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No. 46

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USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS
ENGINEERING AND EQUIPMENT

No. 46

This serial publication contains abstracts of articles and news items from USSR and Eastern Europe scientific and technical journals on the specific subjects reflected in the table of contents.

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ENGINEERING
Aeronautical and Space

USSR

UDC 553.6.011.35+629.7.025.73

FLOW IN THE LOCAL SUPERSONIC ZONE NEAR THE PROFILE OF A WING OF INFINITE SPAN

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 240, No 3, 21 May 78
pp 560-563 manuscript received 16 Jan 78

YEREMENKO, V. A. and RYZHOV, O. S., Institute of Terrestrial Magnetism, the Ionosphere and Propagation of Radio Waves, Academy of Sciences USSR, Akademgorodok, Moskovskaya Oblast, Computing Center of the Academy of Sciences USSR, Moscow

[Abstract] The problem of uniform steady-state flow incident on the profile of a wing of infinite span with high subsonic velocity is considered. The analysis is limited to a symmetric profile with end points that are cusps of its outline. The local nature of the flow is considered close to the point where the compression shock intersects the sonic line. An approximate nonlinear Karman equation is numerically integrated by a completely conservative finite-difference scheme that gives valid relations on the shock wave front. Solution of the resultant system shows that the shock front arises within the local supersonic zone, which is in agreement with interference patterns of transsonic flows [see P. Germain, G. Gillon, Publ. O.N.E.R.A, No 102, 1961]. Figures 2, references 10: 7 Russian, 3 Western.

USSR

UDC 621.729:629.735.33

USE OF ADHESIVES IN AIRCRAFT CONSTRUCTION

Moscow VESTNIK MASHINOSTROYENIYA in Russian, No 5, May 78 pp 50-53

KARDASHOV, D. A., doctor of technical sciences

[Abstract] Adhesive bonding of metallic structures produces joints which, because of the lower stress concentration, are stronger and have better fatigue characteristics than riveted, bolted, or welded joints. They also weigh less, which is important in aircraft construction. Aircraft grades of polymer adhesives are surveyed here, the strongest among them being grade VK-24 epoxide (250 kgf/cm² in shear at 20°C): their specific applications, their storage life, their modes of use (temperature, time, pressure, number of layers required, and amount of material per layer), their curing characteristics, and the mechanical characteristics of joints. A typical case of a successful application is grade VK-3 phenol-rubber adhesive used in helicopters. Figures 1; tables 3; references: 4 Russian.

OBSERVATORY COMPUTATION ON THE BASIS OF MEASUREMENTS WITH REDUNDANCIES

Leningrad IZV. VUZ, PRIBOROSTROYENIYE in Russian Vol 20, No 8, Aug 77
pp 65-69 manuscript received 16 Feb 77

DOLGINTSEVA, G. YA., IGNATOV, A. A., and MAKAROVA, N. V., Chair of Aviation Instruments and Automata, Leningrad Institute of Aviation Instrument Design

[Abstract] Observatories are widely used for determining the coordinates of objects. Continuous measurement of certain parameters $U_i(\varphi, \lambda)$ of an object which are functions of the geographical coordinates (φ, λ) of the object location is considered here, the equation $U_i = \text{const}$ representing a navigational isoline. The location of an object is found at the intersection of two isolines, the problem thus being reduced to the simultaneous solution of two nonlinear equations by any known method approximation (linearization). In the case of redundant observations, i.e., of more than two equations the problem is solved by statistical methods such as the Kalman filtration. When the dimensionalities of the state vector and of the observation vector are high, then a special-purpose digital computer is used with two radio navigation systems, a far-range one and a near-range one, for data processing. As the dimensionalities of these vectors decrease, a computer is used with only one respective navigation system or both navigation systems are used without a computer, or only a far-range navigation system is used. The rms error has been estimated here for each case, as a function of time. Figures 1; tables 1; references: 6 Russian.

USSR

UDC 539.173

A METHOD OF OBTAINING ATOMIC ENERGY

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 19, 1978 p 120

[Description of Author's Certificate No 608112 Division G, filed 25 Feb
76, published 25 May 78]

TOLSTOV, K. D., Joint Institute of Nuclear Research

[Text] This Author's Certificate introduces a method of obtaining atomic energy that involves acceleration of a beam of particles and using the beam to start a chain reaction in a block of fissile elements. As a distinguishing feature a positive energy balance is obtained and breeding of the fissile materials is expanded by using particles that are atomic nuclei with a charge greater than 1 unit and a kinetic energy greater than 2GeV/nucleon.

USSR

UDC 621.187.12

A NEW PHYSICAL METHOD OF REMOVING FREE CARBON DIOXIDE FROM WATER

Moscow ENERGETIK in Russian, No 3, Mar 78 pp 29-30

KOMARCHEV, I. G., engineer, Reactor Power Plant, Volgograd Regional
Administration of Power System Management

BOGDANOV, V. F., engineer, Volgograd Division, Southern Institute for the
Planning of Water Management and Reclamation Construction

[Abstract] Physical methods of removing free carbon dioxide from boiler feed water are less costly than chemical methods, but decarbonizers are not the best means, because their packing (Rashig rings) does not break up the water stream sufficiently. A method is proposed here of using a multistage ejector where water droplets can be continuously broken up into an emulsion in an air stream. Each stage consists of a converging nozzle and a mixer chamber, the chamber in each following stage being longer and having a larger diameter than that in the preceding stage. Eddies as well as waviness and pulsations of the stream contribute to maximum possible contact area of $100,000 \text{ m}^2/\text{m}^3$. This device can be used alone or together with a decarbonizer. Its performance was checked at one of the Volgograd heat and electric power plants, with the residual CO_2 content in boiler feed water regenerated by the hydrogen-starvation method

not exceeding 1-4 mg/l. A variant of this device was built and used in the Mikhaylov heat and electric power plant for supplementary boiler feed water, operating by the H-Na-cationization method and leaving about the same residual CO₂ content. This method of removing free carbon dioxide from feed water eliminates the need for air blow-off and for periodic maintenance operations such as scrubbing. It can also be employed for intensive mixing of reagent solutions, for producing aerosols, for partitioning two-phase media, for removing the gaseous phase from a solution, and other similar processes. Figures 2.

USSR

UDC 621.311.2:621.039:621.175

OPTIMIZATION OF A LOW-POTENTIAL COMPLEX OF ATOMIC ELECTRIC POWER PLANTS WITH A HYBRID SYSTEM OF REVERSIBLE WATER SUPPLY

Moscow TEPLOENERGETIKA in Russian, No 4, Apr 78 pp 38-43

BERMAN, L. D., doctor of technical sciences, POPYRIN, L. S., corresponding member, USSR Academy of Sciences, EISMAN, S. L., engineer, MAY, V. A., engineer, NAUMOV, YU. V., engineer

All-Union Institute of Heat Engineering imeni F. E. Dzerzhinskiy Siberian Power Engineering Institute, All-Union State Institute for Planning of Electrical Equipment for Heat Engineering Installations

[Abstract] Large atomic electric power plants in the European part of the Soviet Union will, as a rule, have reversible water supply. In an expansion of plant capacity the problem arises of either increasing the heat load on an existing water reservoir-cooler and thus raising the temperature of the cooling water, or enlarging its active surface, or adding another water reservoir-cooler, or adding water cooling towers. The tradeoffs are analyzed here in terms of incremental cost of active cooling surface and, specifically, applicable to an enlargement of an atomic electric power plant from 2000 to 4000 MW capacity. The optimal conditions justifying a changeover to a hybrid system are determined, in terms of increase in annual cost as a function of reservoir-cooler active surface area and the number of cooling towers. The limiting specific power and the optimum plant operating parameters are taken into consideration, as is also the requirement of protecting natural surface waters against contamination from waste water. Figures 6; tables 1; references: 4 Russian.

OPERATION OF ATOMIC HEAT AND ELECTRIC POWER PLANTS OF THE THERMIFICATION AND CONDENSATION TYPE (WITH TK TURBINES)

Moscow TEPLOENERGETIKA in Russian, No 4, Apr 78 pp 32-38

BOLDYREV, V. M., candidate in technical sciences, SMIRNOV, I. A., engineer, FEDYAYEV, A. V., engineer, KHRILEV, L. S., doctor of technical sciences Special Design Bureau, Siberian Power Engineering Institute, Siberian Department, Academy of Sciences USSR, All-Union Scientific Research and Planning Institute of the Power Engineering Industry

[Abstract] Atomic heat and electric power plants of the thermification and condensation type are evaluated, namely their performance in combination with TK-type turbines and water-moderated water-cooled reactors. Constant steam rates and appreciable condensation power are taken into account in the calculation of energy balance and in the cost analysis. The design of the thermal system is based on turbine performance according to the thermal load diagram as well as according to the electric load diagram, and in any other possible modes of operation including faults. The optimum thermification factor is found not to exceed 0.7 and the minimum heat load under which an atomic power plant is more efficient than a thermoelectric one run on fossil fuel and equipped with cooling towers is 1000-1500 Gcal/h, or with water reservoir-coolers in the atomic plant a hybrid system becomes more efficient than a separate system under a heat load of 500-600 Gcal/h. This then is now the major trend in the Soviet Union, toward an eventually complete replacement of fossil fuels. Figures 6; references: 9 Russian.

Construction

USSR

UDC 624.138.41

SILICIFICATION OF THE LOESS BASE OF ADMINISTRATIVE BUILDINGS IN TASHKENT

Moscow OSNOVANIYA, FUNDAMENTY I MEKHANIKA GRUNTOV in Russian No 3, May 78
pp 9-11

ZVYAGIN, O. D., engineer and KHEYFETS, V. B., engineer, Gidrospetsstroy

[Abstract] Experimental data are given on silicification of the bases under two large public buildings in Tashkent to prevent settling. The loess under one of the buildings was treated before construction, and treatment of the bases under the other building was carried out in 1975, nine years after construction. These buildings are located side by side in the middle of the city on a layer of quaternary loess 50 m thick with underlying conglomerate. The silicate solution was injected by a special device in the form of a drill with a perforated end section. Injection pressure was 0.4 MPa at a rate of 15 liters per minute per meter. The injection wells were plugged after treatment. More than 40,000 cu. m of loess were treated by this method. The silicification treatment has sharply reduced settling. Figure 1.

USSR

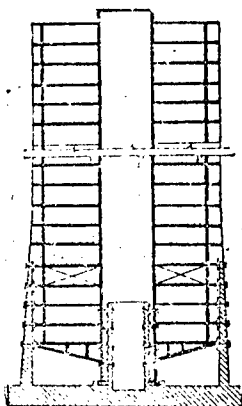
UDC 699.841

A G. G. SEMENETS SEISMICALLY STABLE MULTISTORY STRUCTURE

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian, No 18, 15 May 78 Author's Certificate No 606991 24 Jul 75

SEMENTS, G. G., Central Planning and Technological Institute of Building Production, "Organization for Heavy Construction"

[Text] 1. A seismically stable multistory structure including a hollow tower, rigid upper stories with ceiling slabs, a flexible ground floor, and separable bracing, with the distinguishing feature that, for increasing its resistance to seismic loads over a wide frequency range and its capacity to withstand wind loads, such a structure is reinforced with stiffener belts on the inside and on the outside, the inside belt being fastened through separable bracing to the hollow shaft and the outside belt being fastened through separable bracing to the ceiling slabs around the periphery. 2. Same as 1., except that the outside stiffener belt constitutes a mesh.



USSR

UDC 624.131.52

SOME RESULTS OF SOLUTION OF MIXED PROBLEMS OF THE THEORIES OF ELASTICITY
AND PLASTICITY OF THE SOILS OF BASES

Moscow OSNOVANIYA, FUNDAMENTY I MEKHANIKA GRUNTOV in Russian No 3, May 78
pp 35-39

BUGROV, A. K., candidate of technical sciences, Leningrad Polytechnical
Institute imeni M. I. Kalinin, and ZARKHI, A. A., engineer, All-Union
Scientific Research Institute of Planning of Hydroprojects imeni S. YA Zhuk

[Abstract] The authors consider the problem of the stressed and strained state of a base that simultaneously contains regions of elastic and limiting equilibrium. Data are given on the formulation of the problem, the algorithm of solution and the computer program. The results of problems of plane deformation are analyzed for experimental bases and a comparison is made with data found by punch indentation. The way that the characteristics of strength and weight of the soil influence settling is determined on the basis of in situ studies. A comparison of the results of solution of the mixed problem with the data of experiments shows satisfactory qualitative agreement, and where comparison is possible also quantitative agreement between theoretical and experimental relations and quantities. A number of phenomena observed in the experiments are quite completely described by this problem. The mixed problem enables evaluation of the errors due to using model of linearly deformable ground, and in many instances shows that the application of this model

can be extended beyond the recommendations of SNip II-15-74. Direct application of the solutions of the mixed problem in designing foundations enables determination of dimensions based on the permissible settling for superstructures with consideration of the transformations of stress-strain diagrams. Figures 6, references 16 Russian.

USSR

UDC 624.191.1:624.042.7

CALCULATING THE CASINGS OF TWO CLOSELY LOCATED CIRCULAR TUNNELS FOR SEISMIC EFFECTS

Moscow OSNOVANIYA, FUNDAMENTY I MEKHANIKA GRUNTOV in Russian No 3, May 78
pp 25-29

FOTIYEVA, N. A., doctor of technical sciences, "Order of the Red Banner of Labor" Scientific Research Institute of Foundations and Underground Structures imeni N. M. Gersevanov

[Abstract] A method is proposed for seismic calculation of the casings of two identical parallel circular tunnels. The technique is based on evaluation of the most unfavorable stressed state in each cross section for different combinations of seismic wave action. A complete algorithm is given for programmed solution of the problem on the Nairi computer. An actual numerical example is given to illustrate application of the method. The procedure can be generalized to the case of tunnels of different sizes made from different materials, and also the action of other kinds of loading. The proposed method is to be used for calculations of parallel tunnels on the Baykal-Amur Railroad. Figures 2, references 7 Russian.

USSR

UDC 624.131.524.4

CONCERNING THE QUESTION OF THE INFLUENCE THAT CYCLIC HORIZONTAL ACTIONS
HAVE ON THE WORK OF PILINGS

Moscow OSNOVANIYA, FUNDAMENTY I MEKHANIKA GRUNTOV in Russian No 3, May 78
pp 17-19

FAYANS, B. L., candidate of technical sciences, BARVASHOV, V. A., candi-
date of technical sciences, Scientific Research Institute of Foundations,
LUCHKOVSKIY, I. YA., candidate of technical sciences, LEKUMOVICH, G. S.,
candidate of technical sciences, Khar'kov Promstroyniiprojekt and METS,
M. A., candidate of technical sciences, Estpromproyekt

[Abstract] A report on theoretical and experimental research on the work
of pilings under the action of repeated and alternating horizontal loads.
The experiments were done on 30 x 30 cm pilings driven into the ground
to a depth of at least 5 m, and on large-scale piling models 10 x 10 cm
driven to a depth of 3 m. The pilings were of reinforced concrete. It
was found that the action of alternating loads on pilings sunk in sand
causes slight horizontal displacement that has no appreciable effect on
carrying capacity. Loading of pilings sunk in banded clay and loamy
moraine in alternating horizontal directions at 60% of the maximum
static load reduces carrying capacity by 20-40%, leading to increased
deformability. When the cyclic horizontal load is less than 60% of the
maximum static load, a linear relation can be assumed between the amplitude
of cyclic loading and horizontal displacement for a given number of cycles.
Parallel studies were done on specimens of soil under cyclic uniaxial
loading in the laboratory. These tests were used to determine the nature
of accumulation of total deformations under cyclic loading. The labora-
tory results agree well with field studies. Figures 2, references 5
Russian.

USSR

UDC 627.824.7.012.4.624.042.5

MEASURES FOR REGULATION OF THE TEMPERATURE MODE OF MASSIVE SECTIONS OF
CONCRETE DAMS CONSTRUCTED IN SIBERIA

Moscow, GIDROTEKHNIЧЕСКОYE STROITEL'STVO, in Russian, No 6, Jun 78,
pp 8-11

GARKUN, L. M. AND CHAYKIN, B. V.

[Abstract] Practically convenient methods are recommended for determina-
tion of measures to regulate the temperature mode of massive sections

of concrete dams constructed in Siberia. Analysis of the construction conditions shows that there are a number of indicators which can be developed, which are general and rather similar for all structures. They are characteristic both for dams already constructed and dams under construction, as well as dams currently planned. They include: the mean multiannual air temperature; the columnar section of the dams; the use of slag-portland cement with low heat liberation; the zonal distribution of the concrete; the consumption of cement in the construction of the internal zone of the dam, 180-250kg of slag-portland cement and 170-220 kg of portland cement per M³ of the outer zone of the dam; the averaged data on temperature of the cooled concrete and rock foundation, the basic means of regulation of the temperature mode, by limiting the height of sections poured, pipe cooling, or year-round cooling; the use of decking with optimal insulating properties for the time of year, and insulation of horizontal surfaces; section heights; and limitation of the maximum exothermic temperature rise. Figures 4; tables 4; references 6 Russian.

USSR

UDC 624.074.6.042:69.001.5

INFLUENCE OF ICE ON CONICAL SUPPORTS UPON MOVEMENT OF ICE FIELDS

Moscow, STROITEL'NAYA MEKHANIKA I RASCHET SOORUZHENIY, in Russian, No 3, Jun 78, pp 15-18

VERSHININ, S. A., Moscow Institute of Construction Engineering imeni V.V. Kuybyshev

[Abstract] Exploitation of the mineral riches of the continental shelf requires the construction of ice-resistant supports for operating platforms. At the level of the ice, these supports are often made conical in shape, so that the ice load amounts to the bending strength of the ice, since the moving ice is bent upward by the conical shape of the supports. To determine the influence of the velocity mode of loading of an ice field on the bending strength of the ice, the branch laboratory for ocean ports of the Moscow Institute of Construction Engineers imeni Kuybyshev has performed experiments on the bending of long beams sawn from the ice of the Sea of Okhotsk. The beams are up to 40 m. in length, thickness $H = 1$ m. The experiments showed that the pressure of the ice field on conical supports in the open sea may be significantly greater than the pressure currently recommended by the construction norms and rules for determination of the ice load on conical supports. Figures 2; references 4 Russian.

USSR

UDC 621.311.21

TRENDS IN THE IMPROVEMENT OF CONSTRUCTION METHODS EMPLOYED IN THE INGURI
HYDROELECTRIC POWER STATION

Moscow ENERGETICHESKOYE STROITEL'STVO in Russian, No 3, 1978 pp 3-7

BORISOV, V. I., engineer, KRAT, O. V., engineer

[Abstract] In the western part of the Georgian SSR, on the Inguri river, there is being erected a complex of hydroelectric power structures which include a 272 m high arch dam, a deep penstock, a 15 km long pressurized diversion tunnel, a pressurized station reservoir, and a power house with equipment. Improvements in the construction methods since 1975 have been mainly in the concrete work, production and processing of the material as well as pouring it on site, and in the carrying out of underground work. These improvements include better design of tools and rigs as well as automation of various operations, all resulting in a higher efficiency and a better economy. Photographs for this report were taken by T. Putkaradze. Figures 6.

USSR

UDC 621.993.2.02:539.4

STRENGTH OF TAPS IN MACHINING TITANIUM ALLOYS

Moscow STANKI I INSTRUMENT in Russian No 5, May 78 pp 30-31

REZNIKOV, A. N. and SARYCHEV, I. G.

[Abstract] An examination is made of the relations between strength and cross sectional parameters of the working section of M6-M16 machine taps when threading holes with depth of $1.5d$ through parts made from VT3-1 titanium alloy and 40 Kh steel. Experimental data are used as a basis for getting a formula that gives the thread-cutting torque as a function of the main structural and geometric parameters of the tap. An analytical-experimental technique is used to determine the influence that the area of the chip flutes has on tap strength. It is found that the central chisel and flute angles have the greatest effect on force characteristics of the working part of the tap, and that the radii of the arcs forming the chip flute have somewhat less influence on these characteristics. The optimum combination of elements of the chip flute profile can reduce the thread-cutting torque and stresses in the body of the tool, and also appreciably increase the reserve strength and consequently the reliability of the tap. Figures 2, references 3 Russian.

USSR

UDC 621.9.025.6

INFLUENCE THAT CARBIDE NONUNIFORMITY AND HEAT TREATMENT OF R6M5 STEEL HAVE ON TOOL DURABILITY

Moscow STANKI I INSTRUMENT in Russian No 4, Apr 78 pp 18-20

POPANDOPULO, A. N., SMIRNOV, A. A. and NOVIKOVA, G. YU.

[Abstract] Tests were done on hot-rolled bars of R6M5 steel 30, 60 and 80 mm in diameter with the same composition, the carbide number being 2, 4 and 5 respectively. Maximum size of excess carbides with increasing cross sections increases from 6-8 to 12-15 μm . An investigation is made of the influence that carbide nonuniformity and heat treatment have on the durability of cutting tools made from these bars. The tools were tested by turning and end-milling 12Kh18N9T steel. The tests were done by multifactor design of experiments. It was found that when carbide nonuniformity is high (carbide number of 5), R6M5 steel has lower red hardness, strength and impact toughness than steel with a carbide number of 2-4. An increase in the quenching temperature and the holding temperature with final heating increases the red hardness of cutting tools, but reduces strength and toughness. Carbide nonuniformity has a considerable

effect on tool durability. An increase in the carbide number from 2 to 5 reduces durability in turning by a factor of 1.3, and in milling--by a factor of 2. Changes in the heat treat schedule (quenching from 1210-1240°C, holding with final heating from 1.5-2 minutes) have little effect on durability. However, the stability of cutting properties is higher with quenching from 1225-1240°C and holding for 1.5 minutes for steel with carbide number of 2-4, and from 1210°C with holding for 2.5 minutes for steel with a carbide number of 5. It is concluded that tools for machining 12Kh18N9T steel under the investigated conditions should be heat-treated to give a grain number of 19-9 for turning and 10-11 for milling when the steel has a carbide number of 2-4. To avoid excessive grain nonuniformity when steel with higher carbide nonuniformity is used, the heat treatment should be done to give a finer grain (grain number of 11-12). Figures 2, references 7 Russian.

USSR

UDC 621.941.025.6:621.777.4.016.2

MAKING CUTTING PLATES FROM PRECIPITATION-HARDENED EP723 ALLOY BY HOT HYDRO-DYNAMIC EXTRUSION

Moscow STANKI I INSTRUMENT in Russian No 5, May 78 pp 31-32

LIPINSKIY, V. V., TOLMATSKAYA, E. G. and PARANYUSHKIN, O. V.

[Abstract] A report on research done to increase the strength and impact toughness of precipitation-hardened EP723 alloy and to use this alloy instead of high-speed steel for making cutting tools. A technique is developed for hot hydrodynamic extrusion of cutting plates for composite tools. The forming is done on a K117A crankpress at 1050-1150°C. After appropriate heat treatment, the finished inserts were fastened in tool holders. Studies of the influence of hot hydrodynamic extrusion on the strength, impact toughness and structure of EP723 alloy showed that this type of treatment gives the cast alloy a uniform fine-grained structure with grain number of 11. Bending strength is increased to 200 kgf/mm², and impact toughness is increased to 1.2 kgf·m/cm². Tests were done on a screw-cutting lathe turning VT-20 titanium alloy without coolant by the EP723 hot-extruded cutters and series-produced R18 cutters. Cutter geometry was the same. It was found that the durability of the EP723 cutters is 3.5 times as high as that of the R18 cutters. The hot-extruded cutters have a durability 1.8 times as high as the dispersion-hardened alloy cutters without hot extrusion. Figures 3, references 3 Russian.

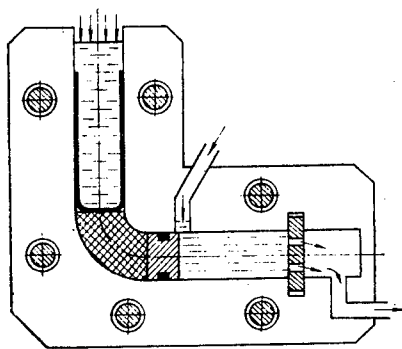
A PIPE BENDING DEVICE

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 19, 1978 p 15

[Description of Author's Certificate No 607619 Division B, filed 2 Nov 76,
published 25 May 78]

MATSUKIN, YU. G., KRYZHNYI, G. K., SVETASHOV, V. D. and BREYEV, B. I.,
Khar'kov Aviation Institute

[Text] This Author's Certificate introduces a pipe bending device that contains a die in which a curved channel is made with straight branches, one of which accommodates the workpiece with a filler. As a distinguishing feature of the patent, to reduce the bending radius in thin-walled pipes the device has a piston in the other straight branch, and in the end of this branch is a disk with throttling holes, the cavity between the piston and the disk being filled with fluid, while the branch that serves for accommodation of the workpiece contains an elastic material.

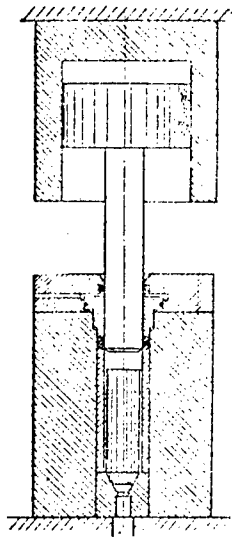


A TOOL FOR WORKING MATERIALS WITH HIGH-PRESSURE FLUID

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI
in Russian, No 18, 15 May 78 Author's Certificate No 606650 8 Apr 76

SHAKHNOVSKIY, D. I., SLOVTSOV, V. YE., MAGAZINER, V. V., AGUREYEV, A. A.,
VAYNMAKHER, M. SH., SNOP, V. I., ESIPOVA, YE. V., and DUBROVIN, M. S.

[Text] A tool consisting of a high-pressure container with a flange and seals, a low-pressure cylinder, both mounted coaxially on a base, a stamping press connected to the plunger in the low-pressure cylinder, a hydraulic system for filling the container with working fluid, and a mechanism for automatically tightening the container seal, with the distinguishing feature that, for simplifying the assembly and reducing the size, this automatic seal tightening mechanism is made in the shape of a hollow piston with stepped diameters inside the flange cavity of the container and the seal is placed around the largest diameter.



A METHOD OF ELECTROSLAG WELDING

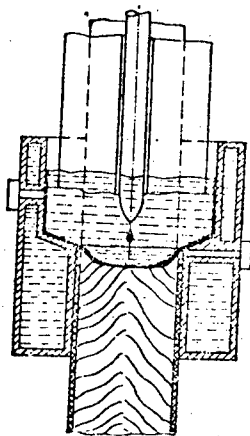
Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI
in Russian, No 18, 15 May 78 Author's Certificate No 606698 24 Jul 75

DUBKO, D. A., SIDORUK, V. S., MISYURENKO, M. A., GALINICH, V. I.,
SUSHCHUKSLYUSARENKO, I. I., KHRUNDZHE, V. M., YALYSHKO, G. F., and
RYAZANOV, A. A., Order of Lenin and Order of Labor's-Red-Banner Institute
of Electric Welding imeni Ye. O. Paton

[Text] A method welding with a fusible plate electrode placed inside the welding gap, with the distinguishing feature that, for raising the productivity and improving the process stability by increasing the free surface of the slag bath, the welding electrode has a cross-sectional area larger than that of the welding gap and it is pulled from the slag bath at a rate

$$v_{\text{pull}} = \frac{K_{\text{melt}} \cdot I}{\gamma} \left(\frac{1}{F_{\text{fill}}} - \frac{1}{F_{\text{elec}}} \right)$$

where v_{pull} is the electrode pull rate,
 K_{melt} is the electrode melting coefficient, g/A·h
 I is the welding current, A
 γ is the density of the electrode metal, g/m³
 F_{fill} is the cross-sectional area of the filler metal, m²
 F_{elec} is the cross-sectional area of the electrode, m²



TESTING OF PARALLEL OPERATION OF THE COMBINED POWER SYSTEM OF SIBERIA WITH THE COMBINED POWER SYSTEM OF KAZAKHSTAN AS PART OF THE UNIFIED SYSTEM OF THE USSR

Moscow, ELEKTRICHESKIYE STANTSII, in Russian, No 9, Sep 77, pp 51-55

TIMCHENKO, V. F., KHACHATUROV, A. A., [Deceased], KILADZE, V. A., BUCHUYEV, V. V., SOVALOV, S. A. RECHETOV, V. I., KOBYTEV, M. I. AND SHCHEGLOV, YU. P., All-Union Scientific Research Institute for Power Engineering, Siberian Scientific Research Institute for Power Engineering, Central Dispatching Administration, Unified Power Network, USSR; Combined Dispatching Administration, Kazakhstan; Combined Dispatching Administration, Siberia

[Abstract] A series of full-scale field tests in various modes of separate and parallel operation of the combined power system of Siberia, the combined power system of Kazakhstan and the intersystem power transmission lines connecting them to each other and to the statewide unified power system was conducted in order to determine experimentally the qualitative peculiarities and quantitative values of mode characteristics. For the first time, brief parallel operation was achieved with the Central Dispatching Administration of the USSR power system from Kaliningrad to the west to Ulan-Ute in the east, representing about 90% of the total installed power generating capacity in the USSR (the power system of Bulgaria operated in parallel with the unified power system of the USSR). The distance between the furthest points of the parallel power systems and unions covered a quarter of the circumference of the earth at these latitudes, spanning six time zones. During the test, the qualitative peculiarities and quantitative values of basic mode characteristics of the power systems of Siberia and Kazakhstan and the intersystem power transmission lines connecting them to each other and the unified power system of the USSR were determined. The tests confirmed the possibility and expediency of constant parallel operation of the Siberian system as a part of the USSR statewide system, which will require significant increases in the intersystem transmission capacity between Siberia, Kazakhstan and Urals, and automatic regulation (limitation of its power, and installation of matched emergency safety devices and operational control equipment) in the Siberian system. Tables 4; figures 5; references 7 Russian.

OUTLOOK FOR PRODUCING LARGE TURBOCOMPRESSORS FOR HEAT PUMPING APPARATUS

Moscow TEPLOENERGETIKA in Russian, No 4, Apr 78 pp 25-28

BYKOV, A. V., candidate in technical sciences, KALNIN', I. M., candidate in technical sciences, TSIRLIN, B. L., candidate in technical sciences, All-Union Scientific Research Institute of Refrigeration Machinery

[Abstract] In the Soviet Union during recent years there have been developed and installed vapor compressors for heat pump sets which operate with freons, of the reciprocating type rated up to 90kW and of the centrifugal type rated up to 2300 kW. Modern regional heat and electric power plants require, however, heat pump sets of 20 MW (17 Gcal) to 600 MW capacity. The feasibility of producing compressors of this size is analyzed here and various methods are discussed, such as staging and pressure regulation in combination with a search for working substances with better characteristics. Of particular interest in the latter category are freon R113 ($C_2Cl_3F_3$) beginning to decompose at 300°C and freon R114 ($C_2Cl_2F_2$) beginning to decompose at 505°C. Experimental production of centrifugal heat pump compressors of 100-150 MW capacity is now underway. Tables 1; references: 2 Russian.

USSR

MECHANIZATION OF THE ELECTRIC-SPARK SURFACE HARDENING PROCESS APPLIED TO PARTS OF INTRICATE SHAPES

Kishinev ELEKTRONNAYA OBRABOTKA MATERIALOV in Russian, No 1, Jan-Feb 78 pp 80-83

ANDREYEV, V. I., Dnepropetrovsk

[Abstract] A set of cams, made of grade 40KhN steel and heat-treated to Rockwell C hardness 48-54, is clamped on a common arbor to be used for batch rolling of metal. The wear resistance and thus the life of such a tool can be increased by electric-spark alloying of the roller surfaces. An electrode system for this purpose has been designed, by mathematical simulation, with which the process of surface alloying can be mechanized. Such a system is regarded, in rheological terms, as a parallel combination of a Maxwell body and a Hooke body. A multielectrode tool has subsequently been built for electric-spark alloying of roller cams in a lathe. An increase in tool life by 30-40% is attainable by this treatment. Figures 4; references 6: 4 Russian, 2 Western.

USSR

UDC 621.778.426

A METHOD OF MAKING BIMETAL WIRE

Moscow OTKRYTIYA, IZOBRETIENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 15, 1978 p 27

[Description of Author's Certificate No 603458 Division B, filed 7 Apr 76,
published 25 Apr 78]

LAPITSKIY, V. V., SOKOLOV, V. A., MUTOVIN, V. D., RODINA, N. N., BOLGOV,
I. S. and CHERNOVA, R. I.

[Text] This Author's Certificate introduces a method of making bimetal wire of molybdenum and copper. The technique involves metallizing a molybdenum core with copper in hydrogen, additional application of a copper layer with subsequent hot and cold drawing. As a distinguishing feature, to increase the electrical conductivity of the wire at micro-wave frequencies, the core is metallized by immersing it in a copper melt at 50-100°C above the melting point, holding the core in the melt to a temperature equalized and then cooling the melt to a temperature 10-16°C above the melting point of copper. The core is then extracted from the melt at a rate of 0.5-2 m/s.

USSR

UDC 669.24/6:621.365.414.001.5

SOME MEANS OF IMPROVEMENT OF ELECTROTHERMAL PROCESSES IN THE PRODUCTION OF
HEAVY NONFERROUS METALS

Moscow, PROMYSHLENNAYA ENERGETIKA, in Russian, No 5, May 78, pp 40-43
NUS, G. S., Gintsvetmet

[Abstract] Theoretical and experimental developments of recent years and the experience of their introduction at a number of nonferrous metallurgy enterprises have shown that revision of the methods of design of multipleslag electric furnaces can significantly increase the economic indicators of the electric melting process (decreasing the specific consumption of electric power and the loss of metal with the slag, increasing melting and furnace capacity, as well as electrical efficiency). Processes of heat and mass transfer are considered and the similarity of the temperature and velocity fields in the slag melt is maintained, in addition to geometric similarity, as furnaces are designed, decreasing current consumption and dimensions of baths while increasing furnace voltage for the same capacity and thus increasing specific power and throughput. Calculation equations are presented. An example of design of a furnace is appended. References 7 Russian.

USSR

UDC 621.311.25:621.039-255:621.791.053.621.78.004.13

ZONAL HEAT TREATMENT OF CIRCULAR WELDED SEAMS IN PIPES FOR NUCLEAR POWER-PLANTS

Moscow, ELEKTRICHESKIYE STANTSII, in Russian, No 12, Dec 77, pp 22-26

SHUL'MAN, I. A. AND PERESTYUK, V. P., Central Scientific Research Institute for Heavy Machine Building

[Abstract] For the pipes of nuclear powerplants, with diameters of 600-1300 mm and wall thicknesses of up to 100 mm, the following technological parameters must be properly selected in determining methods of zonal heat treatment: the rates of heating and cooling; the uniformity of temperature in the welded zone, i.e., the temperature drop through the cross section of the wall in the areas to the right and left of the welded seam and around the circumference between the top and bottom points of the pipe; the width of the section treated, i.e., the tempered zone containing the welded seam at its center; and the temperature gradient in areas adjacent to the seam. Each of these points is discussed and graphs are presented illustrating the proper values. Figures 4; references 9: 7 Russian, 2 Western.

USSR

UDC 621.181.5.021

OPTIMAL INITIAL PARAMETERS OF PEAK-LOAD STEAM-TURBINE UNITS

Minsk, ENERGETIKA, in Russian, No 9, Sept 77, pp 50-56, Manuscript received 22 Feb 77

AMINOV, R. Z., KHRUSTALEV, V. A. AND CHERTYKOV, A. M., Saratov Polytechnical Institute

[Abstract] Earlier works have analyzed the influence of mode factors on the optimum of parameters and characteristics of a power-generating unit. It must be expected that operating modes will have a particularly great influence on the parameters of units intended for coverage of the sharply varying portions of the load graphs. This article studies just such units. The complex optimal initial parameters of the steam or peak-load units with simplified thermal plans with and without intermediate superheating are studied, considering partial loads and the properties of maneuverability. Consideration of the influence of maneuverability with decreasing initial steam pressure decreases the optimal pressure by an average of 2.0 MPa. For the initial conditions used, elimination of intermediate superheating results in a decrease in the optimal pressure by an average of 2.0-2.5 MPa. The optimal initial parameters and feed-water temperature are given for the assumed cost characteristics of the equipment, considering the value of maneuverability. Figures 2, References 2 Russian.

USSR

UDC 621.3.076.7:621.382.333.3

EXPERIENCE IN ADJUSTING THE THYRISTOR EXCITER SYSTEM OF THE TVV-800 TURBINE GENERATOR

Moscow, ELEKTRICHESKIYA STANTSII, in Russian, No 5, May 78, pp 82-83

GLADYSHEV, I. P. AND SLESARCHUK, G. D., Elektroyuzhmontazh

[Abstract] The thyristor excitation system of the TVV-800 turbine generator of the Zaparog Regional Electric Powerplant was ready for operation simultaneously with the startup of power unit 6. This was possible due to a combination of organizational and engineering measures and timely delivery of electric equipment, allowing timely completion of installation of the TV thyristor exciter, full testing as required for acceptance and prestart testing according to a preplanned program. This article describes the sequence of delivery and testing and presents schematic diagrams of the power circuits, rectifying transformer circuit and the circuit for testing of the power circuit of one group of the thyristor exciter. Testing of the thyristor exciter with the power unit operating with no load was reduced to selection of the operating parameters of the automatic regulation system, while testing of individual elements and devices of the exciter system was performed using a separate source of power with the generator stopped. This greatly reduced the need to operate the TVV-800 turbine generator in the no-load mode.

USSR

UDC 621.785.533

INCREASING THE WEAR RESISTANCE OF A FORMING TOOL BY LOW-TEMPERATURE GAS NITRIDIZATION

Moscow VESTNIK MASHINOSTROYENIYA in Russian, No 5, May 78 pp 43-45

TARASOV, A. N., engineer, SHAPIRO, YA. A., engineer

[Abstract] Foundry punches and dies made of grades 3Kh2V8F and 40KhSMFA steel were treated by low-temperature gas nitridization with products of pyrolysis of a general-purpose carburizer containing triethanol amine and activating agents $\text{NH}_4\text{OH} + \text{NaNO}_2 + \text{NaAlO}_2$. The treatment was done at 560-620°C for 3.5-12 h with 40-80 droplets/min of carburizer added, stepwise over one or two temperature ranges and with varying amounts of carburizer. The tools, used for pressure casting of aluminum alloys, had been preheat-treated by quenching and then tempering to a Rockwell C hardness of 40-48. The 0.28-0.46 mm deep diffusion layer formed during nitridization contained 0.50-0.70% carbon and 0.18-0.44% nitrogen, its Vickers hardness ranging from 749 to 841 kgf/mm² in the case of grade 3Kh2V8F steel and

from 707 to 740 kgf/mm² in the case of grade 40KhSMFA steel. The results indicate that stepwise low-temperature gas nitridization with simultaneous thermal oxidation effectively increases the wear resistance of casing and stamping tools. This process does not require any additional gas handling equipment, serially built case hardening furnaces are entirely adequate for this purpose. Figures 1; tables 3; references: 2 Russian.

USSR

UDC [629.123.42:621.869.88].001.2:681.3

COMPUTER OPTIMIZATION OF THE ELEMENTS AND CHARACTERISTICS OF CONTAINER SHIPS

Leningrad SUDOSTROYENIYE in Russian No 2(483), Feb 78 pp 9-13

GAYKOVICH, A. I.

[Abstract] The author considers the principles of computer optimization of elements and characteristics of container ships. Flowcharts are given for determination of the optimum elements and for the optimization algorithm. The principal results of computer optimization of the elements of a container ship are as follows: 1. The mathematical model and optimization algorithm are a convenient tool for design analysis, considerably reducing the work involved in selecting basic dimensions. 2. In normalizing the mechanical stability of container ships it is necessary to account for the influence of this stability on the economic efficiency of the ship. 3. The field of the resultant design solutions is rather narrow: deviations of elements and characteristics from optimum conditions average +5%. The use of actual engine catalog data in the mathematical model leads to a stepwise change in the criterion functional of efficiency. The complexity of the mathematical nature of the design model justifies the use of a random search algorithm. Figures 3, references 9 Russian.

USSR

UDC 656.61.052

REQUIREMENTS FOR AUTOMATED SHIP NAVIGATION SYSTEMS

Leningrad SUDOSTROYENIYE in Russian No 2(483), Feb 78 pp 35-39

KOSHEVOY, A.A., LAPIY, V. YU. and CHERNOV, B. P.

[Abstract] The following basic requirements for large-scale automated ship navigation systems are considered: provisions for repairability; standby facilities for channels and main working modes of the system; instrumentation for monitoring and ensuring operability, troubleshooting, preventive maintenance and extending service life; operational simplicity. In considering questions of repairability, emphasis is given to the requirements for the inventory of spare parts and components. This inventory should include the least reliable elements as well as those that are necessary for ensuring the principal modes of operation of the system. Redundance to ensure reliability should be based on a differentiated approach with classification by priorities. Monitoring and control should be centralized. Problems of optimizing preventive maintenance with respect to periodicity are discussed. A brief description is given of the automated ship navigation system based on the Briz computer that is currently

being used on the Kuban' and Kavkaz tankers and on the Professor Ukhov steamship. This system plots the course of the vessel on the chart, keeps track of the position of the vessel, determines the parameters of up to 15 ships for the purpose of automatic tracking, performs calculations necessary for preventing collisions of ships, and also records navigational parameters. Figures 4, references 6 Russian.

USSR

UDC 629.12.001.11:532

SUMMATION OF THE BENDING MOMENTS ACTING ON A SHIP HULL

Leningrad SUDOSTROYENIYE in Russian No 2(483), Feb 78 pp 18-20

LITONOV, O. YE.

[Abstract] To evaluate the influence that variability of the bending moment $M_{q.w}$ of a ship hull in quiet water has on the statistical characteristics of the sum of the bending moments M_s , the author considers the expression $M_s = M_w + M_{q.w}$, where M_w is the bending moment of the hull in the presence of waves. The distribution of M_s is treated as the composition of the distributions of M_w and $M_{q.w}$, using the ordinates of the investigated processes as a basis for evaluating the extremum values of the amplitudes. Taking the expression $M_s^{\max} = M_w^{\max} + kM_{q.w}^{\max}$ as a convenient form for the result, where the terms are fractiles of equal sufficiency, an expression is derived for the coefficient k . Curves are given showing the variability of $M_{q.w}$ (defined as the ratio between the standard deviation and the average value) as a function of k for different coefficients of variability of bending moments in quiet water. For fairly appreciable bending moments in quiet water, k lies between 0.65 and 0.85. Figure 1, references 4: 3 Russian, 1 Western.

USSR

UDC 621.792.053:678.061

A NEW GRADE VK-40 FILM ADHESIVE

Moscow VESTNIK MASHINOSTROYENIYA in Russian, No 5, May 78 pp 63-64

BATIZAT, V. P., candidate in technical sciences, ANIKHOVSKAYA, L. I., engineer, SOLOV'YEVA, V. N., engineer

[Abstract] The grade VK-40 film adhesive has been modified to better satisfy modern construction requirements. This grade BK-40* is intended for joining metals to nonmetals and for maintaining strong joints at temperatures from -60 to 80°C . It cures at 120°C under a pressure of 5 kgf/cm^2 within 2 h. The superior features of this grade, relative to those of grade VK-25, are an almost complete absence of volatile ingredients, its shorter cure time and higher strength, as well as the lower pressure necessary for making a joint. It has been successfully used for joining grade D16T aluminum alloy, grade 30KhGSA steel, and grade OT-4 titanium alloy. It does not cause corrosion. Its storage life is at least 3 months. In the development of this grade of film adhesive participated L. A. Chubkovets, I. M. Murina, and M. Ye. Kiseleva. Figures 2; tables 3.

USSR

UDC 621.792.539.319

INTERNAL STRESSES IN CURED FILM ADHESIVES

Moscow BESTNIK MASHINOSTROYENIYA in Russian, No 5, May 78 pp 61-63

ARTAMONOVA, R. B., engineer, VINOGRADOVA, L. M., candidate in technical sciences, KOROLEV, A. YA., doctor of technical sciences, BATIZAT, V. P., candidate in technical sciences, VLASOVA-GOLOVATAYA, V. I., engineer, ANIKHOVSKAYA, L. I., engineer

[Abstract] Epoxide film adhesives VK-40 and VK-41 are special grades developed for use in honeycomb and laminate aircraft structures, with a lower curing temperature (120°C) than grades VK-24 and VK-31. A comparative study was made of internal stresses in these adhesives cured on a solid substrate, also of the mechanical strength characteristics of films free without a substrate, over the temperature range from 180 to -40°C and over the 0-98% range of humidity. Above the glass transition temperature ($70-80^{\circ}\text{C}$ for VK-40,41,24 and 95°C for VK-31) these adhesives are found to be in a state of high elasticity with almost no internal stresses. Both ambient temperature and humidity affect the water absorption and the strength characteristics of films as well as of joints. While fracture of a joint with grade VK-41 adhesive is mainly cohesive in nature, fracture of a joint with grade VK-40 adhesive is mainly adhesive in nature. The

strength of joints with grade VK-40 adhesive under high humidity in a tropic climate can, therefore, be increased by means of adhesively active sublayers. Figures 3; tables 3; references: 3 Russian.

USSR

UDC 621.792.053

HIGH-STRENGTH FILM ADHESIVE GRADES VK-31 AND VK-41

Moscow VESTNIK MASHINOSTROYENIYA in Russian, No 5, May 78 pp 64-68

BATIZAT, V. P., candidate in technical sciences, BEK, V. I., candidate in technical sciences, VLASOVA-GOLOVATAYA, V. I., engineer, NAZAROVA, I. V., engineer, KOLOBOVA, Z. N., engineer, BYSTROVA, A. A., engineer

[Abstract] Film adhesives VK-31 and VK-41 are superior to the older phenol-rubber grades VK-3 and VK-32-200 in that they do not require a liquid sublayer nor such a high pressure for making a joint. Their density is 1.5-2 times lower and their strength is 1.5-2 times higher. They also do not contain any volatile ingredients which escape during cure. They have been tested for resistance to water and tropical climate, found to be suitable for joining honeycomb or laminate structures made of grade D16T aluminum alloy, grade 30KhGSA steel, grade OT-4 titanium alloy, or grade SPV 63 glass-plastic - after appropriate surface treatment which may involve anodizing, etching, shot blast, or polishing. Such joints have also been tested for strength in shear, in uniform tension, in nonuniform tension, and in bending (drum test) at -60, 20, and 80°C. The effects of aging at 80°C and of temperature cycling in various aggressive media have also been evaluated. The grades VK-31 and VK-41 are, furthermore, resistant to fungus. Figures 4; tables 5.

USSR

UDC 666.71/.72

A SYNTHETIC RAW MIX AS A BASE FOR A HIGH-GRADE WALL CERAMIC

Moscow STROITEL'NYYE MATERIALLY in Russian, No 5, May 78 pp 7-8

BOZHENOV, P. I., doctor of technical sciences, GLIBINA, I. V., candidate in technical sciences, Leningrad Construction Engineering Institute

[Abstract] Clay brick and ceramic stone are still the basic materials for walls. Major development effort is now directed toward modernization of

equipment and automation of processes, especially of mixing, drying, and firing. More attention should, however, be paid to the feasibility of replacing natural raw mixes with better synthetic ones. About thirty combinations of clays have been studied, accordingly, with such additives as phosphate slag, metallurgical slag, fuel sludge, ash, tailings from ore enrichment processes, borax ore residue, and others. Most of them were found to enhance the plasticizing action, homogeneization, and various properties. These mixes were tested at the Experimental Laboratory of the All-Union Scientific Research Institute of Building Materials and Structural Parts as well as at the Leningrad brick plant. A tunnel drier could produce a 71% flawless brick mix within 48 h. Addition of 30% ground furnace slag results in almost perfect bricks. Other additives serve as fusers which, because of their low melting point, produce a liquid phase in the ceramic mass at lower temperatures and also form with the latter eutectics requiring a lower firing temperature. These include borax ore residue, addition of 1% of which reduces the water absorption from 18.7 to 8.2% and 5% reduces it further to 0.3% in specimens annealed at 1100°C. Products made of loess from the Kazakh SSR is of poor quality, has a low strength and a low frost resistance. These characteristics can be greatly improved by addition of 1% borax ore residue and firing at the same 1000°, or at even lower temperatures (100-150°) with other appropriate additives. Tables 1; references: 1 Russian.

USSR

UDC 625.8.002.68

SILICATE-CONCRETE SLABS FOR ROAD SURFACING MADE OF QUARTZIFEROUS-FERRIFEROUS MATERIALS

Moscow STROITEL'NYYE MATERIALLY in Russian, No 3, May 78 pp 18-20

POGOSTNOV, A. P., engineer, LEONT'YEV, YE. N., candidate in technical sciences, All-Union Research Institute of Building Materials and Structural Parts imeni P. P. Budnik

BOLZHENSKIY, A. B., doctor of technical sciences, professor, Moscow Construction Engineering Institute imeni V. V. Kuybyshev

[Abstract] The feasibility was studied of using the quartziferous-ferriferous tailings from ore enrichment plants in structural materials for road surfacing. Specimens of various size fractions and dispersions, mixed with fine sand as filler and with CaO/SiO_2 in various ratios as binder, were tested, after several freezing-thawing cycles, for chemical activity, mechanical strength, and wear resistance. The optimum ranges of mix ingredients were established, taking into account also the overall material economy. On the basis of these tests and analyses of the results, such slabs are recommended for surfacing of intermittently and permanently use roads of categories III and IV, at an estimated cost 25-30% lower than that of using conventional cement concrete. Figures 3; tables 2, references: 4 Russian.

RELIABILITY OF STEAM REGENERATOR PIPES MADE OF GRADE 12Kh1MF STEEL AND HARDENED BY HEAT TREATMENT AND MECHANICAL FORMING

Moscow TEPLOENERGETIKA in Russian, No 4, Apr 78 pp 68-71

IVANOVA, V. A., doctor of technical sciences, ZLEPKO, E. F., candidate in technical sciences, FRIDMAN, Z. G., candidate in technical sciences, MOZHARENKO, I. P., candidate in technical sciences, PRONINA, G. G., engineer Institute of Metallurgy, USSR Academy of Sciences, All-Union Institute of Heat Engineering imeni F. E. Dzerzhinskiy, All-Union Scientific Research Institute of Pipes

[Abstract] Steam regenerator pipes made of grade 12Kh1MF steel (0.11% C, 0.23% Si, 0.47% Mn, 0.12% S, 0.010% P, 1.02% Cr, 0.30% Mo, 0.25% C) were tested for the purpose of determining their reliability after hardening by heat treatment and mechanical forming. The specimens were 32 mm in diameter and had a wall thickness of 4 mm. The preliminary heat treatment involved normalizing from 980°C without subsequent tempering or with tempering at 720°C. The mechanical forming operations were either drawing at 20°C, or reducing at 20°C, or reducing at 500°C. These operations were followed by annealing at 560°C for 20 h. The thus treated specimens were then tested for mechanical properties such as tensile strength, yield strength, percent elongation, and plasticity. They were also tested for heat resistance, in terms of life under pressure at 570°C. A service life of up to 100,000 h at 500-530°C is estimated on the basis of the test results. Pipes of this steel are also found to have an approximately 25% higher capacity than pipes of the austenitic grade EI257 steel. Figures 1; tables 2; references: 7 Russian.

USSR

EFFECTS OF TREATMENT OF CEMENT MORTAR WITH A MAGNETIC OR ELECTRIC FIELD

Kishinev ELEKTRONNAYA OBRABOTKA MATERIALOV in Russian, No 1, Jan-Feb 78 pp 38-40

KHANIN, M. V., SHALOBASOV, I. A., AND SHAL'NEV, K. K., Moscow

[Abstract] An experimental study was made of cement mortar treated with magnetic and electric fields at the Moscow Power Engineering Institute and at the Institute of Strength Problems (USSR Academy of Sciences). . . Specimens of cement mortar 40x40x40 mm³ in size, grade 400 with a 0.4 water-to-cement ratio were treated with a magnetic field for 0.5-2 h or with an electric field for 6 h at 25°C. The magnetic induction was varied from 0.08

to 0.4 T, its gradient across a specimen in the interpolar gap was varied from 0.008 to 0.04 T/cm. The electric field was maintained at a constant voltage of 3 or 10 V. After this treatment and after 1, 3, 7, and 28 days of curing, the strength of specimens (only 3-day specimens electrically treated) was measured in three orthogonal directions and compared with that of reference specimens not treated at all. The maximum strength of the now anisotropic specimens was found to be in the direction perpendicular to the field intensity gradient. The electric field had produced an anisotropy of 1.3-1.42, while the magnetic field had produced an anisotropy of 1.1-1.36 or 1.5 after addition of a fine-disperse ferromagnetic powder to the mix. A 31% higher strength in the preferred direction than that of untreated cement mortar could be attained by magnetic treatment, the mortar also cured much faster after such a treatment: its strength after 3 days was almost as high as that of untreated mortar after 28 days of cure. Empirical equations and graphs were prepared with the aid of a digital computer on the basis of the test data so that the process parameters (strength in three directions, magnetic induction, induction gradient, treatment time, cure time) can be optimized for industrial purposes. Figures 3; tables 1; references: 4 Russian.

USSR

UDC 681.317.67

MEASURING WITH UNIAXIAL INERTIAL SCANNING INSTRUMENTS

Leningrad IZV, VUZ, PRIBOROSTROYENIYE in Russian Vol 20, No 8, Aug 77
pp 21-23 manuscript received 2 Dec 76

GINSBURG, R. YE., GORODNICHEV, YU. A., and DEMIDENKO, V. P., Kazan

[Abstract] If it were possible to replace n probes oriented in n directions with fewer probes yielding the same information, this would appreciably reduce the size and the weight of measuring equipment. Here the feasibility of measurement with a uniaxial instrument is considered in the simplest case of a plane ($n=2$) which this instrument scans at a constant angular rate. The measured quantity is represented by its two (x,y) components and its projection on the sensitivity axis of the instrument (its sensitivity axis). The error of such a measurement, with integration of the readings over the scanning time, is principally due to the coupling between both instrument channels and found to be inversely proportional to the scanning rate. Special means of error compensation are thus required. Figures 1; references: 3 Russian.

USSR

UDC 620.179.16

A METHOD OF MEASURING THE CHARACTERISTICS OF PULSE SIGNALS OF ACOUSTIC RADIATION, AND A DEVICE FOR REALIZING THIS METHOD

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI in Russian No 15, 1978 pp 135-136

[Description of Author's Certificate No 603893 Division G, filed 19 May 76, published 25 Apr 78]

KONSTANTINOV, V. A., LYKOV, YU. I. and CHENTSOV, V. P.

[Text] This Author's Certificate introduces: 1. A method of measuring the characteristics of pulsed signals of acoustic emission that consists in reception of the acoustic pulses, converting them to electric signals, amplification and analysis. As a distinguishing feature of the method the dynamic range of measurement of the energy characteristics of pulsed signals of acoustic emission is extended by predetermining the direction of propagation of the wave of acoustic emission from the source, picking up the signals at two reception points separated by a given distance in the direction of wave propagation, and automatically regulating the amplification of the signal from the second reception point depending on the amplitude of the signal at the first reception point. The distance S

between the points is determined from the condition $S' \geq t_r \cdot V$, where t_r is the rise time of the peak detector pulse, and V is the velocity of propagation of the acoustic wave in the material. 2. A device for realizing this method that contains an electroacoustic converter, an amplifier and an analysis unit. As a distinguishing feature, this device is equipped with a series circuit comprising an additional electroacoustic converter, an amplifier, a video detector, a Schmidt trigger, a reset pulse shaper, a peak detector and an actuating element. The other output of the additional amplifier is connected to the second input of the peak detector. One output of the actuating element is connected to the second input of the main amplifier, while the other output is connected to the first input of the analysis unit. The second input of the analysis unit is connected to the output of the main amplifier, and the first input of the latter is connected to the electroacoustic converter.

USSR

UDC 621.375.826.083

RELATIVE MEASUREMENT OF THE WAVELENGTH OF THE 3.39 AND 0.63 μm RADIATION OF HIGH STABILITY LASERS

Moscow, IZMERITEL'NAYA TEKHNIKA, in Russian, No 1, Jan 78, pp 31-33

BIKMUKHAMEDOV, K. A., BOBRIK, V. I., KOLOMNIKOV, UY. D. AND TOROPOV, A. K.

[Abstract] The Siberian Scientific Research Institute for Metrology has developed a method and created an installation for measurement of the ratio of wavelengths of the 3.39 μm laser radiation and the wavelength of a laser operating in the visible range of the spectrum. The operating principle is as follows: radiation from a laser ($\lambda = 3.39 \mu\text{m}$), passing through an interferometer (near its transmission maximum) produces an electric signal at the output of a photoelectric cell, which is sent to the input of an extremum automatic regulation system which stabilizes the length of the interferometer at the transmission maximum of the 3.39 μm wavelength. The synchronous detector of the extremum regulation system receives a reference signal from an oscillator tuned to the frequency of modulation of the laser radiation, 18 kHz. The use of the frequency-modulated laser radiation avoids the need to modulate the length of the interferometer itself. Using this length-stabilized interferometer, a photocell and an automatic frequency tuning system, the frequency of the radiation of a second laser can be measured with an accuracy of better than $3 \cdot 10^{-8}$, thus improving on the international krypton standard for wavelength. Figure 1, references 9: 5 Russian, 4 Western.

USSR

UDC 53.089.68:531.71

A NEW SPECIAL STANDARD TO ASSURE UNIFORMITY OF MEASUREMENT OF LOW ANGULAR VELOCITIES

Moscow, IZMERITEL'NAYA TEKHNIKA, in Russian, No 1, Jan 78, pp 36-37

IVANOV, V. A., POVARENKOV, A. S. AND CHISTYAKOV, S. K.

[Abstract] In order to provide uniformity of measurement of low angular velocities, the Production Union of the All-Union Scientific Research Institute for Metrology has created a state special standard for the unit of angular velocity and developed a nationwide testing system for standards for measurement of angular velocity in the range of $5 \cdot 10^{-8}$ - $2.5 \cdot 10^{-4}$ rad/s. The mean square error of results of measurement is $2 \cdot 10^{-9}$ rad/s. The systematic error is $2 \cdot 10^{-9}$ rad/s. The standard consists of a measurement system including a collimating transducer and an information processing unit. The device operates by measuring the angular velocity by measurement of the time of rotation of a reflecting element over a fixed angle.

USSR

UDC 531.76.08

MEASUREMENT OF THE PARAMETERS OF MOTION BY METHODS OF COMPARISON WITH THE MOTION OF STANDARD DEVICES

Moscow, IZMERITEL'NAYA TEKHNIKA, in Russian, No 1, Jan 78, pp 49-52

IVANOV, V. A.

[Abstract] The methods analyzed in this article are based on the idea of comparison of two motions: the desired motion and the motion realized by a standard device. The standard motion is assumed known with the required accuracy. The methods can be used for the construction of programmed motion of manipulator elements through predetermined trajectories, and also in navigation. One method is to construct a reflecting cam, the surface of which traces the desired motion as the cam is rotated. The Doppler frequency shift of laser light reflected from the surface of the cam as it is rotated is used to reproduce the desired motion. Another method is to affix a magnetic drum or disc to a shaft, which rotates at constant speed, and record a series of pulses on the magnetic medium. When the magnetic medium is then attached to a shaft rotating with a desired irregular motion, the intervals between pulses can be measured to determine the motion and allow it to be tracked by another shaft carrying a disc with magnetic pulses recorded at similar positions. Figures 3; Reference 1 Russian.

USSR

UDC 541.123.2:546.831.17

DETERMINING THE EQUILIBRIUM PRESSURE OF GASEOUS COMPONENTS IN REFRACTORY COMPOUNDS BY THE KNUDSEN METHOD

Moscow ZAVODSKAYA LABORATORIYA in Russian Vol 44, No 3, May 78 pp 296-299

KHROMOV, YU. F., TIMOSHENKO, I. B., ALEKSEYEVA, I. S., AND ZHMUROV, S. A.

[Abstract] Measurement of the equilibrium pressure of condensable and gaseous components of refractory compounds such as nitrides is considered at temperatures up to 2800 K and within the homogeneity range of these compounds. A preliminary evaluation of various methods has led to the choice of the Knudsen method of integral effusion for dealing with equilibrium evaporation of variable-composition phases. According to the Dushman criterion, this method is suitable for the maximum pressures of 5-10 mm Hg expected in the case of zirconium nitride. A major problem in application of this method is the requirement that the materials of the crucible-evaporator and of the reflector in the Knudsen effusion chamber do not interact with or affect the test substance in either gaseous or solid state, also that their vapor tensions be lower than that of the test substance. Accordingly, a crucible made of $ZrN_{0.54}$ is found appropriate for testing the $ZrN_{0.96}$ material over the 1700-2300 K temperature range, with the reflector made of the same test material and with the gas pressure measured after proper calibration of the transducer (omegatron) at given diameters of the effusion orifices. The relative error in the determination of partial evaporation rates, vapor pressures, and partial heat of sublimation is 20-30% and 3-5% respectively. The total error of a temperature measurement with an optical reference pyrometer, based on a perfectly black body is $\pm 10-20$ K. Figures 4: references 9: 7 Russian, 1 German, 1 Western.

USSR

UDC 621.565.944

A METHOD OF DETERMINING THE COEFFICIENTS OF PRESSURE LOSSES IN COMPACT PLATE-AND-RIB HEAT EXCHANGERS

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI in Russian No 15, 1978 pp 121-122

[Description of Author's Certificate No 603831 Division F, filed 14 Jul 76, published 25 Apr 78]

DUBROVSKIY, YE. V. AND DREYSTER, G. A., Moscow "Order of Lenin" Aviation Institute imeni Sergo Ordzhonikidze

[Text] This Author's Certificate introduces a method of determining the

coefficients of pressure losses in compact plate-and-rib heat exchangers by isothermal blow-through of the channels of one heat exchanger in an air line, measuring the pressure differential across the unit with simultaneous measurement of the air temperature at the inlet to and outlet from the channels, and subsequent determination of the coefficient of overall pressure losses by Darcy's formula. As a distinguishing feature of the method, to improve accuracy while simultaneously reducing the work involved in determining the coefficients, a second heat exchanger is installed in the air line after the first one. The second unit is identical in design with the first, but the channels are of a different length. The air that has passed through the first heat exchanger is isothermally blown through the second, friction pressure losses are determined over a length equal to the difference in lengths of the channels of the two heat exchangers as the difference between the pressure differentials across each heat exchanger, and Darcy's formula is used to find the coefficient of pressure losses to friction. Then the coefficients of overall inlet and outlet pressure losses are determined for each heat exchanger.

USSR

UDC 521.2

DETERMINATION OF DYNAMIC FLATTENING OF VENUS FROM MEASUREMENTS OF THE TRAJECTORIES OF MOTION OF ITS FIRST ARTIFICIAL SATELLITES, 'VENERA-9' AND 'VENERA-10'

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 240, No 3, 21 May 78
pp 556-559 manuscript received 6 Feb 78

AKIM, E. L., VLASOVA, Z. P. AND CHUYKO, I. V., Institute of Applied Mathematics, Academy of Sciences USSR, Moscow

[Abstract] The dynamic flattening of Venus is determined from the data of trajectory measurements of the Venera-9 and Venera-10 satellites. The components of evolution of the satellite orbits resulting from the gravitational influence of the sun and planets are known, and observations of satellite motion enable determination of the component caused by the unknown eccentricity of the gravitational field of Venus. Orbital perturbations are calculated by numerical integration of the equations of perturbed motion of the satellites in Lagrangian form. Particular emphasis is given to the simplicity of the formulas used for calculating the isochronous partial derivatives of the measured functions with respect to the determined parameters. The observational material for the calculations was provided by radio measurements of the Doppler shift of the frequency of signals from the artificial satellites. Statistical processing by the method of least squares, with consideration of light pressure on the satellite surface, and solution of a 27-parameter problem gave a mathematical expectation of dynamic flattening of Venus with maximum possible errors $c_{20} = (-4.0 \pm 1.5) \cdot 10^{-6}$. Reference 1 Russian.

USSR

UDC 621.384.4/.5.083

STUDY OF THE LINEARITY OF PHOTORECEPTORS IN THE PULSE MODE

Moscow, IZMERITEL'NAYA TEKHNIKA, in Russian, No 1, Jan 78 pp 33-35

KOTYUK, A. F., TIKHOMIROV, S. V., KHATYREV, N. P., CHERNOYARSKIY, A. A.
AND YAKOVLEV, V. A.

[Abstract] Results are presented from a study of the light characteristics of a number of series-produced photoelectric measuring transducers designed to measure instantaneous power levels in the pulse mode with various parameters of the pulses measured and power supplies. The nonlinearity of the photoelectric transducers was measured by two methods in order to assure reliability of the results produced and determine possible systematic errors. It is found that the nonlinearity of transformation depends not only on the operating mode and parameters of the pulses measured, but also on the individual properties of each specific instrument, the spread within a series being as great as 5-10%. This requires individual certification and selection of transducers. Figures 4; References 4 Russian.

USSR

UDC 621.317.333.6:621.315.2.016.2

TESTING OF THE INSULATION OF HIGH-VOLTAGE DIRECT CURRENT CABLE LINES

Moscow, ELEKTRICHESTVO, in Russian, No 11, Nov 77, pp 72-73, manuscript received 15 Nov 76

GLEYZER, S. YE., KAPLAN, D. A., MAKAROV, L. YE. AND OBRAZTSOV, YU. V.

[Abstract] This article explains the expediency of testing the insulation of DC cable lines. The cable line as well as the terminal and connection fittings must all be tested at voltages higher than the nominal voltages for the lines. Testing methods and methods of calculating the characteristics of test equipment are described. Figure 1; References 8: 4 Russian, 4 Western.

USSR

UDC 621.311.25:621.039.002.5:546.3:658.562

TESTING THE CONDITION OF THE METAL OF THE EQUIPMENT OF NUCLEAR POWERPLANTS

Moscow, ELEKTRICHESKIYE STANTSII, in Russian, No 12, Dec 77 pp 11-21

GREBENNIK, V. S. AND SLEPKO, V. F., All-Union Institute of Thermal Engineering imeni F. E. Dzerzhinskiy

[Abstract] This article represents a major statement concerning the policy and methods to be used for testing of the condition of the metal of which the equipment of nuclear powerplants is made. Various possible types of damage to the metal of pipes and fittings are listed. Methods of non-destructive testing, their parameters and interfering problems reducing the accuracy of the methods are listed. A flow chart for manual nondestructive testing of metal fittings is presented and the peculiarities of application of nondestructive testing specifically at nuclear powerplants are noted. Requirements for nuclear powerplant materials testing systems and the experience gained in acceptance testing and testing during installation are reported. Photographs are presented of a portable scanning mechanism for testing of pipes and an instrument for testing of the parameters of defects. Two methods are noted for improving metal testing systems at nuclear powerplants: one is the selection of locations and intervals of testing on the basis of the experience of extensive, 100% testing of leader units. A second involves the development of non-destructive methods of testing of the structure and mechanical properties of metals not requiring the use of standard specimens. Testing of metal primarily in places of fatigue stress and places where stress concentrators are located can reduce the cost of metal testing systems without reducing the reliability of metal equipment. Figures 4; References 37 Russian.

USSR

UDC 539.62

DEVELOPMENT OF A METHOD OF DETERMINING ANTIFRICTION PROPERTIES BASED ON EVALUATING THE PROCESS OF RUBBING DURING STARTUP

Moscow MASHINOVEDENIYE in Russian No 3, May/Jun 78 pp 80-87 manuscript received 24 Dec 77

D'YACHKOV, A. K., Moscow

[Abstract] A method of determining antifriction properties is proposed in which experiments are done on a thrust-bearing testing machine. The criterion for evaluating the quality of antifriction properties is the

specific work of friction on the stage from the onset of motion to the instant when the fluid friction phase begins. This parameter can be determined by processing data on forces or the moment of resistance to motion beginning from onset of motion and ending with transition to the hydrodynamic phase. Three indices are proposed for relative quantitative evaluation of antifriction properties of a given combination. The first is the antifriction characteristic that is the ratio of the critical specific load of the investigated combination of materials and lubricant to the critical specific pressure of a standard. The second is reliability, which is the ratio of the starting friction characteristic under critical specific loading to the characteristic that arises under the specific load that corresponds to the working conditions of the given item for the investigated combination of materials and lubricant. The third is the quality of the friction process from the given friction couple and lubricant as applied to the given conditions. Examples are given of application of the proposed method with molybdenum disulfide surfacing of B-83 babbit, for new antifriction materials, for different starting temperatures of the friction process and for different kinds of lubricants. Figures 7, reference 1 Russian.

USSR

CONCERNING ZONES OF ORE OCCURRENCE ON DEPOSITS OF THE OKHOTSK-CHUKOT
VOLCANOGENIC BELT

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 239, No 6, 21 Apr 78
pp 1415-1418 manuscript received 24 Oct 77

SIDOROV, A. A. AND GONCHAROV, V. I., Northeast Complex Scientific Research
Institute of the Far East Science Center, Academy of Sciences USSR, Magadan

[Abstract] The paper describes a group of typomorphic ore formations in the Okhotsk-Chukot volcano zone. It is shown that ore occurrence in volcanogenic deposits is confined mainly to three types of zones: 1. a low-to-medium temperature isothermal zone of solutions of moderate and low concentration diluted by vadose waters (zone of metalloid veins); 2. a zone with different, chiefly high temperatures with abruptly variable temperature gradient made up of concentrated solutions partly super-saturated with alkali metal chlorides (explosive-hydrothermal breccia zone); 3. a medium-temperature zone with high temperature gradient made up of solutions of moderate concentration (zone of belted veins). These different types of zones show certain relations indicating that they are members of a common system of vertical zoning of volcanogenic ore formation. There are frequently cases of spatial overlapping of zones. In most deposits zones of one type are usually more pronounced, and less frequently--zones of two types. Figure 1, references 2 Russian.

USSR

CONCERNING ANOMALIES IN THE DISTRIBUTION OF HELIUM IN STUDYING THE STRUCTURE
OF ORE FIELDS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 239, No 6, 21 Apr 78
pp 1408-1410 manuscript received 26 Dec 77

BULASHEVICH, YU. P., associate member of the Academy of Sciences USSR, and
YURKOV, A. K., Institute of Geophysics, Ural Science Center, Academy of
Sciences USSR, Sverdlovsk

[Abstract] The authors consider the distribution of helium concentration in wells of the Podol'sk ore field in the Magnitogorsk synclinorium. It has been shown that helium concentration increases with depth in the range of background values of $n \cdot 10^{-4}$ - $n \cdot 10^{-3}$ m³/t. Tectonic dislocations, especially those associated with ore bodies, show elevated helium concentrations as high as 1 m³/t. In this case there is an increase in the gas factor as well, i. e. the specific amount of dissolved gas, from

15-20 to 40 m l/l. A recent development is anomalously high helium concentration through the entire well on the periphery of the ore field. In this well the nitrogen makeup of the dissolved gas has been replaced chiefly by methane composition. The main peculiarity of the helium anomaly is the high concentration from a shallow depth to the bottom of the well unaccompanied by zones of fractionation of ore bodies. It is hypothesized that fine cracks in the rocks throughout the vicinity of this well have accumulated helium and methane in the interstitial water. The authors thank Z. N. Sungurova for doing the chemical analysis and V. A. Shchapov for providing data of well thermometry. Figures 2, references 7 Russian.

USSR

UDC 551.71/.72(571.56)

A NEW PRE-CAMBRIAN GLACIAL TROUGH IN THE CENTRAL PART OF THE ALDAN SHIELD

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 239, No 6, 21 Apr 78
pp 1411-1414 manuscript received 2 Jan 78

REUTOV, L. M., Institute of Geology of the Yakutsk Affiliate, Siberian Department of the Academy of Sciences USSR, Yakutsk

[Abstract] A report on the discovery of a pre-Cambrian glacial trough in the west central part of the Aldan shield between the Amedichi and Chugi rivers. The discovery is the result of research in the area in 1972-1973 and in 1976. Schematic geological maps are given showing the formations in the vicinity of the trough and in the southern part of the trough itself. A scheme is presented to correlate the features of the trough with other sections of the Aldan shield. Figures 2, references 11 Russian.

USSR

UDC 624.121

ROCK MECHANICS: ACHIEVEMENTS AND LONG-TERM PROBLEMS

Moscow VESTNIK AKADEMII NAUK SSSR in Russian, No 3, 1978 pp 58-66

TURCHANINOV, I. A., doctor of technical sciences

[Abstract] The study of rock mechanics is a prerequisite for various related engineering enterprises such as oil and gas prospecting and drilling, underground and tunnel construction, water construction, and reclamation. The history of rock mechanics as a science in Russian dates back

to 1875 and progress has been steadily made since, especially during the 1907-1913 period and then since 1935. Despite the particularly outstanding achievements made during the last decade, there still remain problems to be tackled and these can be classified into several categories. One set of problems is involved with attempts to deeper penetrate the earth crust, another problem is involved with pitless mining and unmanned extraction of deposits. A third problem is the effect which dynamic loads due to natural and man-made causes have on rock formations. A fourth problem is predicting, on the basis of the knowledge of rock mechanics, what one will encounter on the moon and on other planets. The central object in all these problems is determining the laws which govern the state of stress. Much research in all these directions is now underway at the Institute of Mining imeni A. A. Skochinskiy, at the All-Union Scientific Institute of Mining Geomechanics, and Mine Surveying, Institute of Mining of the Siberian Department of the Academy of Sciences USSR, and at the Institute of Mining Affairs, and at the Institute of Mining, Academy of Sciences Kazakh SSR.

USSR

UDC 621.313.29.016.1.001.24

STUDY OF TORQUE PULSATIIONS IN LOW-SPEED CONTACTLESS DC MOTORS WITH DISCRETE ROTOR POSITION SENSOR

Moscow, ELEKTRICHESTVO, in Russian, No 11, Nov 77, pp 54-58, manuscript received 2 Aug 76

VORONIN, S. G., LIFANOV, V. A. AND SHUMIKHIN, B. G.

[Abstract] A study is presented of the pulsations of torque of contactless dc motors with discrete rotor position sensors as a function of the angle of rotation of the rotor, considering the discrete nature of displacement of magnetizing force of the stator and the switching processes in the winding as the sections are switched. A 3-section motor with a rotor consisting of a cylindrical permanent magnet and a controlled semiconductor switch connected in a bridge circuit is studied. Both 180° six-cycle switching 120° six-cycle switching are analyzed, as well as twelve-cycle switching. It is found that with 180° switching, the switching processes do not cause torque pulsations. Figures 3; references 4 Russian.

USSR

UDC 539.43

INVESTIGATION OF LOW-CYCLE STRENGTH OF BELLOWS COMPENSATORS AT HIGH TEMPERATURES

Moscow MASHINOVEDENIYE in Russian, No 3, May/June 78 pp 58-67 manuscript received 15 Aug 77

GUSENKOV, A. P., LUKIN, B. YU. AND MOSKIVITIN, G. V., Moscow Ufa

[Abstract] A method is proposed for calculating the permanent strength of displacement compensators in the form of bellows after a low number of loading cycles with consideration of the influence of high temperatures. The method is based on using a deformational-kinetic criterion of low-cycle permanent strength developed at the State Scientific Research Institute of Machine Sciences, and on solution of the problem of the stressed and strained state of a bellows compensator with long-term cyclic loading, and also data on the mechanical properties of materials. Expressions are given for the limiting state with respect to crack formation, fatigue damage, the amplitude of axial displacement of a half-corrugation due to strain, the components of the strains and stresses for a given half-cycle of loading and deformation as a function of the number of loading cycles. Comparison of calculations with experimental data shows that it is feasible to use a deformational-kinetic criterion for calculating the permanent low-cycle strength of bellows compensators. Figures 6, references 19 Russian.

USSR

UDC 620.178.311

STRAIN CRITERION OF FATIGUE FRACTURE IN METALS AFTER LONG LOAD CYCLING

Kiev VISNIK AKADEMIY NAUK UKRAYNS'KOY RSR in Ukrainian Vol 42, No 4,
Apr 78 pp 42-53

TROSHCHENKO, V. T., corresponding member, Academy of Sciences of the
Ukrainian SSR

[Abstract] The fatigue characteristics of metals under long load cycling are analyzed, taking into account the lag as well as the hysteresis in stress-strain cycles. The theoretical analysis is supplemented with an analysis of an experimental study made on four groups of metal alloys: 1) nickel alloys, aluminum alloys, and titanium alloys with small and hardly measurable inelastic strains after long cycling; 2) carbon steels, alloy steels, coppers, and bronze with the elastic limit close to the endurance limit on the basis of 10^7 cycles; 3) brass with the elastic limit beyond the endurance limit; and 4) austenitic steels and cast iron with the elastic limit below the endurance limit. On this semiempirical basis, strain criteria are derived for characterizing and comparing various materials with regard to their fatigue strength. Figures 7; tables 2; references 21: 16 Russian, 1 German, 4 Western.

USSR

UDC 620.178.15.4

METHOD OF STATIC INDENTATION FOR EXAMINATION OF SUBSURFACE LAYERS IN BRITTLE SINGLE CRYSTALS

Moscow ZAVODSKAYA LABORATORIYA in Russian Vol 44, No 2, Feb 78 pp 217-220
manuscript received 4 Oct 76

YENISHERLOVA, K. L., KUTEYNIKOVA, Z. A., AND PODSHIBYAKINA, N. P.

[Abstract] A study was made to determine the variation of microhardness of brittle single crystals over a wide range of loads applied through various indenters. These indenters included a Vickers square-base pyramid and a Knoop rhomb-base pyramid, the load was varied from 5 to 200 gf. Wafer specimens of silicon and lithium niobate were processed according to standard technologies with appropriate heat and mechanical treatment, their surface being subsequently finished by chemico-mechanical polishing. After measurements in a PMT-3 hardness tester with automatic smooth load buildup and with special vibration proofing, these specimens were again etched and then microphotographed. The results indicate that the microhardness of brittle single crystals as well as their other mechanical characteristics and elastoplastic deformability are best determined under

a load within 40-70 gf, till circular petaloid cracks appear around the impression. The deformability anomalies in thin subsurface layers are preferably revealed by tests with a Knoop indenter under a load smaller than 40 gf, also in the presence of a surfactant. Heavier loads are recommended for determining the degree of brittle fracture. Static indentation reveals the dominant mode and the trend of a fracture in subsurface layers of various thicknesses. Figures 4; tables 1; references: 6 Russian.

USSR

FRACTURE OF NONHOMOGENEOUS MATERIALS UNDER PULSE LOADS

Kishinev ELEKTRONNAYA OBRABOTKA MATERIALOV in Russian, No 1, Jan-Feb 78
pp 32-34

KALYATSKIY, I. I., KURETS, V. I., AND VOLKOVA, N. M., Tomsk

[Abstract] The problem of selective fracture is an important one in the ore comminution and concentration technology. A study was made to determine the effect of inclusions on the cracking process initiated by pulse loads in the form of electric discharges. As test models served cylindrical specimens of grade S-114-1 glass (diameter 50 mm and height 30 mm) in transformer oil. As inclusions (2-3 mm size) served grains of molybdenum or garnet and gas bubbles, three or six of them in a specimen symmetrically spaces. Pulses with an energy content of 200 J over a duration of 2.2 or 22 us, depending on the inductance of the discharge circuit, were generated and correspondingly different crack densities were noted. The results indicate, furthermore, that local mechanical stress increases cause cracking and fracture in a nonhomogenous material to occur predominantly around the inclusions. Figures 1; tables 2, references 6.

USSR

UDC 621.313.322-81.064.1.001.24

TORQUE ON THE SHAFT OF A TURBINE DURING DISCONNECTION OF SHORT CIRCUITS

Moscow, ELEKTRICHESTVO, in Russian, No 2, Feb 78, pp 22-26, manuscript received 4 Mar 76

GLEBOV, I. A., KAZOVSKIY, YE. YA., OSTROUMOV, E. YE. AND RUBISOV, G. V.

[Abstract] As the unit power of turbines increases, the specific electromagnetic, thermal and mechanical loads on the structural elements of the machine increase; it is therefore quite important to study the transient modes of a generator (disconnection of brief short circuits, automatic reclosing, sequential short circuits, etc.) in which the electromagnetic, thermal and mechanical loads may be higher than those encountered in sudden short circuits. This article presents an experimental study and comparison with digital computer calculations of the torque acting on the shaft of a turbine during disconnection of brief balanced and unbalanced short circuits from the nominal load mode of the generator, operating in parallel with a network of finite power capacity, without disconnection from the network. The use of the tensometric method of determination of torque on the shaft of a model turbine allows the first experimental confirmation of the effect of increased torque acting on the shaft unit of a turbine after disconnection of short circuits, which had been predicted earlier by the authors. The maximum torque is approximately 40% higher than the maximum torque encountered with a 3-phase short circuit in the loaded mode. The results of the studies indicate a need to consider the possibility of increasing mechanical stresses in the shaft of a turbine after disconnection of a brief short circuit, so that the necessary strength reserve can be provided. Figures 5; references 3: 1 Russian, 2 Western.

USSR

UDC 621.165.6-5.004.69.001.5

PECULIARITIES OF REGULATION OF THE K-200-130 TURBINE WITH STEAM TAKEOFF

Moscow, ELEKTRICHESKIYE STANTSII, in Russian, No 5, May 78 pp 23-25

KARLINER, V. M., LEZMAN, V. I. AND LYAKIN, A. V., Khar'kov Affiliate of Central Design Bureau of Main Administration for Power Equipment Repair

[Abstract] One of the easiest sources of steam takeoff for heat supply is the K-200-130 turbine manufactured by the Leningrad Metals Plant, since the absolute pressure drop between the medium and low pressure cylinders with maximum steam throughput is 0.13 MPa, which corresponds to the standard level of pressure for a steam heating system. This article describes

some problems encountered in modernization of the regulation systems used with such turbines, such as selection of the type and design of low pressure regulating unit, problems related to intermediate superheating of steam, assurance of safe operation in all possible turbine operating modes, and automation of the process of disconnection of the steam takeoff and opening of the low pressure regulating organ when the electrical load drops. Figures 3; references 4 Russian.

USSR

UDC 621.313.323.013.8:621382.233.026

STUDY OF THYRISTOR BRUSHLESS SYSTEMS OF EXCITATION OF MEDIUM AND HIGH POWER TURBINE ENGINES

Moscow, ELEKTROTEKHNIKA, in Russian, No 2, Feb 78, pp 28-31

LOGINOV, S. I., VAL'KOV, V. I., BEKHTEREVA, T. V. AND RYABENKO, YE. I.

[Abstract] Two brushless thyristor excitation systems were studied for series STD-630.12,500 kW 3000 rpm turbine engines. The exciter systems were studied on an electrodynamic model, used as the synchronous motor, with the following parameters: $P = 12\text{kw}$, $V_{st} = 380\text{ V}$, $I_{st} = 23\text{ A}$, $\cos \varphi = 0.8$. A dc motor type PN-290 supplied the load, mounted on the same shaft as the MG15-1000 electrodynamic model. The static and dynamic modes of the model synchronous motor were studied. Oscillograms of the startup mode of the motor are presented. It was found that the weight, size and power-consumption characteristics of the brushless exciter could be improved by the use of a combined brushless thyristor excitation system with regulation of the excitation with a static thyristor converter in the exciter winding and a thyristor rotating converter, used to damp the field during automatic startup and other modes. Figures 5; references 5 Russian.

USSR

UDC 621.165.001.5

THE POSSIBILITY OF TECHNICAL DEVELOPMENT OF VARIOUS TYPES AND SIZES OF
LOW-PRESSURE CYLINDERS FOR TURBINES BY THE METHOD OF PROBABILISTIC
EXPERT ESTIMATES

Leningrad, ENERGO MASHINOSTROYENIYE, in Russian, No 5, 1978, pp 21-23

MOISEYEVA, L. N. , PESHKOVSKII, A. O., NUSHNIVICH, V. I. AND LEONT'EV, V. K.,
Scientific and Production Union for the Study and Planning of Power
Equipment imeni Polzunov (Central Institute for Boilers and Turbines);
Ministry for Power Machinery

[Abstract] The concentration of the power-generating capacities of power equipment, including steam turbines, is one of the main trends in the development of power engineering and power machine building. This requires the solution of a number of problems, including the problem of development and creation of efficient designs of low-pressure cylinders (LPC). Further increases in the power capacity of turbines require the development and creation of new LPC types and sizes. Important means for this may include: the development and creation of LPC on the basis of existing designs; the development and creation of the last stages of LPC with longer vanes; the development and creation of LPC using basically new designs for exhaust with existing types and sizes of last stages. The specialists who took part in expert estimates of the capabilities of various types and sizes of LPC believe that increasing their throughput capacity by increasing the specific load on the output cross section, with the corresponding increases in counterpressure, using present designs of vanes for the last stages, are most probable. The creation of final stages with longer vanes for turbines operating at 3,000 rpm is considered improbable. Most experts believe that it is possible to increase the throughput capacity of LPC for low-speed turbines (1500 rpm) by increasing vane length and by creating new designs of exhaust sections, using existing types and sizes of final stages.

USSR

UDC 621.165:621.438.001.5

A HIGH-TEMPERATURE GAS-STEAM INSTALLATION

Leningrad, ENERGO MASHINOSTROYENIYE, in Russian, No 4, 1978, pp 5-6

KIRILLOV, I. I., ARSEN'EV, L. V., KOTOV, YU. V. AND KHODAK, YE. A.,
Leningrad Polytechnical Institute imeni M. I. Kalinin

[Abstract] The creation of a high-temperature gas turbine operating for long periods of time at 850-900 C solves a number of problems of large-

scale power generation. Leningrad Polytechnical Institute is now studying the development of an optimal combined installation including a high-temperature gas turbine with intensive cooling of the passages. The turbine will use a closed steam system of cooling of the gas turbine, with intermediate super-heating of the steam, allowing effective utilization of the heat of the cooling system in a condensation turbine for the performance of useful work, with an afterburner before the low-head steam generator, to increase the efficiency of the installation and improve its maneuverability. One great advantage of the system is its ability to utilize high-sulphur fuels, since the steam and air necessary for gasification and cleansing of the fuel are both present in the installation as it operates. Today's level of science and technology should support the creation of such a gas-steam turbine with an efficiency of 50% or even higher. Figure 1; references 16: 14 Russian, 2 Western.

USSR

UDC 621.165.001.3

THE TYPE T-180/210-130 HEAT-SUPPLY TURBINE OF THE LENINGRAD METALS PLANT

Leningrad, ENERGO MASHINOSTROYENIYE, in Russian, No 4, 1978, pp 7-10

RYZHKOV, V. K., NEZHENSTEV, YR. N. AND LISNYANSKII, F. A., Production Union for Turbine Building of Leningrad Metals Plant

[Abstract] The Central Institute for Boilers and Turbines, All-Union Scientific Research and Planning Institute for the Power Industry, and State Institute for the Planning of Electrical Equipment for Heat Engineering Installations, considering planning and design work already performed and the extensive utilization of individual elements of equipment already in production (steam generators, electric power generators, transformers, feed pumps, regenerative heaters, etc.) has determined that it is desirable to create new, powerful heat-supply turbines, the T-175/210-130, with initial steam parameters 130 kg/cm², 555 C, and the T-180/210-130, initial steam parameters 130 kg/cm², 540/540 C. The T-180/210-130 steam turbine is to be created on the basis of the widely used sections of the K-210-130 turbine plus supplementary equipment. The basic characteristics of the new turbine are to be: nominal power 180 MW: maximum power 210 MW: maximum steam consumption 670 t/hr; nominal thermal load 260 Gcal/hr; circulating water flow 19,000 m³/hr; specific heat flow with cooling water temperature 27 C, 2,067 Kcal/kW·hr). One significant feature of the new turbine is its ability to operate at the maximum steam flow in the condensation mode at a power of 210 MW. This will allow the capacity of the turbine to be used during the summer, and during the initial period of operation when the thermal load is not fully used. A cross-sectional diagram and thermal diagram of the turbine are presented. In comparison to

the best currently produced heat-supply turbine, the T-110/120-130, the new turbine will provide a savings of 2.6 million rubles per installation per year. Figures 2; references 5 Russian.

USSR

UDC 621.165.76.001.5

EXPERIMENTAL STUDY OF DUAL-FLOW RADIAL-AXIAL TURBINE STAGES

Leningrad, ENERGO MASHINOSTROYENIYE, in Russian, No 4, 1978, pp 14-16

KIRILLOV, I. I., BIRZHAKOV, M. B., LITINETSKII, V. V. AND PODBORSKIY, L. N., Leningrad Polytechnical Institute imeni M. I. Kalinin

[Abstract] One promising trend in the improvement of the low-pressure cylinders of powerful steam turbines is the use of a dual-flow radial-axial stage (DRAS) at the input to the LPC, followed by axial stages. This article studies the problem of selection of the optimal design, and presents an experimental determination of the characteristics of DRAS under specific operating conditions, with large, asymmetrically changing clearances between the runner and the body, and determines the influence of the subsequent axial stages on the operation of the DRAS. The study was performed by creating and testing a model of a DRAS in air at the Problems Laboratory of Turbine Building of Leningrad Polytechnical Institute. The purpose of these experimental studies was to compare the characteristics of stages with runners of various designs, including changes of the axial-radial clearances over broad limits, and with asymmetrical placement of the runner relative to the flow-guiding apparatus. It was found that DRAS with closed-type runners have high efficiency. Figures 3; references 4 Russian.

USSR

UDC 62.50:621.165

OPTIMIZATION OF A DUAL-SHAFT GAS TURBINE AS TO OPERATING SPEED

Minsk, ENERGETIKA, in Russian, No 9, Sept 77, pp 75-82, manuscript received 30 Nov 76

SMIRNOV, G. M., Leningrad Machine Plant imeni XXII Party Congress

[Abstract] A dual-shaft gas turbine is used to drive injectors that operate, for example, on main-line gas pipelines. These turbines are usually produced with optimal regulators. In the development of regulators

by the method used in the Department of Automation and Remote Control of the Leningrad Electric Engineering Institute, optimization involves using a linearized model of the installation. This article suggests the use of the generalized nonlinear model of the turbine produced for the first time by the author. The speed-optimal control of a dual-shaft gas-turbine installation consists of two intervals of continuity, each with its own extreme equation. The moment of switching from one to the other is determined numerically for each boundary-value problem. The equations lead to an optimal control rule for the consumption of fuel. Calculations were performed for the specific parameters of actual gas-turbine units, but the conclusions generated are applicable to any gas turbine. Figures 2; references 5 Russian.

USSR

UDC 621.165.620.178.53

SOME METHODS OF INCREASING THE VIBRATION RESISTANCE OF TURBINE UNITS

Moscow, TEPLOENERGETIKA, in Russian, No 5, May 78, pp 10-13

KOSTYUK, A. G., KUMENKO, A. I., SERKOV, S. A., SHOSHIN, V. G. AND LUPOLO, O. A., Moscow Power Engineering Institute, Kostromskaya Regional Electric Powerplant

[Abstract] This article studies the influence of the type of bearings, their geometric characteristics and the reaction of the bearings on the vibration resistance of the shaft drives of large steam turbines. For a specific turbine unit there is an optimal distribution of bearing reactions providing the greatest vibration resistance of the shaft drive. Each different value of lateral clearance in the elliptical bearings corresponds to an optimal form factor (or optimal top clearance) at which the threshold power capacity reaches its maximum value. The use of segmented bearings can increase the threshold power capacity by over 30% in comparison to elliptical bearings with identical side clearances. Under favorable conditions (relationships of clearances), the use of segmented bearings may decrease vibration resistance. In selecting the type, geometric characteristics and load on bearings, versions should be compared as to level of vibration stability. Figures 7; references 7 Russian.

EQUIPMENT
Acoustical and Ultrasonic

USSR

UDC 620.179.16

AN ULTRASONIC DEVICE FOR CONCRETE TESTING

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 12, 1978 p 167

[Description of Author's Certificate No 600438, Division G, filed 3 Aug
76, published 30 Mar 78]

VAYNORIS, Z. A. AND SIMANAS, A. G., Vil'nyus Construction Engineering
Institute

[Text] This Author's Certificate introduces an ultrasonic device for concrete testing that contains a synchronizer, scanning oscillator, CRT display, a series circuit comprising a probing pulse generator, a sending and receiving converter and an amplifier, and also a gating pulse generator, a quartz-controlled pip oscillator, a first mixer and two frequency dividers. The first input of the CRT display is connected to the output of the scanning oscillator, and the second input of the display is connected to the first output of the amplifier. The first input of the first mixer is connected to the first output of the pip oscillator. As a distinguishing feature of the device, provision is made for chart recording of acoustic signals by adding a sawtooth voltage generator with input connected to the first output of the gating pulse generator. The first output of the sawtooth voltage generator is connected to the synchronizer input, and the second output of the sawtooth voltage generator is connected to the terminal tied to the X-channel of the chart recorder. Also added is a second mixer with the first input connected to the second output of the amplifier, while the second input of this mixer is connected to the output of the gating pulse generator, and the mixer output is connected to the terminal that is tied to the Y channel of the chart recorder. The third input of the display is connected to the second output of the pip oscillator, and the output of the first frequency divider is connected to the inputs of the gating pulse generator and the scanning oscillator. The inputs of the frequency dividers are connected to the synchronizer outputs. The output of the second frequency divider is connected to the input of the gating pulse generator, and the second output of this generator is connected to the second input of the first mixer. The output of this mixer is connected to the chart recorder pen control channel.

USSR

UDC 620.179.16

AN ULTRASONIC DEVICE FOR MEASURING THE ACOUSTIC CHARACTERISTICS OF SOLIDS

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 12, 1978 p 167

[Description of Author's Certificate No 600435, Division B, filed 24 Jun
76, published 30 Mar 78]

NAGURITSA, V. P. AND SELEZNEV, N. I.

[Text] This Author's Certificate introduces an ultrasonic device for measuring the acoustic characteristics of solids based on Author's Certificate No 307814. As a distinguishing feature of the device, measurement accuracy is increased by adding a series-connected matching device, time selector and scaler. The second input of the scaler is connected to the output of the master oscillator. The instrument also incorporates a high-frequency pulse oscillator that is connected to the second output of the time selector. The second input of the matching device is connected to the output of the master oscillator, and the second output of the matching device is connected to one of the vertical plates of the cathode-ray tube.

USSR

UDC 534.141

A DEVICE FOR RADIATING SOUND INTO AN AMBIENT MEDIUM

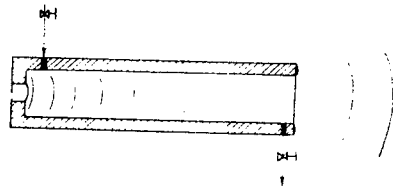
Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 19, 1978 p 12

[Description of Author's Certificate No 607604 Division B filed 14 Dec
76, published 25 May 78]

GROMOV, YU. I., NOVIKOV, L. V. AND SEMENOV, A. G.

[Text] This Author's Certificate introduces a device for radiating sound into an ambient medium. The device contains a sound generator fastened in the bottom of a cup-like acoustic resonator filled with an elastic medium. As a distinguishing feature of the patent, in order to reduce the overall dimensions the cup-like acoustic resonator is equipped with an elastic diaphragm fastened to the end opposite the bottom, and the elastic medium is a gas with speed of sound transmission less than that in the ambient medium, the density of the gas being equal to the product of the density of the ambient medium multiplied by the ratio of the speed of

sound in the ambient medium to that in the gas.



USSR

UDC 62-712

A METHOD OF STABILIZING THE TEMPERATURE OF A WORKING FLUID AND A DEVICE FOR REALIZING THIS METHOD

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI in Russian No 19, 1978 p 33

[Description of Author's Certificate No 607705 Division B, filed 25 May 1975, published 25 May 1978]

GAVRILOV, A. N., GODIN, E. M., KEBETS, L. N., BEREGOVOY, I. Z., MATSKEVICH, V. I., KORF, YA. O. AND NEYMAN, V. G., Moscow "Order of Lenin" Aviation Institute imeni Sergo Ordzhonikidze

[Text] This Author's Certificate introduces: 1. A method of stabilizing the temperature of a working fluid in the hydraulic loop of a pneumo-hydraulic drive. In this technique the temperature of the working fluid is maintained at a predetermined level by heat exchange with a gas. As a distinguishing feature of the device, efficiency is increased by using the spent compressed air of the pneumatic loop as the heat-exchange fluid. The fluid in the hydraulic loop is brought into periodic contact with this heat-exchange medium for the time required to bring the temperature of the working fluid to the predetermined level. 2. A device for realizing the method covered in point 1 that is made in the form of a heat exchanger with pneumatic and hydraulic heat-exchanger media fed through separate channels. A two-position pneumatic distributor installed in the feed line switches the air to the heat exchanger. A choke is installed in the hydraulic line that is shunted by a heat sensor connected to the two-position distributor.

USSR

UDC 62-50

A REGULATOR OF THE CONCENTRATION OF ATMOSPHERIC IONS

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI in Russian No 12, 1978 pp 189-190

[Description of Author's Certificate No 600538, Division G, filed 25 Mar 1974, published 30 Mar 1978]

REUTA, V. P., MAKOVEYEV, V. M. AND SOKHABEYEV, V. M., KAZAN' "Order of the Red Banner of Labor" Aviation Institute imeni A. N. Tupolev

[Text] This Author's Certificate introduces: 1. A regulator of the concentration of atmospheric ions that contains an ion chamber connected

through a relay to a chamber protection unit, a data point setter for the ion concentration to be regulated, and first and second flip-flops. The outputs of the flip-flops are connected to the inputs of a first decoder, while the set terminals of the flip-flops and one input of the first decoder are connected to the outputs of a control pulse shaper. The relay is connected to the third output of the control pulse shaper. The outputs of the first decoder are connected to the inputs of a reversible counter. The set terminals of the counter are connected to the data point setter for the initial state. The outputs of the reversible counter are connected to the inputs of a digital-analog converter that is connected through a control unit to an ionizer. As a distinguishing feature of the regulator, accuracy is improved by adding an analog-code converter, a pulse counter and a digital display. The display is connected to the outputs of the pulse counter. The counting input of the counter is connected to the output of the analog-code converter. The input of the analog-code converter is connected to the chamber protection unit. The set terminal of the pulse counter is connected to the first output of the control pulse shaper, and the outputs of the pulse counter are connected to the inputs of the data point setter for the ion concentration to be regulated. The output of this data point setter is connected to the counting input of the first flip-flop, and the output of this flip-flop is connected to the counting input of the second flip-flop. 2. A modification of this regulator distinguished by the fact that the data point setter for the ion concentration to be regulated contains a series circuit comprising a second decoder and a switch. The inputs of the second decoder are connected to the inputs of the data point setter for the ion concentration to be regulated, and the outputs of the switch are connected to the output of the data point setter.

USSR

UDC 681.323

A MULTICHANNEL CORRELATOR

Moscow OTKRYTIYA, IZOBRETIENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 12, 1978 p 197

[Description of Author's Certificate No 600564 Division G, filed 4 Jan
1976, published 30 Mar 78]

ZELENKOV, A. A., Kiev, "Order of the Red Banner of Labor" Institute of
Civil Aviation Engineers

[Text] This Author's Certificate introduces a multichannel correlator that
contains a commutator and has a reversible counter in each channel. The
counting input of each counter is connected to the output of a corresponding

AND gate, and the first input of the AND gate in each channel is connected to the corresponding output of the commutator, the input of the commutator being connected to a pulse generator. The first input of the correlator is the input of a first matching unit with output connected to the information input of a sign memorizing unit. The controlling inputs of this unit are connected respectively to the first and last outputs of the commutator and to the controlling inputs of a signal level memorizing unit. The second correlator input is the input of a second matching unit with output connected through a full-wave detector to the input of a voltage-to-frequency converter. The output of this converter is connected to the first input of an additional AND gate whose second input is connected to the output of a voltage-to-time interval converter with the first input connected to the output of the pulse generator. The output of the additional AND element is connected to the second input of the AND gate in each channel. As a distinguishing feature, the device is simplified by adding another full-wave detector, a switching unit, a source of constant potentials, a paraphase amplifier and a sign discriminator with input connected to the output of the paraphase amplifier, while the outputs of the sign discriminator are connected respectively to the controlling inputs of the reversible counters in each channel. The controlling input of the paraphase amplifier is connected to the output of the sign memorizing unit, while the input of the paraphase amplifier is connected to the second input of the correlator. The inputs of the switching unit are connected respectively to the outputs of the source of constant potentials and the signal level memorizing unit. The information input of the signal level memorizing unit is connected to the output of the additional full-wave detector with input connected to the output of the first matching unit.

USSR

UDC 621.565.58

A HEAT TUBE

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 15, 1978 p 121

[Description of Author's Certificate No 603829 Division F. filed 18
Oct 76, published 25 Apr 78]

MOSIN, I. I. AND LOKAY, N. V., Kazan' "Order of the Red Banner of Labor"
Aviation Institute imeni A. N. Tupolev

[Text] This Author's Certificate introduces a heat tube that contains
a hermetically sealed housing with bimetal elements in its inner cavity.
As a distinguishing feature of the patent, to improve operational reliability

when heat is transmitted along the axis of the housing, the bimetal elements are made in the form of lobes fastened in pairs on the walls of the housing symmetrically with respect to the axis.

USSR

UDC 621.314.225.004.69

INTEGRATED OPERATIONAL AMPLIFIERS IN THE CIRCUITS OF INDUCTIVE AND MAGNETICALLY SENSITIVE ELECTRIC SIGNAL CONVERTERS

Leningrad, IZVESTIYA VUZ--PRIBOROSTROYENIYE, in Russian, No 12, 1977, pp 17-22, manuscript received 31 Mar 77

GUSEV, V. G., Ufa Aviation Institute imeni S. Ordzhonikidze

[Abstract] Due to the mass production of cheap integrated op amps, it has become possible to reconsider the traditional approach to the construction of inductive and magnetically sensitive converters for information-carrying electric signals. The use of integrated op amps avoids a number of difficulties, decreasing the size and weight, and significantly improving metrologic characteristics. As a result, a combined magnetic-electronic conversion circuit is produced in which the IOA acts as a static compensator for certain parasitic parameters or acts to increase the desired parameters with respect to the parasitic parameters. Schematic diagrams of several possible circuits are presented. Figure 1; references 2 Russian.

USSR

UDC 681.325

A PROCESSOR

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian, No 18, 15 May 78 Author's Certificate No 607222 27 Aug 74

BARBAKOVA, I. V., IGNAT'YEV, M. B., KISEL'NIKOV, V. M., MYASNIKOV, V. A., AND TOGRASHEV, V. A., Leningrad Institute of Aviation Instrument Design and State Committee on Science and Engineering of the Council of Ministers USSR

[Text] A processor containing an arithmetic unit, a supermemory, a control unit, microprogram memory, and a control unit for the process memory, the supermemory output connected to the first input of the arithmetic unit, the first output of the latter connected to the first input of the control

unit, the first output of the latter connected to the input of the control unit for the process memory, the output of the latter connected to the second input of the arithmetic unit, the second output of the latter connected to the super-memory input, and the output of the microprogram memory connected to the input of the control unit, with the distinguishing feature that, for faster operation, it also includes an operational-code generator and an associative memory, with the third output of the control unit connected through this operational-code generator and the associative memory to the input of the microprogram memory.

USSR

A NAVIGATIONAL SYSTEM WITH ASTROCORRECTION

Leningrad, IZBESTIYA VUZ--PRIBOROSTROYENIYE, in Russian, No 12, 1977,
pp 48-54, manuscript received 8 Feb 77

BUGROV, YE. A., LEVANENKO, V. A., LEONOV, V. N., PIPATOV, I. N., SERGEYEV,
M. A., YUSHCHENKO, V. I., Leningrad Institute of Precision Mechanics and
Optics

[Abstract] A navigational system is developed based on the use of gyroscopes plus astronomical correction of the indications taken from the gyroscopic vertical and the direction gyroscope. The astrocorrector includes two starsensing telescopes mounted on a stabilized platform, plus an additional digital computer. Possible errors of the system are discussed. The system is shown to have advantages over traditional gyroscopic systems in which the local vertical is determined by a pendulum device, which is quite sensitive to accelerations during maneuvering of the vehicle. The new system allows measurement of the angular coordinates of the vehicle very accurately, and provides more complete information on the spectral composition of its rotary motion than gyroscopic devices can. Figures 3; references 8 Russian.

UDC 531.383

USSR

ERRORS IN THE DETERMINATION OF THE SHIP VELOCITY COMPONENTS DURING ROCKING

Leningrad IZV. VUZ, PRIBOROSTROYENIYE in Russian Vol 20, No 8, Aug 77
pp 59-65 manuscript received 18 Jan 77

RIVKIN, S. S. AND SVESHNIKOV, A. A., Chair of Shipboard Navigation Instru-
ments, Institute of Aviation Instrument Design, Leningrad

[Abstract] Many instruments such as accelerometers and gyros mounted on moving objects actually measure the velocity components at the points of their location in a system of coordinates tied to the object. The instrument readings must then be referred to a stationary system of coordinates, which requires unwieldy computations involving also the angles of rotation of the object. This transformation is usually waived for rough velocity determinations, but here the resulting error is estimated. Considered are two Cartesian systems of coordinates: one stationary is space and one tied to a ship with the origin at the center of gravity. The ship velocity components are first calculated from the fundamental differential equations of motion, which includes the rocking motion of the ship together with the coordinate axes tied to it. Subsequently, the ship rotation angle and the

velocity of the ship's center of gravity are regarded as random functions of time. The problem is now solved by statistical analysis, with the application of Simpson's method and with linear interpolation after transformation from rectangular to polar coordinates, for the case of an instrument mounted in the diametral plane of a ship. Figures 1; tables 1; references 6: 5 Russian, 1 Western.

USSR

UDC 621.224.001.57

HYDRAULIC STUDIES OF MODELS OF HYDRAULIC TURBINES FROM THE SATANO-SHUSHENSKIY HYDROELECTRIC POWERPLANT

Leningrad, ENERGO MASHINOSTROYENIYE, in Russian, No 4, 1978, pp 18-21

GUSHCHIN, M. V., Production Union for Turbine Building of Leningrad Metals Plant

[Abstract] The plan of the Sayano-Shushenskiy Powerplant calls for the installation of 12 hydraulic turbines of 540 MW each. The Leningrad Metals Plant has performed theoretical and experimental studies for the development of all elements of the waterway of these turbines: the volute casing, runner, wicket gates and draft tube. Volute casings with both single and double intakes have been tested. The double-intake version is considered more promising. The studies have resulted in creation of a mixed-flow hydraulic turbine with a capacity of 650 MW, design head 194 m, capable of developing a maximum of 735 MW with a head of 212 m or higher. The efficiency in the optimal mode is 95.8%. A series of new runners has been developed for 170-230 m head. The development of the hydraulic turbines for this powerplant has been a great advance in the development of hydraulic turbine design, particularly in the design of research operations and experimental studies of hydraulic turbines. Figures 3; references 3 Russian.

USSR

UDC 621.224.7.001.57

MODEL STUDIES OF REVERSIBLE HYDRAULIC MACHINES

Leningrad, ENERGO MASHINOSTROYENIYE, in Russian, No 4, 1978, pp 23-24

SOTNIKOV, A. A., Production Union for Turbine Building of Leningrad Metals Plant

[Abstract] Model studies are required to increase the effectiveness, reliability and service life of reversible hydraulic machines. The model studies are called upon to aid in the development of a highly effective waterway and assure sufficient structural strength. The Leningrad Metals Plant has gained experience in model studies of reversible hydraulic machines in association with the development of such a machine for the Zagorskaya pumped-storage powerplant. Most of the studies have been performed on a model with a runner 360 mm in diameter, and on a reversible cavitation test stand with a test head of not over 18 m. The characteristics of the initial runner were greatly improved by modification of the hub fairing and changing the angles of the vanes. In spite of all modifications, cavitation still develops when the machine is operated as a pump. Figures 4.

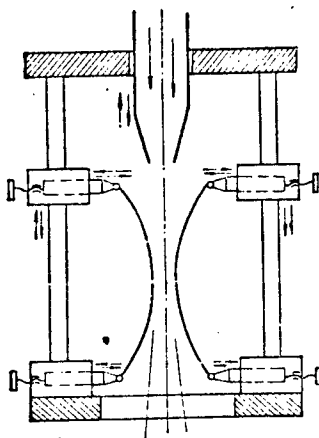
A HYDRODYNAMIC EMITTER OF ELASTIC OSCILLATIONS

Moscow OTKRYTIYA, IZOBRETIENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 15, 1978 p 21

[Description of Author's Certificate No 603434, Division B, filed 7 Jul
76, published 25 Apr 78]

BABENKO, V. K., KORTNEV, A. V., NAZARENKO, A. F. AND SAMOYLENKO, V. V.,
Odessa "Order of the Red Banner of Labor" Polytechnical Institute

[Text] This Author's Certificate introduces a hydrodynamic emitter of elastic oscillations that contains a housing accommodating a nozzle and a resonant oscillatory system comprising elastic elements and a device for altering their stiffness. As a distinguishing feature of the emitter, to simplify control of the frequency of the emitted oscillations the elastic elements are made in the form of two plates that form a slit, the axis coinciding with that of the nozzle. The device that alters the stiffness of the plates is made in the form of carriers that hold the ends of the plates and are mounted in the housing so that they can be moved parallel and perpendicular to the axis of the nozzle.



USSR

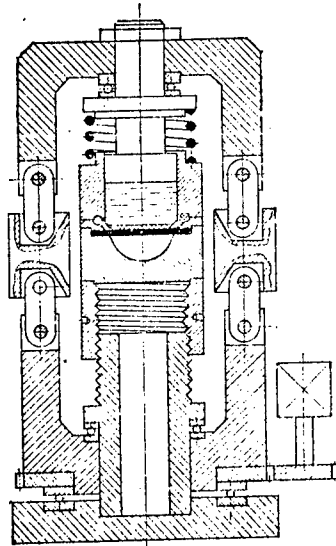
A HYDRAULIC STAMPING DEVICE

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 15, 1978 p 29

[Description of Author's Certificate No 603467 Division B, filed 13 Sep 76,
published 25 Apr 78]

VORONOV, A. I., Khar'kov Aviation Institute

[Text] This Author's Certificate introduces a hydraulic stamping device that contains a die, a punch and a power drive. The punch is made in the form of a liquid-filled housing enclosed with an elastic diaphragm and carrying a piston that is springloaded relative to the housing. As a distinguishing feature of the stamping device the design is simplified by making the power drive in the form of two columns located on the axis of the device and fastened to the bearing surfaces of the piston and the die, and two brackets resting freely on the above-mentioned columns and hinged to each other by their own end through levers and intermediate weights. One of the brackets has a mechanism for rotating it.



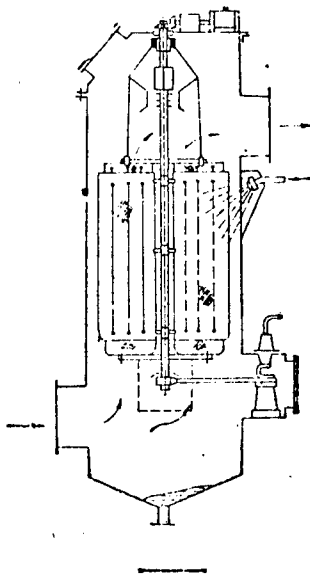
USSR

AN ELECTRICAL FILTER FOR CLEANING A GAS STREAM

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI
in Russian, No 18, 15 May 78 Patent No 606601 21 Mar 75

YAKOVENKO, M. M., Central Scientific Research Planning and Design In-
stitute of Air Dust Abatement and Safety Engineering

[Text] A filter consisting of a cylindrical housing with an inlet tap and an outlet tap, radial electrode plates with corona dischargers between them mounted on a rotating shaft, and a high-voltage source connected to these electrodes as well as to the corona dischargers, with the distinguish-
ing feature that, for a more effective cleaning, the radial electrode plates are perforated, with the corona dischargers on one side, and connected alternately to opposite-polarity terminals of the high-voltage source.

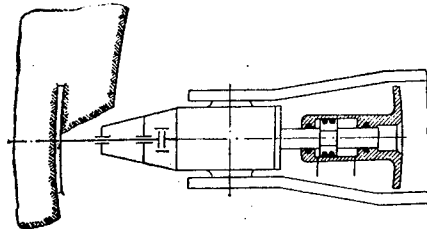


A SAGITTAL SERVO ACTUATOR FOR AN AUGER SET

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian, No 18, 15 May 78 Author's Certificate No 607012 3 May 76

POLOVNEV, G. P., PROKHOROVSKIY, V. A., BARULIN, A. V., KLIMOV, YU. I., PETUKHOV, N. N., AND SOKOLOV, YU. L., Karaganda All-Union Scientific Research and Planning Institute of Coal

[Text] A tool including a rotatable gun with a drive, a disc cutter, and a hydraulic disconnecter, with the distinguishing feature that, for reducing the dynamic loads on the cutter and for improvement of the cutting process, the cutter and the hydraulic disconnecter are located separately on opposite ends of the rotatable gun, with the thickness of the hydraulic disconnecter being equal to that of the cutter and their surfaces equidistant from the gun axis.



USSR

UDC 629.124.74:628.4

A SELF-PROPELLED OIL SKIMMER FOR SEAPORTS AND COASTAL WATERS

Leningrad SUDOSTROYENIYE in Russian No 4, Apr 78 pp 17-19

DERZHAVETS, A. YA. AND TABACHNIKOV, V. I.

[Abstract] The article describes a self-propelled oil skimmer that performs the following functions: collected any floating contaminants regardless of consistency, type or state; sucks up floating contaminants from inaccessible narrow areas; collects contaminants in waves and wind; collects contaminants uninterruptedly during maneuvering, even when backing; rapidly dumps the collected trash and oil; has provisions for fire safety when collecting raw petroleum. This skimmer is especially suitable for work in congested areas. The skimmer is made in seaport and seagoing models. The seagoing model is more suitable for cleaning up oil spills in coastal waters. This model is larger, faster, and has a range of ten nautical miles from port. A cross sectional view of the skimmer is shown, and the operation of the vacuum system for collecting and separating an oil-water mixture is described. Series production of these boats was started in 1976. Figures 2.

USSR

UDC 614.838.42:629.12

USING SPARK SUPPRESSION IN FLUE GASES TO REDUCE AIR POLLUTION AND FIRE HAZARD ON SHIPS

Leningrad SUDOSTROYENIYE in Russian No 4, Apr 78 pp 35-39

BIRYUK, V. S.

[Abstract] The article discusses the fire hazard and air pollution problems caused by sparks in flue gases. Some kinds of spark suppressors used on ships are described and their working principles are explained. In the dry type of spark quencher, the flue gas is swirled by a fan before entering a chamber where the swirling flow throws the sparks against a wall with a slit and flap arrangement through which the dead sparks pass into a dead space with a cleanout door where they can be removed. These units are simple to make and care for, but do not guarantee total spark suppression. In the closed wet type of spark remover, a tank with fresh water is located in the stack with a pump that transfers the water to sprayers for diesel and boiler spark quenchers. A distribution element directs the water to one or more spray units depending on working conditions of the diesel and boiler. The water is filtered and returned to the tank. The water entrained by the gas flow is trapped by a centrifugal separator. In another type of spark quencher, tabular rings with steam nozzles are installed

inside the stack. The most effective system is the closed wet type with centrifugal separator. Figures 4, references 10 Russian.

USSR

UDC 628.511:621.791.947.55

SELECTING A DUST CATCHER FOR THE KRISTALL PLASMA-ARC CUTTING TORCH

Leningrad SUDOSTROYENIYE in Russian No 4, Apr 78 pp 51-52

KOZLOV, V. A.

[Abstract] Technical and economic characteristics are compared for twelve models of dust catchers as possibilities for the Kristall plasma-arc cutting torch. The units considered vary widely in principle of action, size, power consumption, hydraulic drag and cost. The optimum type of device is the LKI electromagnetic dust catcher developed at Leningrad Shipbuilding Institute. In this device, the filtering action of metal chips is combined with the coagulating action of an electromagnetic field with resultant improved efficiency in trapping micron-size particles, as well as metal, oxide and dopant aerosols. An industrial model is now being developed with a capacity of 12,000 cu. m per hour. Figure 1.

USSR

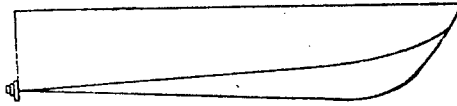
UDC 629.1.042

A HIGH-SPEED BOAT

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian, No 18, 15 May 78 Author's Certificate No 606754 6 Jul 76

AFREMOV, A. SH., KRUGLOV, A. D., AND NEMUDROV, V. I.

[Text] 1. A boat with a hydroplane bottom surface and a plate mounted on it, with the distinguishing feature that, for preventing a tiltover of the boat by means of a restoring moment on one of the sides, this plate is rigidly fastened to the transom so as to extend from the diametral plane to the side of the boat. 2. Same as 1., except that one lower edge of this plate coincides with the keel line, and its other edge runs below the side of the boat.



USSR

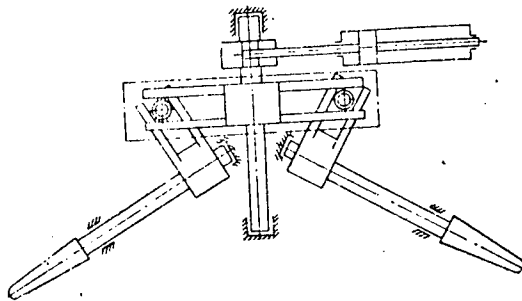
UDC 629.12.014.6

A STABILIZER OF SHIPBOARD ROCKING

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in Russian, No 18, 15 May 78 Author's Certificate No 606756 22 Nov 76

OGARKOV, L. F., VOROB'YEV, V. O., AND KHMELEV, L. I.

[Text] A stabilizer including nonretractable inside the hull steering rudders whose heads are kinematically linked to a hydraulic shifter drive, with the distinbuishing feature that, for simplifying the design by using a single hydraulic drive for the rudder shifters on the port side and on the starboard side, the stabilizer is furnished with a shaft and a mechanism for steering simultaneously two rudder heads whose axes intersect; this shaft is mounted vertically in the diametral plane of the ship, with its one end kinematically linked to the hydraulic drive and its other end through the steering mechanism linked to the rudder heads on both sides.



USSR

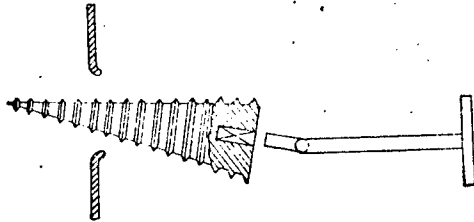
UDC 629.12-788.4.002.54

A TOOL FOR TEMPORARY PLUGGING OF HOLES IN THE SIDE OF A SHIP

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI
in Russian, No 18, 15 May 78 Author's Certificate No 606757 29 Nov 76

VARTSABA, V. I.

[Text] A tool including an elastic conical stopper, with the distinguishing feature that, for improving the reliability of plugs in not easily accessible places, the stopper has a threaded surface with a pitch larger than and a space smaller than the thickness of the skin and the base of the stopper has a contoured square hold cut out into which a key wrench with a bendable knee fits.



USSR

UDC 629.1.037.17

A MECHANISM FOR VARYING THE PITCH OF A SHIP PROPELLER SCREW

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI
in Russian, No 18, 15 May 78 Author's Certificate No 606760 18 Nov 76

MILOVANTSEV, P. M. AND NAUMENKO, V. G.

[Text] A mechanism including a hydraulic cylinder with a piston and a slide valve, both shifted from the propeller axis, a hollow propeller shaft mounted in journal bearings in the ship foundation plate, and a bushing, with the distinguishing feature that, for a simpler construction and a more reliable performance, it is also furnished with hydraulic steering cylinders and thrust bearings, while the slide valve is tubular with holes and mounted inside the hydraulic steering cylinders; the bushing with a thrust collar is slipped around the propeller shaft and coupled through the thrust bearings to the piston of the main hydraulic cylinder, and the propeller shaft is mounted in journal bearings inside the main hydraulic cylinder, with the latter being rigidly fastened to the ship foundation plate.

USSR

UDC 629.12:532.3.073/074

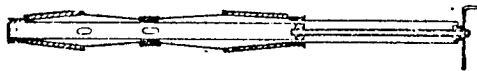
A MEHTOD OF FIXING A HOLE IN A BOAT HULL

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 12, 1978 p 73

[Description of Author's Certificate No 600027 Division B, filed 29 Dec
76, published 20 Mar 78]

VARTSABA, V. I.

[Text] This Author's Certificate introduces a method fixing a hole in a boat hull based on using a filler to inflate a patch installed in the hole. As a distinguishing feature of the device the patching process is simplified by using the surrounding water flowing through the hole to fill the patch.



USSR

UDC 621-788.4

A PATCH FOR FIXING A HOLE IN A BOAT

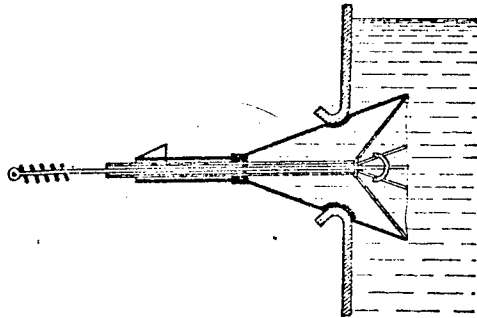
Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 12, 1978 p 73

[Description of Author's Certificate No 600026, Division B, filed 27
Dec 76, published 30 Mar 78]

VARTSABA, V. I.

[Text] This Author's Certificate introduces: 1. A patch for fixing a hole in a boat. The device is made in the form of a collapsible umbrella and contains a post with a catch and an elastic cover fastened on a ring and struts that are hinged to a coupling. As a distinguishing feature

of the device, the patching job is simplified by using the hydrostatic pressure of the surrounding water. Inside the post is a movable pipe with coupling and clamp. 2. A modification of this patch distinguished by the fact that the clamp is made in the form of a rod that moves freely inside the pipe and has one end connected to a cap and the other end connected to a spring.



USSR

UDC 629.12.013/015:621.86/.87

A SHIPBOARD HOISTING DEVICE

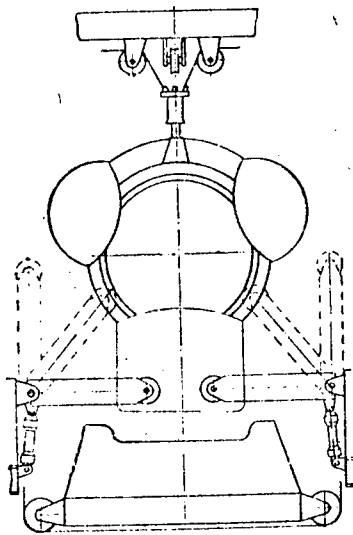
Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 12, 1978 pp 71-72

[Description of USSR Author's Certificate No 600022 Division B, filed 2
Feb 76, published 30 Mar 78]

KOBYZEV, L. M., KOROLENKO, YU. A., KUSHNIRENKO, O. V., ZUYEV, V. N.,
KONDRATENKO, V. B. AND KURASA, A. A.

[Text] This Author's Certificate introduces: 1. A shipboard hoisting device for underwater equipment that contains a platform bridge that carries a block and tackle system and a drive. The device also includes a shock-absorbing centering unit with a drive. As a distinguishing feature, in order to ensure a smooth reduction in the amplitude of swing of the underwater equipment and to prevent it from striking against the keel block when the ship is rolling, the shock-absorbing centering unit

is made in the form of two pairs of levers that are symmetrically placed and hinged to the ship structure. The free ends of the levers are fitted with elastic rollers, and the drive of the shock-absorbing centering unit is made in the form of two pairs of hydraulic cylinders that are equipped with hydraulic control systems. 2. A modification of this device distinguished by the fact that the hydraulic control system of each pair of hydraulic cylinders contains a hydraulic feed system, a main dump line, a hydraulic accumulator, flow regulators, a reversible slide valve, check and relief valves and a slide valve. The identical cavities of each pair of hydraulic cylinders are connected through flow regulators and check valves to the reversible slide valve, and communicate with the hydraulic supply system and the main dump line, and are also connected through check valves and the slide valve to the hydraulic accumulator, which is connected through a throttle and the relief valve to the main dump line. The opposite identical cavities of each pair of hydraulic cylinders are connected through flow regulators and check valves to the reversible slide valve. The reversible slide valves of each pair of hydraulic cylinders are interlocked for simultaneous operation.



USSR

AN APPARATUS FOR DETERMINING THE COMPOSITION OF TRANSITION-METAL OXIDES

Moscow ZAVODSKAYA LABORATORIYA in Russian Vol 44, No 2, Feb 78 pp 152-153
manuscript received 18 Nov 76

IVON, A. I. AND CHERNENKO, I. M., Dnepropetrovsk State University

[Abstract] An apparatus for an exceptionally simple and accurate determination of transition-metal oxides is described which does not require costly materials. It includes a periclase vessel for 1 g KOH (sufficient for analyzing 40-50 oxide specimens) with KBr and KI added to lower the melting point, an injector for oxide specimens which, after weighing, are dropped into the KOH melt, a heater, a vacuum pump, a thermocouple, and a manometer. The composition of MeO_y is determined from the chemical reaction $m\text{KOH} + \text{MeO}_{n-x} \rightarrow$ dissolved products of reaction with $\text{KOH} + x\text{H}_2$ and from the mass balance under given thermodynamic conditions. The apparatus has been checked out on vanadium oxide $\text{VO}_{2.008}$ ($x = 0.492 \pm 0.003$) and $\text{VO}_{1.995}$ ($x = 0.505 \pm 0.003$), whose composition was also determined gravimetrically. The discrepancy of x values did not exceed 1%. The minimum value of x which can be determined by the new method with an error not exceeding 5% is $1.6 \cdot 10^{-3}$. Figures 1; references: 2 Western.

USSR

AN APPARATUS FOR STUDYING THE CORROSION OF METALS WITH A TEMPERATURE GRADIENT ALONG THE SURFACE

Moscow ZAVODSKAYA LABORATORIYA in Russian Vol 44, No 2, Feb 78 pp 201-203
manuscript received 24 Nov 76

KALUZHINA, S. A., MALYGIN, V. V., AND FROLOV, N. G., Voronezh State University imeni Lenin's Komsomol

[Abstract] An apparatus is described with which the temperature distribution over a metal surface with a temperature gradient can be measured simultaneously with the distributions of the corrosion potential and the corrosion current. Thus the intensity of thermogalvanic corrosion and its role in overall corrosion of a metal surface in a stream of electrolyte can be established. A hollow metal rod is held firmly inside a tubular cell of acrylic glass by means of teflon stoppers sealed with silicone rubber. One end is heated in a noninductive electric oven, the other end is cooled in an ice bath. An electrolyte is passed through the rod at some constant rate and a steady temperature field is established.

Measurements are made through taps in the cell along the rod, the temperatures read with a transistor probe and all test electrodes as well as the auxiliary electrode and the reference electrode feeding through a commutator to a set of potentiometers and current recorders. Test results obtained with this apparatus and a copper rod indicate that the corrosion potential varies linearly with the temperature and thus linearly along such a rod. In a completely polarized and nonisothermal system, moreover, a large part of such a rod is cathodic and the corrosion losses are localized within the hot zone. These conclusions have been confirmed by visual inspection of a nonuniformly heated rod after the test. Figures 3; references 8: 5 Russian, 3 Western.

USSR

UDC 621.373:621.382.3

AN APPARATUS FOR PULSE LOADING OF CRYSTALS WITH PASSAGE OF ELECTRIC CURRENT THROUGH THE SPECIMEN

Moscow ZAVODSKAYA LABORATORIYA in Russian Vol 44, No 3, Mar 78 pp 305-307 manuscript received 31 Jan 77

GROMOV, V. YE., SELIVERSTOV, N. M., SEMAKIN, YE. V., AND GUREVICH, K. I., Siberian Metallurgical Institute imeni S. Ordzhonikidze, Novokuznetsk

[Abstract] An apparatus is shown which generates mechanical pulses for loading a metal crystal and also electric current pulses to be simultaneously passed through the test specimen. The mechanical pulses are generated by electro-mechanical conversion of voltage pulses, the latter being generated with a set of electromagnetic relays through several transistor stages including a sharper, a stabilizer-limiter, and an amplifier feeding a low-inertia electromagnet coil with a movable membrane. The current pulses are generated through a transformer and a rectifier set, then shaped to an almost rectangular form with an up to 10 kA amplitude and a 300 μ s - 5 ms duration. This apparatus was used for examining the effect of current pulses of $3 \cdot 10^{-4}$ -s duration and up to 150 A/mm² amplitude on the mobility of pyramidal dislocations in single crystals of 99.998% pure zinc at room temperature. The velocity of glissile dislocations was found to increase in the direction of electron motion and to decrease in the opposite direction by approximately 50% under a stress of 60 gf/mm². The authors are indebted to L. B. Zuyev for his critical comments and discussion of the design. Figures 3; references: 4 Russian.

A PRECISION THERMOSTATE FOR TEMPERATURES UP TO 1500°C

Moscow ZAVODSKAYA LABORATORIYA in Russian Vol 44, No 3, Mar 78 pp 307-308
manuscript received 22 Nov 77

KIM, A. G., LIPANOV, I. I., IVANOV, V. I., PETROV, A. A., NEMCHINOV, V. A.,
AND ROGALOVA, Z. N., Moscow Division, All-Union Scientific Research In-
stitute of Physicotechnical and Radiotechnical Measurements

[Abstract] A precision thermostate has been developed which is particularly suitable for differential dilatometry. With the heater on top, which prevents stray heating by convection, the instrument consists of the following coaxially arranged elements on a base made of grade OKh18N9T steel: the inner sleeve made of a clay ceramic, on it would the main heater coil of 70/30 platinum-rhodium wire, separated from the latter by a narrow air gap the outer sleeve also made of a ceramic, on it would two auxiliary heater coils of grade OKh27Yu5A steel wire, a shield of grade OKh18N9T steel around the latter and separated from the outer sleeve with a lid by clay-wool thermal insulation, and the entire assembly inside a shell to which a coil for cooling water has been soldered. The temperature of the main heater is measured with a platinum-rhodium thermocouple, the temperature of the auxiliary heaters is measured with a Pt/Pt-Rh thermocouple, and the temperature in the space inside the inner sleeve is measured with both a plain Pt/Rh thermocouple and a differential Pt/Pt-Rh thermocouple. These thermocouples are automatically regulated, the most effective settings being 200-300 s of integrating time and a 1:1 ratio of integrating time to differentiating time. The thermostat precision is $\pm(0.1-0.15)^{\circ}\text{C}$ for at least 30 min. The controlled space is 300 mm high and 45 mm in diameter, the vertical temperature gradient not exceeding $0.2^{\circ}\text{C}/\text{cm}$. The instrument does not draw more than 2000 VA from a 220 V 50 Hz line. Figures 1.

USSR

UDC 621.503.55

A MULTICHANNEL DEVICE FOR PROGRAMMED CONTROL OF THE FRACTION EXTRACTORS
OF A PREPARATIVE CHROMATOGRAPH

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 19, 1978 p 116

[Description of Author's Certificate No 608095 Division G, filed 28 Apr
76, published 25 May 78]

TUYMAN, P. E. AND IOONSON, V. A., Special Design Office, Academy of Sciences,
Estonian SSR

[Text] This Author's Certificate introduces a multichannel device for programmed control of the fraction extractors in a preparative chromatograph. The device contains a series circuit comprising a detector, a distributor of the fronts of the chromatograph peaks, and a distributor of the received peaks. Each channel of the device contains a unit for setting the level of extraction and a unit for assigning the number of the selected peaks. The unit for setting the level of extraction is connected to the detector. The input of the unit for setting the number of the selected peaks is connected to the output of the distributor of the received peaks, and the output of the unit for setting the number of the selected peaks is connected to the input of a control module. As a distinguishing feature, the field of application of the device is extended by extracting fractions when the components are incompletely separated. A unit for logical recognition of the peak and a unit for assignment of extraction conditions connected in series are added in each channel. The inputs of the logical recognition unit are connected to the outputs of the distributor of the fronts of the chromatograph peaks and to the output of the comparison circuit in the given channel. The unit for assignment of extraction conditions is connected to the control module.

USSR

UDC 531.768

A DEVICE FOR DETERMINING THE AMPLITUDE-FREQUENCY CHARACTERISTIC
OF AN ACCELEROMETER

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 12, 1978 p 170

[Description of Author's Certificate No 600451 Division G, filed 13 Dec
74, published 30 Mar 78]

AVDEYEV, V. P., YEROFEYEV, N. K. AND PELLINETS, V. S.

[Text] This Author's Certificate introduces a device for determining

the amplitude-frequency characteristic of an accelerometer. The device contains a vibrator, a working element in the form of a rod with the investigated accelerometer fastened to its end face, and a system for maintaining a constant level of vibrations with a sensing element. As a distinguishing feature, the accuracy is improved and the frequency range is extended by mounting the sensing element (e.g. a strain gage) on the rod at a distance from the accelerometer equal to 20-30% of the wavelength of the vibrations corresponding to the natural frequency of the accelerometer.

USSR

UDC 550.834

A DEVICE FOR VERIFYING THE IDENTITY OF SEISMIC CHANNELS

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI in Russian No 12, 1978, p 180

[Description of Author's Certificate No 600494, Division G, filed 13 Jan 76, published 30 Mar 78]

IVANOV, M. P. AND SHEKHTMAN, G. A., ALL-Union Scientific Research Institute of Geophysical Methods of Prospecting

[Text] This Author's Certificate introduces a device for verifying the identity of seismic channels that contains decoupling resistors and commutating elements. As a distinguishing feature of the device the measurement accuracy is improved by adding two DC voltage pulse generators, a transistor switch, a delay cell and supplemental decoupling resistors. The output of the first generator is connected to the transistor switch and the delay cell. The output of the delay cell is connected to the second generator, and output of the second generator is connected through the supplemental decoupling resistors to the input of the amplifiers.

USSR

UDC 654.91

A DEVICE FOR SIGNALING DEVIATIONS OF A TECHNOLOGICAL PARAMETER

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 12, 1978 p 204

[Description of Author's Certificate No 600587, Division G, filed 1 Nov
76, published 30 Mar 78]

YUSUPOV, I. YU. AND DUBININ, N. M., Ufa Aviation Institute imeni
Ordzhonikidze

[Text] This Author's Certificate introduces a device for signaling de-
viations of a technological parameter based on Author's Certificate No
413513. As a distinguishing feature, the reliability of the device is
improved by adding a switching element and an interlocking element with
one input connected to the output of the first NOR gate, while the out-
put of the switching element is connected to the third input of the fourth
NOR gate and to the second input of the interlocking element.

USSR

UDC 531.717.1

A DEVICE FOR CHECKING THE THICKNESS OF CONDUCTIVE FILMS

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 15, 1978 p 123

[Description of Author's Certificate No 603836, Division G, filed 22 Jan
76, published 25 Apr 78]

LOPUKHIN, V. A., MALYSHEV, G. T., SHEKHANOV, YU. V. AND SHELEST, D. K.,
Leningrad Institute of Aviation Instrument Making

[Text] This Author's Certificate introduces a device for checking the
thickness of conductive films that contains a signal generator, a sensor,
a reference signal generating unit, a first comparator and an actuating
unit. As a distinguishing feature of the device, measurement precision
is improved by adding a series hookup comprising a trigger circuit, a
clock pulse oscillator, a first AND gate, a first counter, a second com-
parator with output connected to the actuating unit, and another series
hookup comprising a second AND gate, a second counter, a flip-flop and a
delay circuit. The input of the second counter is connected to the clock
pulse oscillator, and the output of this counter is connected to the
second comparator. The first input of the flip-flop is connected to the

first comparator, while the first output of the flip-flop is connected to the second input of the first AND gate, and the second output of the flip-flop is connected to the second input of the second AND gate. The input of the delay circuit is connected to the second comparator, and the output of the delay circuit is connected to the input of the second counter. The output of the trigger circuit is connected to the inputs of the signal generator, the second input of the flip-flop and the second input of the actuating unit.

USSR

UDC 531.717

A FUNCTIONAL RHEOSTAT CONVERTER

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 15, 1978 p 123

[Description of Author's Certificate No 603839, Division G, filed 27
Oct 76 published 25 Apr 78]

FRIDMAN, BR. P. AND FRIDMAN, BEL. P., Ufa Aviation Institute imeni
Ordzhonikidze

[Text] This Author's Certificate introduces a functional rheostat converter that contains an insulating plate carrying high-resistance wires on its surface that form parallel sections, e. g. U-shaped. The device also contains a moving current pick-up element and commutating elements made in the form of strips of electrically conductive material that join the branches of adjacent sections. As a distinguishing feature of the converter the device is simplified by making the insulation plate with projections located in the zone of joining of the adjacent sections, each of these projections accommodating the joined branches of adjacent sections.

USSR

UDC 533.6.08

A HOT-WIRE ANEMOMETER TRANSDUCER

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 15, 1978 p 139

[Description of Author's Certificate No 603906 Division G, filed 27 Dec
76, published 25 Apr 78]

ROMANCHENKO, A. F., PATLAKH, A. S., VIL'DANOV, R. KH. AND SHIPILOVA, YE. N.,
Ufa Aviation Institute imeni Ordzhonikidze

[Text] This Author's Certificate introduces a hot-wire anemometer transducer that contains a measurement circuit with a thermal resistor. As a distinguishing feature, a duration-modulated output signal is produced by connecting the thermal resistor in series with a capacitor in the measurement circuit. The input of the measurement circuit is connected to an oscillator and the output is connected to a comparison element.

USSR

UDC 551.508.71

A DEVICE FOR MEASURING THE WATER CONTENT OF CLOUDS AND FOGS

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 15, 1978 p 147

[Description of Author's Certificate No 603937 Division G, filed 30
Dec 76, published 25 Apr 78]

SELIVEYEV, N. N. AND VASILEVSKIY, G. S.

[Text] This Author's Certificate introduces a device for measuring the water content of clouds and fogs based on Author's Certificate No 453651. As a distinguishing feature of the device, the accuracy and speed are increased by adding a light source placed in a heat-insulating compartment, two photovoltaic cells placed in different chambers located diametrically opposite with respect to the light source, a comparison unit and a regulating unit. The photovoltaic cells are connected to the input of the comparison unit, and the output of the comparison unit is connected to the input of the regulating unit. The regulating unit is connected in series in the heater supply circuit.

USSR

UDC 53.082.4:532.1

A DEVICE FOR DETERMINATION OF THE DENSITY AND ACOUSTICAL PARAMETERS OF LIQUIDS OVER A BROAD RANGE OF TEMPERATURES AND PRESSURES

Leningrad, IZVESTIYA VUZ--PRIBOROSTROYENIYE, in Russian, No 12, 1977, pp 98-99, manuscript received 19 Jul 76

VAVRUKH, A. T., KISEL'NIK, V. V. AND MAKOGON, B. P., Donetsk State University

[Abstract] An improved design of bellows piezometer is suggested. The device allows simultaneous measurement of the density and acoustical properties of liquids. It is based on a bellows piezometer used for the determination of compressibility of liquids, in which the volume of the piezometer is a function of the distance between its ends. The device is filled with liquid to be studied and sealed with a plug. The mass of the liquid is determined by weighing before and after filling. The device is then placed in a high-pressure chamber. The velocity of propagation of ultrasonic waves in the device is then measured. Knowing the propagation velocity of ultrasound and the density at various temperatures and pressures, one can calculate such important parameters as the coefficient of thermal expansion, adiabatic and isothermic compressibility, as well as heat capacity at constant pressure and at constant volume. Figure 1; references 4 Russian.

USSR

UDC 621.317:621.35

INFRALOW FREQUENCY SIGNAL ANALYZER

Leningrad, IZVESTIYA VUZ--PRIBOROSTROYENIYE, in Russian, No 12, 1977, pp 5-7, manuscript received 22 Feb 77

KONOVALOV, A. A. AND NAGIBIN, O. A., Leningrad Institute for Aviation Instrument Building

[Abstract] A study is made of a device for determination of the integral values of infralow frequency signals, as well as their distribution, based on an electrochemical discrete hydrogen integrator. The use of this integrator as an accumulating element allows measurement of low-level infralow-frequency signals with great accuracy without preliminary amplification. The simplicity of the circuit which matches the output of the discrete hydrogen integrator to the digital circuits also allows rapid processing of the information accumulated. The operation of the integrator is analyzed as the integral values of signals analyzed are measured.

The maximum relative error of the instrument is determined by the errors of the integrator and is not over 3% in the temperature range of -10 to +40 C. The analyzer described in this article can be used in systems for testing the parameters of the environment, with gas analyzers, in medical studies and other branches of measurement technology. Figures 2; references 2 Russian.

USSR

UDC 531.77

METHODS AND EQUIPMENT FOR REPRODUCTION OF LOW ANGULAR VELOCITIES

Moscow, IZMERITEL'NAYA TEKHNKA, in Russian, No 1, Jan 78, pp 44-45

POVARENKOV. A.S.

[Abstract] Devices are described for reproduction of low angular velocities that do not have the defects of earlier devices, primarily low accuracy of reproduction of the required value of angular velocity, usually resulting from the great error of test equipment or the instability of angular velocity resulting from forces of friction. The new rotating mechanism, operating in the range of $0-1.5 \cdot 10^{-5}$ rad/s, consists of a statically and dynamically balanced cylinder with an inertial mass and a platform for attachment of a device suspended in the body on an air suspension. The rotating device is worm gear drive which is attached to one of the two pins of the body. The maximum relative error is 0.005% at the lower limit and 0.0002% at the upper limit of the range of reproducible velocities. Another possible device described utilizes a micrometer screw driven by an electric motor to rotate a long beam. The range of angular velocities which can be reproduced is $0-1 \cdot 10^{-3}$ rad/s, maximum error of reproduction of angular velocities 0.026%. Figures 2; references 2 Russian.

USSR

UDC 621.165:621.313.322-81:534.647.004

A MULTICHANNEL DEVICE FOR LONG-TERM CONTINUOUS TESTING OF THE VIBRATION OF A TURBINE SHAFT

Moscow, ELEKTRICHESKIYE STANTSII, in Russian, No 11, Nov 77, pp 48-50

BORISENKO, A. P., DASHEVSKII, R. A., TKACHENKO, L. I. AND TSYBUL'KO, V. I.,
Khar'kov Division of All-Union Institute of Heat Engineering

[Abstract] Long-term continuous measurements of the vibration of a rotor,

with simultaneous recording of indications from several measurement points, are required for analysis of the influence of operating modes of a turbine on its vibration status. The authors' institute has developed a device for performance of these measurements in electric powerplants. The device is a system of eight independent channels for measurement of vibration displacements, with each channel producing a strip-chart recording and both loop and cathode-ray oscilloscope displays, with the gap between the vibration transducer and the shaft also being recorded on a strip-chart recorder. The signal from each channel can also be subjected to frequency measurement and analysis. Experience gained in using the device has shown that it allows timely detection of damage to a rotor (breaking of vanes, breaking of rims, bending of rotors, etc.), resulting in increased vibration of the shaft system. It can also check the vibration of the rotor as the turbine is started up, preventing damage to end and diaphragm seals. Figures 3; references 2 Russian.

USSR

UDC 620.17.05:629.12.03-8

A TEST STAND FOR WORKING OUT REVERSAL CONDITIONS FOR MARINE TURBINE UNITS

Leningrad SUDOSTROYENIYE in Russian No 2(483), Feb 78 pp 26-28

BERKOVICH, S. N.

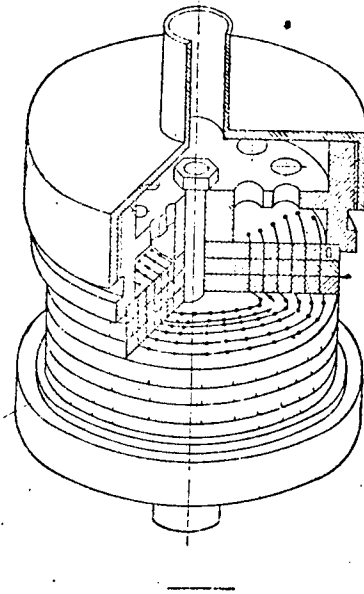
[Abstract] Existing test equipment for turbine reversal can only simulate conditions before starting and after completing reversal, although the reversal equipment may be damaged during transient processes. In this article the author discusses a test stand improvement that involves using a second propulsion unit to simulate the load on the test unit. The operations in the test procedure are as follows: the test unit is brought up to the operating conditions preceding reversal; the reversal apparatus of the loading propulsion unit is engaged in a position corresponding to the direction of rotation of the hydraulic brake immediately preceding reversal, and the generator part of the loading unit is brought to operating conditions ensuring the required total loading conditions; the test unit is reversed; after the direction of rotation of the hydraulic brake has changed, the speed of rotation of loading and test unit is reduced. Figures 3, references 4 Russian.

AN INSTRUMENT FOR EXAMINING TWO-DIMENSIONAL AND THREE-DIMENSIONAL FLOW THROUGH PERMEABLE MEDIA

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TAVARNYYE ZNAKI
in Russian, No 18, 15 May 78 Author's Certificate No 607006 26 Apr 76

BIKBULATOV, I. KH., ABDRAKHMANOV, G. S., AND SHAYAKHMETOV, SH. K., Tatar
State Scientific Research and Planning Institute of the Petroleum Industry

[Text] A device including a case, a cover, and a model of a permeable medium, with the distinguishing feature that, for ensuring a variability of the medium parameters over a wide range, the model constitutes a stack of disks with clearing holes interconnected through channels along the contacting disk surfaces, these disks being arranged so as to be movable relative to one another.



USSR

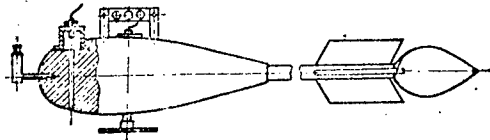
UDC 532.574:66

A HYDROMETRIC SINKER

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI
in Russian, No 18, 5 May 78 Author's Certificate No 607102 15 Sep 76

SOLOV'YEV, N. YA., Order of Labor's-Red-Banner State Institute of Hydrology

[Text] 1. A sinker including a hull with a surface contactor and a bottom contactor with the distinguishing feature that, for measuring the depth of a water stream more accurately, the surface contactor is inside a dashpot chamber mounted on the top of the sinker, above the vertical duct through the hull. 2. Same as 1., except that the cross-sectional area of the vertical duct is within 0.2-0.3 of the cross-sectional area of the dashpot chamber.



USSR

UDC 621.50.3.55

A DEVICE FOR PROGRAMMED CONTROL OF A TEST STAND FOR TESTING SPECIMENS AND STRUCTURES FOR MECHANICAL STRENGTH

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBRAZTSY TOVARNYYE ZNAKI in
Russian, No 18, 15 May 78 Author's Certificate No 607185 24 Sep 76

BULANOV, V. V., DUDNIK, M. F., KONDRATENKO, YE. A., KOSTIN, V. L., MAZNYAK,
YA. A., PATSENKER, B. L., PUGIN, A. P., SOKOLYANSKIY, V. P., TIMCHENKO, V. I.,
AND KHIL'CHENKO, A. G., Kharkov Aviation Institute

[Text] A device with a force setter connected to an electrohydraulic servo drive with force feedback which includes an input summing stage, a scaler, an error signal generator, an error amplifier, an electrohydraulic converter, a force transducer, and object position transducer in each channel, with the distinguishing feature that, for facilitating static tests of untied structural specimens, it also includes an object position setter, an object position stabilizer with its inputs connected

to the object position transducers, also a scaler for three dimensions which consists of object position manipulators for each channel with their inputs connected to the input summing stage, also a force exciter coordinator and a maximum-force holder connected to the corresponding inputs of the scalers, while the outputs of the object position setter and of the force setter are connected to the inputs of the object position stabilizer, the outputs of the latter are connected to the inputs of all object position correctors in the three-dimensional scaler, and the second inputs of the object position correctors are connected to the corresponding outputs of the force exciter coordinator.

USSR

UDC 550.83

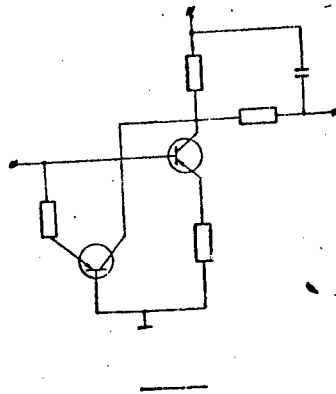
A METAL DETECTOR

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI in Russian No 12, 1978 pp 180-181

[Description of Author's Certificate No 600496 Division G, filed 22 Apr 75, published 30 Mar 78]

DMITRIYEV, YU. S., SHATERNIKOV, V. YE., STEBLEV, YU. I., BELYAKOV, V. I., KLYUYEV, V. V. AND KUROZAYEV, V. P., Kuybyshev "Order of the Red Banner of Labor" Aluminum Institute imeni Academician S. P. Korolev

[Text] This Author's Certificate introduces a metal detector that contains a variable voltage oscillator, an induction transducer, an electric compensation unit fed from a master oscillator with regulation of the phase and amplitude of the output voltage, a selective preamplifier, a demodulator and a display. As a distinguishing feature, the sensitivity and working stability of the device are improved by connecting a phase-inverting limiter amplifier to the output of the selective preamplifier. The output of the limiter amplifier is connected through a voltage divider to a narrow-band filter. The inputs of the phase-inverting limiter amplifier and the selective amplifier are connected to this filter, and the output of the selective amplifier is connected to the input of a transistorized demodulator.



USSR

UDC 536.532

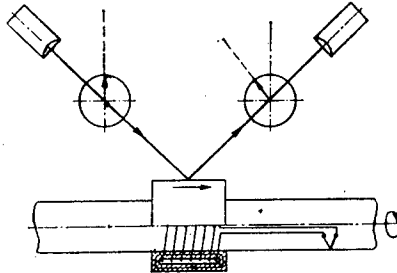
A DEVICE FOR MEASURING THE TEMPERATURE OF ROTATING OBJECTS

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 19, 1978 p 110

[Description of Author's Certificate No 608064 Division G, filed 8 Oct 75,
published 25 May 78]

IVANOV, M. P., GUSEV, V. G. AND ANDRIANOVA, L. P., Ufa Aviation Institute
imeni Ordzhonikidze

[Text] This Author's Certificate introduces a device for measuring the temperature of rotating objects that contains a thermocouple and a magnetic circuit with a flip coil placed on the object to be checked. As a distinguishing feature of the device, the sensitivity of the device is improved by adding a source of plane-polarized light and an instrument for measuring the angle of turn of the polarization plane. The axes of the source of plane-polarized light, the instrument for measuring the angle of turn of the polarization plane and the flip coil lie in the same plane, and an annular cavity is made in the magnetic circuit to accommodate the flip coil.



USSR

UDC 621.313.322-81.3.045:778.2

USE OF HIGH-SPEED CINEMATOGRAPHY TO STUDY THE MOVEMENTS OF STATOR WINDINGS
IN TURBINE GENERATORS

Moscow, ELEKTRICHESKIYE STANTSII, in Russian, No 11, Nov 77, pp 76-78

LERNER, L. G., RUBISOV, G. V. AND STANISLAVSKII, L. YA., ALL-Union
Scientific Research Institute for Electric Machines; Khar'kov Scientific
Center, Academy of Sciences, Ukrainian SSR

[Abstract] The Academy of Sciences Ukrainian SSR has developed and begun operating a program of combined studies of four-pole turbine generators, a very important program for the study of their mechanical, thermal and electromagnetic characteristics, to allow the studies to be considered in the design of turbine generators with capacities of 500 and 1000 MW operating at 1500 rpm at nuclear powerplants. This article reports on one part of the studies, involving the use of cinematography in experiments with sudden short circuits. The studies were performed on turbine generator #6 of the Zuyevskaya Regional Electric Powerplant, which has been in operation since 1939 with one overhaul, a total operating time of over 240,000 hours. Two SK-1 cameras were used, both on the exciter side of the generator. Seven experiments with sudden short circuits were conducted in all. The use of high speed cinematography was found to be an effective method for the creation of reliable and economic designs of

turbine generators and other electric machines subject to sudden short circuits. Broader introduction of the method is recommended. Table 1; figures 3; references 4: 2 Russian, 2 Western.

USSR

AN OPTICAL MULTIPLIER FOR THE ANGLE OF ROTATION OF A PLANE OF POLARIZATION

Leningrad, IZVESTIYA VUZ--PRIBOROSTROYENIYE, in Russian, No 12, 1977,
pp 82-84, manuscript received 15 Mar 77

KOROTAYEV, V. V., MUSYAKOV, V. L. AND PANKOV, E. D., Leningrad Institute
of Precision Mechanics and Optics

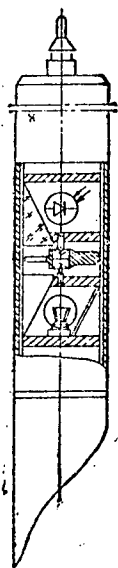
[Abstract] A device is known for increasing the transfer coefficient of polarization devices for measurement of twisting angles, based on transmission of the radiation, after it has passed through a polarizer, in sequence through a system of half-wave plates with the even numbered plates rigidly connected to the polarizer, the odd numbered plates rigidly connected to the second object. Another version of this device, usable for remote measurement of twisting, involves attachment of quarter-wave plates to flat mirrors, from which the radiation is repeatedly reflected on the path from the polarizer to the analyzer. However, it is frequently necessary to assure insensitivity to rotation of these elements relative to axes perpendicular to the twisting axes. The device described in this article satisfies this requirement. It consists of two units. The first unit includes a polarizer, mirror-plus lens reflector and quarter-wave phase plate, rigidly connected to each other. The second unit contains two mirror-lens reflectors and quarter-wave plates. The radiation, as it passes through the polarizer in the first unit, is linearly polarized and then is transmitted to the first mirror-lens reflector of the second unit with its quarter-wave phase plate, a combination equivalent to a half-wave phase plate. The radiation is returned to the first unit, passing through its quarter-wave phase plate, is rereflected to the second unit, where it passes through its second quarter-wave phase plate and lens-mirror reflecting unit, and is finally returned to the first unit. With the use of the mirror-plus-lens reflectors, the path of the rays is retained even if the second unit is rotated relative to the axes perpendicular to the beam incident at this unit, and the distance between the two units can be varied broadly. Figures 3; references 5: 4 Russian, 1 Western.

A DEVICE FOR ORIENTING ARTIFICIAL DEFLECTORS IN A WELL

Moscow OTKRYTIYA IZOBRETENIYA PROMYSHLENNYYE OBTAZTSY TOVARNYYE ZNAKI in Russian, No 18, 15 May 78 Author's Certificate No 607005 26 Apr 76

BACHMANOV, N. A., KOZLOV, M. M., MOROZOV, YU. T., AND RYABINOV, M. N.,
All-Union Scientific Research Institute of Surveying Methods and Techniques

[Text] A device including a case, a light source in a fixed location inside it, light guides, a radiation energy to electric signal converter, and a disk with a clearing slit placed between them so as to be rotatable, with the distinguishing feature that, for facilitating the orientation of artificial deflectors in a magnetic medium, this disk is furnished with a plumb diametrically opposite the clearing slit.



USSR

UDC 621.311.22.002.51-57

STARTUP AND MAINTENANCE OPERATIONS ON A 100 MW POWER UNIT

Moscow ENERGETICHESKOYE STROITEL'STVO in Russian, No 3, 1978 pp 46-54

LEVIN, YE. M., engineer, KREMEN', M. G., engineer, PODKOPAYEV, A. A., engineer, MIKHAYLOVSKIY, A. K., engineer, SHVARTS, A. V., candidate in technical sciences

[Abstract] The first 1000-MW power unit in the Chernobyl'sk atomic electric power station operates with an RBMK-1000 uranium-graphite reactor and two K-500-65/3000 turbogenerator sets. In the course of inspection, certain improvements and adjustments were found necessary in the water collection-purification-recovery system as well as in the lubrication system. Scrubbing and scavenging operations as well as the performance of de-aerators, were found to be especially critical for startup. A standby capacity for evaporators and acid scrubbing with conventional pumps and tanks are recommended for better and faster startup, if properly employed before the startup. A more efficient and faster technique with the use of existing equipment still needs to be developed. Figures 5; tables 2.

USSR

UDC 621.31125:621.362:5.38.4

REGULATION OF THE PROCESS OF COMBUSTION OF FUEL IN THE COMBUSTION CHAMBER OF AN MHD GENERATOR

Moscow, TEPLOENERGETIKA, in Russian, No 5, May 78, pp 41-44

PINKHASIK, M. S., MIRONOV, V. D., ZAKHARKO, YU. A., PLAVINSKIY, A. I. AND MINYAYEV, N. A., Institute of Heat Engineering, Academy of Sciences USSR; All-Union Heat-Engineering Institute

[Abstract] The U-25 MHD generator has been in operation in the USSR since 1971 on a pilot scale. Due to the increases in parameters of the MHD generator and its increasing time of operation, the question of automation is increasingly pressing. Experimental studies of the combustion chamber as an object of automatic control have found that the determining parameter upon which control should be based is the excess oxidizer factor. The regulation system should provide for operation of the combustion chamber with excess oxygen factor $\alpha = 0.9-0$. The transfer function of the object in this range of change of alpha has been experimentally determined. Figures 7; references 6 Russian.

KHTGZ STEAM TURBINES

Moscow, TEPLOENERGETIKA, in Russian, No 5, May 78, pp 2-10

UGOL'NIKOV, V. V., KOSYAK, YR. F., ARKAD'EV, B. A., ROKHLENKO, V. YU., CHEPELO, K. S., VIRCHENKO, M. A., LINETSKIY, SH. M., IOFFE, V. YU. AND POLUYANOV, B. M., Khar'kov Turbine Plant

[Abstract] The Kharkov Turbine Plant plans and manufactures large steam turbines for thermal and nuclear electric powerplants. This article describes the steam turbines currently being manufactured, which consist primarily of elements and units which have been tested in long-term operation. The turbines characteristically have dual-wall construction of the bodies of all cylinders; welded diaphragms of rolled carbon steel, or alloy steels in areas of high temperature or high moisture content; highly reliable rigid welded and forged rotors; interconnection of all rotors of the turbine and generator by rigid couplings; antierosion surfacing on parts and the use of moisture removal systems from steamways in areas with high moisture content; and transverse dual-pass condensers. Photographs of a number of the large turbines produced are presented, their reliability (service lives of 80,000 hours, readiness factors of 99.5%, MTBF 4200 hours) and economy [heat consumption 7,700 kJ(kW·hr)] are discussed. The electrohydraulic regulation system used with the turbines is diagrammed, and prospects for further development of steam-turbine construction are outlined. For fossil fuel plants with reflux cooling, 3 cylinder turbines with capacities of up to 500 MW are quite realistic, as well as 4-cylinder turbines of 800 MW. For similar conditions, nuclear powerplant turbines of 500-1000 MW are realistic. Turbines with extensive unregulated steam takeoff can reduce the difference between the maximum and minimum volumes of steam consumption through the last stage (winter-summer). This can decrease the total exhaust area and low-pressure cylinder volume simplifying turbine design and arrangement. New types of turbines of up to 2,000 MW capacity with good economy are predicted. Figures 9; references 7 Russian.

USSR

UDC 621.311.22.004.1

STUDY OF THE MAXIMUM POSSIBLE LOAD ON A 300 MW POWER UNIT

Minsk, ENERGETIKA, in Russian, No 9, Sep 77, pp 57-61, manuscript received 10 Feb 77

LEONKOV, A. M., Belorussian Polytechnical Institute, MYSAK, I. S. AND PROKOPENKO, A. G., Southern Division of State Trust for the Organization and Rationalization of Regional Electric Power Plants and Networks

[Abstract] Studies were performed on a 300-MW single power unit with a K-300-240 turbine of the Leningrad metals plant and a TGMP-314 steam-generating unit, to determine the possibility of producing additional power. Special experiments were used to determine the permissible overload on the unit and the factors limiting further increases in power. Preliminary data on the operation of the steam-generating unit and the power unit together showed that the basic factors limiting the increase in power in the unit are the maximum permissible steam pressure in the chamber of the regulating stage of the turbine (18.5 MPa) and the operating load of the heating surfaces of the steam-generating unit. With suitable modifications, the maximum possible load was increased to 315 MW. The optimal fuel parameters in the maximum load mode allow the unit to be comparatively economically operated in overload modes, the efficiency of the steam-generating unit reaching about 94%. Figures 3; references 2 Russian.

USSR

UDC 621.165:621.039.5.001.3

THE K-1000-60/3000 SINGLE-SHAFT STEAM TURBINE CONSTRUCTED BY THE LENINGRAD METALS PLANT TURBINE BUILDING PRODUCTION UNION

Leningrad, ENERGO MASHINOSTROYENIYE, in Russian, No 4, 1978, pp 1-4

OGURTSOV, A. P., PYZHSKOV, V. K., NEZHSENTSEV, YU. N. AND PAKHOMOV, V. A., Turbine-Building Construction Union of Leningrad Metals Plant

[Abstract] One of the primary problems involved in increasing the unit power of steam turbines is that of assuring the necessary cross sections of the passages in the turbine, particularly the last state in the low-pressure cylinder. For turbines operating with nuclear reactors this problem is greatly complicated because of the significantly lower temperature drop, leading to a significant increase in the steam flow required for equal power production. The Leningrad Metals Plant has planned and manufactured a low-pressure cylinder with drive vanes of the last stage 1200 mm in length, made of titanium alloy and producing an end cross-

sectional area of 11.3m^3 . This LPC is designed for use in turbines generating up to two million kW. The design solutions used in the 1.2 million kW turbine, already in production, can be used to manufacture single-shaft steam turbines of one million kW and higher operating at 3,000 rpm with initial steam parameters of up to 60 kg/cm^2 pressure, with super heated steam for operation in nuclear powerplants. A technical plant for the K-1000-60/3000 turbine, designed to operate in a single unit with a type VVER-1000 water-cooled water-modulated reactor and generate one million kW ac has been developed at the plant. The turbine is a single-shaft 5-cylinder unit consisting of one high-pressure and four low-pressure cylinders. A longitudinal cross section of the turbine is shown. The technical characteristics of this turbine are presented. Figures 2; references 4 Russian.

USSR

UDC 621.181.61.001.3

THE STEAM GENERATOR FOR A SEMIPEAK 500-MW POWER UNIT

Leningrad, ENERGOMASHINOSTROYENIYE, in Russian, No 5, 1978, pp 1-4

PARSHIN, A. A., LEVCHENKO, G. I., KHRISTICH, L. M. AND SIVTSOV, A. I.,
Krasnyy Kotel'shchik" Production Union

[Abstract] A plan has been developed for a steam generator for use with a semipeak 500-MW power unit. The basic technical characteristics of the steam generator are: steam generating capacity, t/hr; live (515 C) 1800; secondary (515 C), 1630; pressure of live steam 140 kg/cm^2 ; feed water temperature 243 C; fuel; high sulphur fuel oil. The steam generator is designed to tolerate 300 operating cycles per year, including 250 daily cycles after 6 or 8 hours down time and 50 weekly cycles after 50 or 60 hours of down time, for a total of 9,000 startup cycles during its entire service life. The generator is designed to provide sufficient steam to start a turbine after an overnight rest in 30 minutes, after two days' rest in 60 minutes. Longitudinal and cross-sectional drawings of the steam generator are presented. Figures 3.

USSR

UDC 621.311.22:621.311.153.22

ADJUSTABLE HEAT AND ELECTRIC POWER PLANT WITH COMBINED USE OF STEAM TURBINE AND GAS TURBINE SETS

Moscow TEPLOENERGETIKA in Russian, No 4, Apr 78 pp 28-32

GRIBOV, V. B., engineer, DAVYDOVA, T. N., engineer, DLUGOSEL'SKIY, V. I., candidate in technical sciences, ZARETSKAYA, A. V., engineer, KAPLAN, M. P., engineer, KOLOSOVA, E. G., engineer, KOSTROBA, T. A., engineer. All-Union Scientific Research Institute of the Power Engineering Industry Central Scientific Research Planning and Design Boiler and Turbine Institute imeni I. I. Polzunov. Kharkov Turbogenerator Plant imeni S. M. Kirov

[Abstract] One problem in power generation in the Soviet Union is covering the variable peak and semipeak portion of the load diagram, which requires an adjustable power capacity. One promising solution is the combined use of gas turbines and steam turbines, without condensers run on fossil fuel. The operation of such a system based on central heating is analyzed here in terms of mass (water) and heat balance, whereupon nomograms of power regulation can be constructed for any given steam power plant and any given ambient air temperature. The technical and economic performance characteristics of various existing types of equipment are compared and, accordingly a T-175/210-130 steam turbine set with a disconnectable high-pressure heater and a GT-45 (Kharkov Turbogenerator Plant) or a GT-100-2 (Leningrad Metal Plant) gas turbine are recommended. Cost savings within the ranges of 250-500 and 650-950 rubles/yr can be expected with this combination. Figures 4; tables 1; references: 4 Russian.

USSR

UDC 621.664.2

AN INTERNAL GEAR PUMP

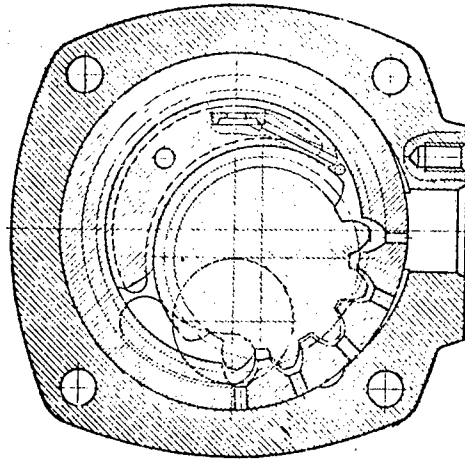
Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI in Russian No 15, 1978 p 105

[Description of Author's Certificate No 603770, Division F, filed 27 Aug 75, published 25 Apr 78]

GAFKUSHA, A. T. AND KORNITSA, A. M., Kirovograd "Order of the Emblem of Honor" Hydraulic Tractor Implement Plant

[Text] This Author's certificate introduces an internal gear pump that contains a separator installed between end-sealing elements. As a distinguishing feature of the pump the volumetric efficiency is increased by equipping the separator with two bracket elements located in niches in the end-sealing elements. Recesses are made in each bracket element,

and a compensating piston is placed in one of these recesses located on the external side of the pump axis. The cavity of this piston communicates with the pressurized zone. A spring is placed in the other recess located on the inside.



USSR

UDC 621.565.4

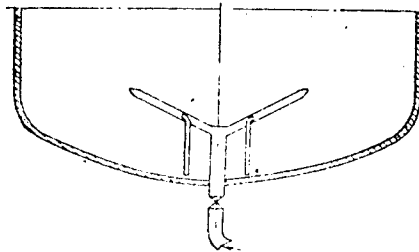
A VACUUM CHAMBER

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 15, 1978 p 117

[Description of Author's Certificate No 603815 Division F, filed 6 Dec
76, published 25 Apr 78]

FILIN, N. V., KURANOV, A. A., LEONOV, V. V., MURATOV, V. M., SAMARIN, A. V.
AND BELYAKOV, V. P.

[Text] This Author's Certificate introduces a vacuum chamber that contains a housing with cover, an evacuation system, lines for feeding in atmospheric air, and a screen cooled with a cryogenic fluid. As a distinguishing feature, to protect the chamber from loss of stability when the cryogenic fluid is being poured in, it is equipped with vertically placed injection tubes with the outlet openings installed in the atmospheric air feeding lines.



A CRYOSTAT

Moscow OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI
in Russian No 19, 1978 p 105

[Description of Author's Certificate No 608041 Division F, filed 19 Jul
76, published 25 May 78]

PERMYAKOV, V. V., GAVRISH, I. G. AND SKRIPCHENKO, V. V., Special Design
Office of Donetsk Physiotekhnical Institute, Academy of Sciences UkrSSR

[Text] This Author's Certificate introduces: 1. A cryostat that contains a working chamber with a heat contact located in its upper part, a bath with coolant and heat contacts, and a chamber drive mechanism installed outside of the housing. As a distinguishing feature of the cryostat, to extend the temperature control range and improve economy, the working chamber is equipped with an additional heat contact that is made in the form of projections is located in the lower part of the chamber, and the heat contact of the bath is made in the form of a screen placed opposite to the heat contacts of the chamber. 2. A modification of this cryostat distinguished by the fact that the spacing between the upper heat contact of the bath is equal to the distance between the lower heat contact of the chamber and the heat contact of the bath opposite to it.

