G. N., and KRUTSKIKH, Z. A.

[Text] An accelerometer consisting of a case, a sensing element in the form of a balanced hollow sleeve around a shaft whose rotation produces a gas-dynamic bearing, and a flexible inelastic filament whose one end is fastened to the sensing element and other end is fastened to the case, with the distinguishing feature that, for increasing the accuracy by reducing the axial response of the gas layer to motion of the sensing element, in the inside surface of the latter are cut oppositely running helical grooves.

USSR UDC 531.717

AN OPTOELECTRONIC LOCATOR OF A LUMINOUS OBJECT

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 567944 13 Oct 75

ZARIPOV, M. F., GINIYATULLIN, N. I., SULEYMANOV, N. T., TRUKHINA, N. G., and TEPTIN, L. P., Ufa Aviation Institute imeni Ordzonikidze

[Text] An optoelectronic locator of a luminous object, consisting of a fiber-optic encoder at whose output end each light conducting strand is subdivided into several bundles, the number of the latter depending on the number of digits in the binary code and equal to the consecutive number of the strand, and of photoreceivers facing these bundles, with the distinguishing feature that, for simplifying the construction, the photoreceivers are annular in shape and the input end of the encoder is rotating disk, the light conducting strands being laid in a straight line on this disk and in concentric circles at the output end of this fiber-optic encoder.

USSR UDC 662.997

A DEVICE FOR IRRADIATING PLANT SEEDS

Tashkent GELIOTEKHNIKA in Russian No 4, Apr 77 pp 64-65 manuscript received 5 Apr 77

ALIMOV, A. K., and ALAVUTDINOV, DZH. N., Physicotechnical Institute imeni S. V. Starodubtsev, Academy of Sciences of the Uzbek SSR

[Abstract] A device is described which concentrates light from an artificial source for irradiation of cotton seeds. It consists of such a source, an elliptic cylindrical concentrator, and an auxiliary circular cylindrical reflector. The first focal axis of the concentrator coincides with the center axis of the reflector and in the second focal plane of the concentrator are placed the seeds. For a more efficient and uniform irradiation of all seeds in a batch, the latter are places in a rotating cylindrical drum. It is thus possible to process 30 kg/h, 5 min per batch, but the capacity could be increased to 600 kg/h in an around-the-clock operation. Figures 1; references 1 (Russian).

USSR

UDC 621.515

AN AXIAL COMPRESSOR

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 27, 25 Jul 77 Patent No 566026 30 Dec 75

VEREMEYCHUK, G. N., KAYNOV, G. P., and STEPANOV, E. A.

[Text] An axial compressor consisting of a housing with an annular cavity connected to the flow channel through slots in a stand plate above which is placed axially a collar, and inside the housing an intake guiding device with a blade rotating mechanism and equipped with levers, with the distinguishing feature that, for extending the range of compressor performance stability during startup by regulating the active cross section of the slots simultaneously while the blades are rotating, the collar is hinge-joined to the levers.

USSR

UDC 621.438-226.2

A LOCK FOR AN ACTIVE BLADE OF A TURBOMACHINE

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 27, 25 Jul 77 Patent No 565994 1 Oct 75

GRIBOV, N. N., FISHER, A. V., OLIMPIEV, V. I., and MUSTAFIN, CH. G.

[Text]1.The same lock as in Patent No 295896, except that, for a higher reliability, the lock insert is made with a tailpiece and its bearing surfaces lie in planes perpendicular to the vertical plane through the runner axis, one of these surfaces being located on the side of the blade stem and making an acute angle with the insert base. 2. The same lock, except that between the lock insert and the clamping element there is another intermediate element which makes contact with both along parallel planes and includes a protrusion fitting into a special expansion in the lock insert. 3. The same lock, except that a thrust plate fits tightly into the runner groove on the side of the bearing surface of the lock insert, on the opposite side of the blade stem. 4. The same lock, except that the bearing surface of the lock insert on the opposite side of the blade stem makes an acute angle with the insert base, while the tailpiece of the lock insert has a horizontal segment along the surface adjacent to the lower end of the blade stem.

USSR UDC 621.438-226

A COOLED BLADE FOR A TURBOMACHINE

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 27, 25 Jul 77 Patent No 565991 18 Aug 75

ISKAKOV, K. M., PANTELEYEV, A. A., PYATKOV, F. I., and TRUSHIN, V. A., Ufa Aviation Institute imeni Ordzhonikidze

[Text] A cooled blade for a turbomachine, preferably for a gas turbine, consisting of a shell with a protrusion on the inside surface of the tip and a deflector with holes, with the distinguishing feature that, for a more effective cooling, the protrusion is made of a material with a high thermal conductivity such as copper and in the shape of a curvilinear trinagular prism with transverse ribs.

USSR UDC 621.57.012.4

A GAS-EXPANSION TURBINE

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 567908 15 Apr 76

ZAKHAR'YEV, YU. G., and ZAYTSEV, YU. B.

[Text] A gas-expansion turbine for cooling natural gas, consisting of a housing with turbine and compressor inlet and outlet taps with shutters, with the distinguishing feature that, for an easier assembly and a higher performance reliability, the shutters are pneumatically driven movable cylinders with spherical bottoms located inside the taps, the taps passing through a plate installed in the lower part of the housing and furnished with guide bushings for the cylinders.

USSR UDC 621.57.012.4

A GAS-EXPANSION TURBINE

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 567909 19 Apr 76

MEDVEDEV, V. K., PRASOL, G. G., YEKHICHEV, V. I., and GAPON, I. V.

[Text] A gas-expansion turbine for cooling natural gas, consisting of a housing with turbine and compressor inlet and outlet taps with shutters,with the distinguishing feature that, for saving on the volume of metal, the housing and the shutters are built in the form of coaxial spheres, with the shutters on the outside and movable relative to the taps.

USSR UDC 621.671

A CENTRIFUGAL PUMP

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 567851 8 Jan 76

YAKOVLEV, YU. P., AUZULEYM, YU. V., and POLINOVSKIY, A. YU.

[Text] A centrifugal pump consisting of an impeller between the front-end wall and the rear-end wall of the casing, and a discharge duct which includes ring and spiral segments shifted widthwise toward the rear-end wall and partly covering it with a cylindrical surface, with the distinguishing feature that, for reducing the radial forces acting on the impeller, the discharge duct has a uniform width equal to 1.7-1.9 times the impeller width at the periphery and a ring segment whose diameter is equal to 1.2-1.3 times the impeller diameter and which subtends a 195-215° angle.

USSR UDC 621.43-242

A PISTON PIN

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 29, 5 Aug 77 Patent No 567837 10 Sep 75

SHNEYDER, YU. G., LEBEDINSKIY, G. G., ZHEREBTSOV, V. M., DOBRUSIN, A. M., SHORNIKOV, V. V., and GUTIN, M. YE., Ufa Aviation Institute imeni Ordzonikidze, Leningrad Institute of Precision Mechanics and Optica, Ufa Engine Manufacturing Plant

[Text] 1. A piston pin for an internal-combustion engine, for instance, with a microrelief cut on its active surface, with the distinguishing feature that, for a higher wear resistance, the microrelief consists of at least one groove in the shape of a sinusoid superposed on a helix. 2. The same piston pin, except that the microrelief takes up 25-45% of the active pin surface.

USSR UDC 621.515-251

A RUNNER FOR A CENTRIFUGAL COMPRESSOR

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564446 4 Nov 74

GUSAK, YA. M., and CHEBOTAREV, O. M.

[Text] A runner for a centrifugal compressor consisting of a carrier disk with integrally fitted blades and a cover disk fastened to it by means of rivets passing through holes in the blades, with the distinguishing feature that, for higher strength and reliability, the thickness of the cover disk is at the periphery equal to 0.007-0.01 times its outside diameter and the blade thickness is 2.0-2.3 times this disk thickness at the periphery with the active disk surface inclined at 0-6° to the radius and 2.3-2.5 times this disk thickness at the periphery with the active disk surface inclined at 6-12° to the radius, the diameter of the rivet holes being 0.55-0.60 times the blade thickness, the upper row of holes lying on a circle whose diameter is 0.85-0.90 times the outside diameter of the cover disk and the lower row of holes lying on a circle whose diameter is 1.4-1.5 times the bore diameter of the cover disk.

USSR UDC 621.515

A TURBOCOMPRESSOR

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 574445 31 Dec 74

PETYALIN, V. A.

[Text] A turbocompressor consisting of a cooled housing with a peripherally located annular chamber and a runner inside, the latter carrying the compressor wheel and the turbine wheel both coupled together and each with radial blades, with the distinguishing feature that, for better cooling of the housing and for a partial recovery of the energy lost on cooling, the annular chamber is partitioned into an outer and an inner cavity by a perforated cylindrical shell, an annular disk shield is placed in the inner cavity to clear the shell and the nozzle set is placed before the turbine blades in the space between this shield and the lateral wall of the chamber.

USSR UDC 621.224-2

A RADIAL-AXIAL TURBOPUMP

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 25, 5 Jul 77 Patent No 564435 4 Jun 73

CHMELEV, N. YE., and FEDULOV, YU. I., Institute of Machine Design Problems, Academy of Sciences of the Ukrainian SSR

[Text] 1. A radial-axial turbopump consisting of a runner with blades joined to it through a slotted split connector and with an extension collar for the blades, and of a guiding device equipped with a lower wheel and a servomotor, the vanes of this device engaging a regulator wheel through levers and links cylindrically hinged to one another, with the distinguishing feature that, for preventing vibrations of the guiding vanes while the machine operates as a pump and for keeping the radial dimensions short, the extension collar and the guiding device are located one below the other with an allowance for each to be axially displaced, while the guiding vanes are located in the servomotor gap and rigidly coupled to the lower wheel constituting the servomotor piston. 2. The same turbopump, except that the levers of the guiding device can freely move along the hinge axes. 3. The same turbopump, except that, for ensuring a reliable joint between the runner and the extension collar during operation as a pump, the number of slotted connectors is equal to the number of blades.

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A STEAM TURBINE INSTALLATION

USSR Authors Certificate No 561223

[Translated from Moscow, OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI in Russian No 21, 1977 p 172]

LIPETS, A. U., MOSKVICHEV, V. F., KATYSHEV, G. V., FADEYEV, YE. A., ARTEMOV, L. N., STANISLAVSKIY, V. YA., BUSHLER, I. SH., and SHEFER, N. M.

[Text] A steam turbine installation, primarily for nuclear power plants, including a steam generator with evaporator and main live steam superheater, connected to the turbine, an intermediate separator and steam-steam superheater between the high and low pressure cylinders, connected to the pipes containing the heating element, is distinguished by the fact that to decrease the heating surface of the main and intermediate superheaters, the pipe containing the heating surface of the main and intermediate superheaters, is connected to the steam generator line between the evaporator and superheater.

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A COMBINED TURBOFAN DRIVE BLADE

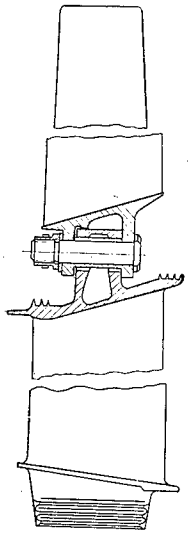
USSR Authors Certificate No 560990

[Translated from Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian No 21, 1977 p 114]

SERGEYEV, V. B., VAVIN, S. V., and SHINKARENKO, YE. M.

[Text] 1. A composite turbofan drive blade containing an internal contour blade, on the periphery of which is a flat with lugs, articulated to the lugs of the tail of the vane of the outer ring, is distinguished by the fact that to reduce weight and decrease size, the lugs of the flats are connected by a cross piece and located within the lugs of the tail piece.

2. A blade as in claim 1 is distinguished by the fact that between the lugs of the tail piece is a spreader sleeve containing a bolt which retains the lugs.



USSR UDC 621.472

EXPERIENCE IN OPERATING AN ABSORPTION-TYPE SOLAR REFRIGERATOR WITH AN OPEN SALT-SOLUTION REGENERATOR

Tashkent GELIOTEKHNIKA in Russian No 4, Apr 77 pp 73-76 manuscript received 25 Mar 76

KAKABAYEV, A. A., KLYUSHCHAYEVA, O., KHANDURDYYEV, A., and KURBANOV, N., Physicotechnical Institute, Academy of Sciences of the Turkmen SSR

[Abstract] A laboratory model of an absorption-type solar refrigerator was first designed for a capacity of 6,000 kcal/h and then enlarged for a capacity of 50,000 kcal/h. The latter version was operated for four years, maintaining the room temperature inside a building at 25-27°C (with a separate condenser) or at 24-26°C (with an integral condenser) during summer, when themaximum outside temperature reached 40°C. The regenerator, installed on the roof, sloped at a 5° angle and was covered with ruberoid 10 m long and 8 m wide. About 1 liter/m^2 of salt solution was needed to wet the entire regenerator surface, at the given viscosity and concentration. The absorber-evaporator consisted of a bundle of horizontal inch-size tubes inside a cylindrical jacket 0.8 m in diameter with an 80 mm wide separator. Two-layer mesh filters, installed vertically, decontaminated the salt solution on the high-concentration side where no vacuum could develop. The tube-inside-a-tube heat exchanger, installed between the weak solution and the strong solution, had an effective area of 8 m^2. The flow of strong solution into the absorber was regulated by a float valve in the bottom of a rectangular container. Since 1975 an aqueous solution of 1:1 calcium chloride and lithium chloride has been used as the refrigerant. Because of foaming, however, the apparatus must be shut down for the afternoon. References 2 (Russian).

USSR UDC 629.113.033

AN AUTOMOBILE-TRANSPORTATION MECHANISM

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russina No 25, 5 Jul 77 Patent No 564205 23 Jun 75

KOROVITSYN, L. F., Order-of-Labor's-Red-Banner Kalinin Polytechnic Institute

[Text] An automobile-transportation device consisting of stepping supports, each hinge joined to the free ends of the connecting rods in two synchronously driven crank mechanisms of the "parallel-motion Chebyshev" type whose rockers are hinge mounted on the chassis, with the distinguishing feature that, for more effective turning, the chassis is furnished with guide bushings with the rocker hinges and a hydraulic power piston placed inside respectively, and with this piston coupled to those rocker hinges through a common drawbar.

CSO: 1861

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