S/137/62/000/003/023/191
A006/A101

AUTHORS: Neymark, V. Ye., Dukhin, A. I.

TITLE: The effect of modifiers on the structure, deformation of the crust, and the solidification rate of a steel ingot

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 44, abstract 3V270 ("Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii", 1959, no. 6, 39-62)

TEXT: The effect of modifiers on the deformability and solidification rate of the crust was investigated on hollow ingots produced by the method of vacuum crystallization. The following steel grades were selected for the investigation: Ст.3 (St.3) carbon, Х27 (Kh27) ferrite; Х18Н9 (Kh18N9) and Х23Н18 (Kh23N18) austenite steels and admixtures of Ti, Zr, B, Al, Mg, N, Ca. Deformation of the steel crust was characterized by the degree of difference in the wall thickness of the hollow ingot: $[(\delta - \alpha)/\delta \cdot 100\%$ where α is the minimum and δ the maximum thickness of the ring. Rings of equal height were cut at 100 mm distance from the lower ingot end. The solidification rate of the steel crust was determined from the weight - length ratio of the cut-out ring. For steel melting, standard

Card 1/3

The effect of modifiers on the structure ...

charge materials were used, such as Armco-Fe, St.10-10, N1000 and Fe-Cr-0000 steels. The steels were melted in 50-kg high-frequency and 1 ton-electric arc furnaces. Hollow ingots were produced in vacuum steel molds with 90 mm internal diameter and 130 mm external diameter. From each heat produced in a high-frequency furnace, 4 hollow ingots were obtained: one without admixtures and three with admixtures of different concentrations. The admixtures were introduced directly into the furnace prior to the teeming of the metal. Heats from the arc furnace were teemed into 50-kg ladles where the corresponding admixtures had been preliminarily introduced. Then the hollow ingots were taken off. It was established that when adding 0.005% B the difference in the thickness of walls of hollow ingots decreases from 41% (hollow ingot without admixture) to 24.3%. If B concentration is raised to 0.01% the difference is 18%, and at 0.05% B it decreases down to 12.5%. Additions of B considerably increase the solidification rate of hollow St.3 steel ingots. When adding 0.2% Ti, the difference in the thickness of walls decreases from 35 to 21.7%. The addition of 0.1% Ti raised the solidification rate of a hollow ingot by 26%, and 0.2% Ti, by 17%. The addition of 0.1% Zr reduced the difference in the wall thickness of hollow St.3 steel ingots from 35 to 21.5% and 0.2% Zr to 17.1%; Zr considerably increases the solidification rate of hollow ingots: 0.1% Zr by 37.%; 0.2% Zr by 30% and

0.3% Zr by 18%. Additions of B and Ti did not considerably affect the difference in the wall thickness of hollow Kh27 steel ingots, but the solidification rate of the ingot increased by 34% when adding 0.01% B and by 22% when adding 0.3% Ti. Ti and Zr introduced jointly to the molten metal (0.6% Ti and 0.3% Zr) reduced deformation from 29.4 to 1.5% and increased the solidification rate of Kh23N18 steel crust by 13 - 18%. Modifiers in optimum concentrations substantially affect the macrostructure of a St.3 ingot; B in a 0.003 - 0.005% concentration, eliminates the columnar structure of an ingot; Ti and Zr promote the formation of a homogeneous columnar structure with very fine crystals. B and Ti refine strongly the dendritic structure of Kh18N9 and Kh23N18 steel at a high crystallization rate. There are 15 references.

O. Lyubimova

[Abstracter's note: Complete translation]

Card 3/3

Durkin, A.I.

18(0) PHASE I BOOK EXPLOITATION SOV/2125

Tsentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii. Institut Metallovedeniya i fiziki metallov

Problemy metallovedeniya i fiziki metallov (Problems in Physical Metallurgy and Metallophysics) Moscow, Metallurgizdat, 1959. 540 p. (Series: Its: Sbornik trudov, 6) Errata slip inserted. 3,600 copies printed.

Additional Sponsoring Agency: USSR. Gosudarstvennaya planova komissiya.

Ed. of Publishing House: Ye.N. Berlin; Tech. Ed.: P.G. Islent'yeva; Editorial Board: D.S. Kamenetskaya, B.Ya. Lyubov (Resp. Ed.), Ye.Z. Spektor, L.M. Utevskiy, L.A. Shvartsman, and V.I. Malkin.

PURPOSE: This book is intended for metallurgists, metallurgical engineers, and specialists in the physics of metals.

COVERAGE: The papers in this collection present the results of investigations conducted between 1954 and 1956. Subjects

Card 1/18

covered include crystallization of metals, physical methods of influencing the processes of crystallization, problems in the physical chemistry of metallurgical processes, development of new methods and equipment for investigating metals, and production control. References follow each article.

TABLE OF CONTENTS:

steel with the aid of seed crystals. It was shown that modifying additions of titanium and boron diminish the capacity of Kh23N18 steel for significant supercooling. Titanium and boron, at concentrations which produce minimum supercooling of the melt, refine the dendritic structure at rapid rates of solidification.

Neymark, V.Ye., and A.I. Dukhin. Effect of Modifying Agents on the Structure, Skin Deformation, and Solidification Rate of Steel Ingots 39

Skin defects were revealed in ingots of four types of steel (St. 3, Kh27, Kh23N18, and Kh18N9) by the vacuum-crystallization method. It was found that modifying agents (titanium, zirconium, and boron) reduce skin deformation and accelerate the skin-solidification rate of these steels in varying degrees. The results obtained suggest that it would be advisable to investigate the possibility of using modifying agents for lessening skin deformation and increasing the skin-solidification rate in the continuous casting of steel.

Kamenetskaya, D.S., Candidate of Physical and Mathematical Sciences; E.P. Rakhmanova; Ye.Z. Spektor; and V.I. Shiryayev.
The Mechanism of the Effect of Aluminum on the Formation of Crystallization Centers in Liquid Iron 63

Liquid primary iron (electrolytic and direct-reduction) containing no active undissolved impurities or surface-active dissolved impurities can easily be supercooled 260-270° C, below the melting point. Nonactivated particles of Al_2O_3 have little effect on the development of crystallization centers in iron. But the start of the crystallization process in iron containing particles of Al_2O_3 has an activating effect on the particles and results in a decrease in supercooling capacity. The introduction of small quantities of aluminum into iron sharply reduces the supercooling capacity. The small degree of supercooling in such cases is in accord with the fact that additions of aluminum to steel act to refine the grain. In view of the results of this investigation and others, this effect may be explained by the fact that small additions of aluminum decrease the energy of nucleation in liquid iron. Because of the surface activity of aluminum, nucleation can take place spontaneously with but slight supercooling, as a result of which a fine-grained cast structure is obtained.

For effective passage of ultrasonic waves through molten metal it is necessary to establish a definite limit of specific ultrasonic power. The time necessary for action of the waves on the molten metal must exceed a certain minimum, but at the same time need not be as great as that required for complete solidification. Better results are obtained with the use of wider ingot molds and slower cooling. Ultrasonic waves induce intensive crystallization in all directions from numerous nuclei, the formation of which is aided by the action of the waves.

facts may be explained by the specific interaction of ions in the acid fusion. The free energy of solution of solid iron sulfide in ferruginous and ferruginous-silicate slags was calculated. It was shown that the heat of transfer of phosphorus from iron to acid slag does not differ from the corresponding figure in the case of ferruginous slag. The coefficients of diffusion of phosphorus, however, are considerably less in the first case than in the second. This can be explained by the presence of a "structure" of silicate polymers in the acid slag. Additions of CaO and Na_2O to acid slag increase the heat of reaction of dephosphorization, and at the same time the values of the coefficients of distribution rise.

The distribution process was studied with the use of a radioactive isotope (Ca^{45}). It was shown that the process of diffusion of a substance in slag takes place at a considerably slower rate than in metal.

Shvartsman, L.A., A.I. Osipov,, V.I. Alekseyev, V.F. Surov, M.L. Sazonov, M.T. Bul'skiy, S.A. Telesov, A.M. Skrebtsov, A.M. Ofengenden, L.G. Gol'dshteyn, and F.F. Sviridenko. An Investigation of the Kinetics of Scrap Melting in the Scrap-Ore Process 326

A method for determining the speed of melting scrap in an open-hearth furnace in the scrap-ore process was developed on the basis of this investigation. The method is based on "isotopic dilution" using radioactive cobalt. It was shown that the melting speed depends on the duration of the pig iron pouring process and carbon content in the bath.

Stupar', S.N. Investigation of the Transfer of Sulfur from the Gas Phase to the Bath in the Basic Open-hearth Furnace 344

The transfer of sulfur from the gas phase to the bath takes place most intensively during the loading of the

It was found that a substantial increase in plasticity results from the addition of 0.1-0.2 percent. Al and 0.2-0.3 percent Ba-Al alloy. Addition of Titanium greatly reduces the plasticity.

Tokmakov, V.S. Experience Gained in the Use of Gamma-ray Flaw-detection Method in Metallurgy 537

Experience gained in the use of radioactive isotopes for the purpose of flaw detection has shown that it is possible to use this method in checking castings and welded structures.

AVAILABLE: Library of Congress

S/137/62/000/006/090/163
A160/A101

AUTHOR: Dukhin, A. I.

TITLE: Crystallization of metals and alloys in small volumes

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 6, 1962, 4, abstract 6I26 ("Sb. tr. In-t metalloved. i fiz. metallov Tsentr. n.-i. in-ta chernoy metallurgii", v. 6, 1959, 9 - 33)

TEXT: The undercooling of Sn, Bi and Fe with small additions of Al and C was investigated by the method of microvolumes. The investigations were carried out in a vacuum and in the atmosphere of purified argon in a specially-built chamber at cooling rates of 100 - 500 degrees/sec. It was determined that the drops of Bi and Sn with a diameter of 40 - 50 μ usually undercool by 110 and 115°C respectively, and in drops of 200 - 300 μ the undercooling reaches 60 - 80°C. In the latter case, a dependence of the undercooling on the overheating is noted. This is an indication for the appearance of crystallization centers on foreign admixture particles. In case the drops are of smaller sizes (up to 50 μ), the obtained maximum undercoolings do not depend on preliminary overheatings. Based on

Card 1/2

this fact, a conclusion is drawn on a spontaneous crystallization. As regards Fe, the maximum undercoolings reached 500 - 550°C, which, as claimed by the author, were practically the same for drops of 50 and 500 μ and depended neither on the overheating nor on the rate of undercooling which varied from 100 to 600 degrees/sec. Additions of C decreased the undercooling to temperatures of 180 - 230°C which almost did not change at concentrations of 0.8 - 5.15% of C. Additions of 0.005 and 0.08% Al decreased the undercooling of Fe to 290 and 230°C, respectively. It is assumed that both C and Al act as substances which lower the surface tension. There are 29 references.

D. Ovsiyenko

[Abstracter's note: Complete translation]

BORISOV, V.T.; DUKHIN, A.I.

Temperature measurement during the growth of metal crystals from melts. Fiz. met. i metalloved. 11 no.6:893-898 Je '61. (MIRA 14:6)

1. Institut metallovedeniya i fiziki metallov TSentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii.
(Metal crystals—Growth)
(Thermocouples)

S/070/62/007/002/012/022
E132/E160

24.7100

AUTHORS: Borisov, V.T., and Dukhin, A.I.

TITLE: Influence of thermal regime on the structure of the crystalline front in one-component systems

PERIODICAL: Kristallografiya, v.7, no.2, 1962, 280-285

TEXT: The principle of the maximum rate of growth is numerically applied to establish the relationship between the dimensions of the crystals in the crystallisation front and the rate of advance of the front (velocity V). In the part of the theoretical curve of V against supercooling, the appropriate form for the crystals to take where the curve rises is that of coarse needles, and in the part of the same curve where V falls, fine needles. The change of the dimensions of the crystals in the intermediate region leads to the appearance of a plateau. Observations made on crystals of salol growing in a film between two glass plates or on a thick copper plate confirm the theoretical deductions.
There are 5 figures.

Card 1/2

Influence of thermal regime on the ... S/070/62/007/002/012/022
E132/E160

ASSOCIATION: Institut metallovedeniya i fiziki metallov (Institute of Science of Metals and Physics of Metals,)

Tsentral'nogo nauchno-issledovatel'skogo instituta chernoy metallurgii im. I.P. Bardina (Central Scientific Research Institute of Ferrous Metallurgy imeni I.P. Bardin)

SUBMITTED: June 27, 1961

Card 2/2

BORISOV, V.T.; DUKHIN, A.I.; MATVEYEV, Yu.Ye.

Problems in the theory of crystal growth in metal systems. Probl. metalloved. i fiz. met. no.8:269-280 '64. (MIRA 18:7)

L 19591-63 EWP(q)/EWT(m)/EWP(B)/BDS AFFTC/ASD JD
ACCESSION NR: AT3001925 S/2912/62/000/000/0279/0284

AUTHORS: Borisov, V. T.; Dukhin, A. I.; Matveyev, Yu. Ye.

TITLE: On the mechanism of the growth of metallic crystals

SOURCE: Kristallizatsiya i fazovyye perekhody. Minsk, Izd-vo AN BSSR, 1962, 279-284

TOPIC TAGS: crystal, crystallization, crystallography, single-component, binary, phase, phase discontinuity, boundary, Hg, Cd, K, Sn, Zn, Pb, growth, phase diagram, equilibrium, kinetic, solidus, liquidus.

ABSTRACT: The paper discusses an expression for the rate of the displacement of a planar phase-discontinuity boundary during the crystallization (CR) of a single-component substance generally adopted by a number of authors (for example, O. Z. Jantsch, Kristallographie, v.108, 1956, 185), an expression which has an extremely general character and may be employed in the description of CR from a vapor, a solution, or a fusion, also in the theory of phase transformations in solids, and even in the theory of spiral growth. I. It is noted that as yet there are no dependable experimental data on the measurement of the supercooling on the surface of growing crystals. Among all the tests surveyed the author decries the absence of

Card 1/3

6

even a single identification of a specific degree of supercooling; however, some upper-bound estimates of its value for growing crystals of Hg, Cd, and K were obtained in referenced test reports. Literature on the calculation of the density of growth points, an essential parameter in the understanding of the growth of metallic crystals, both for spiral growth (for isolated spirals) and for growth on two-dimensional nuclei, is cited. II. Whereas the initial equation given determines the rate of growth of a single-component liquid substance for a given degree of supercooling, a separate discussion is made of the analogous problem on the magnitude of the rate of displacement of the phase-discontinuity boundary in a binary system under a specified deviation of the state of the system from an equilibrium state. The expressions obtained give rise to nonequilibrium phase diagrams in a temperature-vs.-composition coordinate system. A plurality of such diagrams determines the kinetics of the CR of the alloy under different conditions. It is shown that the system of equations obtained is in effect analogous to the first kinetic equation obtained for the single-component substance, except that in the binary system the rate of growth of a given phase is determined by two kinetic coefficients. In measurements made of the temperature (T) along the CR front in the systems Sn-Zn and Sn-Pb, the authors observed a displacement of the T at the beginning of the two-phase zone of the alloys (counted from the liquidus) that is proportional to the rate of growth and the concentration of the second component and which

L 19391-63
ACCESSION NR: AT3001925

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amounts to a few degrees C at growth rates of 3-5 mm/sec. In conclusion it is noted that in nondiffusional CR of alloys the CR of the liquid proceeds always with a change in composition, even when the state of the crystallizing alloy is determined by a representative point that lies below the solidus of the equilibrium phase diagram. Orig. art. has 1 figure and 6 equations.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 16Apr63 ENCL: 00

SUB CODE: CH, PH, MA, EL NO REF SOV: 005 OTHER: 003

Card 3/3

L 19592-63 EWT(1)/EWP(q)/EWT(m)/EWP(B)/BDS AFFTC/ASD/ESD-3/IJP(C) JD
ACCESSION NR: AT3001926 S/2912/62/000/000/0285/0288

AUTHORS: Borisov, V. T.; Dukhin, A. I.

TITLE: Effect of the thermal regime on the shape of columnar crystals

SOURCE: Kristallizatsiya i fazovyye perekhody. Minsk, Izd-vo AN BSSR, 1962, 285-288

TOPIC TAGS: crystal, crystallization, crystallography, maximum-rate principle, front, growth, growth rate, spherolite, salol, fissure

ABSTRACT: The paper describes results of an experimental investigation of the maximum possible rate of displacement (RD) of the crystallization (CR) front (F) under given external thermal conditions. The RD of the CR F depends on the degree of supercooling at the surface of the growing crystals. The tests were made on salol. The crystal growth was observed and photographed for different bath temperatures (T). It is noted that the structures characteristic for each T are readily reproducible. The multiplication of the number of crystals per unit length of the CR F appears to be due to the formation of fissures, near which fan-shaped groups of small slightly-disoriented crystals are formed. A decrease in the number of crystals per unit length is occasioned by the development of pinching-out processes.

Card 1/2

L 19392-63
ACCESSION NR: AT3001926

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The results of the present study show that the equilibrium between these two counteracting factors is regulated by the heat regime in accordance with the principle of maximum growth rate. A schematic graphic plot shows that the rate of growth of the crystals vs.T achieves a certain plateau-like constant region with a drop-off at either side. Experimental data supporting this conclusion are cited. It is postulated that the appearance of the plateau is linked with a change in the structure of the CR F and, more specifically, a comminution of the crystals with a decrease in the bath T. It is also concluded that if an experimental determination is made simultaneously of the RD of the CR F and its structure as functions of the bath T, then the crystals must be large on those segments of the curve where an increase in rate of growth occurs, must then progressively decrease in size as the T is reduced over the segments of constant rate of growth, and must invariably have a fine structure (with a planar CR F) along the descending branches of the curve. The experimental results of the measurements of the linear rate of growth and of the size of the crystals, adduced in a graph, support this postulated relationship. Orig. art. has 4 figures.

ASSOCIATION: none

SUBMITTED:	00	DATE ACQ:	16Apr63	ENCL:	00
SUB CODE:	CH, PH, MA	NO REF SOV:	003	OTHER:	000

Card 2/2

DUKHIN, A.L.

Correlation of clinical and morphological aspects of multiple spongioblastomas. Vopr.neirokhir. no.2:32-37 Mr-Ap '50.(CLML 19:3)

1. Of the Department of Nervous Diseases, Kiev Medical Institute (Head of Department -- Academician B.N.Man'kovskiy) and of the Pathomorphological Department, Kiev Psychoneurological Institute (Head of Department -- Prof. B.S.Khominskiy).

DUKHIN, A.L.

DUKHIN, A.L.; KOTLYAREVSKAYA, O.G.

Tumors of the occipital lobe simulating lesions of the posterior cranial fossa. Vop.neirokhir. 19 no.5:41-47 S-O '55. (MLRA 8:11)

1. Iz Instituta neyrokhirurgii Ministerstva zdravookhraneniya USSR.

(OCCIPITAL LOBE, neoplasms,
differ. diag. from tumors of posterior cranial fossa)

DUKHIN A.L.

134. DUKHIN A.L. and FROLKIS V.V. Med. Inst., Kieff. "Trophic changes in the corresponding segment of the spinal cord in myocardial infarction (Russian text) KLIN.MED.(Mosk.) 1955, 33/5 (74-77)

This study is based on Bykow's theory that in all the viscera 'interoceptors' are present, the excitation of which is transmitted to the spinal cord, where it may produce 2 kinds of reactions: (1) those modifying the physiological behaviour of the medullary segments (excitability, reflex time, etc.) or (2) those producing motor reflexes. The appearance of these reactions depends on the condition of the viscera, their receptors, the nature and the intensity of the stimulus, and on the condition of the marrow. This is illustrated by the change in muscular tone of the lower limbs in spastic paralysis, according to whether the bladder is full or empty. Excitation of the receptors of the heart may be produced by different factors, such as anoxia, accumulation of metabolites, and even the rhythmic activity of the myocardium itself. If the heart is excluded from the circulation, the latter being maintained by pumping blood into the aorta, the reflex time (Türk) is prolonged. Strain of the myocardium may produce 'correcting' reactions of the spinal cord. Acute excitation of the myocardial receptors, as in obstruction of a branch of the coronary artery, may produce reflex movements of the feet. To this type of phenomena also belong the 'respiratory' movements of the extremities due to coronary artery insufficiency, i.e., movements synchronous with the rhythm of the respiration, similar to those observed experimentally when the posterior roots of the spinal cord are cut. Myocardial anoxia lowers the threshold of excitability of the spinal cord, and if there is sudden, intense anoxia, as in infarction, trophic centres may be affected. This explains the signs of dystrophy in the shoulder and left arm occurring frequently in infarct, when its clinical and ECG picture have already improved. The excitation of the myocardial receptors, due to infarction, gives rise to functional changes in the nerve cells, with a change of their excitability with regard to the afferent neurons, but also of their trophic influence on the peripheral neurons. Levín - Buenos Aires

Dukhin, A.L.

VIROZUB, I.D.; DUKHIN, A.L.; SERGIYENKO, T.M.

On A.D. Dinaburg's article "Clinical and physiological characteristics of the hypertensive syndrome in supratentorial tumors of the brain". Vopr. neirokhir. 21 no.2:30-32 Mr-Ap '57 (MLRA 10:5)

1. Ukrainskiy nauchno-issledovatel'skiy institut neyrokhirurgii.
(BRAIN NEOPLASMS, compl.
hypertension in supratentorial tumors, clin. aspects)
(HYPERTENSION, etiol. and pathogen.
supratentorial tumors of brain)

DUKHIN, A.L. (Kiyev)

Bulbar symtoms in cerebral tumors of varying histostructure in the last phase of the tumorous process. Vrach.delo no.6:603-606 Je '59.
(MIRA 12:12)

1. Institut neyrokhirurgii Ministerstva zdravookhraneniya USSR.
(CEREBELLUM--TUMORS)

DUKHIN, A.L. (Kiyev)

Syndromes of primary and secondary focal lesions of the brain stem in cerebellar tumors [with summary in English, p.64]. Vop.neirokhir. 23 no.1:31-35 '59. (MIRA 12:3)

1. Ukrainskiy nauchno-issledovatel'skiy institut neyrokhirurgii.
(CEREBELLUM, neoplasms,
causing primary & secondary focal lesions of brain stem (Rus))
(BRAIN STEM, dis.
synd. of primary & secondary focal lesions in cerebellar rumors (Rus))

DUKHIN, A.L.

Correlation of focal and general brain symptoms of tumors of the brain stem of varying histostructure. Probl.neirokhir. 4:33-39 '59. (MIRA 13:11)

(BRAIN--TUMORS)

DUKHIN, A.L., kand.med.nauk (Kiyev)

Clinical tumors of the brain stem and some problems in differential diagnosis. Vrach. delo no.9:74-79 S '61. (MIRA 14:12)

1. Nauchno-issledovatel'skiy institut neyrokhirurgii. Nauchnyy rukovoditel' - zasluzhennyy deyatel' nauki USSR, chlen-korrespondent AMN SSSR A.I. Arutyunov.
(BRAIN—TUMORS) (DIAGNOSIS, DIFFERENTIAL)

DUKHIN, A. L. (Kiyev)

So-called irritative brain stem syndromes. Vop. neirokhirurgii no.3:53-56 '62. (MIRA 15:7)

1. Ukrainskiy nauchno-issledovatel'skiy institut neyrokhirurgii.

(BRAIN--TUMORS) (CEREBELLUM--TUMORS)

DUKHIN, A. L.; TUSHEVSKIY, V. P.

Pathogenesis of brain stem syndromes in tumors of the cerebrum. Vrach. delo no.6:40-46 Je '62. (MIRA 15:7)

1. Ukrainskiy nauchno-issledovatel'skiy institut neyrokhirurgii.

(BRAIN--TUMORS)

ROMODANOV, A.P., otv. red.; ZOZULYA, Yu.A., zam. otv. red.; AGASHEV-KONSTANTINOVSKIY, A.L., red.; KHOMINSKIY, B.S., red.; ERGTMAN, M.K., red.; DUKHIN, A.L., red.

[Problems of neurosurgery; clinical, pathophysiological and morphological principles in neurosurgical pathology] Problemy neirokhirurgii; klinicheskie, patofiziologicheskie i morfologicheskie zakonomernosti v neirokhirurgicheskoi patologii. Kiev, Zdorov'ia, 1964. 332 p. (MIRA 18:9)

1. Ukrainskiy nauchno-issledovatel'skiy institut neyrokhirurgii.

DUKHIN, I. P.

DUKHIN, I. P. --"The Physiological State and Productivity of Lactating Cows with Various Daily Schedules." Laboratory of the Physiology of Agricultural Animals. Moscow, 1956. (Dissertation for the Degree of Candidate in Biological Sciences.)

So.: Knizhnaya Litopis', No 7, 1956.

DUKHIN, I.P., kand.biol.nauk; SOROKIN, A.I., starshiy nauchnyy sotrudnik

Automatic ventilation and heating unit for farrowing houses. Svinovodstvo 13 no.11:41-44 N '59. (MIRA 13:2)

1. Sibirskiy nauchno-issledovatel'skiy institut zhivotnovodstva.

(Swine houses and equipment)
(Farm buildings--Heating and ventilation)

S/133/62/000/004/006/008
A054/A127

AUTHORS: Baklushin, L.N.; Gaydukovskiy, N.V.; Dukhin, I.S.; - Engineers

TITLE: Electric-pulse machining of transverse flutes on grooves of rolls for rolling alternating reinforcement sections

PERIODICAL: Stal', no. 4, 1962, 330 - 333

TEXT: The Eksperimental'nyy nauchno-issledovatel'skiy institut metallorezhushchykh stankov (Experimental Scientific Research Institute of Metal-Cutting Machine Tools, ENIMS) and the Magnitogorskiy metallurgicheskiy kombinat (Magnitogorsk Metallurgical Combine) have developed a pilot installation for fluting rolls of elevated hardness by means of unipolar electric pulses of medium and long duration (10^{-4} - 10^{-2} sec). The pilot equipment was designed in cooperation with A.S. Opolinskiy (ENIMS), N.V. Gaydukovskiy, A.P. Shemyavich, I.L. Prisazhnyuk, G.M. Gubanishev and V.A. Bezobrazov (MMK). By this method the metal is removed directly from the rolls by the force of loaded particles. Consequently, the operating elements of the machine need only be of simple design and their number can be increased considerably (up to more than 20 grooves). The tool need not be of exceptionally hard or strong material; it may also have various shapes,

Card 1/3

Electric-pulse machining of transverse ....

the main object being that the shape is suitable for fluting at a high rate a great number of grooves. An МГИ-2 (MGI-2) type machine generator was used for the generation of the electric pulses (pulse frequency: 400/sec; average power 4.3 - 6.4 kw; current 80 - 100 amp; metal cutting rate (for steel) 1,200 - 1,500 mm^3/min; drive motor speed 3,000 rpm; its power: 6 kw). The pilot equipment was reconstructed from an old horizontal milling machine. The electrode is a copper tube, coiled with trapezoidal copper wire; the pitch and number of threads correspond to the projections on the rolled rod. There are 3 patterns for the interaction between the electrode and the roll (Fig. 1). Version II was used on the pilot installation, ensuring a large contact surface between the roll to be fluted and the electrode. In this version the electrode moves together with the feed table and the roll rotates in the same direction. Version III of the roll-electrode interaction, however, promises an even larger contact surface, in spite of the process being intermittent, due to the reciprocating motion of the electrode in this case. The feed is controlled automatically. The machine must be adjusted in such a way that there is no play of the roll in the direction of the feed mechanism, that the electrode is fixed accurately in respect of the groove axis and that the peripheral speed of the roll is synchronized with the linear speed of the electrode. The number of flutes to be eroded (the number of

threads on the electrode) can be calculated with $z = \frac{\pi D}{l}$ (D = roll diameter at the groove bottom, l = pitch of fluting). The total depth of the flute is obtained during one revolution of the roll. The method is applied in rolling No. 10 and 12 sections on the 250-I small section rolling mill (barrel-diameter 300 mm; barrel length 750 mm; roll-neck diameter 160 mm; roll-neck length 260 mm). After having tested rolls of various grades (alloyed cast iron, cast iron with an elevated nickel content, etc) and of varying hardness (400 - 420 H_B or 54 - 56 H_{Sh}, 55 - 65 H_{Sh}) it was found that for rolling No. 10 and 12 sections, rolls made of chilled carbon cast iron with a barrel minimum hardness of 70H_{Sh} is the most suitable for this purpose. It is important that the working surface of the electric-pulse machined rolls does not form any stable joint with the metal rolled and scale, which would spoil the groove. The inclination of the flute walls is increased when the electric pulse method is used which improves the bond between concrete and reinforcement. The new fluting method saves 3.5% of metal on an average during rolling and reduces the weight of 1 running meter of sections from 944 to 912 g (with new grooves) and from 991 to 959 g (with worn grooves). The service life of electrd-pulse machined rolls is increased by a factor of 2. There are 3 figures and 2 tables.

ASSOCIATION: Magnitogorskiy metallurgicheskiy kombinat (Magnitogorsk Metallurgical Combine)

UZIYENKO, A.M.; KUSTOBAYEV, O.O.; DUKHIN, I.S.; SMIRNOV, B.I.; GRISHKO, A.G.; GONCHAROVA, R.Ya.

Research at the Magnitogorsk Metallurgical Combine. Stal' 22 no.8:742-743 Ag '62. (MIRA 15:7)
(Rolling mills—Equipment and supplies)

SOKOLOV, V.A., inzh.; LEVINA, G.G., inzh.; Prinimali uchastiye: DUKHIN, I.S.; KOLOV, M.I.; SOSNOVSKAYA, Z.N.

Increasing the durability of steel rolls for strip mills.
Stal' 22 no.9:821-823 S '62. (MIRA 15:11)

1. Magnitogorskiy metallurgicheskiy kombinat.
(Rolls (Iron mills)) (Steel--Heat treatment)

DUKHIN, I. Ye.

Some factors having an effect on the thickness of rocks frozen for many years. Mat. k uch. o merz. zon. sem. kory no.9:141-149 '63 (MIRA 18:1)

PORKHAYEV, G.V., kand.tekhn.nauk; FEDOROVICH, D.I.; SHEYKIN, I.V.; DUKHIN, I.Ie.; SHCHELOKOV, V.K.; SHUR, Yu.L.; FEL'DMAN, G.M.; FILIPPOVSKIY, S.M.;

[Thermal physics of freezing and thawing soils] Teplofizika promerzaiushchikh i protaivaiushchikh gruntov. Moskva, Nauka, 1964. 195 p. (MIRA 17:8)

1. Moscow. Institut merzlotovedeniya.

ZHESTKOVA, T.N.; FEL'DMAN, G.M.; DUKHIN, I.Ye.; SHVETSOV, P.F.

Formation of glacial horizons in epigenetic frozen strata.
Dokl. AN SSSR 156 no. 3:558-560 '64. (MIRA 17:5)

1. Chlen-korrespondent AN SSSR (for Shvetsov).

ACC NR: AP6036386 SOURCE CODE: UR/0210/66/000/007/0092/0097

AUTHOR: Yefimov, A. I.; Dukhin, I. Ye.

ORG: none

TITLE: Maximum depth of occurrence of perennially frozen rock

SOURCE: Geologiya i geofizika, no. 7, 1966, 92-97

TOPIC TAGS: geology, physical geology, geocryology, frozen rock, perennially frozen rock, perennially frozen rock depth, permafrost, depression/Tunkin

ABSTRACT: The authors discuss the possibility of the occurrence of perennially frozen rock to depths of 1200—1300 m in the Tunkin depression and elsewhere in the vicinity of Lake Baykal. Data obtained by other authors, principally A. P. Bulmasov, and the arguments presented by them for and against the occurrence of perennially frozen rock at such great depths are analyzed, as is the reliability of the gravimetric methods used in obtaining the data. A table is included which presents information on instances of perennially frozen rock at maximum depths (isothermal lower surface temperature 0°C) in Europe, Asia, and North America.

Card 1/2 UDC: 551.52

ACC NR: AP6036386

The table in the original article shows name place, location, predominating rocks, average annual air temperature, rock temperature at specific depths, maximum depth of occurrence, and source of data. [W-79-67-4] [SP]

SUB CODE: 08/SUBM DATE: none/ORIG REF: 024/OTH REF: 004/

Card 2/2

FROLOV, N.M.; AVER'YEV, V.V.; DUKHIN, I.Ye.; LYUBIMOVA, Ye.A.; Prinimali uchastiye: GOL'DBERG, V.M.; MAVRITSKIY, B.F.; SEDOV, N.V.; YAZVIN, L.S.; KUTASOV, I.M.; STARIKOVA, G.N.; KORTSENSHTEYN, V.N., red.

[Methodological instructions for studying thermal waters in boreholes.] Metodicheskie ukazaniia po izucheniiu termal'nykh vod v skvazhinakh. Moskva, Nedra, 1964. 139 p. (Moskov. Vsesoiuznyi nauchno-issledovatel'skii institut gidrogeologii i inzhenernoi geologii. Trudy, no.17). (MIRA 19:1)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut gidrogeologii i inzhenernoy geologii, Moskva (for Frolov, Gol'dberg, Mavritskiy, Sedov, Yazvin). 2. Institut vulkanologii Sibirskogo otdeleniya AN SSSR (for Aver'yev). 3. Institut merzlotovedeniya AN SSSR (for Dukhin). 4. Institut fiziki Zemli AN SSSR (for Lyubimova, Kutasov, Starikova).

DUKHIN, L.Kh., kandidat meditsinskikh nauk.

Program of the obstetrics study club. Fel'd i akush.no.12:38-40 D '55. (MLRA 9:3)

1. Kiyevskoye meditsinskoye uchilishche.
(OBSTETRICS--STUDY AND TEACHING)

DUKHIN, L.Kh., kand.med.nauk; IEVDOKIMOV, [IEvdokimov, O.I.], kand.med.nauk

Immediate and late results for mother and child of the use of obstetrical forceps. Fel'd., akush. i gin. 20 no.1:49-52 '58. (MIRA 13:1)

1. Kiyevskiy gorodskoy otdel zdravookhraneniya.
(FORCEPS, OBSTETRIC)

DUKHIN, L.Kh., kand.med.nauk (Kiyev)

On the fiftieth anniversary of the Second All-Russian Congress of Feldshers and gynecologists. Fel'd. i akush. 24 no.9:42-46 S '59. (MIRA 12:12)

(GYNECOLOGY--CONGRESSES)

DUKHIN, L.Kh., kand.med.nauk (Kiyev)

Development of medical (feldshere) schools in the Ukraine. Vrach. delo no.12:1329-1331 D '59. (MIRA 13:5)
(UKRAINE--MEDICINE--STUDY AND TEACHING)

DUKHIN, L.Kh., kand.med.nauk (Kiyev)

Problems in semiprofessional medical education at feldshers' and special congresses in the prerevolutionary period. Vrach.delo no.10: 135-138 O '60. (MIRA 13:11)
(MEDICINE--STUDY AND TEACHING)

DUKHIN, L.Kh., kand.meditsinskikh nauk (Kiyev)

From the history of medical training for subprofessional personnel in the Kiev region in the prerevolutionary period. Fel'd i akush. 25 no. 10:46-49 O '60. (MIRA 13:10)
(KIEV—MEDICINE—STUDY AND TEACHING)

DUKHIN, L.Kh., kand.med.nauk (Kiyev)

Problems in semiprofessional medical training at Pirogov meetings of physicians. Fel'd. i akush. 25 no.12:38-42 D '60. (MIRA 13:12)
(MEDICINE—STUDY AND TEACHING)

DUKHIN, L.Kh., kand.med.nauk (Kiyev)

50th anniversary of the First All-Russian Congress on the Reform of Obstetrical Education. Fel'd. i akush. 26 no.3:39-43 Mr '61. (MIRA 14:3)

(OBSTETRICS—CONGRESSES)

DUKHIN, L.Kh., kand.med.nauk

History of the development of pharmaceutical education in the Ukraine. Part.1: The prerevolutionary peroid. Farmatsev. zhur. 16 no.3:53-56 '61. (MIRA 14:6)
(UKRAINE—PHARMACY—STUDY AND TEACHING)

DUKHIN, L.Kh., kand.med.nauk (Kiyev)

100th anniversary of A.N.Rakhmanov's birth. Fel'd. i akush. 26 no.5: 28-30 My '61. (MIRA 14:5)
(RAKHMANOV, ALEKSANDR NIKOLAEVICH, 1861-1961)

DUKHIN, L.Kh., kand.med.nauk (Kiyev)

N.M. Maksimovich-Ambodik, the father of Russian obstetrics; on the 150th anniversary of his death. Fel'd.i akush. 27 no.7:34-37 Jl '62. (MIRA 15:9)

(MAKSIMOVICH-AMBODIK, NESTOR MAKSIMOVICH, 1744-1812)

DUKHIN, L.Kh., kand.med. nauk (Kiyev)

Fiftieth anniversary of the Third All-Russian Congress of Doldshers and Obstetricians. Fel'd. i akush. 27 no.8:33-38 Ag'62. (MIRA 16:8)

(PUBLIC HEALTH—CONGRESSES)

DUKHIN, L.Kh., kand.med.nauk (Kiyev)

Professor G.F.Pisemskii and his role in the organization of maternity hospitals on collective farms. Fel'd. i akush. 28 no.4:36-39 Ap'63. (MIRA 16:8)
(HOSPITALS, GYNECOLOGIC AND OBSTETRIC)
(PISEMSKII, GRIGORII FEDOROVICH, 1862 - 1937)

DUKHIN, L.Kh.

Experience in training pharmacy workers in socialist countries.
Apt. delo 13 no.2:78-82 Mr-Ap '64.
(MIRA 17:12)

DUKHIN, S. D.

"Theory of the Interaction of Evaporating or Growing Drops at Long Distances," by S. D. Dukhin and B. V. Deryagin, Corresponding Member of the Academy of Sciences USSR, Institute of Physical Chemistry, Academy of Sciences USSR, Doklady Akademii Nauk SSSR, Vol 112, No 3, 1957, pp 407-410

The isothermal analysis of the problem of the motion of drops in a diffusion field led to establishment of the attraction and repulsion forces acting between fog drops, or between drops and an extended moist surface, and exerting a significant influence on their motion relative to the medium. In first approximation the diffusion forces were compensated by the effect of Stephan's flow, and the velocity of the drop with respect to the surface of phase transition was equal to zero. However, it is shown that under consideration of heat transfer occurring simultaneously with the diffusive process such compensation is mostly disturbed and diffusive forces may act on deposit and coagulation of aerosols. (C)

Sum. 1816

DUKHIN, S.S.; BUYKOV, M.V.

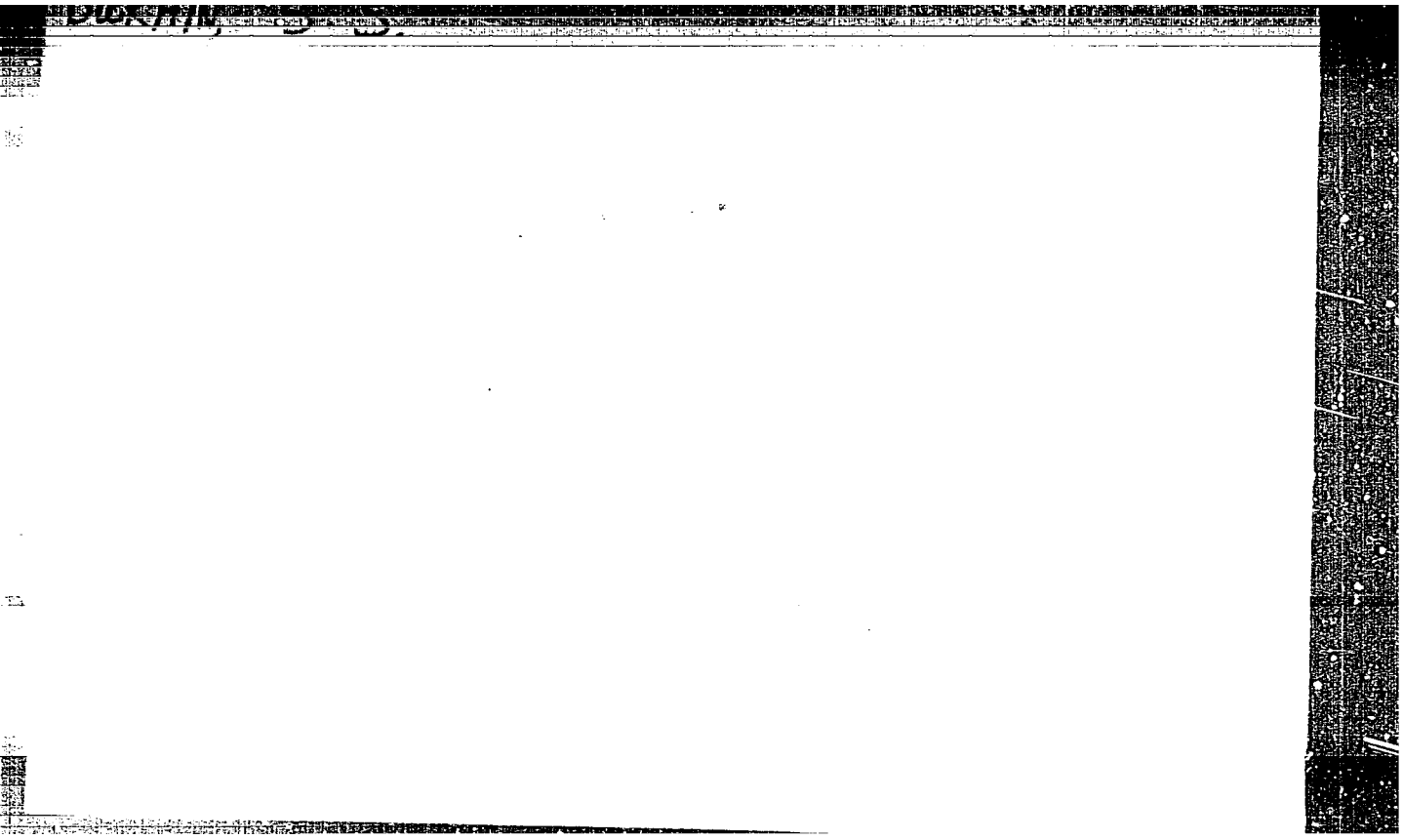
The theory of the dynamic adsorption layer of moving spherical particles. Part 2. Zhur. fiz. khim. 39 no.4:913-920 Ap '65. (MIRA 19:1)

1. Institut obshchey i neorganicheskoy khimii AN UkrSSR.

DERYAGIN, B.V.; DUKHIN, S.S.; MIKHEL'SON, M.L.; KAGANER, V.M.

Utilization of the condensation method for the precipitation of the ore dust. Bor'ba s sil. 2:22-31 '55. (MLRA 9:5)

1. Chlen-korrespondent Akademii nauk SSSR (for Deryagin). 2. Institut fizicheskoy khimii Akademii nauk SSSR (for Deryagin) 3. Krivorozhskiy Nauchno-issledovatel'skiy gornorudnyy institut (for Dukhin, Mikhel'son, Kaganer)
(DUST--REMOVAL)

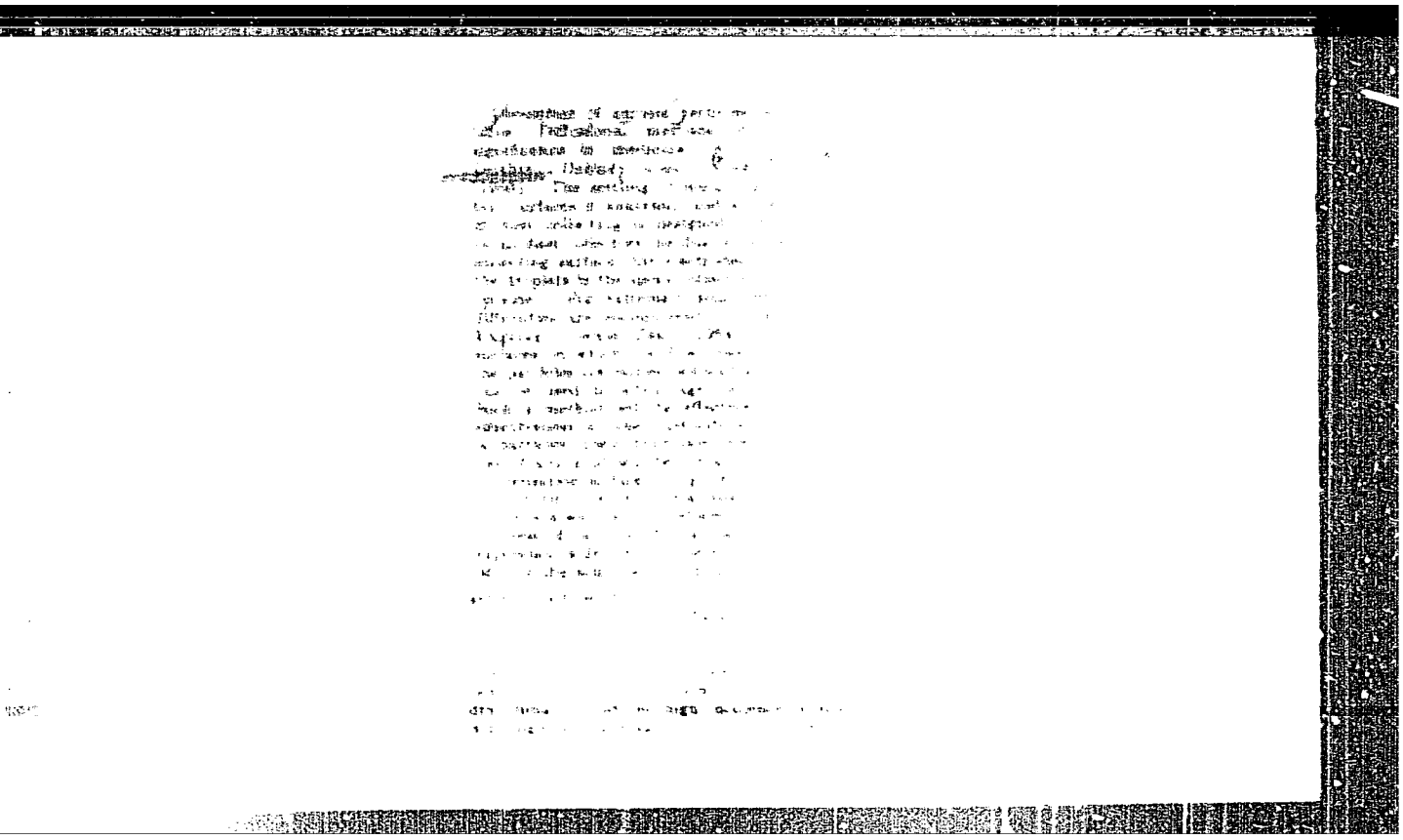


APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00041151(

DERYAGIN, B.V.; DUKHIN, S.S.

Motion of aerosol particles in a diffusion field. Dokl.AN SSSR 106 no.5:851-854 F '56. (MLRA 9:7)

1.Chlen-korrespondent AN SSSR (for Deryagin).2.Institut fizicheskoy khimii Akademii nauk SSSR.
(Aerosols) (Diffusion)



DUKHIN, S.S., Cand Phys-Math Sci -- (diss) "Theory of the force of diffused long-range action of aerosols." Moscow, 1957, 16 pp (Acad Sci USSR. Institute of Physical Chemistry. Scientific Research Mining Institute), 100 copies (KL, 36-57, 103)

DUKHIN, S.S.

49-6-8/21

AUTHORS: Deryagin, B. V. and Dukhin, S. S.

TITLE: On the influence of thermophoresis on the coagulation of cloud drops. (O vliyanii termoforeza na koagulyatsiyu oblachnykh kapel').

PERIODICAL: "Izvestiya Akademii Nauk, Seriya Geofizicheskaya" (Bulletin of the Ac.Sc., Geophysics Series), 1957, No.6, pp. 779-784 (U.S.S.R.)

ABSTRACT: The influence of thermophoresis forces is investigated on the movement of aerosol particles in conjunction with a temperature drop in the neighbourhood of mist drops. The authors restrict themselves to the temperature field and consequently to the thermophoresis forces in the neighbourhood of the drops, the dimensions of which do not exceed several tens of μ since with a decrease in the drop dimensions, other conditions remaining equal, the thermophoresis force increases and the considered problem can be solved more simply if this simplification is valid. The convective heat transfer and the convective diffusion during the fall of particles of such dimensions can be disregarded and the temperature field and the vapour concentration in their neighbourhood can be considered as being spherically symmetrical. The investigation in this

Card 1/2

AUTHOR DUKHIN, S.S. PA - 2110

TITLE A Theory of Distant Interaction between Evaporating or Growing Drops (Teorija vzaimodeystviya isparyayushchichkhsya ili rastushchikh kapel'na bol'shikh rastoyaniyakh).

PERIODICAL Doklady Akademii Nauk SSSR, 1957, Vol 112, Nr 3, pp 407-410 (U.S.S.R.)
Received 3/1957 Reviewed 4/1957

ABSTRACT The present paper shows that, when taking a heat transfer process developing parallel to diffusion, the compensating effect of Stefan's flow (Stefanov, spelling not given) is cancelled in the general case. Therefore the diffusion forces are able to exercise considerable influence on the precipitation and on the coagulation of an aerosol.
This problem is solved here by using the simplifications already previously discussed by the authors (Dokl.Akad.Nauk, 95, 467, 1956).
The authors here deal only with the important case of the low partial pressure of steam, for which reason it is possible to use the linearized system of equations for the hydrodynamics of a mixture. All processes are here considered to be quasi-steady. The system of equations and boundary is explicitly given and explained. Next, the solutions of these equations which were found in consideration of boundary conditions are explicitly given. An additional "polarization temperature" is then added to the average temperature of the drop (this polarization temperature being identical with psychometric temperature). In a homogeneous exterior temperature- and diffusion field the drop is subjected to diffusion-thermal polarization. The boundary condition obtained here, which takes diffusion-

Card 1/2

A Theory of Distant Interaction between Evaporating or Growing Drops.

thermal polarization into account differs from the corresponding boundary condition in the case of pure diffusion polarization by the amount of a coefficient. The total field of velocities found here is expressed by a superposition $v_1(r_2, \Theta_2)$ and Stoke's velocity field $v_2(r_2, \Theta_2)$ which is due to the exterior Stefan flow. Therefore also the entire diffusion force is expressed by a corresponding sum. In the case of the liberation of heat the drops are repulsed by the surface. However, in the case of the absorption of heat, the drops are attracted by the surface. In the case of a turbulent flow round a surface the diffusion force is localized in a thin boundary layer. Surfaces with a temperature that is below psychometric temperature attract the drops, but surfaces with a temperature that is above psychometric temperature repulse the drops. The diffusion forces must render frosting of surfaces in undercooled clouds more difficult. A heat-liberating frozen drop must be a repulsion center for other drops. (No illustrations)

ASSOCIATION Institute for Physical Chemistry of the Academy of Sciences of the USSR.
PRESENTED BY
SUBMITTED 3. 1. 1957
AVAILABLE Library of Congress

DUKHIN, S.S.

20-1-34/54

AUTHOR: Dukhin, S.S., Deryagin, B.V., Corresponding Member of the Academy of Sciences of the USSR

TITLE: A Theory of the Interaction Force Between Drops at Rest at Any Distance at Psychrometric Temperature
(Teoriya silovogo vzaimodeystviya pokoyashchikhsya kapel' na lyubom rasstoyanii pri psikhrometricheskoy temperature)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 115, Nr 1, pp. 126 - 129 (USSR)

ABSTRACT: The present work treats this interaction for the stationary and adiabatic course of the phase transition with regard to members small of first and second order in relation to $\lambda = \varrho'/\varrho'' \ll 1$. ϱ' and ϱ'' are the partial densities of the vapour and the air. With using the similarity of the heat-transfer- and diffusion processes we can easily show that in the case of an adiabatic course of the phase transition, that is to say in the case of lacking heat sources and heat transfer in drops, the temperature along the surface of the drop does not change and is equal to the psychrometric temperature. This causes an interesting characteristic of interaction and makes easier its investigation.

Card 1/2

20-1-34/54

A Theory of the Interaction Force Between Drops at Rest at Any Distance at Psychrometric Temperature

First the equations and boundary conditions for the field of velocities and diffusion current on the occasion of phase transition at the surfaces of spherical particles (drops) 1 and 2 with the radii R_1 and R_2 are put down. The Stefan's linear flow ($Re \ll 1$) of the viscous medium is, strange to say, a potential flow which makes easier the calculation of diffusion forces. After this a transformation of the equation for this potential φ is discussed. A formula is deduced for the force exercised on drop 2 by drop 1. The interaction of the drops in first approximation and with $Re \ll 1$ is at all distances equal to zero. This coincides excellently with the result of the direct calculation of the interaction of drops at great distances in first approximation as also this interaction is equal to zero. The authors find here an important analogy between the diffusion interaction and the electrostatic interaction. In the end the formula for the interaction of drops at great distances obtained from Coulomb's law is mentioned. There is no figure but there are 4 Slavic references.

SUBMITTED: January 29, 1957
AVAILABLE: Library of Congress

Card 2/2

AUTHORS: Dukhin, S.S.; Deryagin, B.V. 69-20-3-11/24

TITLE: On a Method of Computing the Deposition of Disperse Particles From a Flow on an Obstacle (K metodike rascheta osazhdeniya dispersnykh chastits iz potoka na prepyatstviya)

PERIODICAL: Kolloidnyy zhurnal, 1958, vol XX, Nr 3, pp 326-328 (USSR)

ABSTRACT: In the physics of aerosols the problem of the deposition of aerosols from a flow on an obstacle is very important. For the calculation of the particles deposited in the time unit on the obstacle, it is sufficient to determine the coefficient of capture E equal to the relation of the cross section of the flow to the largest cross section of the obstacle. If the inertia of the aerosol or colloidal particle circumventing the obstacle is negligible and the field of external forces is solenoidal, then the computed concentration of the particles along their trajectory is constant. This theorem permits, in a simple manner, the calculation of the deposition speed of particles on obstacles, e.g. emerging bubbles or descending balloons.

Card 1/2 There are 2 references, 1 Soviet and 1 English.

69-20-3-11/24

On a Method of Computing the Deposition of Disperse Particles From a Flow on an Obstacle

ASSOCIATION: Institut fizicheskoy khimii AN SSSR, Moskva (Institute of Physical Chemistry of the USSR Academy of Sciences)

SUBMITTED: January 10, 1958

Card 2/2 1. Aerosols—Deposits—Theory

DUKHIN, S. S.,; PROKHOROV, P. S.; DERYAGIN, B. V.; IZMAYLOVA, G. I.;

"The adsorption of vapors by condensation nuclei and their influence on the formation of water aerosols,"

report presented at the Fourth All-Union Conference on Colloidal Chemistry, Tbilisi, Georgian SSR, 12-16 May 1958 (Koll zhur, 20,5, p.677-9, '58, Tsubman, A.B)

AUTHORS: Dukhin, S.S., Deryagin, B.V. SOV/69-20-6-5/15

TITLE: The Secondary (Diffusion) Electrical Double Layer (Vtorichnyy (diffuzionnyy) dvoynoy elektricheskiy sloy)

PERIODICAL: Kolloidnyy zhurnal, 1958, Vol 20, Nr 6, pp 705-707 (USSR)

ABSTRACT: On the mobile interface of two media, of which at least one is an electrolyte, an ordinary (diffusion) electrical double layer appears due to the interaction of diffusion and ionic migration in an electric field. There is also a secondary (diffusion) electrical double layer arising from the interaction between convective diffusion and ionic migration in an electric field. The charge of the inner layer is due to deviation from electrical neutrality. The charge of the outer layer is located in the electrolyte layer adjacent to the interface and is equal in magnitude and opposite in sign.
There is 1 Soviet reference.

Card 1/2

The Secondary (Diffusion) Electrical Double Layer SOV/69-20-6-5/15

ASSOCIATION: Kavkazskiy institut mineral'nogo syr'ya (Caucasian Institute of Mineral Raw Materials)

SUBMITTED: May 12, 1958

1. Electrical double layer—Theory

Card 2/2

5(4)

AUTHORS: Dukhin, S. S., Deryagin, B. V., Corresponding Member, Academy of Sciences, USSR

SOV/20-121-3-30/47

TITLE: The Diffusional-Electrical Potential of a Falling Drop With an Adsorption Layer (Diffuzionno elektricheskiy potentsial padayushchey kapli s adsorbtsionnym sloyem)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 121, Nr 3, pp. 503 - 506 (USSR)

ABSTRACT: This paper carries out a qualitative investigation of the adsorption of two types of ions from the solution of an electrolyte on the movable surface of a drop. The approximate conservation of the electroneutrality of the double layer (dvoynoy sloy) (which is constantly regenerated) requires approximately equal numbers of the positive and negative charges which abandon the volume of the solution. If the diffusion coefficients of the positive and of the negative charges do not coincide, an electromagnetic field will compensate the migration of the positive and negative ions to the surface. The phenomena of this kind are analogous to the diffusion potentials. This paper

Card 1/3

investigates the diffusional-electrical effects occurring during the falling of an electrolyte drop in a liquid or gaseous medium (for example, in oil or air). For the sake of simplicity, this medium is assumed to be free from ions. In order to determine the electric potential in the volume of the drop, it is necessary to investigate the continuity equations for the ion flows in the volume of the electrolyte. The normal component of the current on the surface of the drop is (in first approximation) equal to zero. It can be shown by analyses or by thermal analogy that the problem under discussion has only a trivial solution. Authors then investigate the problem of the electric field of a drop for the special case of small differences of ion concentration. A condition is then given for the diffusion within the drop, it determines the order of magnitude of the ratio between convective and diffusion flow. Finally, an expression is derived for the distribution of the potential. The calculation values of electric field strength do not occur in concrete experimental conditions since the electrocapillary influence

The Diffusional-Electrical Potential of a Falling Drop With an Adsorption Layer SOV/20-121-3-30/47

of the surface was not taken into account. There are 3 references, 3 of which are Soviet.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR(Institute of Physical Chemistry AS USSR)

SUBMITTED: April 5, 1958

Card 3/3

SOV/180-59-1-16/29

AUTHORS: Deryagin, B.V. and Dukhin, S.S. (Moscow)

TITLE: Theory of the Movement of Mineral Particles near a Rising Bubble Applied to Flotation (Teoriya dvizheniya mineral'nykh chastits vblizi vsplyvayushchego puzyr'ka v primenenii k flotatsii)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1959, Nr 1, pp 82-89 (USSR)

ABSTRACT: The authors distinguish two stages in the attachment of a mineral particle to a bubble in flotation. In the first stage the particle approaches the bubble surface so closely that forces promoting or hindering adhesion can develop. This stage has not previously received attention, and the authors now give a theoretical treatment, following the extensive work of one of them (Deryagin) in this field. They conclude that if "turbulization" (setting in turbulent motion) of the pulp and deviation of the bubble and mineral-grain shapes from spherical are ignored and the treatment is restricted to grains small compared with the bubbles the problem becomes similar to the trapping of mist droplets. They discuss the influence of the ratio of the particle size to the minimum size at which contact due

Card 1/3

Theory of the Movement of Mineral Particles near a Rising Bubble Applied to Flotation

solely to inertial forces is still possible, and of the values of the Reynolds number and another dimensionless group. The second stage, in which the particle becomes attached to the bubble, they show to depend on the point of contact and the contact velocity and give equations and data for the calculations. The equations obtained for the probability of contact are necessary for calculating the rate of flotation. Since the particle diameter greatly affects this probability, the authors emphasize that in considering the selectiveness of flotation the degree of dispersion of particles must be allowed for; this may be done by using the equations given.

Card 2/3

SOV/180-59-1-16/29

Theory of the Movement of Mineral Particles near a Rising Bubble Applied to Flotation

There are 8 references, 6 of which are Soviet and 2 are mixed English-Soviet.

ASSOCIATION: Kavkazskiy institut mineral'nogo syr'ya (Caucasian Mineral Raw-Materials Institute), Ministerstvo geologii i okhrany nedr SSSR (Ministry of Geology and Conservation of Mineral Resources of the USSR)

SUBMITTED: March 26, 1958

Card 3/3

80140
24,2400 S/141/59/002/06/022/024
AUTHOR: Dukhin, S.S. E032/E314

TITLE: On a Possibility of Producing a Periodically Non-homogeneous Dielectric

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, 1959, Vol 2, Nr 6, pp 1013 - 1014 (USSR)

ABSTRACT: Gershenzon (Ref 1) has studied the effect of a standing sonic wave on a liquid dielectric. The use of ultrasonic waves to produce periodic structures is very convenient since the period of the structure can be varied within wide limits. However, in the form in which it was used in Ref 1, the method ensures only very small changes in the dielectric constant. One would expect that the value of the ultrasonic method would be greater if it were to be applied to suspensions or aerosols. In suspensions, the suspended particles tend to concentrate near the maxima or minima of the standing wave and the maximum difference between the values of the dielectric constant along the standing wave may approach a value equal to the difference between the dielectric constant of the medium and of the particles. The sonic pressure on a small

Card1/5

S/141/59/002/06/022/024
E032/E314

On a Possibility of Producing a Periodically Non-homogeneous Dielectric

sphere in a standing sonic wave can be calculated from King's formula (Ref 2), which is given by Eq (1) in the present paper, where $k = 2\pi/\lambda$, m' is the mass of the displaced medium, v and u are the amplitudes of the velocities of the particle and the medium and f is of the order of unity and depends on the density ratio. This formula does not take into account the viscosity of the medium and consequently cannot be used for fine particles whose motion in the medium is characterised by a Reynolds number smaller than unity. In the latter case the effect off the sonic wave on the particle is mainly viscous and the drift of the particle is approximately described by Eq (2), where m is the mass of the particle, η and ν are the viscosity and the kinematic viscosity of the medium, r is the radius of the particle, t is the time, $v = x$ is the velocity of the particle and $u = A\sin(kx)\sin(ut)$ and is the velocity distribution in the standing wave. Since the amplitude of the vibrations A is much smaller

4

On a Possibility of Producing a Periodically Non-homogeneous Dielectric

than the wavelength λ, the x on the righthand side of Eq (2) may be looked upon as constant during a single period. On this approximation the solution of Eq (2) is given by Eq (3), where A', Ψ and β are given by the equations at the foot of p 1013 and the top of p 1014. The righthand side of Eq (2) may be looked upon as a quasi-periodic force with a slightly varying amplitude which produces vibrations of the particle and a simultaneous (on the average) displacement during each period. The average drift of the particle can be obtained by averaging Eq (2) over the period. This gives the trajectory of the particle $x_o(t)$ which can be obtained as a solution of Eqs (4) and (5). Since the Reynolds number in the present case is smaller than unity it may be shown that the first and third terms in Eq (4) are small and hence one obtains the simplified equation given by Eq (6). When the collection time θ, calculated from Eq (1), is of the order of 10^{3} sec

Card3/5

On a Possibility of Producing a Periodically Non-homogeneous Dielectric

(λ = 3 cm, r = 1 μ, ultrasonic energy density Ω = 100 cm). Collection time calculated from Eq (6) is 1 sec. This indicates the possibility of more effective collection of fine particles at the turning points of the standing wave. In order to prevent the sedimentation of the particles under the action of gravity the ultrasonic beam should be directed upwards in which case the stationary distribution of particles near a nodal plane which is set up after a time of the order of θ is determined by Eq (7). It follows that for λ = 3 cm and Ω = 100 erg.cm^{-3}, particles with a radius smaller than 1 μ lie within an interval $\Delta x \cong 3 \times 10^{-2}$ of the node. An estimate carried out using Einstein's formula for the root mean square displacement due to thermal motion showed that when the radius of the particles is greater than 0.1 μ, the thermal

Card4/5

4

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E032/E314

On a Possibility of Producing a Periodically Non-homogeneous Dielectric

motion cannot prevent a collection of particles near the nodal planes.
This is an abridged translation.
There are 5 references, 4 of which are Soviet and 1 is English.

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Card 5/5

DUKHIN, S.S.; DERYAGIN, B.V.

Electric field of a moving drop. Part 1: Theory of the electric field of a drop containing an ionogenic surface-active substance. Koll.zhur. 21 no.1:37-49 Ja-F '59. (MIRA 12:5)

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AUTHORS: Deryagin, B. V., Dukhin, S. S., Lisichenko, V. A.

TITLE: Kinetics of the Attachment of Mineral Particles to Bubbles During Flotation. I. The Electric Field of the Moving Bubble

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ABSTRACT: The generation of an electric field during the motion of a liquid separating layer was investigated for the first time by A. N. Frumkin and V. G. Levich (Ref 3) by means of a mercury drop sinking in an electrolyte. It is shown here that during the motion of bubbles in liquid media an electric field is always generated which extends far beyond the ion sheath. The production of such forces of a relatively large range of action is further indicated in investigations made by V. A. Lisichenko et al (Ref 4). This article is intended to give a theoretical explanation of this new effect in the field of electrokinetics produced by stretching or compression of the separating layers and at different diffusion coefficients of the ions. The authors calculated the electric field generated as a result of the afore-mentioned effect when a bubble rises

Card 1/2