L 24434-66
ACC NR: AT6006477

This explanation was proposed by V. I. Arkharov and Ye. B. Blankova (FMM, vyp. 1, 1962, t. 10). Orig. art. has: 6 graphs.

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 004/ OTH REF: 001

Card 2/2 dda

L 24432-66 EWT(m)/T/EWP(t) IJP(c) JD/JH
ACC NR: AT6006479 SOURCE CODE: UR/2680/65/000/024/0124/0130

AUTHORS: Layner, D. I.; Kurakin, A. K. 45

ORG: State Scientific Research and Design Institute of Alloys and Nonferrous Metalworking, Moscow (Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut splavov i obrabotki tsvetnykh metallov) B+1

TITLE: The reaction diffusion of iron into aluminum

SOURCE: Moscow. Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut splavov i obrabotki tsvetnykh metallov. Trudy, no. 24, 1965. Metallovedeniye i obrabotka tsvetnykh metallov i splavov (Metal science and the treatment of nonferrous metals and alloys), 124-130

TOPIC TAGS: aluminum, iron, aluminum compound, intermetallic compound/ AV000 aluminum, Armco Iron

ABSTRACT: This investigation was undertaken to resolve the present controversy concerning the nature of the compounds formed in the solid state diffusion of iron into aluminum. Electron and x-ray diffraction spectra of bimetallic specimens consisting of Armco A iron and high purity aluminum AV000 were investigated. The aluminum coating of the specimens was of sufficient thickness (2 and 6 μ) to yield a characteristic aluminum x-ray pattern, as suggested by M. M. Umanskiy and M. P. Shaskol'skaya (ZhTF, 1964, vyp. 11, t. 14, str. 1283--1290). The experimental results

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ACC NR: AT6006479

are presented in graphs and tables (see Fig. 1). It was found that the solid state diffusion of iron into aluminum begins at 350C and gives rise to the formation of the compound $FeAl_3$. At higher temperatures (up to 400C) Fe_2Al_5 is formed, and at 650C the formation of FeAl takes place.

L 24432-66

ACC NR: AT6006479

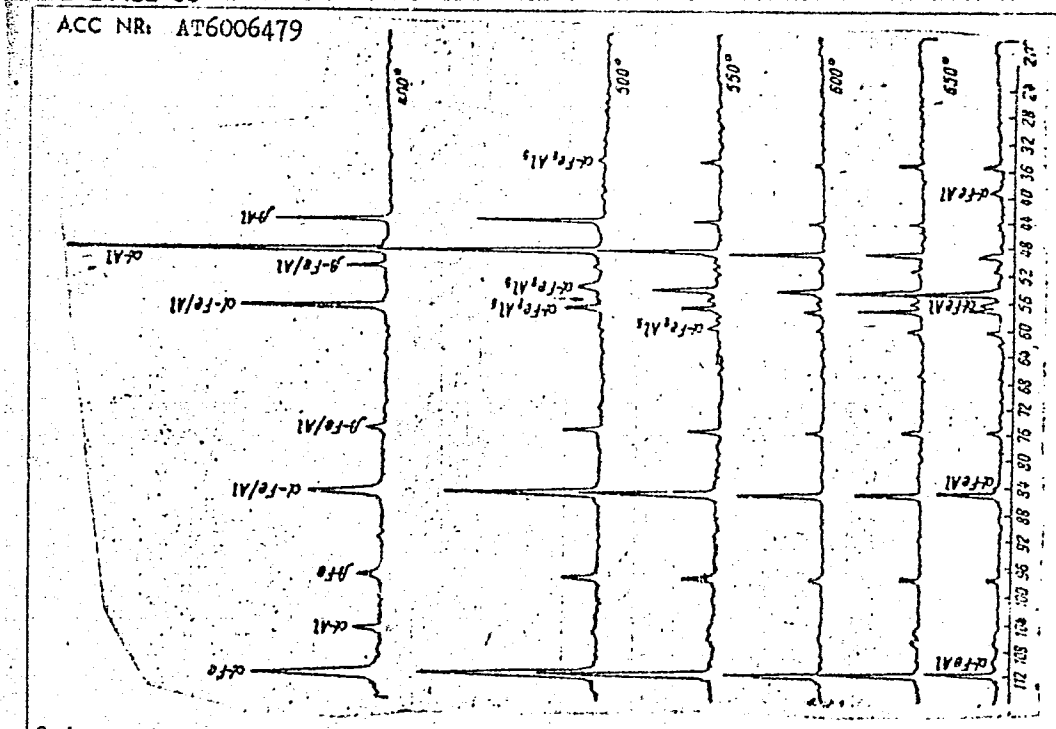

Fig. 1. X-ray diffraction spectra of bimetallic specimens, annealed at different temperatures for a period of 30 minutes.

Orig. art. has: 3 tables and 2 graphs.

Card 3/3 ddu SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 007/ OTH REF: 005

L 28857-66 EWT(m)/EWP(t)/ETI IJP(c) JD/WB

ACC NR: AP6010411 SOURCE CODE: UR/0126/66/021/003/0466/0467

AUTHOR: Layner, D. I.; Bay, A. S.; Gil'dengorn, I. S.

ORG: Giprotsvetmetobrabotka

34
8

TITLE: On the mechanism of the oxidation of iron

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 3, 1966, 466-467

TOPIC TAGS: metal oxidation, iron, iron compound, physical diffusion, ion, physical chemistry theory

ABSTRACT: There is a discrepancy between two theories of this mechanism. Thus, Pfeil (Iron and Steel Inst., 1929, 119, 501) established that the dominant factor in the oxidation of iron is the diffusion of Fe ions through the scale, whereas Davies et al. (J. Metals, 1951, 3, 10, 889) and Himmel et al. (J. Metals, 1953, 5, 6, 827) believe that oxygen diffusion accounts two-thirds for the formation of Fe_2O_3 layer and consider the diffusion of cations and entirely for the formation of Fe_3O_4 layers as the dominant factor in the oxidation of iron. To clear up this discrepancy, the authors performed a simple experiment: specimens of armco iron were oxidized in air at 1000°C until a Fe_2O_3 layer several microns thick had formed. After this, a platinum tag (wire of 100-μ diameter) was placed on the surface of the specimen without removing it from the furnace and the oxidation was continued for several hours.

Card 1/2

UDC: 669.018.85: 620.193

L 23857-66

ACC NR: AP6010411

Subsequent investigation showed that the tag lay deep in the layer of wustite. Additional experiments with annealing the scale separated (together with the tag) from the iron showed that the penetration of the tag into the scale is not associated with creep. These findings contradict the theory of Davies et al. and Himmel et al. and can be explained only by the mechanism suggested by Pfeil as well as by V. I. Arkharov (Okisleniye metallov, Sverdlovsk, Metallurgizdat, 1945). (Arkharov showed that at high temperatures the Fe_2O_3 layer is the first to appear. Below it form the Fe_3O_4 and FeO layers owing to the reduction of the Fe_2O_3 oxide by Fe ions. The scale forms at the Fe_2O_3-O_2 interface.) Orig. art. has: 1 figure

SUB CODE: 11,07/ SUBM DATE: 09Jun65/ ORIG REF: 001/ OTH REF: 003

Card 2/2 CC

L 47358-66 E:T(m)/E:P(j) RM

ACC NR: AP6030559 (AN) SOURCE CODE: UR/0413/66/000/016/0033/0033

INVENTOR: Tsvanger, T. A.; Rostunov, V. F.; Golovnya, B. A.; Turetskaya, R. A.; Golubtsov, S. A.; Layner, D. I.; Malysheva, L. A.; Komrakova, V. V.; Yezerets, M. A.; Maslyukov, A. I.; Nastasin, A. A.

ORG: none

TITLE: Method of obtaining phenylchlorosilane. Class 12, No. 184855, [announced by State Scientific Research Institute of State Design and Planning Scientific Research for the Processing of Nonferrous Metals (Gosudarstvennyy nauchno-issledovatel'skiy institut "Giprotsvetmetobrabotka")]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 16, 1966, 33

TOPIC TAGS: phenylchlorosilene, chlorobenzene

ABSTRACT: An Author Certificate has been issued for obtaining phenylchlorosilanes by the reaction of chlorobenzene with the silicon-copper contact mass in the presence of an activator. To raise the yield of diphenyldichlorosilane and to

UDC: 547.419.5.07

Card 1/2

L 47359-66
ACC NR: AP6030558

increase the efficiency of the process, zinc oxide, in amounts up to 4%, is used as the activator. [Translation]

[NT]

SUB CODE: 11/ SUBM DATE: 01Dec64/

Card 2/2 mt

ACC NR: AP7005141 SOURCE CODE: UR/0126/66/022/004/0640/0640

AUTHOR: Pakhomov, V. Ya.; Kunakov, Ya. N.; Kachur, Ye. V.; Layner, D. I.

ORG: Scientific Research and Design and Planning Institute of the Rare Metals Industry (Nauchno-issled. i proektnyy institut redkometallicheskoy promyshlennosti)

TITLE: The effect of microinhomogeneity on the critical points of superconducting alloys

SOURCE: Fizika metallov i metallovedeniye, v. 22, no. 4, 1966, 640

TOPIC TAGS: critical point, superconducting alloy, lattice defect, grain structure, homogenization heat treatment, cast alloy

ABSTRACT: The effect of a homogenization anneal on the critical current density of Nb-46% Ti and alloy-2 was studied. The purpose of this heat treatment was to eliminate intercrystalline liquation which exists in the as-cast alloys. It is known that the Lorentz force can cause a creep of magnetic current that may result in the loss of superconductivity. Different types of metallic defects (inhomogeneities, dislocations, internal stresses, etc.) may act as stabilizers against the creep. For the experiments, 40-gram ingots were melted in a radiant arc furnace with tungsten electrodes in a purified helium atmosphere and homogenized in a vacuum furnace at 1500°C. The homogenized ingots were cold reduced into 0.25 mm diameter samples. All samples

Card 1/2 UDC: 537.312.62

ACC NR: AP7005141

had similar cold reductions. Critical current densities were measured in a transverse magnetic field of 16 kilooersted at 4.2°K. The critical current density was given as a function of ingot homogenization time which ranged from 1 to 5 hours. In both alloys, the critical current density was lowered by homogenization. The critical current density for Nb-46% Ti decreased linearly from about $1.8 \cdot 10^4$ a/cm^2 in the as-cast condition to about 10^4 a/cm^2 after 5 hours of ingot homogenization. Alloy-2 dropped sharply from $2 \cdot 10^4$ a/cm^2 to about 10^4 a/cm^2 after 1 hour of ingot homogenization, and remained constant thereafter. All of the samples had a similar dislocation density of 10^{11}-10^{12} cm^{-2}, characteristic of severely deformed metals. The microstructure of as-cast ingots showed intercrystalline liquation, which decreased as a function of homogenization time. After 5 hours at 1500°C, almost all of the liquation was absent in both alloys. Analogous results were obtained in the alloys Nb-75% Zr and 65 BNT in which the critical current density after homogenization changed from $1.3 \cdot 10^4$ and $2 \cdot 10^4$ to $7.8 \cdot 10^3$ and $1.2 \cdot 10^3$, respectively. Orig. art. has: 1 figure.

SUB CODE: 20,11/ SUBM DATE: 02Feb66/ OTH REF: 001

Card 2/2

ACC NR: AP6036114 (N) SOURCE CODE: UR/0365/66/002/006/0692/0699

AUTHOR: Layner, L. I.; Slesareva, Ye. N.; Tsypin, M. I.; Bay, A. S.

ORG: Scientific Research Institute for Alloys and the Working of Nonferrous Metals (Nauchno-issledovatelskiy institut splavov i obrabotki tsvetnykh metallov)

TITLE: Oxidation mechanism of titanium alloys containing up to 11% aluminum

SOURCE: Zashchita metallov, v. 2, no. 6, 1966, 692-699

TOPIC TAGS: titanium containing alloy, metal oxidation, aluminum

ABSTRACT: A study was made of binary titanium-aluminum alloys containing 0.01, 0.87, 2.85, 5.05, and 11.20 weight percent aluminum. The alloys were twice melted in an arc furnace with consumable electrodes, and then forged, rolled, annealed, and planed to eliminate the oxygen-saturated layer. The polished samples had dimensions of 1.2 x 1.2 x 1.5 cm, with an opening 2 mm in diameter. A day before the experiment, the samples were degreased in benzene and stored in a desiccator. The samples were charged into a resistance furnace with a working chamber 150 x 400 mm, heated to the given temperature. Temperature variations in the furnace did not exceed ± 5%. In some of the experiments steam was supplied at a temperature of 600°. In this case, the atmosphere of the furnace contained 60-70% water vapor. The rate of oxidation was determined by the gravimetric method. The effect of alloying on heat resistance was evaluated from the

Card 1/2 UDC: 620.193.5

ACC NR: AP6036114

relative change in weight of the samples. Phase analysis of the scale and of the layers beneath the scale was done on a Type URS-501 diffractometer. The experimental results with respect to the relative weight change of the alloys as a function of temperature, holding time, and composition of the gas medium are shown in a series of curves and tables. Based on the experimental data it is concluded that two basic mechanisms play a role in the process of the oxidation of titanium-aluminum alloys: 1) acceleration of diffusion through the scale due to a shift of the ionic equilibrium as a result of the entrance of trivalent aluminum ions into the titanium dioxide lattice; 2) slowing down of the oxidation when the amount of aluminum oxide in the scale increases to such an extent that there is formed a more or less thick layer of Al_2O_3 which hinders the diffusion of the titanium ions. Orig. art. has: 2 figures and 4 tables.

SUB CODE: 11/ SUBM DATE: 21Dec65/ ORIG REF: 015/ OTH REF: 012

Card 2/2

84126

9.4300 (1035, 1138, 1143)

S/070/60/005/005/015/017
E132/E360

AUTHORS: Mil'vidskiy, M.G., Layner, L.V. and Ovsyannikova, S.P.

TITLE: Dendritic Structure in Single Crystals of Silicon Grown from the Melt by Czochralski's Method

PERIODICAL: Kristallografiya, 1960, Vol. 5, No. 5, pp. 817 - 818

TEXT: A dendritic structure was found in a number of specimens of single crystals of silicon, oriented to show the 111 plane and etched in a mixture of HF, HNO_3 and $(CH_3CO)_2O$ in the ratio of 1:3:3. The origin of this structure appears to be crystallisation at a temperature below the temperature at which certain impurities separate out from the melt. Here, dendritic growth is most frequent when crystals are pulled out of technical silicon (purity 99.7 - 99.8%). Dendrites are developed in the 111 planes and when a section across them is cut in the 111 plane a picture is obtained which is very like that found in the octahedral slipping in crystal of Ge and Si when dislocations are developed. In purer materials dendrite formation is connected

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84126

S/070/60/005/005/015/017
E132/E360

Dendritic Structure in Single Crystals of Silicon Grown from the Melt by Czochralski's Method

with the presence of impurities (Ta, Ti, Fe, Mo) with solubilities within the limits 10^{-3} to 10^{-4}%. Ingots grown from supercooled melts also show this dendritic structure. It is most readily shown on surfaces which have suffered light oxidation as a result of etching. The growth of dendrites on slow cooling of a melt in a vacuum has been observed (on the free surface of the melt). The purer the Si the greater the supercooling at which dendritic growth begins and the slower the growth is.
There are 3 figures and 3 references: 2 Soviet and 1 English.

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskoy promyshlennosti (State Scientific Research and Design Institute for the Rare Metal Industry)

SUBMITTED: April 4, 1960

Card 2/2

89298

S/181/61/003/001/039/042
B102/B204

24,7500 (1136, 1143, 1160)

AUTHORS: Mil'vidskiy, M. G. and Layner, L. V.

TITLE: Twins and dislocations in silicon single crystals

PERIODICAL: Fizika tverdogo tela, v. 3, no. 1, 1961, 289-296

TEXT: It was the aim of the authors to study the twin formation in the growth of silicon single crystals, and to investigate the interaction between twins and dislocations. Twins containing Si single crystals, grown in the [111] and [110] directions by the Chokhral'skiy method were used for the purpose; the position of the twins was determined after etching in 10% NaOH at 65-80°C (20 min); the dislocation density was determined from the etch pits in longitudinal and cross sections of crystals with (111) orientation. For counting the etch pits an МИМ-8М (MIM-8M) microscope was used (225x). The orientation of the specimens was determined from Laue patterns. The outward appearance of the twins is shown in Fig. 1 (a - growth axis [111]; b - [110]). The experimental results indicate that the twin boundary actually hinders dislocations

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Twins and dislocations in silicon...

from penetrating into the twinned part of the crystal; this is explained by the fact that on the twin boundary, dislocations accumulate (Fig. 4) and form a glide plane. However, it also happens that dislocations slip through this barrier (Fig. 3) as, e.g., in the case of crystals growing in the [110] direction. If one assumes that an axial temperature gradient during the growth of the crystal block is the main reason of sliding, it is possible to estimate the probability of sliding in the crystal or in the twin. In this case, the entire tangential stress acting upon the glide plane {111} may be calculated, considering the change in orientation of this plane relative to the growth axis during twinning. Table 2 gives data on the change in orientation of the (111) planes after twinning for the three main directions of growth. Calculation of the tangential stresses σ_{tan} led to the following result:

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89298

Twins and dislocations in silicon... S/181/61/003/001/039/042
B102/B204

Orientation of the original crystal	σ_{tan} with respect to {111} (in B)		Angle between twinning plane and pulling axis
	main crystal	twin	
[100]	3.76	2.22 1.68	0° (parallel)
[110]	1.88	2.37	54°44'
[111]	1.89	1.89 3.44	90° 19°28'

σ_{tan} is given in units of B, where B = P/2A, P - axial load, A - cross-section area of crystal. It could be shown that the dislocation density in the twin depends on two essential factors: a) The concentration of dislocations which penetrate the boundary toward the twin from the main crystal, and b) the orientation of the sliding system in the crystal before and after twinning with respect to the direction of the main

Card 3/6

Twins and dislocations in silicon...

temperature gradient during the growth of the main crystal. There are 5 figures, 3 tables, and 4 references: 1 Soviet-bloc and 2 non-Soviet-bloc.

SUBMITTED: January 9, 1960

Направление роста D	Число плоскостей (111)	Угол плоскостей (111) с D	D после двойникования	Число плоскостей (111) в двойнике	Угол плоскостей (111) с D
[100]	4	35°16′	[221]	1	35°16′
				2	11°06′
				1	74°12′
[110]	2	0°	[110]	2	0°
				2	54°44′
	2	54°44′	[411]	1	15°48′
				2	33°00′
				1	54°44′
[111]	1	90°	[111]	3	17°28′
				1	90°00′
	3	19°28′	[511]	1	19°28′
				2	33°45′
				1	53°06′

Table 2

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18,9500
24,7500

24480
S/126/61/011/006/006/011
E073/E435

AUTHORS: Milʹvidskiy, M.G. and Layner, L.V.

TITLE: Microhardness and Dislocation Density in Silicon Single Crystals

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.6, pp. 923-926

TEXT. The microhardness of a crystal depends not only on individual dislocations but on the collective behaviour of larger conglomerations of such dislocations, i.e. it depends on the mutual distribution and the interaction of dislocations. Therefore, a direct correlation can be anticipated between the hardness and the density of dislocations on a given section of a crystal. The microhardness was measured on various crystallographic planes of single crystals drawn from the melt in vacuum according to the method of Czochralskv. The microhardness depends on the method of preparing the surface of the specimens for measurements. After grinding, the microhardness H amounted to 1670 kg/mm^2. By chemical polishing in an acid mixture of HF:HNO$_3$ (1:2) for 2 to 3 min, the

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Microhardness and Dislocation ...

surface layer which was internally stressed by grinding was removed; then the microhardness was 950 kg/mm^2. Equal values were obtained from natural cleavages of the specimen and therefore chemical polishing can be considered as the most suitable method of preparing the specimen surface for measurements. The density of the dislocations was determined on the basis of the cavities formed during etching in the mixture $HF:HNO_3:(CH_3CO)_2O$ (1 : 3 : 3) for 25 to 30 minutes. Simultaneously, for some specimens, the specific resistance and the lifetime of the non-basic current-carriers were determined. The dependence of the microhardness in plane (111) on the density of the dislocations in silicon single crystals is plotted in Fig.1. The increase in microhardness is particularly pronounced if the dislocation density changes within the limits of 1 x 10^3 to 2 x 10^4 cm^{-2}; this results in an increase in the microhardness from 830 to 1250 kg/mm^2. Outside this range the microhardness changes much less. The changes in microhardness along the planes (110) and (100) are also fully in correlation with the distribution of the dislocation

S/126/61/011/006/006/011
E073/E335

Microhardness and Dislocation ....

densities; regardless of the crystallographic orientation, the maximum microhardness was always observed at the edges of the specimen and the minimum in its central part. Usually, sections with increased microhardness show a shorter lifetime of the minority current-carriers. It was established that a correlation exists between the microhardness and the density of dislocations in various crystallographic planes of silicon single crystals. The anisotropy in the microhardness of silicon single crystals drawn from the melt is determined by the general distribution of the dislocations along the crystal which is associated primarily with the thermal conditions pertaining during the growing of the crystal. Acknowledgments are expressed to D.B. Kiseleva for her assistance in carrying out the experiments.
There are 2 figures, 1 table and 13 references: 4 Soviet and 9 non-Soviet. The four latest English-language references quoted are: Ref. 6 - Wolf, G.A., Toman, L., Field, N.J. and Clark, J.C. Semiconductors and Phosphors, New Jersey, 1958; Ref. 10 - Dash, W. - Appl. Phys., 1959, 30, No. 4, 459;

S/126/61/011/006/006/011
E073/E335

Microhardness and Dislocation ....

Ref. 12 - Roberts, D., Stephens, P. and Hunt, P. Nature, 1957, 180, No. 4587, 665; Ref. 13 - Green, G., Hogarth, C. and Johnson, F. J. Electron. and Control, 1957, 3, No. 2, 171.

ASSOCIATION: Nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskoy promyshlennosti (Scientific Research and Design Institute of the Rare Metals Industry)

SUBMITTED: August 12, 1960

Card 4/4

3575

S/032/62/028/004/007/026
B101/B113

AUTHORS: Mil'vidskiy, M. G., and Layner, L. V.

TITLE: Method of detecting dislocations in Si single crystals

PERIODICAL: Zavodskaya laboratoriya, v. 28, no. 4, 1962, 459-462

TEXT: To make dislocations in Si single crystals apparent, a 15-25 min thermal treatment of the crystals at 850-900°C in vacuo ($\sim 1 \cdot 10^{-5}$ mm Hg) and cooling at a rate of ~ 40°C/min is suggested. The decorating of dislocations with copper in H_2 atmosphere is even more efficient. The tests were made with n-type and p-type single crystals prepared by Chokhral'skiy's method. Before thermal treatment, the specimens were ground with boron carbide and M14 (M14) powder. After thermal treatment, they were polished in acid CP-8 (SR-8) mixture and etched in HF : HNO_3 : $(CH_3CO)_2O$ = 1 : 3 :3. The pits were counted with an MIM-8M (MIM-8M) metallographic microscope. It was found that the thermal treatment did not change density and position

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of the dislocations. The form of the etched figures observed depended on the heat treatment and on the decorating method. Dendritic inhomogeneities and stratified distribution of impurities were observed. The thermal pretreatment increases the sensitivity of chemical etching as well as the possibility of metallographically detecting inhomogeneities. There are 5 figures and 4 references: 1 Soviet and 3 non-Soviet. The three references to English-language publications read as follows: R. A. Logan, A. J. Peters. J. Appl. Phys., 28, 2, 1419 (1957); W. Dash, J. Appl. Phys., 27, 10, 1193 (1956); W. Dash. J. Appl. Phys., 30, 459 (1959).

ASSOCIATION: Gosudarstvennyy nauchno-issledovatel'skiy institut redkometallicheskoy promyshlennosti (State Scientific Research Institute of the Rare Metals Industry)

TUROVSKIY, B.M.; LAYNER, L.V.

Detection of dislocations in silicon single crystals with low density dislocations. Zav.lab. 29 no.11:1331-1333 '63. (MIRA 16:12)

1. Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut redkometallicheskoy promyshlennosti.

S/0070/64/009/001/0092/0097

ACCESSION NO: AP4012279

AUTHORS: Turovskiy, B. M.; Layner, L. V.

TITLE: Formation and structure of 90 degree twins in single crystals of silicon grown by the Czochralski method

SOURCE: Kristallografiya, v. 9, no. 1, 1964, 92-97

TOPIC TAGS: silicon crystal, twin crystal, 90 degree twin crystal, crystal structure, Czochralski method

ABSTRACT: The formation of 90-degree twins takes place by deviation of the growth direction from the [111] axis and is due to asymmetry in the thermal field or to disorientation of the seed crystal, or to a combination of these two factors. The transition from clear faces to indistinct faces during twin growth is accompanied by the formation of twin laminae of adjustment. Etch tests show that a zone with dendritic structure occurs immediately next the face of a 90-degree twin. X-ray studies indicate no deviation from monocrystalline structure, however. The most likely cause of the dendritic structure is local super-cooling, which may occur in the Czochralski method because of asymmetry in the thermal field (which is one of

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ACCESSION NO: AP4012279

the causes for development of the 90-degree twin growth). Orig. art. has: 8 figures.

ASSOCIATION: Nauchno-issledovatel'skiy i proyektny*y institut redkometallicheskoy promy*shlennosti (Scientific Research and Planning Institute of the Rare Metal Industry)

SUBMITTED: 14Feb63 DATE ACQ: 19Feb64 ENCL: 00

SUB CODE: PH NO REF SOV: 003 OTHER: 002

Card 2/2

L 63513-65 EWA(c)/EWT(m)/EWP(b)/T/EWA(d)/EWP(w)/EWP(t) IJP(c) JD

ACCESSION NR: AP5011922 UR/0363/65/001/003/0311/0315

AUTHOR: Iglitsyn, M. I.; Kekelidze, G. P.; Layner, L. V.; Mil'vidskiy, M. G.

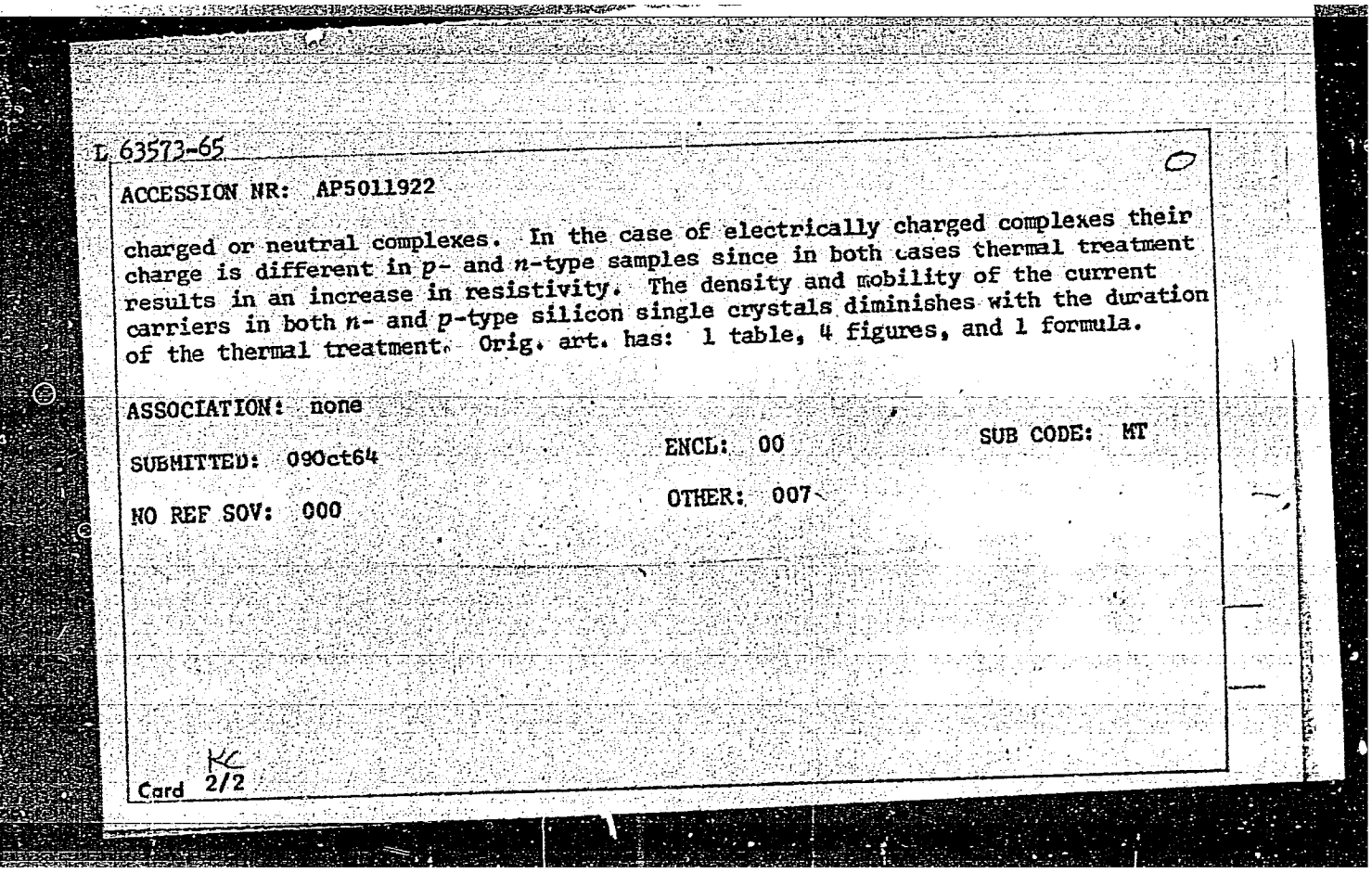
TITLE: Some characteristics of the behavior of silicon during thermal treatment

SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 3, 1965, 311-315

TOPIC TAGS: silicon, single crystal, thermal treatment, semiconductor, lattice defect, crystal impurity

ABSTRACT: The effect which thermal treatment of silicon monocrystals (at 1000°C for 10 to 90 hours) has on specific resistance, concentration and the mobility of principal current carriers was studied. *N*- and *p*-silicon crystals were grown in vacuum and inert atmosphere with various concentrations of oxygen by the Czochralski method. The density of lattice defects in these single crystals varied from zero to 1.10^4 per cm^2. The Hall effect was used as a measure of concentration and mobility of the current carriers. Specific resistance of both *n*- and *p*-type samples of silicon single crystals increases with the duration of the thermal treatment. It is postulated that during thermal treatment atoms of oxygen interact with impurities present in silicon single crystals with resultant formation of either electrically

Card 1/2



L 63573-65

ACCESSION NR: AP5011922

charged or neutral complexes. In the case of electrically charged complexes their charge is different in *p*- and *n*-type samples since in both cases thermal treatment results in an increase in resistivity. The density and mobility of the current carriers in both *n*- and *p*-type silicon single crystals diminishes with the duration of the thermal treatment. Orig. art. has: 1 table, 4 figures, and 1 formula.

ASSOCIATION: none

SUBMITTED: 090ct64 ENCL: 00 SUB CODE: MT

NO REF SOV: 000 OTHER: 007

Card 2/2

L 22540-66 EWT(l)/EWT(m)/T/EWP(t) IJP(c) JD/GG

ACC NR: AP6009650 SOURCE CODE: UR/0181/66/008/003/0725/0730

AUTHOR: Pavlov, P. V.; Layner, L. V.; Sterkhov, V. A.; Panteleyev, V. A. 48 B

ORG: Gor'kiy State University im. N. I. Lobachevsiy (Gor'kovskiy gosudarstvennyy universitet)

TITLE: On the proof of the existence of an autonomous diffusion flux along isolated dislocations 14

SOURCE: Fizika tverdogo tela, v. 8, no. 3, 1966, 725-730

TOPIC TAGS: crystal lattice dislocation, physical diffusion, silicon, single crystal

ABSTRACT: This is a continuation of earlier work by the authors (FTT v. 7, 922, 1965 and v. 6, 384, 1964), where it was shown that diffusion along dislocations exist in single crystals of germanium and silicon, in addition to the ordinary volume diffusion. Since these results differ from those of many others, the authors present, using the diffusion of indium in silicon as an example, new results to confirm that the diffusion along the dislocations is much faster than through the volume. The investigations were made on "sitting" dislocations. p-type silicon samples were used, with specific resistivity 18 ohm-cm and average dislocation density $N_d = 10^4$ cm^{-2}. The samples were cut from a specially grown

Card 1/2

ingot, which contained dislocations of only one kind, "sitting" dislocations parallel strictly to the growth axis [110]. The diffusing indium was tagged with In^{114}. The diffusion from the gas phase in quartz ampoules is accurate to 10^{-4} torr at temperatures 1010--1270C. The distribution of the indium was determined by removal of layers. In parallel with this method, autoradiographic study of the diffusion was also made to exclude the possibility of simultaneous existence of other diffusion mechanisms. The data yielded for the diffusion coefficient and diffusion heat along the dislocations values of 10^4 cm^2/sec and 77 kcal/mole, respectively, as against 16.5 cm^2/sec and 90 kcal/mole for volume diffusion. A criterion is introduced, making it possible to estimate the influence of volume diffusion on the form of the concenteration curve, and it is shown that the diffusion actually observed takes place along the dislocations and cannot be attributed to the settling of indium on the dislocations when the sample is cooled. The dimension of the effective diffusion region around the dislocations is determined by an independent electron transport method, and is found to be of the order of 100 Å. Orig. art. has: 3 figures, 11 formulas, and 1 table.

SUB CODE: 20/ SUBM DATE: 16Jul65/ ORIG REF: 012/ OTH REF: 005

Card 2/2 BK

L 10986-66 EWT(m)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD
ACC NR: AP6000004 UR/0080/65/038/011/2473/2479

29

AUTHOR: Layner, L.V.; Layner, V.I.; Baronova, Z.A.

ORG: None

TITLE: Chemical polishing and etching of single silicon crystals for exposure of dislocations

SOURCE: Zhurnal prikladnoy khimii, v.38, no.11, 1965, 2473-2479

TOPIC TAGS: crystal dislocation, silicon single crystal, metallography

ABSTRACT: Two ternary systems were investigated in the experiments: $HF-HNO_3-H_2O$ and $HF-CrO_3-H_2O$. The system $HF-HNO_3-H_2O$ was used to establish the optimum region for the polishing of a silicon single crystal, and the system $HF-CrO_3-H_2O$ for the optimum region for etching to expose dislocations. The effect of concentration of individual components of the $HF-HNO_3-H_2O$ system on the quality of the polished surface was determined by setting up a triangular concentration diagram. The diagram was constructed with data from the study of 230 tested solutions and is given in the article. A figure shows the dependence of the rate of solution of silicon with an increase in the concentration of HNO_3 and the decrease in the concentration of HF with a varying amount of added water. For exposure of dislocations, the authors studied the etching of

UDC: 621.357.8 + 621.315.592

Card 1/2

L 10986-66
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chemically polished silicon in the mixture HF-CrO_3-H_2O. These experimental data are also exhibited in the form of a triangular diagram. It was established that the rate of solution of silicon in the optimum regions of the system HF-HNO_3-H_2O is approximately 100 times greater than in the corresponding regions of the system HF-CrO_3-H_2O. Orig. art. has: 7 figures.

SUB CODE: 07,11/ SUBM DATE: 22Apr64/ ORIG REF: 001/ OTH REF: 004

Card 2/2

LAYNER, M.

27-11-10/31

AUTHOR: Layner, M., Instructor at Construction School # 7, Kiyev

TITLE: Training of Concrete Workers (Podgotovka betonshchikov)

PERIODICAL: Professional'no - Tekhnicheskoye Obrazovaniye, 1957, # 11, p 14-15 (USSR)

ABSTRACT: The article contains particulars on the theoretical instruction of concrete-reinforcement workers at the Construction School # 7, Kiyev (Stroitel'naya shkola # 7, Kiyev). The students are required to pass special courses in technology and knowledge of materials. In general it provides for the study of advanced methods of labor and of the latest techniques in performing reinforcement and concrete work. How the training is conducted is described by a few examples, such as information on the parts of a building and the order of carrying out construction work; straightening and sorting of the steel rods, the drawing out and cutting of the wire rod; and electrical butt welding. On one occasion the students were shown an entirely new device - a multiple point welding machine "ВНИСТО" for welding screens up to 2,5 m length.

ASSOCIATION: Construction School # 7, Kiyev (Stroitel'naya shkola # 7, Kiyev)

Card 1/1

LAYNER, S., starshiy nauchnyy sotrudnik; LIMONOV, E., starshiy inzh.

Criteria and economic indices of seagoing freighter efficiency. Mor.flot. 20 no.8:3-6 Ag '60. (MIRA 13:8)

1. TSentral'nyy nauchno-issledovatel'skiy institut morskogo flota.
(Freighters--Cost of operation)
(Ocean liners--Cost of operation)

VOLCHEK, N., nauchnyy sotrudnik; LAYNER, S., nauchnyy sotrudnik;
LIMONOV, E., nauchnyy sotrudnik

Dry-cargo liner fleet of capitalist countries of Europe. Mor. flot 22 no.4:38-39 Ap '62. (MIRA 15:4)

1. TSentral'nyy nauchno-issledovatel'skiy institut morskogo flota.
(Europe--Freighters)

LAYNER, S., kand.tekhn.nauk, starshiy nauchnyy sotrudnik

Method of comparative evaluation of the operational and technical efficiency of freighters. Mor. flot 22 no.8:35-36 Ag '62. (MIRA 15:7)

1. TSentral'nyy nauchno-issledovatel'skiy institut morskogo flota.

(Freighters)

LAYNER, S. V. PA 30T85

USSR/Ships, Cargo Jan 1946
Ships, Construction

"The Demands of Cargo-passenger Ships of the Far Eastern Line," S. V. Layner, Candidate in Technical Sciences, 4½ pp

"Morskoy Flot" No 1

The planning of new types of ships for the far eastern area must consider the experiences of the ships of the "Sakhalin" and "Anadyr'" types which were built in 1929 - 1933. The article discusses the structure of the hull, general plan and internal structure of passenger and service spaces, cargo accommodations, and engineering considerations for the new ships.

[redacted] 30T85

LAYNER, S. PA 16T8

USSR/Ships - Construction Jul/Aug 1946
Ships, Welded

"Desirable Changes and Additions to Regulations for the Classification and Construction of Steel Seagoing Vessels'," S. Layner, 6 pp

"Mor Flot" No 7/8

Welded construction, determination of measurements of ship ribs, new types of cargo and passenger-cargo vessels, construction of hulls of tankers, increase of thickness of bulkheads in cargo holds, etc., are among the desirable changes recommended.

16T8

LAYNER, S., kandidat tekhnicheskikh nauk.

Studying the strength of ship hulls in operation. Mor.flot 7 no.8:23-27 Ag '47. (MLRA 9:6)
(Hulls (Naval architecture))

USSR/Engineering Mar 1948
Ships, Passenger
Ships - Specifications

"Requirements for Passenger Vessels on the Crimea-Caucasus Line," S. Layner, Candidate Tech Sci, 4 pp

"Morsk Flot" No 3

New vessels are based on design of vessels now plying subject route, including "Krym," "Gruziya," "Adzharistan," "Abkhaziya," etc. Vessels now in design stage will be 1,100 meters along water line, beam about 18 meters, 6 meters draught when empty; speed 11-12 knots, with a capacity for 1,000 tons of cargo; capable of carrying about 900 passengers comfortably. These boats will be known as "Krymchak" type.

61T49

LAYNER, S.

LAYNER,S., kandidat tekhnicheskikh nauk

Respecting hull strength requirements in load spacing. Mor.flot 15 no.9:15-16 S'55. (MLRA 8:11)
(Ships--Cargo)

LAYNER, S.V., kandidat tekhnicheskikh nauk.

Extensible movable pillar not fixed to the ship hull.
Sudostroenie 22 no.11:41-42 N '56. (MLRA 10:2)

(Ships--Equipment and supplies)

LAYNER, Samuil Vladimirovich; GORYANSKIY, Yu.V., otvetstvennyy red.; SHISHKOVA, L.M., tekhn.red.

[Seagoing dry cargo vessels] Morskie sukhogruznye suda. Leningrad, Gos. izd-vo sudostroit. lit-ry, 1957. 283 p. (MIRA 11:5)
(Freighters)

LAYNER, S.V., kand.tekhn.nauk

Method of the preliminary evaluation of a ship type being studied by comparing it to the best examples of world technology. Trudy TSNIIMF 7 no.37:81-85 '61. (MIRA 15:3)
(Merchant ships)

LAYNER, S.V., kand.tekhn.nauk; LIMONOV, E.L.

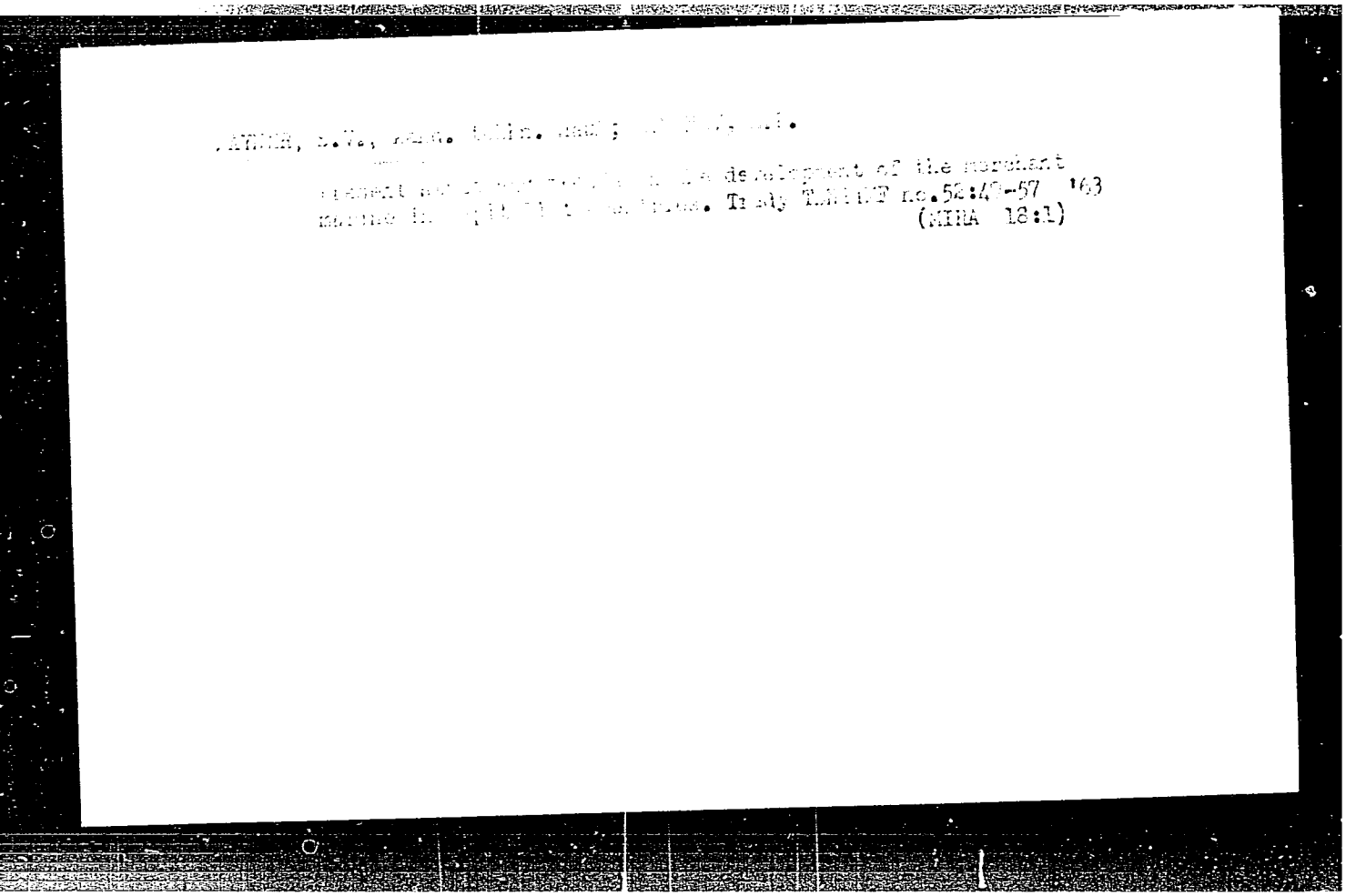
Methods of economic justification for selecting the optimum variant of a sea transportation ship. Trudy TSNIIMF no.29:62-68 '60. (MIRA 15:11)
(Merchant marine—Cost of operation) (Ocean liners)

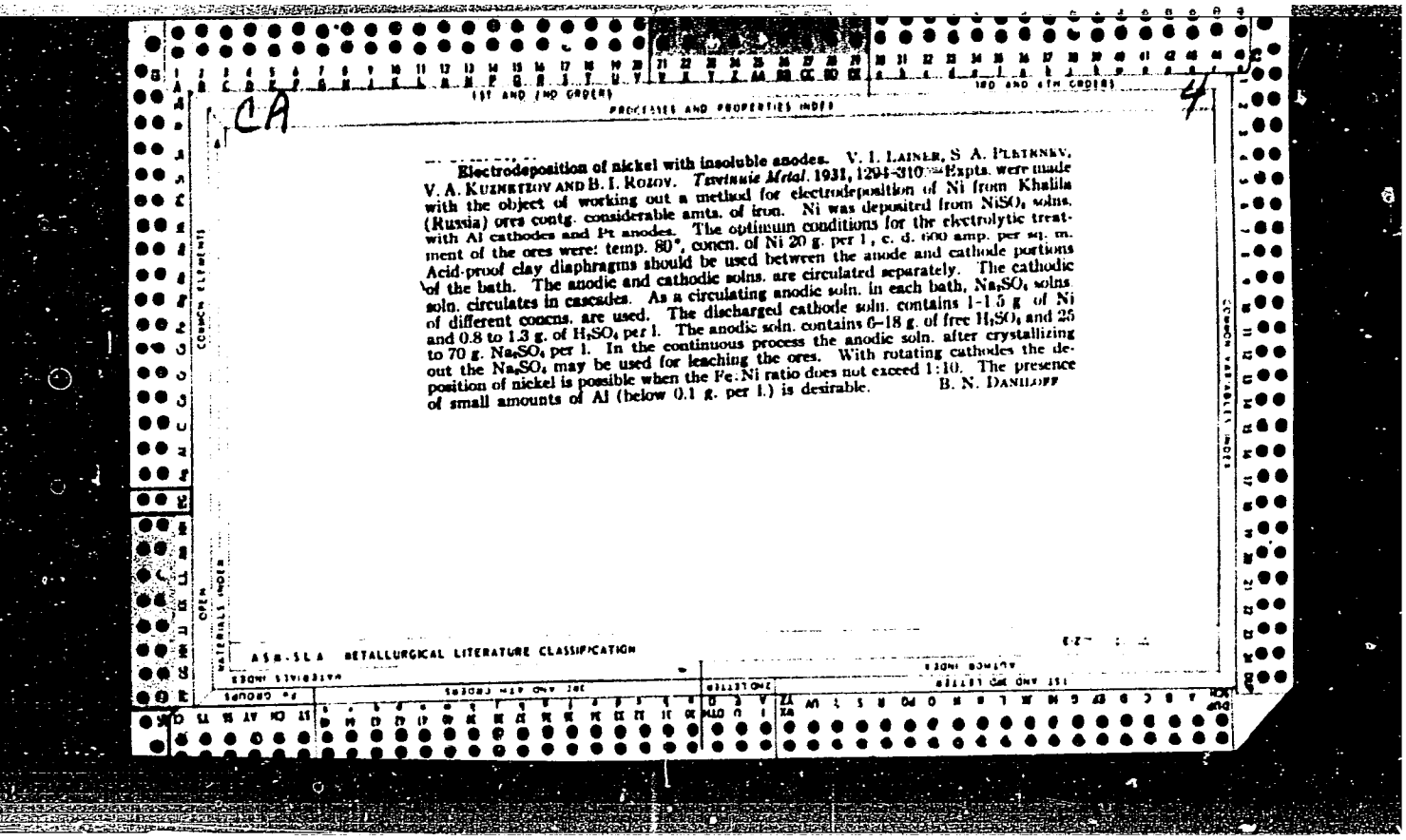
LAYNER, S.V., kand.tekhn.nauk; VOLCHEK, N.Z.; LIMONOV, E.L.

Composition and principle technical and operational characteristics of dry cargo ships sailing regular ocean lines and belonging to capitalist countries of Europe. Trudy TSNIIMF no.43:64-80 '62. (MIRA 16:2)
(Ocean liners) (Freighters)

LAYNER, S.V., kand. tekhn. nauk

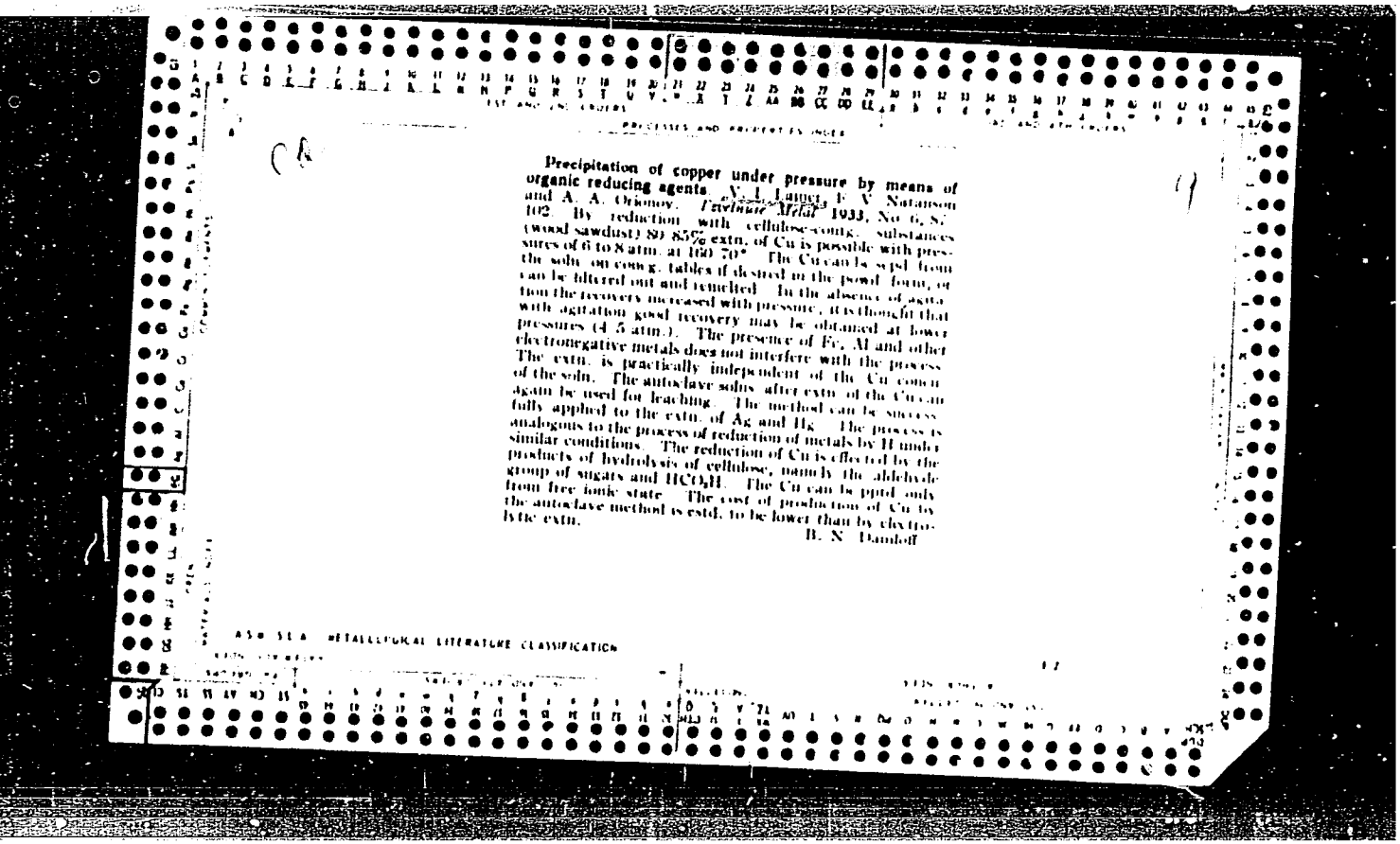
Methods of operational and economic examination of the first series built ship. Trudy TSNIIMF no.56:45-50 '64. (MIRA 17:11)





CA

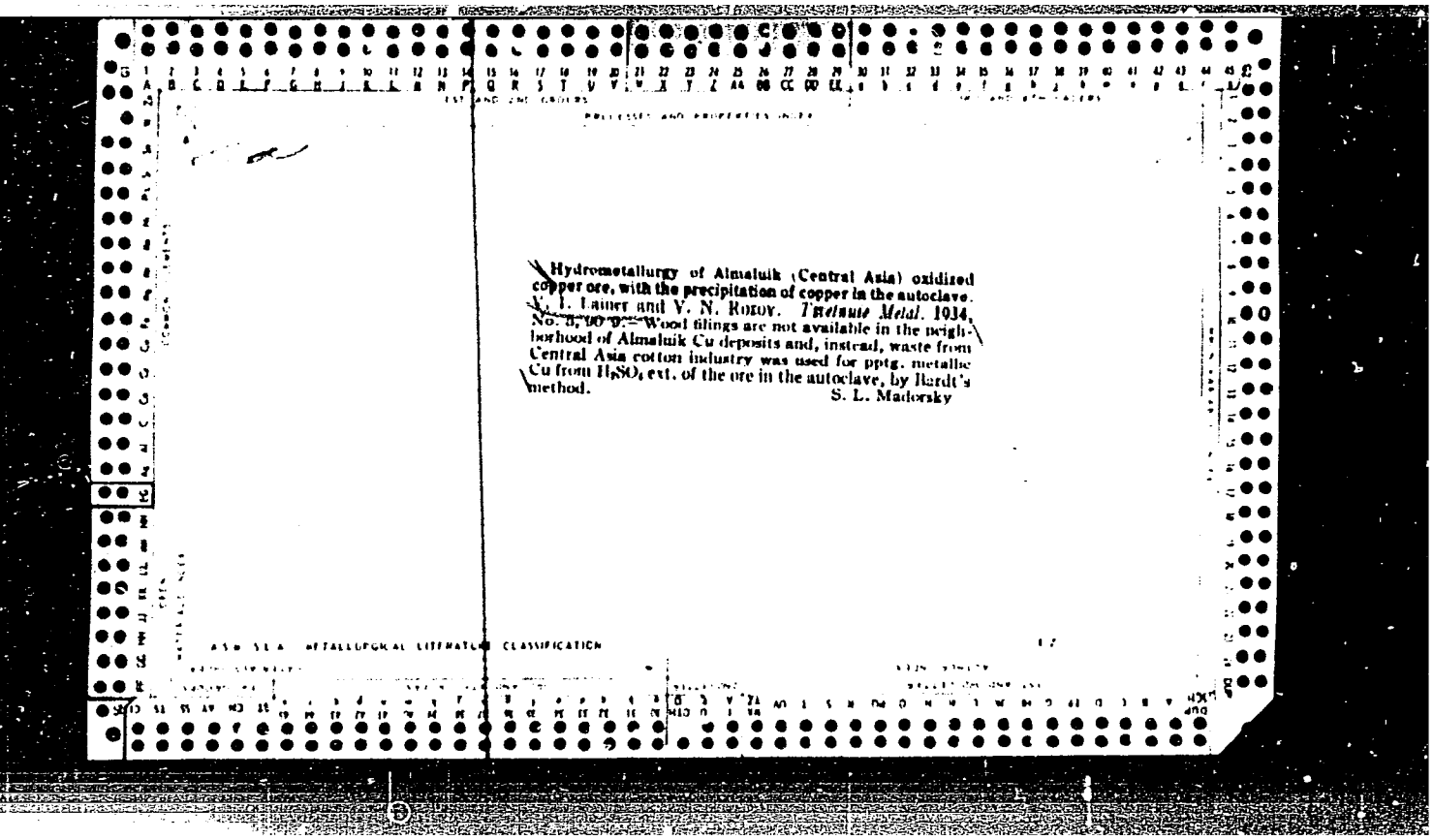
Electrodeposition of nickel with insoluble anodes. V. I. Lainer, S. A. Pletnev, V. A. Kuznetzov and B. I. Rozov. *Tsvetnie Metal.* 1931, 1294-310.—Expts. were made with the object of working out a method for electrodeposition of Ni from Khalila (Russia) ores contg. considerable amts. of iron. Ni was deposited from $NiSO_4$ solns. with Al cathodes and Pt anodes. The optimum conditions for the electrolytic treatment of the ores were: temp. 80°, concn. of Ni 20 g. per l., c. d. 600 amp. per sq. m. Acid-proof clay diaphragms should be used between the anode and cathode portions of the bath. The anodic and cathodic solns. are circulated separately. The cathodic soln. circulates in cascades. As a circulating anodic soln. in each bath, Na_2SO_4 solns. of different concns. are used. The discharged cathode soln. contains 1-1.5 g. of Ni and 0.8 to 1.3 g. of H_2SO_4 per l. The anodic soln. contains 6-18 g. of free H_2SO_4 and 25 to 70 g. Na_2SO_4 per l. In the continuous process the anodic soln. after crystallizing out the Na_2SO_4 may be used for leaching the ores. With rotating cathodes the deposition of nickel is possible when the Fe:Ni ratio does not exceed 1:10. The presence of small amounts of Al (below 0.1 g. per l.) is desirable. B. N. Danilov



Precipitation of copper under pressure by means of organic reducing agents. N. I. Lanner, F. V. Natanson and A. A. Orlenov. *Tsvetnye Metal.* 1933, No. 6, 87-102. By reduction with cellulose-contg. substances (wood sawdust) 80-85% extn. of Cu is possible with pressures of 6 to 8 atm. at 160-70°. The Cu can be sepd. from the soln. on cooling; tables if desired in the powd. form, or can be filtered out and remelted. In the absence of agitation the recovery increased with pressure, it is thought that with agitation good recovery may be obtained at lower pressures (4-5 atm.). The presence of Fe, Al and other electronegative metals does not interfere with the process. The extn. is practically independent of the Cu concn. of the soln. The autoclave solns. after extn. of the Cu can again be used for leaching. The method can be successfully applied to the extn. of Ag and Hg. The process is analogous to the process of reduction of metals by H under similar conditions. The reduction of Cu is effected by the products of hydrolysis of cellulose, namely the aldehyde group of sugars and HCO_2H. The Cu can be ppted. only from free ionic state. The cost of production of Cu by the autoclave method is estd. to be lower than by electrolytic extn.

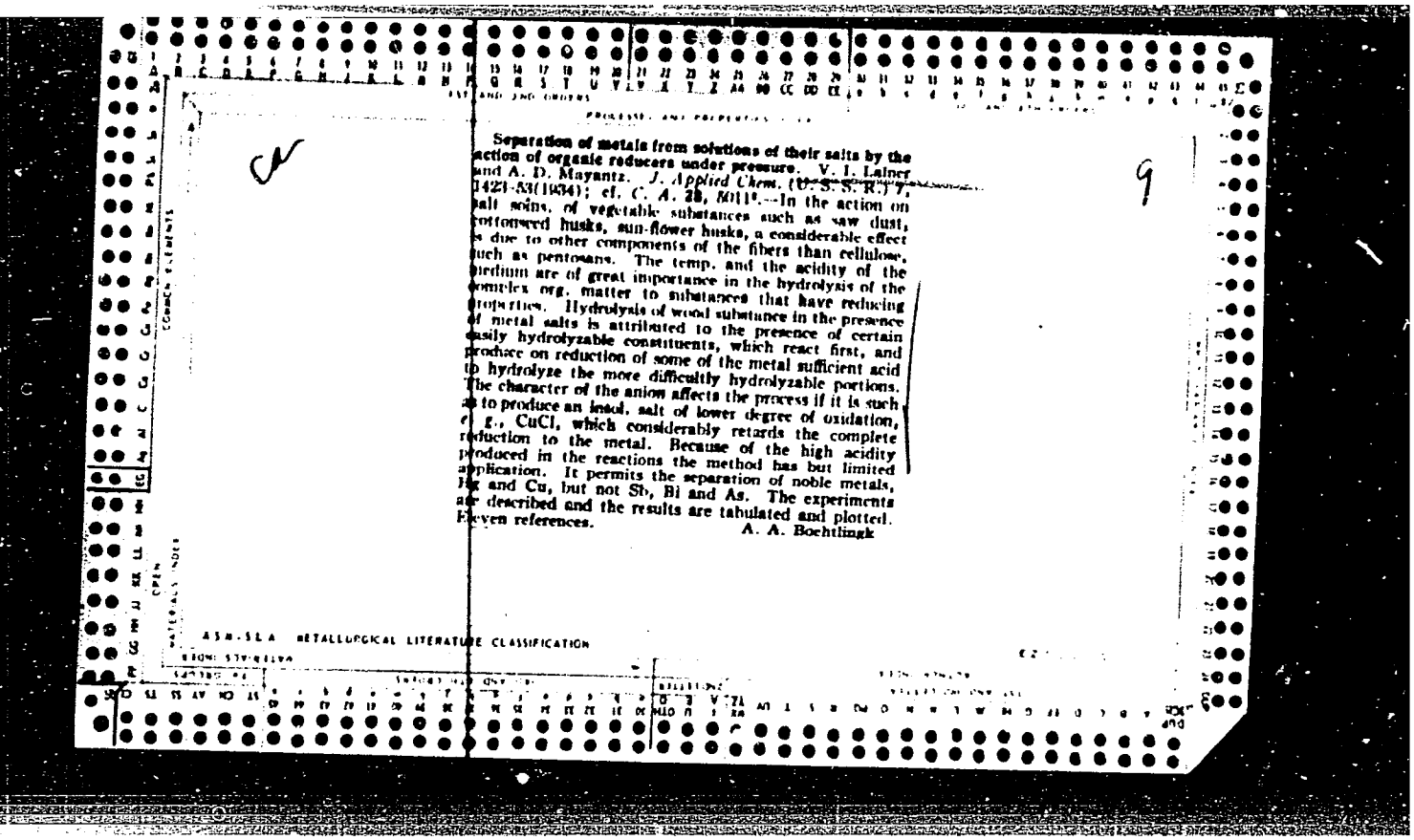
B. N. Danilov

A5m 51A METALLURGICAL LITERATURE CLASSIFICATION



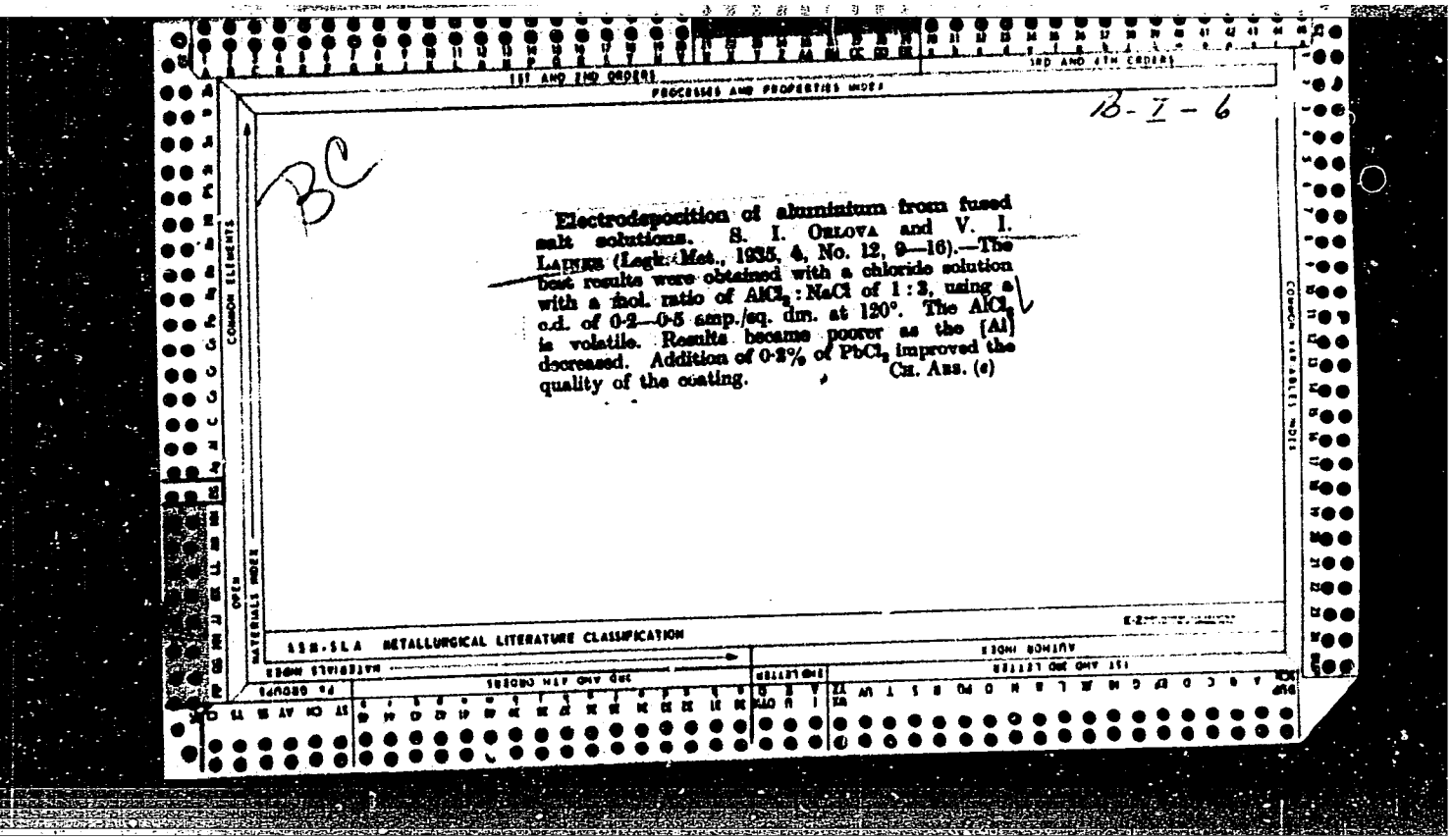
Hydrometallurgy of Almaluik (Central Asia) oxidized copper ore, with the precipitation of copper in the autoclave. V. I. Lainer and V. N. Rozov. *Tsvetnye Metal.* 1934, No. 8, 90-9.—Wool filings are not available in the neighborhood of Almaluik Cu deposits and, instead, waste from Central Asia cotton industry was used for pptg. metallic Cu from H_2SO_4 ext. of the ore in the autoclave, by Bardt's method.

S. L. Madorsky



Separation of metals from solutions of their salts by the action of organic reducers under pressure. V. I. Lainer and A. D. Mayantz. *J. Applied Chem.* (U. S. S. R.) 7, 1421-53(1934); cf. *C. A.* 28, 801[1].—In the action on salt solns. of vegetable substances such as saw dust, cottonseed husks, sun-flower husks, a considerable effect is due to other components of the fibers than cellulose, such as pentosans. The temp. and the acidity of the medium are of great importance in the hydrolysis of the complex org. matter to substances that have reducing properties. Hydrolysis of wood substance in the presence of metal salts is attributed to the presence of certain easily hydrolyzable constituents, which react first, and produce on reduction of some of the metal sufficient acid to hydrolyze the more difficultly hydrolyzable portions. The character of the anion affects the process if it is such as to produce an insol. salt of lower degree of oxidation, e. g., CuCl, which considerably retards the complete reduction to the metal. Because of the high acidity produced in the reactions the method has but limited application. It permits the separation of noble metals, Hg and Cu, but not Sb, Bi and As. The experiments are described and the results are tabulated and plotted. Eleven references.

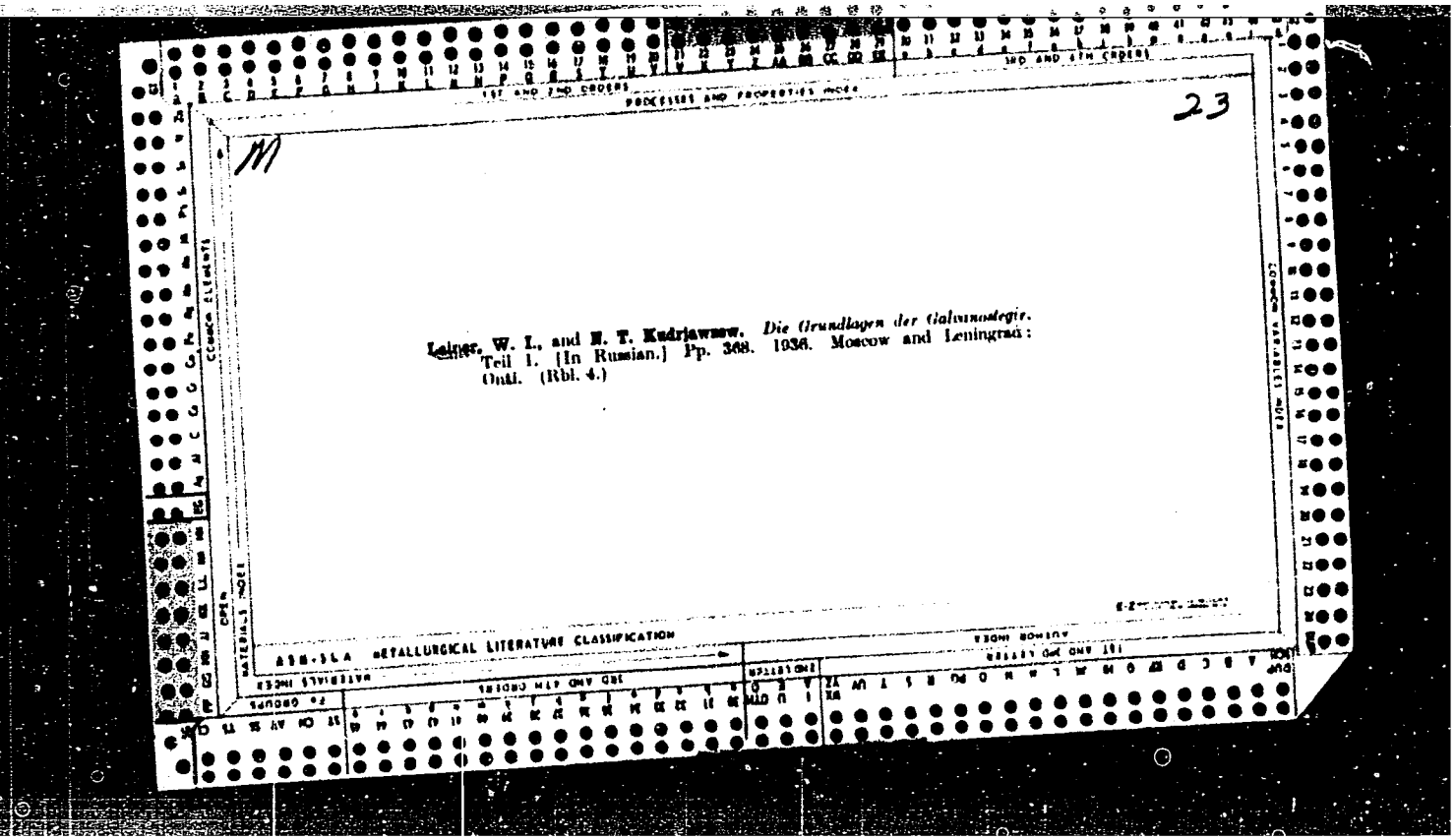
A. A. Boehtlingk

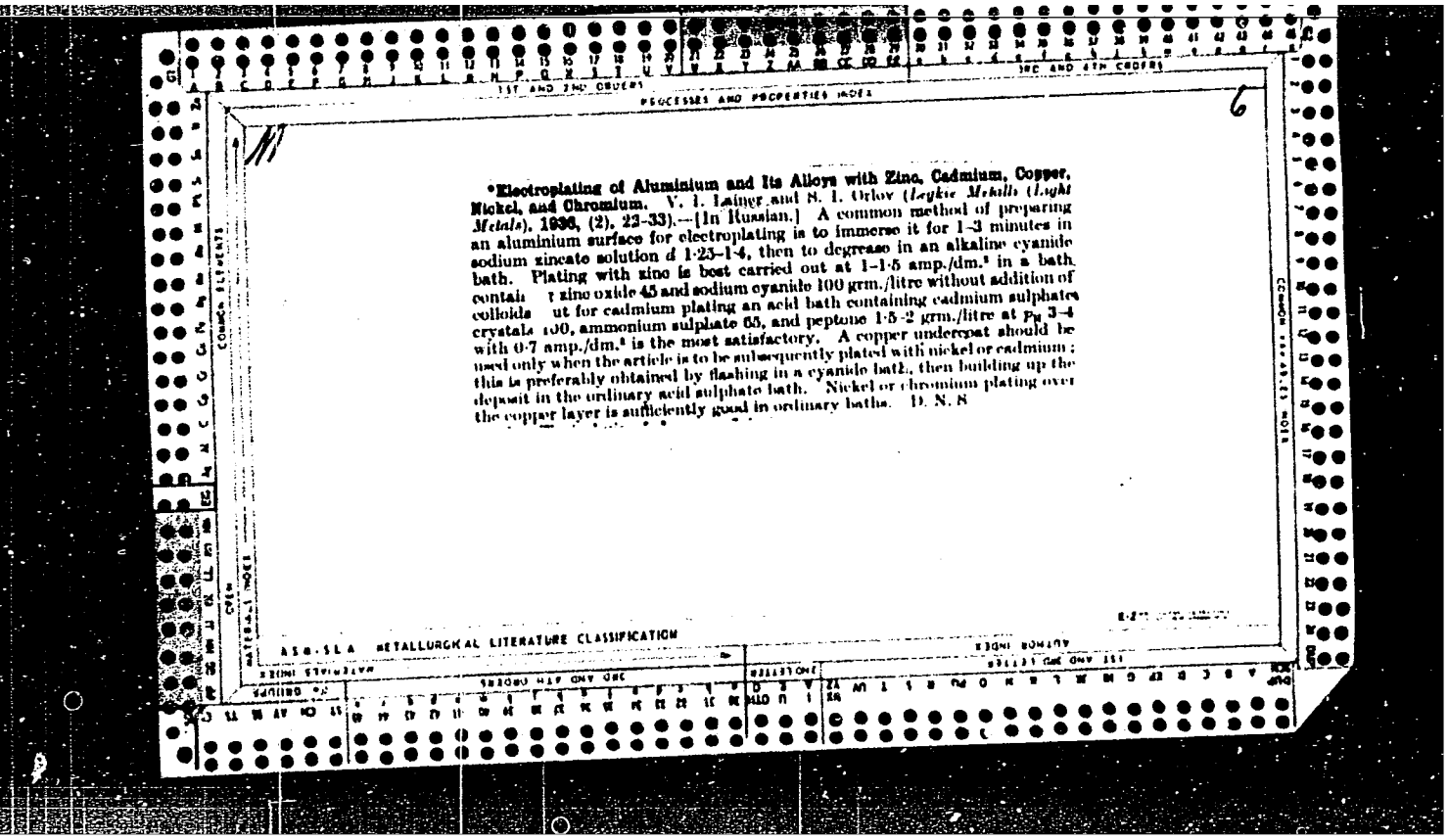


B-I-6

BC

Electrodeposition of aluminium from fused salt solutions. S. I. Orlova and V. I. Lainer (Legk. Met., 1935, 4, No. 12, 9—16).—The best results were obtained with a chloride solution with a mol. ratio of $AlCl_3$: NaCl of 1 : 3, using a c.d. of 0·2—0·5 amp./sq. dm. at 120°. The $AlCl_3$ is volatile. Results became poorer as the [Al] decreased. Addition of 0·2% of $PbCl_2$ improved the quality of the coating. Ch. Abs. (e)



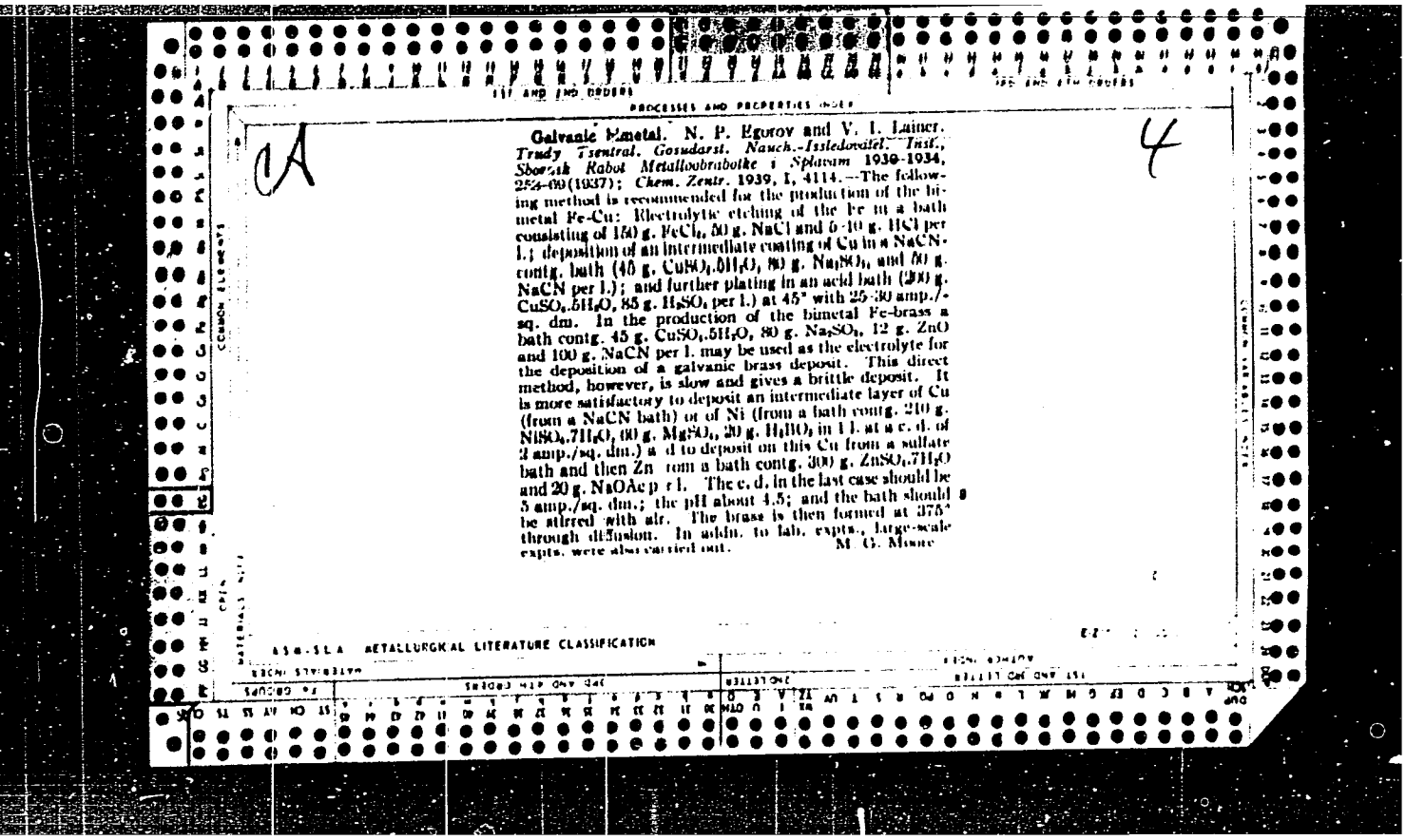


PROCESSES AND PROPERTIES INDEX

6

•**Electroplating of Aluminium and its Alloys with Zinc, Cadmium, Copper, Nickel, and Chromium.** V. I. Lainer and N. I. Orlov (*Legkie Metally* (*Light Metals*), **1936**, (2), 23-33).—[In Russian.] A common method of preparing an aluminium surface for electroplating is to immerse it for 1-3 minutes in sodium zincate solution *d* 1·23–1·4, then to degrease in an alkaline cyanide bath. Plating with zinc is best carried out at 1–1·5 amp./dm.^{2} in a bath contain t zinc oxide 45 and sodium cyanide 100 grm./litre without addition of colloids ut for cadmium plating an acid bath containing cadmium sulphate crystals 100, ammonium sulphate 65, and peptone 1·5–2 grm./litre at P_H 3–4 with 0·7 amp./dm.^{2} is the most satisfactory. A copper undercoat should be used only when the article is to be subsequently plated with nickel or cadmium; this is preferably obtained by flashing in a cyanide bath, then building up the deposit in the ordinary acid sulphate bath. Nickel or chromium plating over the copper layer is sufficiently good in ordinary baths. D. N. S

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION



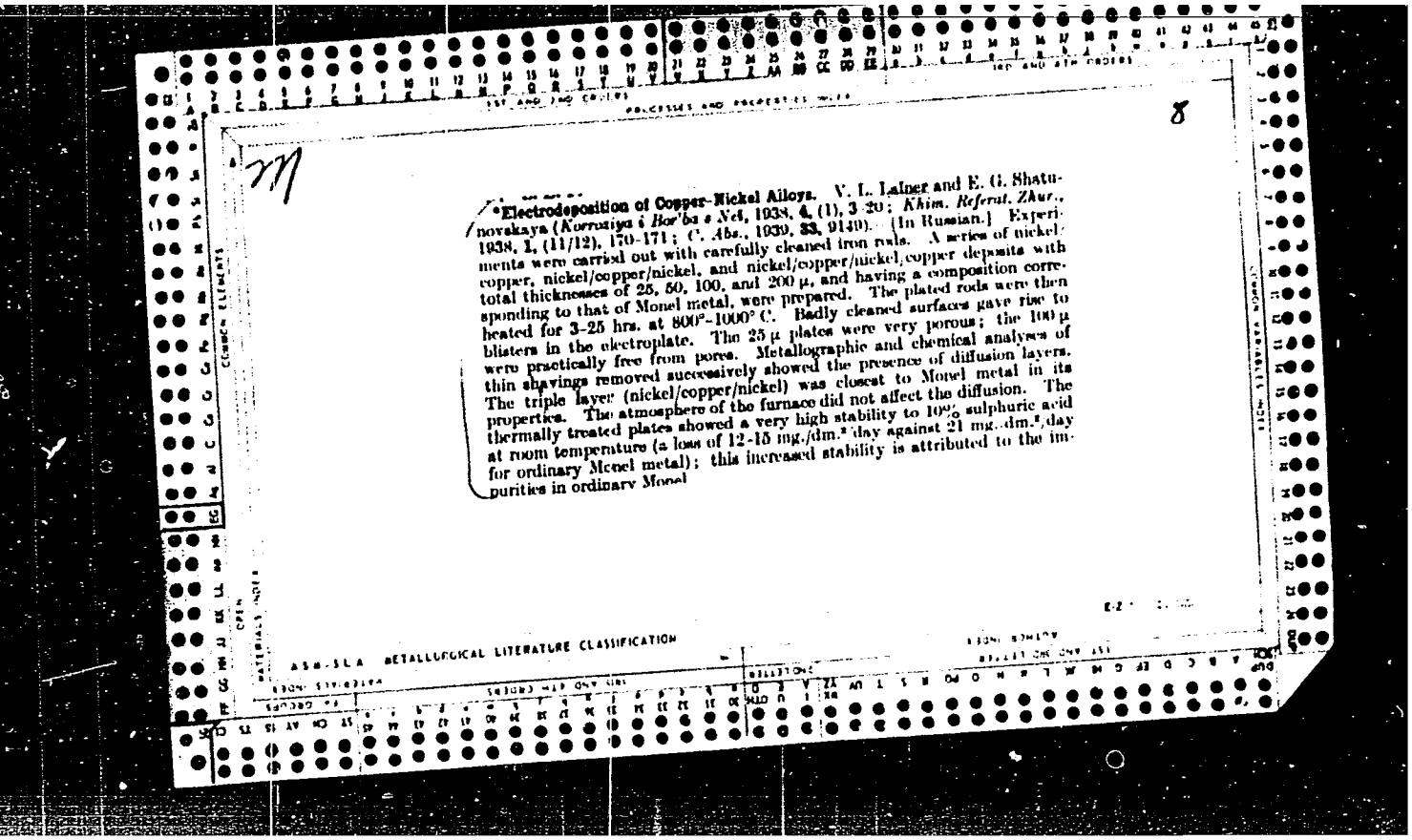
1A

4

Galvanic Bimetal. N. P. Egorov and V. I. Lainer. *Trudy Tsentral. Gosudarst. Nauch.-Issledovatel. Inst., Sbornik Rabot Metalloobrabotke i Splavam* 1930-1934, 252-60 (1937); *Chem. Zentr.* 1939, I, 4114.—The following method is recommended for the production of the bimetal Fe-Cu: Electrolytic etching of the Fe in a bath consisting of 150 g. $FeCl_3$, 50 g. NaCl and 5-10 g. HCl per l.; deposition of an intermediate coating of Cu in a NaCN-contg. bath (45 g. $CuSO_4.5H_2O$, 80 g. Na_2SO_3 and 50 g. NaCN per l.); and further plating in an acid bath (200 g. $CuSO_4.5H_2O$, 85 g. H_2SO_4 per l.) at 45° with 25-30 amp./sq. dm. In the production of the bimetal Fe-brass a bath contg. 45 g. $CuSO_4.5H_2O$, 80 g. Na_2SO_3, 12 g. ZnO and 100 g. NaCN per l. may be used as the electrolyte for the deposition of a galvanic brass deposit. This direct method, however, is slow and gives a brittle deposit. It is more satisfactory to deposit an intermediate layer of Cu (from a NaCN bath) or of Ni (from a bath contg. 210 g. $NiSO_4.7H_2O$, 60 g. $MgSO_4$, 20 g. H_3BO_3 in 1 l. at a c. d. of 2 amp./sq. dm.) and to deposit on this Cu from a sulfate bath and then Zn from a bath contg. 300 g. $ZnSO_4.7H_2O$ and 20 g. NaOAc per l. The c. d. in the last case should be 5 amp./sq. dm.; the pH about 4.5; and the bath should be stirred with air. The brass is then formed at 375° through diffusion. In addn. to lab. expts., large-scale expts. were also carried out.

M. G. Moore

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



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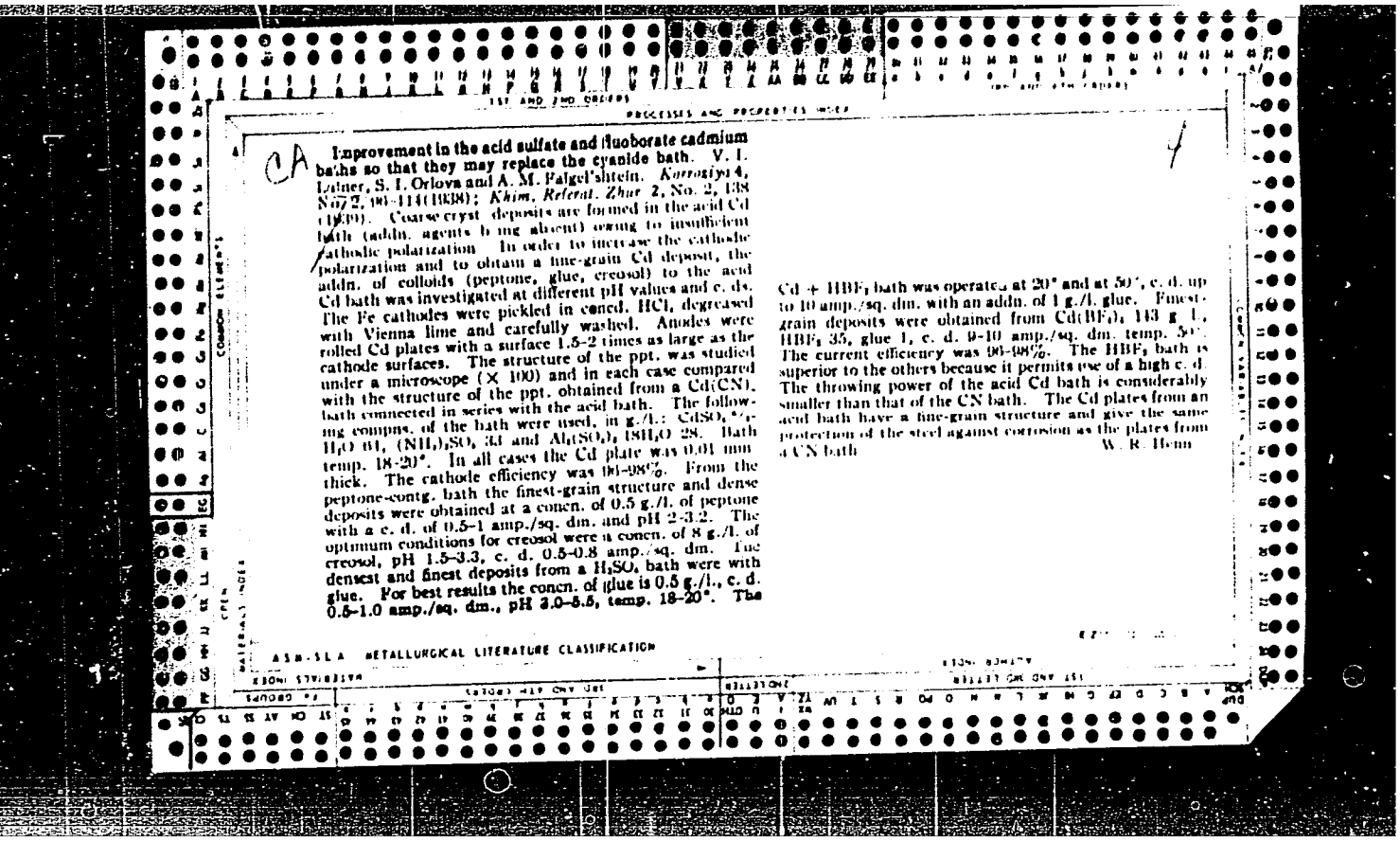
8

Electrodeposition of Copper-Nickel Alloys. V. L. Lainer and E. G. Shatunovskaya (*Korroziya i Bor'ba s Ney*, 1938, **4**, (1), 3–20; *Khim. Referat. Zhur.*, 1938, **1**, (11/12), 170–171; *C. Abs.*, 1939, **33**, 9140). [In Russian.] Experiments were carried out with carefully cleaned iron rods. A series of nickel/copper, nickel/copper/nickel, and nickel/copper/nickel/copper deposits with total thicknesses of 25, 50, 100, and 200 μ, and having a composition corresponding to that of Monel metal, were prepared. The plated rods were then heated for 3–25 hrs. at 800°–1000° C. Badly cleaned surfaces gave rise to blisters in the electroplate. The 25 μ plates were very porous; the 100 μ were practically free from pores. Metallographic and chemical analyses of thin shavings removed successively showed the presence of diffusion layers. The triple layer (nickel/copper/nickel) was closest to Monel metal in its properties. The atmosphere of the furnace did not affect the diffusion. The thermally treated plates showed a very high stability to 10% sulphuric acid at room temperature (a loss of 12–15 mg./dm.²/day against 21 mg./dm.²/day for ordinary Monel metal); this increased stability is attributed to the impurities in ordinary Monel

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

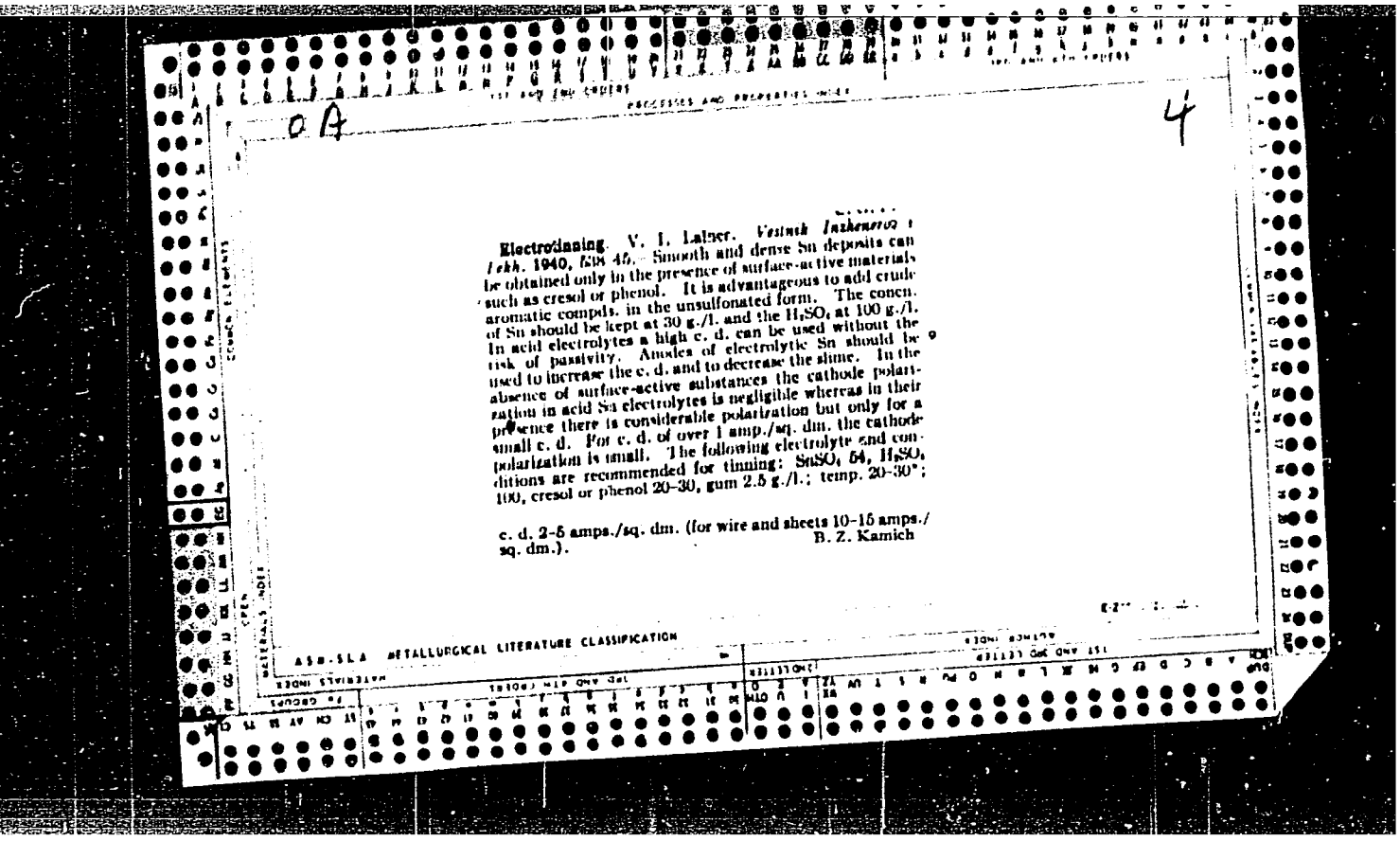


CA

Improvement in the acid sulfate and fluoborate cadmium baths so that they may replace the cyanide bath. V. I. Lainer, S. I. Orlova and A. M. Falgel'shtein. *Korrozija i Zashchita* 4, No. 2, 99–114(1938); *Khim. Referat. Zhur.* 2, No. 2, 138 (1939). Coarse cryst deposits are formed in the acid Cd bath (addn. agents being absent) owing to insufficient cathodic polarization. In order to increase the cathodic polarization and to obtain a fine-grain Cd deposit, the addn. of colloids (peptone, glue, creosol) to the acid Cd bath was investigated at different pH values and c. ds. The Fe cathodes were pickled in concd. HCl, degreased with Vienna lime and carefully washed. Anodes were rolled Cd plates with a surface 1.5–2 times as large as the cathode surfaces. The structure of the ppt. was studied under a microscope (× 100) and in each case compared with the structure of the ppt. obtained from a Cd(CN)$_2$ bath connected in series with the acid bath. The following compns. of the bath were used, in g./l.: $CdSO_4$ $^{8}/_{3}H_2O$ 61, $(NH_4)_2SO_4$ 33 and $Al_2(SO_4)_3$ $18H_2O$ 28. Bath temp. 18–20°. In all cases the Cd plate was 0.01 mm thick. The cathode efficiency was 96–98%. From the peptone-contg. bath the finest-grain structure and dense deposits were obtained at a concn. of 0.5 g./l. of peptone with a c. d. of 0.5–1 amp./sq. dm. and pH 2–3.2. The optimum conditions for creosol were a concn. of 8 g./l. of creosol, pH 1.5–3.3, c. d. 0.5–0.8 amp./sq. dm. The densest and finest deposits from a H_2SO_4 bath were with glue. For best results the concn. of glue is 0.5 g./l., c. d. 0.5–1.0 amp./sq. dm., pH 3.0–5.5, temp. 18–20°. The Cd + HBF_4 bath was operated at 20° and at 50°, c. d. up to 10 amp./sq. dm. with an addn. of 1 g./l. glue. Finest-grain deposits were obtained from $Cd(BF_4)_2$ 143 g./l., HBF_4 35, glue 1, c. d. 9–10 amp./sq. dm. temp. 50°. The current efficiency was 96–98%. The HBF_4 bath is superior to the others because it permits use of a high c. d. The throwing power of the acid Cd bath is considerably smaller than that of the CN bath. The Cd plates from an acid bath have a fine-grain structure and give the same protection of the steel against corrosion as the plates from a CN bath.

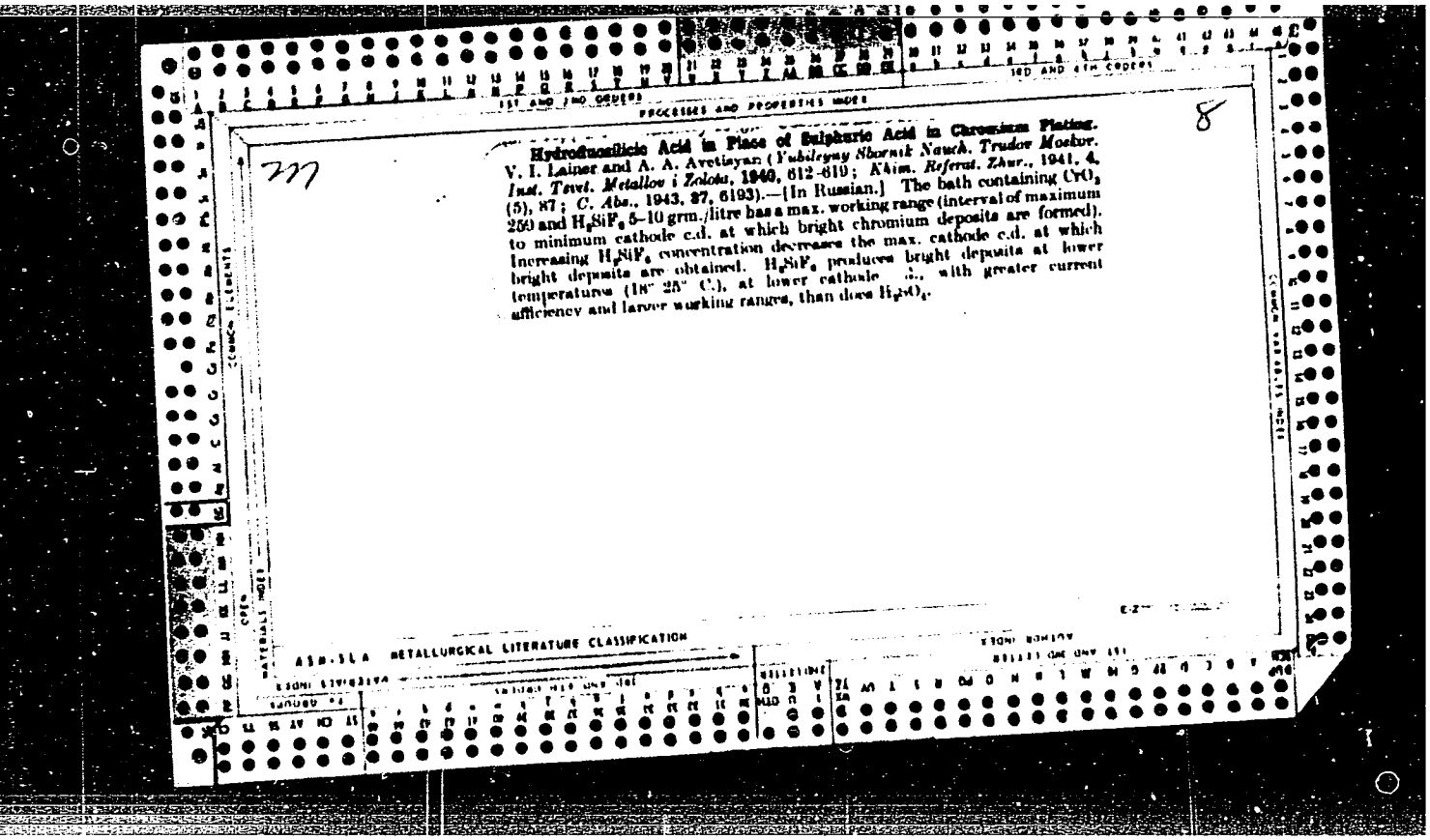
W. R. Henn

4



Electrodraining. V. I. Lainer. *Vestnik Inzhenerov i Tekh.* 1940, 638 45. Smooth and dense Sn deposits can be obtained only in the presence of surface-active materials such as cresol or phenol. It is advantageous to add crude aromatic compds. in the unsulfonated form. The concn. of Sn should be kept at 30 g./l. and the H_2SO_4 at 100 g./l. In acid electrolytes a high c. d. can be used without the risk of passivity. Anodes of electrolytic Sn should be used to increase the c. d. and to decrease the slime. In the absence of surface-active substances the cathode polarization in acid Sn electrolytes is negligible whereas in their presence there is considerable polarization but only for a small c. d. For c. d. of over 1 amp./sq. dm. the cathode polarization is small. The following electrolyte and conditions are recommended for tinning: $SnSO_4$ 54, H_2SO_4 100, cresol or phenol 20–30, gum 2.5 g./l.; temp. 20–30°; c. d. 2–5 amps./sq. dm. (for wire and sheets 10–15 amps./sq. dm.).

B. Z. Kamich

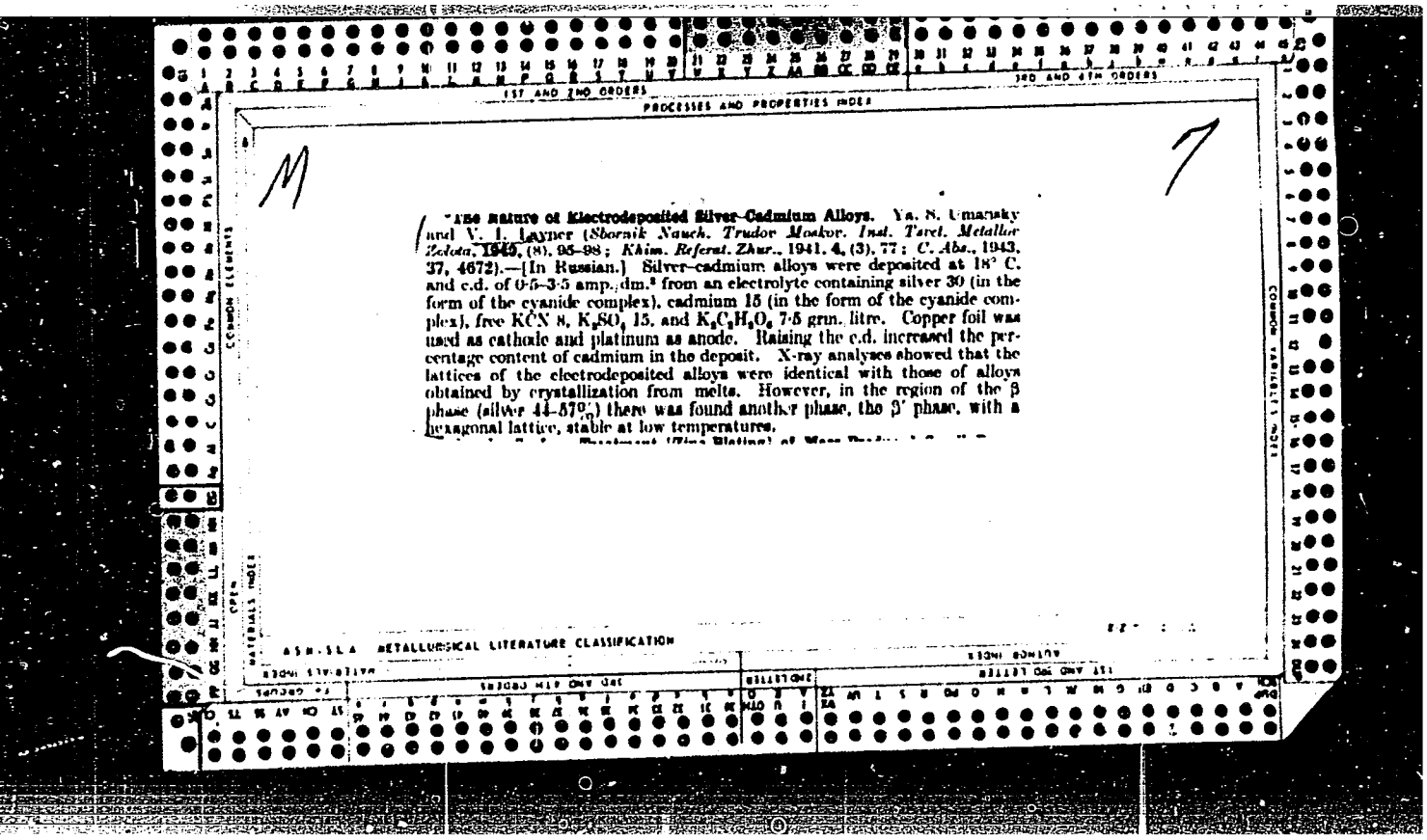


777

Hydrofluosilicic Acid in Place of Sulphuric Acid in Chromium Plating. V. I. Lainer and A. A. Avetisyan (*Yubileyny Sbornik Nauch. Trudov Moskov. Inst. Tsvet. Metallov i Zolota*, **1940**, 612–619; *Khim. Referat. Zhur.*, 1941, **4**, (5), 87; *C. Abs.*, 1943, **37**, 6193).—[In Russian.] The bath containing CrO_3 250 and H_2SiF_6 5–10 grm./litre has a max. working range (interval of maximum to minimum cathode c.d. at which bright chromium deposits are formed). Increasing H_2SiF_6 concentration decreases the max. cathode c.d. at which bright deposits are obtained. H_2SiF_6 produces bright deposits at lower temperatures (18°–25° C.), at lower cathode c.d., with greater current efficiency and larger working ranges, than does H_2SO_4.

8

METALLURGICAL LITERATURE CLASSIFICATION

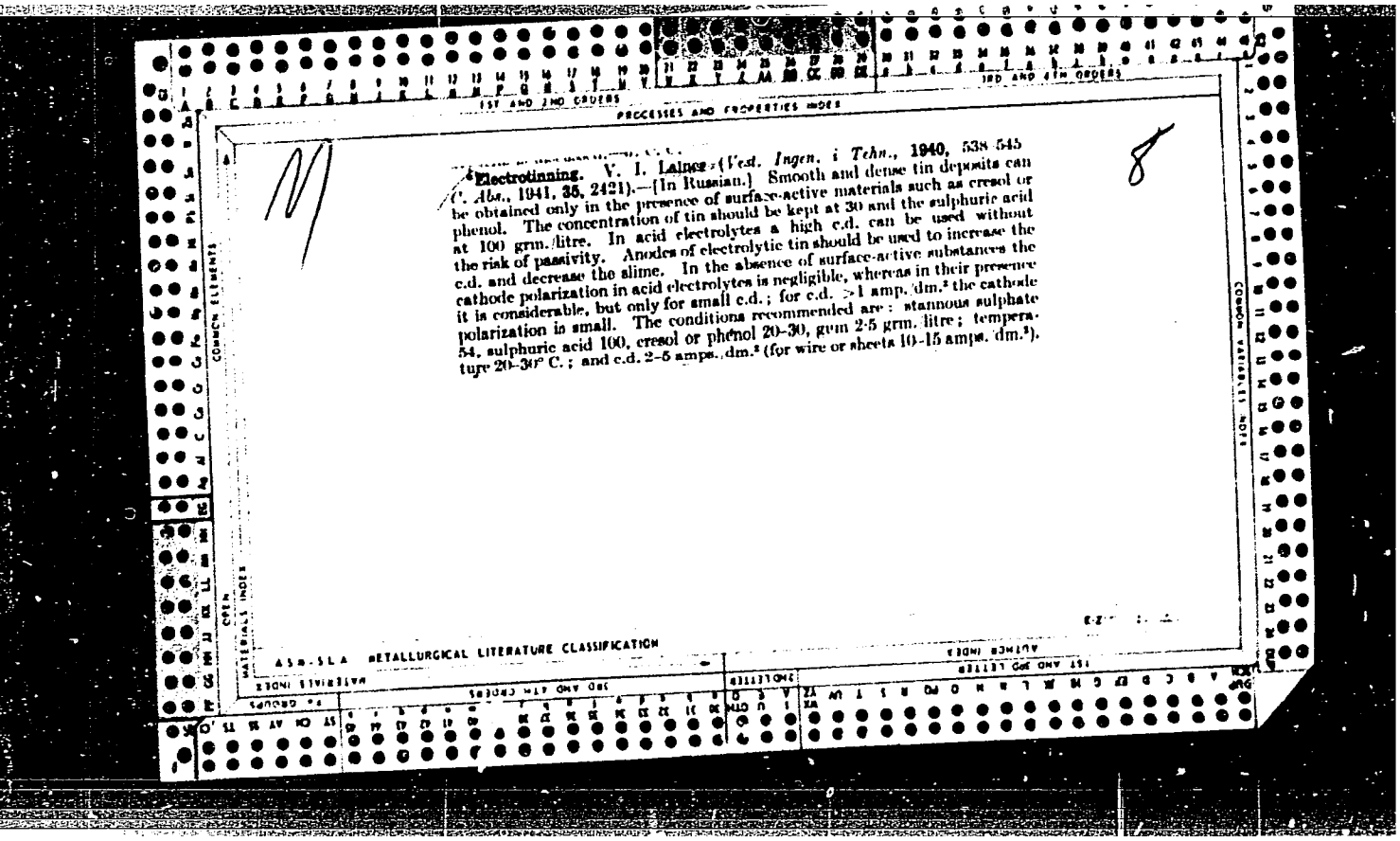


PROCESSES AND PROPERTIES INDEX

M 7

The Nature of Electrodeposited Silver–Cadmium Alloys. Ya. S. Umansky and V. I. Layner (*Sbornik Nauch. Trudov Moskov. Inst. Tsvet. Metallov Zolota*, 1945, (8), 95–98; *Khim. Referat. Zhur.*, 1941, 4, (3), 77; *C. Abs.*, 1943, 37, 4672).—[In Russian.] Silver–cadmium alloys were deposited at 18° C. and c.d. of 0·5–3·5 amp./dm.² from an electrolyte containing silver 30 (in the form of the cyanide complex), cadmium 15 (in the form of the cyanide complex), free KCN 8, K_2SO_4 15, and $K_2C_4H_4O_6$ 7·5 grm./litre. Copper foil was used as cathode and platinum as anode. Raising the c.d. increased the percentage content of cadmium in the deposit. X-ray analyses showed that the lattices of the electrodeposited alloys were identical with those of alloys obtained by crystallization from melts. However, in the region of the β phase (silver 44–57%) there was found another phase, the β′ phase, with a hexagonal lattice, stable at low temperatures.

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION

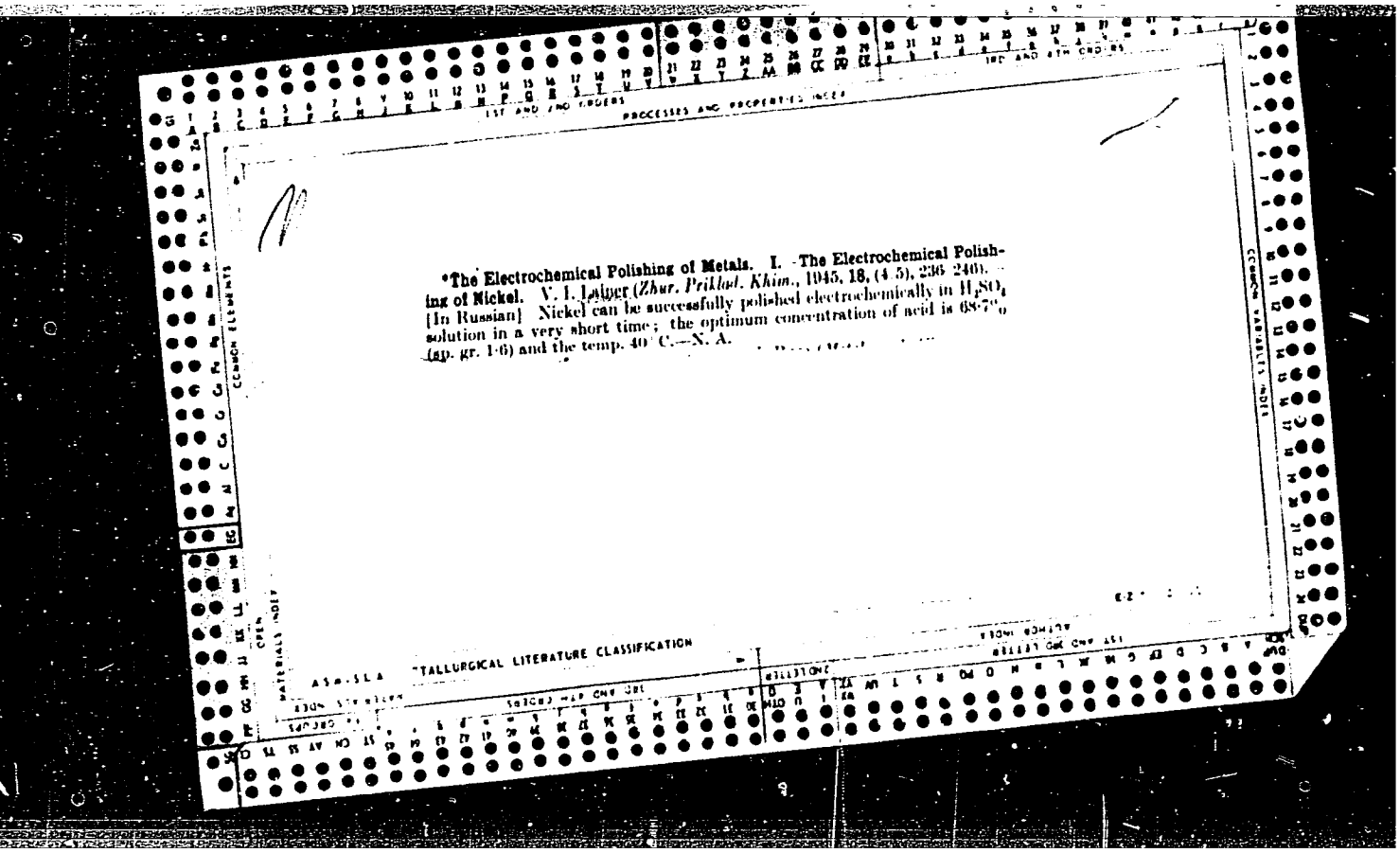


Electrotinning. V. I. Laing. (*Vest. Ingen. i Tekn.*, **1940**, 538–545 (*C. Abs.*, 1941, **35**, 2421).—[In Russian.] Smooth and dense tin deposits can be obtained only in the presence of surface-active materials such as cresol or phenol. The concentration of tin should be kept at 30 and the sulphuric acid at 100 grm./litre. In acid electrolytes a high c.d. can be used without the risk of passivity. Anodes of electrolytic tin should be used to increase the c.d. and decrease the slime. In the absence of surface-active substances the cathode polarization in acid electrolytes is negligible, whereas in their presence it is considerable, but only for small c.d.; for c.d. >1 amp./dm.² the cathode polarization is small. The conditions recommended are: stannous sulphate 54, sulphuric acid 100, cresol or phenol 20–30, gum 2·5 grm./litre; temperature 20–30° C.; and c.d. 2–5 amps./dm.² (for wire or sheets 10–15 amps./dm.²).

LAINER, V. I.

LAINER, V. I.: The principles of electroplating. Moskva, Metallurgizdat, 1943-46. 2 v. (49-30931)

TS670.L26 1943

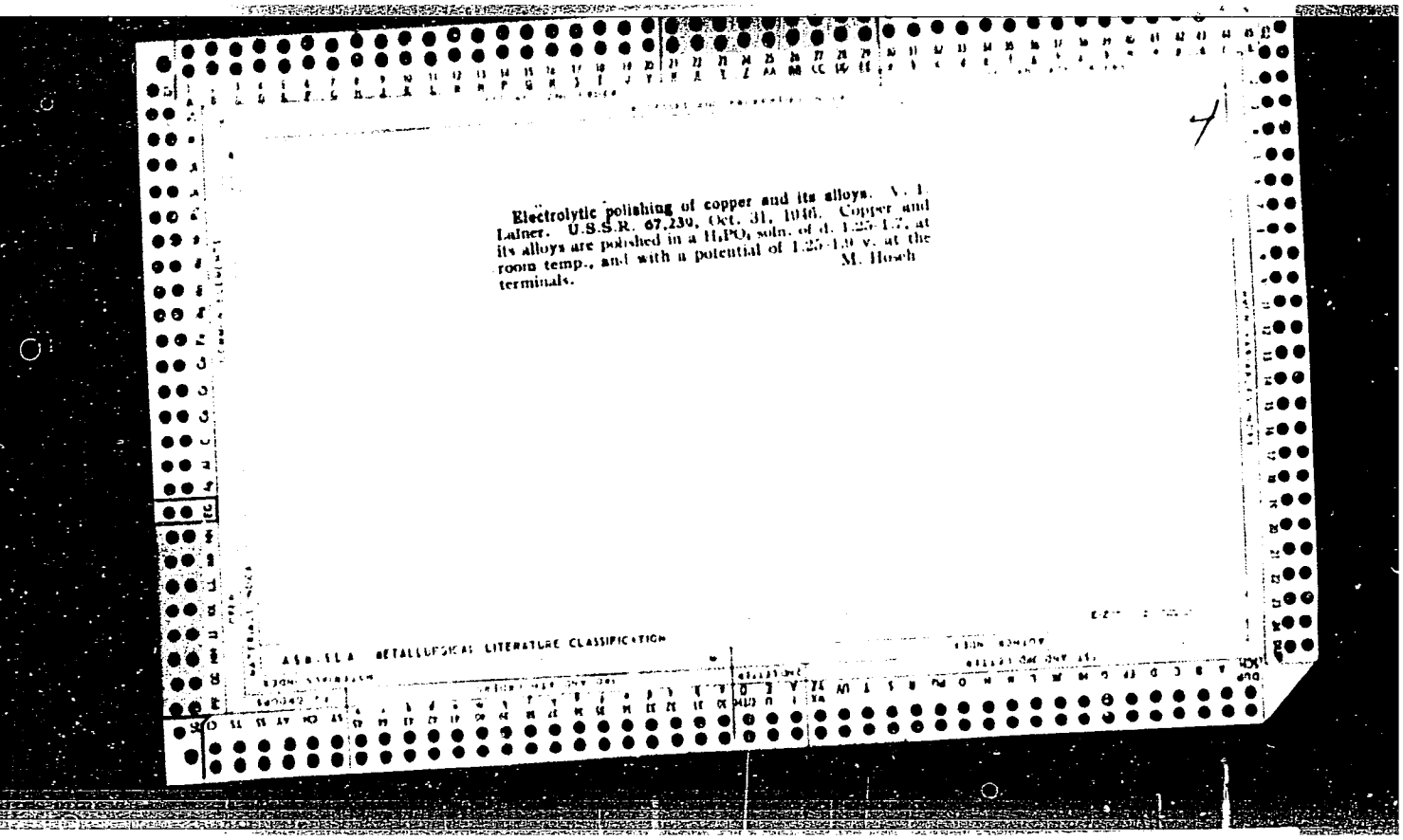


•**The Electrochemical Polishing of Metals. I. The Electrochemical Polishing of Nickel.** V. I. Lainer (*Zhur. Prikład. Khim.*, 1945, 18, (4-5), 236-240). [In Russian] Nickel can be successfully polished electrochemically in H_2SO_4 solution in a very short time; the optimum concentration of acid is 68·7% (sp. gr. 1·6) and the temp. 40° C.—N. A.

METALLURGICAL LITERATURE CLASSIFICATION

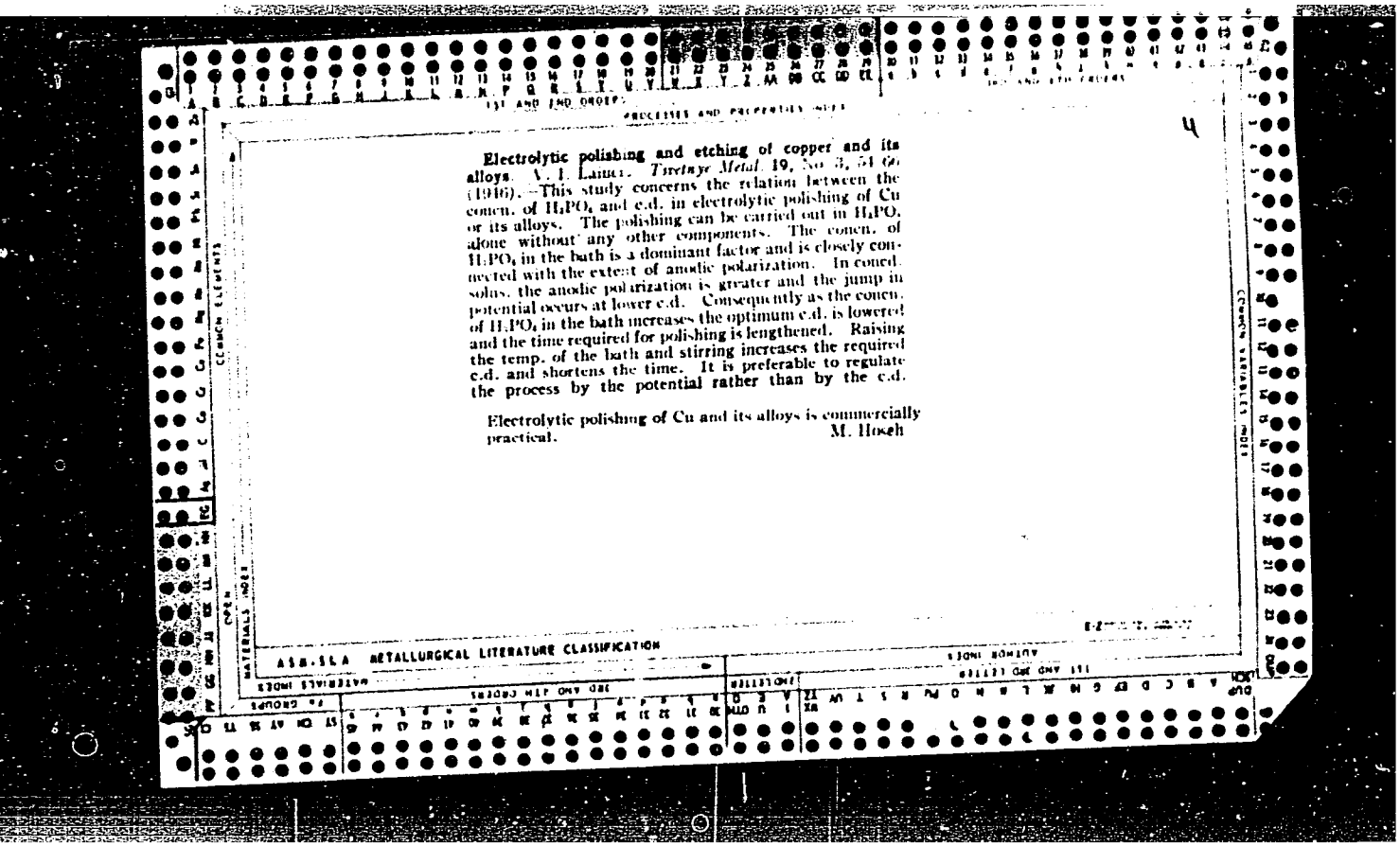
LAYNER, A. I.

The recovery of alumina and alkali form the waste red slimes of an aluminum plant by sintering, Metallurgy of Non-Ferrous Metals, Moscow, 1946. Collection of Scientific Works No. 14, Moscow Inst. of Non-Ferrous Metallurgy. Report U-2391, 22 April 1953.



Electrolytic polishing of copper and its alloys. V. I. Lainer. U.S.S.R. 67,230, Oct. 31, 1946. Copper and its alloys are polished in a H_3PO_4 soln. of d. 1.25-1.7, at room temp., and with a potential of 1.25-1.0 v. at the terminals.

M. Hosch



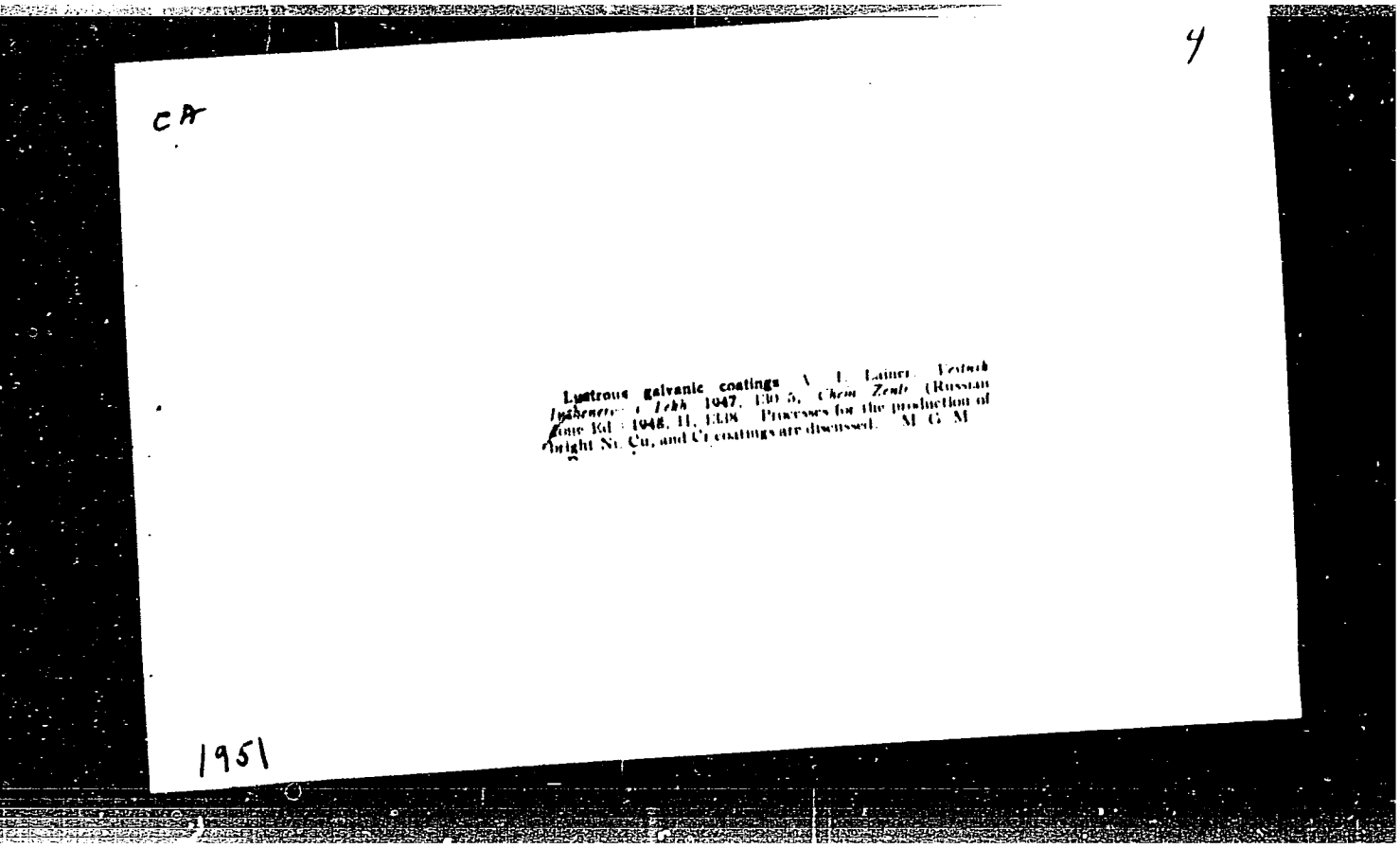
Electrolytic polishing and etching of copper and its alloys. V. I. Lainer. *Tsvetnye Metal.* 19, No. 3, 51-6 (1946).—This study concerns the relation between the concn. of H_3PO_4 and c.d. in electrolytic polishing of Cu or its alloys. The polishing can be carried out in H_3PO_4 alone without any other components. The concn. of H_3PO_4 in the bath is a dominant factor and is closely connected with the extent of anodic polarization. In concd. solns. the anodic polarization is greater and the jump in potential occurs at lower c.d. Consequently as the concn. of H_3PO_4 in the bath increases the optimum c.d. is lowered and the time required for polishing is lengthened. Raising the temp. of the bath and stirring increases the required c.d. and shortens the time. It is preferable to regulate the process by the potential rather than by the c.d.

Electrolytic polishing of Cu and its alloys is commercially practical.
M. Hoseh

LAINER, V. I.

Electrolytic polishing and etching of metals. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1947. 243 p. (54-58459)

TS213.L2



4

CA

Lustrous galvanic coatings. V. I. Lainer. Vestnik Inzhenerov i Tekh. 1947, No. 5, Chem. Zentr. (Russian Zone Ed.) 1948, II, 1108. Processes for the production of bright Ni, Cu, and Cr coatings are discussed. M. G. M.

1951

LAYNER, V. I.

Apr 1947

USSR/Metals
Galvanizing
Plating, Nickel

"Efficient Methods for Obtaining Shiny Galvanized Plating," Prof V. I. Layner, Dr of Technical Sciences, Deputy Chairman for the Committee on Galvanizing for VSNITO, 6 pp

"Vest Inzher i Tekh" No 4

The article gives photographs of pitting in nickel plate, as well as of various phenomena arising from the use of peptone x50 and 2 naphthol, 6 sulphuric x2. Nickel plating by means of electrolysis was by far the most efficient. This is an exacting process,

24T87

Apr 1947

USSR/Metals (Contd)

however, and people must be trained for its efficient operation. Frequent reference is made to electrolyte nickel plating methods used in the US.

24T87

LAYNER, V. I.

IA 12T69

USSR/Galvanizing
Zinc coatings

Apr 1947

"The Problem of an Economical Method of Shiny Galvanizing," V. I. Layner, 6 pp

"Vestnik Inzhenerov i Tekhnikov" Vol XXXII, No 4

Gives microphotos of flaws in the zinc covering. Discusses electrolytic polishing.

12T69

LAYNER, V. I., Prof

PA 10/49T88

USSR/Metals
Pickling (Metals)

Jul/Aug 48

"Electrolytic Pickling of Metals," V. I. Layner, Prof, Dr Tech Sci, Deputy Rep for Committee of Galvanostegy, VSNITO, 6¼ pp

"Vest Inzhener i Tekhnik" No 4

Lists disadvantages of chemical method of pickling. Describes various types of electrochemical pickling. Graphs show time required varies with current density, temperature and chemical concentration.

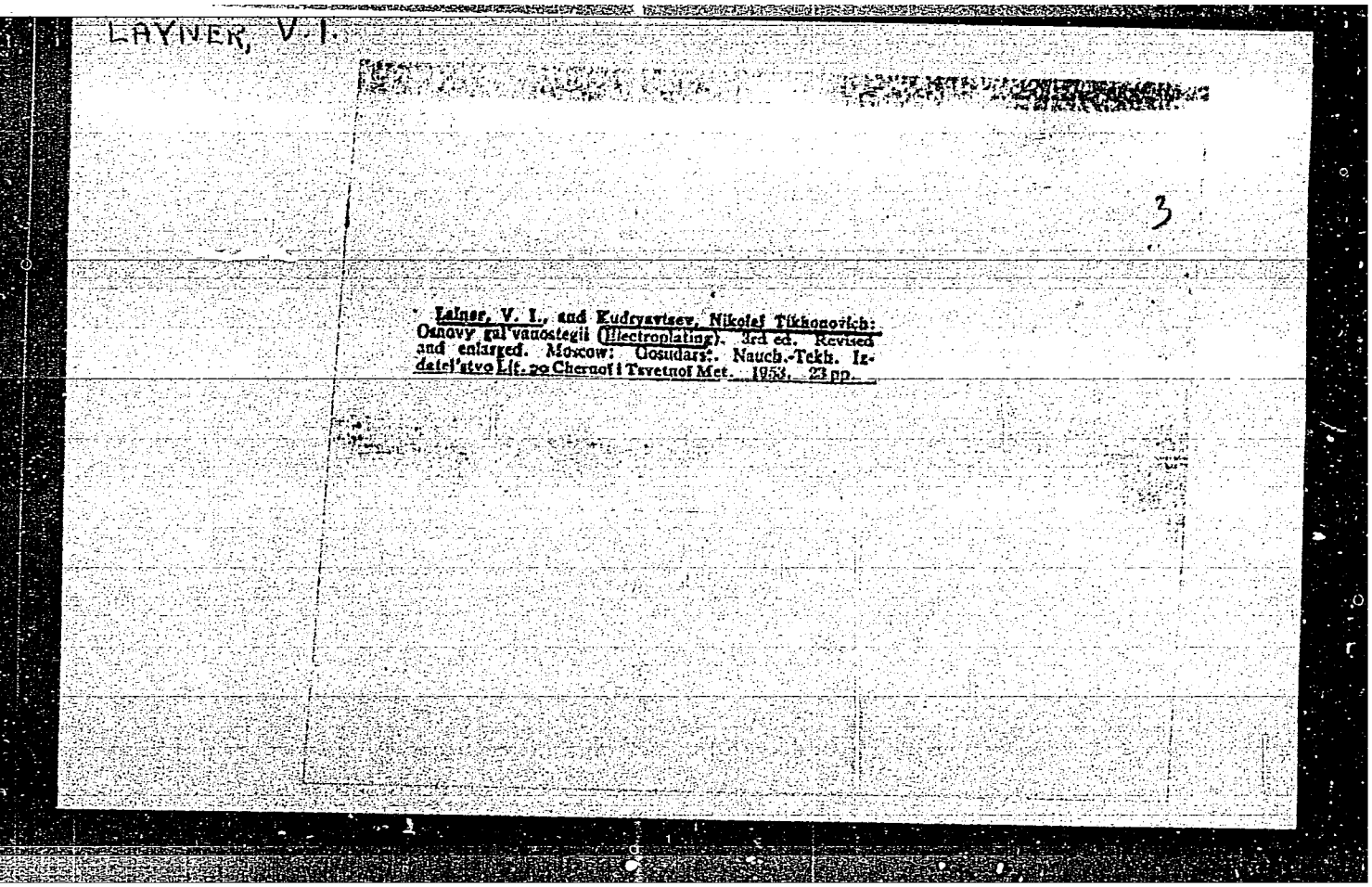
10/49T88

Layner, V. I.

Technology

(Corrosion and protection of metals) Moskva Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii 1951 Pt. 4 (Metal coatings, electro-chemical and chemical treatment of metals)

Monthly List of Russian Accessions, Library of Congress, July 1952. Unclassified.



LAYNER, V. I.

3

Layner, V. I., and Kudryavtsev, Nikolai Tikhonovich: Osnovy gal'vanostegii (Electroplating). 3rd ed. Revised and enlarged. Moscow: Gosudarst. Nauch.-Tekh. Izdatel'stvo Lit. po Chernoi i Tsvetnoi Met., 1953. 23 pp.

LAYNER, V. I.

PHASE I TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 587 - I

BOOK

Authors: LAYNER, V. I. and KUDRYAVTSEV, N. T. Call No.: AF639674
Full Title: FUNDAMENTALS OF ELECTROPLATING. Part 1, 3rd. ed.rev.
Transliterated Title: Osnovy gal'vanostegii. Chast' 1. 3-e izd., perer. i dopol.

PUBLISHING DATA

Originating Agency: None
Publishing House: State Scientific and Technical Publishing House of Literature on Ferrous and Nonferrous Metallurgy (Metallurgizdat)
Date: 1953 No. pp.: 624 No. of copies: 15,000
Editorial Staff
Appraiser: Titov, P. S., Prof. Dr.

PURPOSE: The book is intended for engineers and technicians in scientific research institutions, enterprises and design organizations dealing with problems of corrosion and electroplating, and can be useful to students specializing in this field.

TEXT DATA

Coverage: This work deals with the general principles and the technology of electroplating processes, as well as with the processes of the preparation of metal surfaces for the application of metal layers. It gives the characteristics of metal coatings and discusses

Osnovy gal'vanostegii. Chast' 1. 3-e izd., perer. i dopol. AID 587 - I

the quality of electrolytic platings as it depends on the surface conditions and on the plating materials. The book describes the surface treatment, the electrolytic polishing of metals, the structure of the deposited metals and the metal distribution in a cathode surface. Zinc, cadmium, copper, brass, nickel, chromium, tin and lead plating processes are examined in detail, with attention to the qualities, corrosion-resisting properties and the practical application of different coatings. This work is the third supplemented edition. Some chapters are radically changed and new chapters are added. The book is provided with illustrations, microphotographs of surfaces, tables and diagrams.

No. of References: Total 167, Russian 160, 1909-1952.

Facilities: B. S. Yakobi, E. K. Lents, P. P. Fedot'yev, V. A. Kistyakovskiy, N. A. Izgaryshev

2/2

BAKHVALOV, Grigoriy Tikhonovich; BIRKGAN, Leopol'd Nikolayevich; LABUTIN, Valentin Petrovich; FOMIN, N.V., redaktor; KAMAYEVA, O.M., redaktor; LAYNER, V.I., professor, doktor, retsenzent; KUPTSOV, I.I., inzhener, retsenzent; VAYNSHTEYN, Ye.B., tekhnicheskiy redaktor.

[Handbook of an electroplater] Spravochnik gal'vanostega. Izd. 2-e, perer. i dop. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1954. 650 p. (MIRA 8:4)
(Electroplating)

LAYNER, V.I.

AKIMOVA, K.I.; BAZHENOV, M.F.; BAKHVALOV, G.T.; BEZKLUBENKO, N.P.; BERMAN, S.I.; BOGDANOV, Ye.S.; BODYAKO, M.N.; BOYKO, B.B.; VINOGRADOV, S.V.; GAGEN-TORN, K.V.; GLEK, T.P.; GOREV, K.V.; GRADUSOV, P.I.; GUSHCHINA, T.N.; YEMEL'YANOV, A.K.; YESIKOV, M.P.; ZDZYARSKIY, A.V.; ZAKHAROV, M.V.; ZAKHAROVA, M.I.; KARCHEVSKIY, V.A.; KOMAROV, A.M.; KORZHENKO, O.T.; LAYNER, V.I.; MAL'TSEV, M.V.; MILLER, L.Ye.; MILOVANOV, A.I.; MIRONOV, S.S.; NIKONOROVA, N.A.; OL'KHOV, N.P.; OSIPOVA, T.V.; OSOKIN, N.Ye.; PERLIN, I.L.; PLAKSIN, I.N.; PROKOF'YEV, A.D.; RUMYANTSEV, M.V.; SEVERDENKO, V.P.; SEREDIN, P.I.; SMIRYAGIN, A.P.; SPASSKIY, A.G.; TITOV, P.S.; TURKOVSKAYA, A.V.; SHAKHNAZAROV, A.K.; SHPICHINETSKIY, Ye.S.; YURKSHTOVICH, N.A.; YUSHKOV, A.V.; YANUSHEVICH, L.V.

Sergei Ivanovich Gubkin. TSvet.met. 28 no.6:60-61 N-D '55. (MIRA 10:11)
(Gubkin, Sergei Ivanovich, 1898-1955)

FEDOT'YEV, Nikolay Pavlovich; GRILIKHES, Semen Yakovlevich; LAYNER, V.I., professor, retsenzent; KHEYFETS, B.L., kandidat khimicheskikh nauk, redaktor; VASIL'YEVA, V.P., redaktor izdatel'stva; POL'SKAYA, R.G., tekhnicheskiy redaktor

[Electrochemical pickling, polishing and oxidation of metals] Elektrokhimicheskoe travlenie, polirovanie i oksidirovanie metallov. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1957. 242 p. (MLRA 10:5)
(Oxidation, Electrolytic) (Electrolytic polishing)
(Metals--Pickling)

Layner, V. I.

Layner, Vladimir I., Professor, Doctor; Kudryavtsev, Nikolay T., Professor, Doctor.

Osnovy gal'vanostegii (Principles of Electroplating) Chast' II (Part II) Moscow, Gosudarstvennoye nauchno-tekhnicheskoye izdatel'stvo literatury po chernoy i tsvetnoy metallurgii, 1957, 3d edition, rev. and enl., 647 pp., 10,000 copies.

Ed.: Chernov, A. N.; Ed. of the Publ. House: Kamayeva, O. M., Tech., Ed.: Attopovich, M. K.; Reviewers: Gorbunova, K. M., Professor, Doctor; Dokin, N. I., Engineer, and Semin, V. M., Engineer.

PURPOSE: The book is intended for engineers and technically trained personnel in electroplating shops, scientific research institutions, and engineering design organizations, and may be of use to university students.

Card 1/16

Principles of Electroplating (Cont.) 184

COVERAGE: The book treats of electroplating with noble and rare metals and alloys. Equipment, theoretical principles and techniques of electroplating are described in detail. Personalities mentioned include: Shvyryayev, G. K., Engineer, and Korolenko, N. K., Engineer. There are 202 references, 96 of which are USSR, 78 English and 28 German.

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Ch. I. Electrodeposition of Iron and Cobalt

Electrodeposition of iron 9
Use of iron plating and properties of electrodeposited iron 9
Composition of the electrolyte and control of the iron baths 13
Preparation, control and adjustment of electrolytes 21
Electrodeposition of cobalt 22

Ch. II. Electrodeposition of Indium

Card 2/16

LAYNER, V.I.

AUTHORS: Layner, V.I., Professor, Doctor and Velichko, Yu. A., Engineer. 136-3-12/25

TITLE: Galvanothermic Method of Producing Steel/Copper-Zinc Alloy Bimetal. (Gal'vanotermicheskiy metod polucheniya bimetalla stal' - medno-tsinkovyy splav).

PERIODICAL: Tsvetnyye Metally, 1957, No.3, pp.60-66 (USSR)

ABSTRACT: There are practical difficulties in depositing electrolytically a copper-zinc alloy; copper and zinc, however, can be deposited separately without difficulty and this is the principle of the "galvanothermic" method of making bimetal. The zinc and copper are deposited on the steel in thin layers which diffuse into each other on annealing. The investigation of this process is described in the present article. The steel was first coated thinly with nickel and then with copper and zinc in acid electrolytes to give a total thickness of 30 or 90.μ. Annealing was carried out in a reducing atmosphere and specimens were then subjected to microscopic analysis, to chemical analysis of different layers and to deformation tests. Graphs show changes in composition with depth for specimens treated under various conditions and photomicrographs are also shown. It was shown that under the above conditions the

1/2

136-3-12/25

Galvanothermal Method of Producing Steel/Copper-Zinc Alloy Bimetal.

zinc content decreases with increasing depth from the surface; least variation in composition was found in specimens heated for three hours at 400 C and then for four hours at 520 C. Satisfactory adhesion between copper and steel was obtained with a 1 μ thick nickel deposit. Good adhesion and stamping properties were obtained. There are 10 figures and 4 references, 2 of which are Slavic.

2/2

AVAILABLE: Library of Congress

LAYNER, V.I.

122-4-13/29

AUTHOR: Layner, V.I., Doctor of Technical Sciences, Professor, and Velichko, Yu.A.

TITLE: Copper plating in hydro-fluoric boron electrolytes. (Medbebie v borftoristovodorodnykh elektrolitakh.)

PERIODICAL: "Vestnik Mashinostroeniya" (Engineering Journal), 1957, No.4, pp. 60 - 64 (U.S.S.R.)

ABSTRACT: Investigations on hydro-fluoric boron electrolytes are reported containing between 17 and 125 g/litre of copper in the form of hydrofluoric boron salts. The raw materials for preparing the electrolyte were hydrofluoric acid, boric acid and copper sulphate first transformed into copper carbonate. The method of obtaining the electrolyte is described in detail. The copper content in the bath was determined by the electrolytic or the volume method. The analytical procedure is described. For all electrolytes the upper limit of the permissible current density at different temperatures was determined both at rest and when stirred by air. The porosity of coatings (depending on their thickness), the strength of the bond with the parent metal and the capacity of copper-plated steel to be deformed in press tools were found. Specimens of low carbon steel were degreased, subjected to anodic treatment in an alkaline solution and plated with a nickel undercoat of

1/3

Copper plating in hydrofluoric boron electrolytes. (Cont.) 122-4-13/29

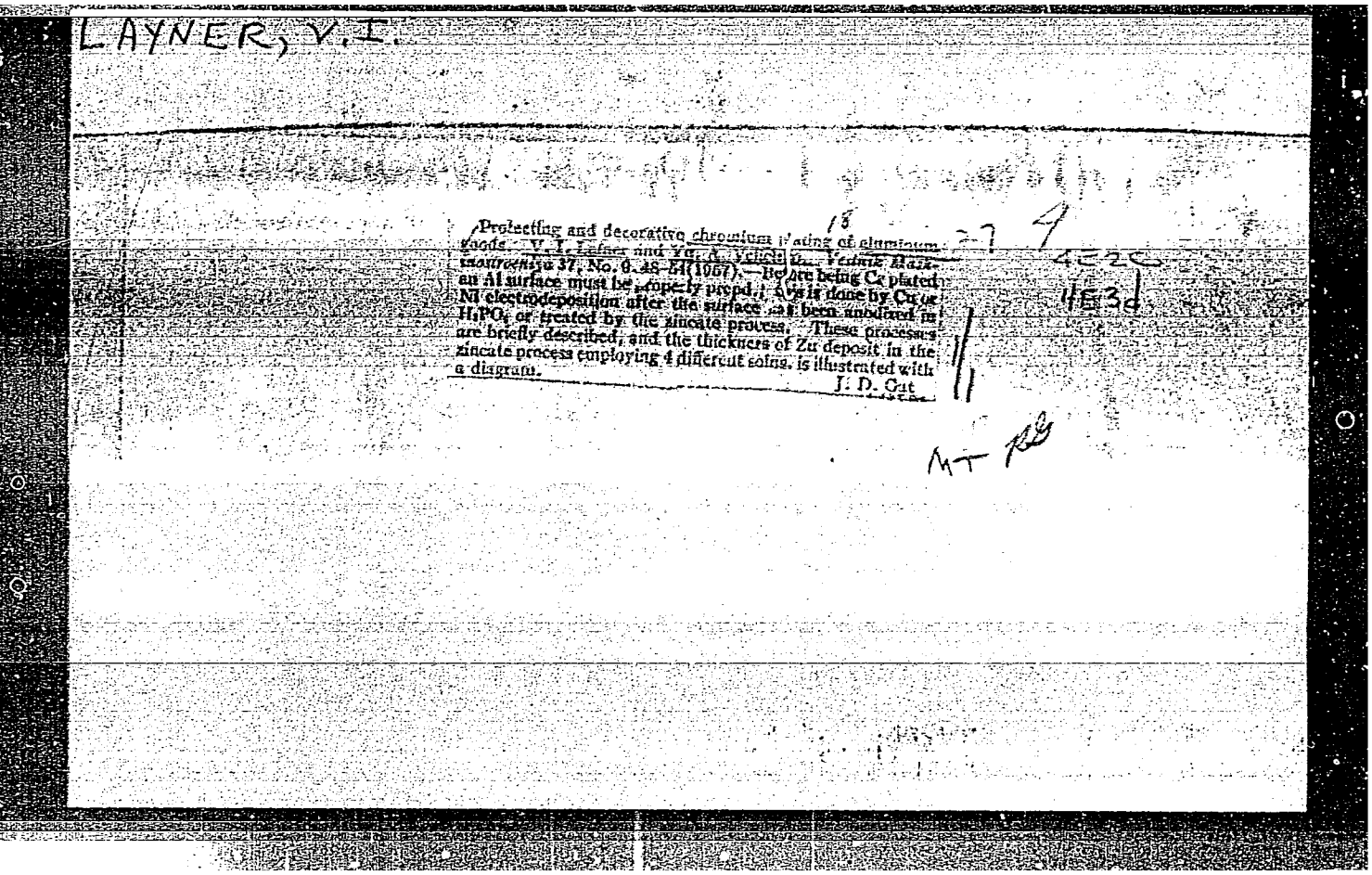
1 μ thickness. It is not necessary to obtain a completely dense nickel coat. The copper coat forms bridges through the pores of the nickel. The solution of iron in the pores is retarded by cathodic polarisation. The adhesion strength of the copper coat was determined by repeated bending tests, by the Ericson drawing test and by annealing. Bad adhesion was obtained with a very thin (0.2 μ) or a very thick (5 μ) nickel undercoat. The tests are summarised in tables and graphs. The distinguishing feature of hydrofluoric boron electrolytes, compared with sulphates, is a much greater permissible current density. This rises with the concentration of the copper salt. At 20 °C and 17 g/litre copper in the form of hydrofluoric boron salt, good deposits are obtained with a density of 2 A/dm^2. With a copper concentration of 125 g/litre the permissible current density rises to 25-30 A/dm^2. A high temperature and stirring of the electrolyte help to increase the permissible current density. In the dilute bath an increase of temperature from 20 to 65 °C raises the permissible current density from 2 to 5 A/dm^2, whilst in the concentrated bath the value rises from 20 to 65 A/dm^2. Stirring by air increases the permissible
2/3 density almost two-fold. Non-porous copper coats from electrolytes of medium concentration (80 g/litre) are obtained if

Copper plating in hydrofluoric boron electrolytes. (Cont.)
122-4-13/29

30 μ thick or above. 50 μ thickness is necessary when plating from dilute baths. The coat becomes smooth at a large thickness (100 μ). Such coats still retain good adhesion and can be recommended for producing bi-metallic strip subject to deep drawing operations.

3/3 There are 6 figures, 2 tables and 3 non-Slavic references.

AVAILABLE:



LAYNER, V.I.

Protecting and decorative chromium plating of aluminum goods. V. I. Layner and Yu. A. Yelinek. *Vestnik Mashinostroyeniya* 37, No. 8, 48–51(1957).—Before being Cu plated an Al surface must be capacity prepd. This is done by Cu or Ni electrodeposition after the surface has been anodized in H_3PO_4 or treated by the zincate process. These processes are briefly described, and the thickness of Zu deposit in the zincate process employing 4 different solns. is illustrated with a diagram.

J. D. Gat

SOV/149-58-5-14/18

AUTHORS: Layner, V.I., Panchenko, I.I.

TITLE: Electrode Processes in Electro-deposition of Nickel from Fluoborate Electrolytes (Elektrodnyye protsessy pri elektroosazhdenii nikelya iz ftorboratnykh elektrolitov)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Tsvetnaya Metallurgiya, 1958, Nr 5, pp 124 - 130 (USSR)

ABSTRACT: The object of the investigation described in this paper was to study the effect of various factors on electrodeposition of nickel from fluoborate solutions and on the quality of the deposits obtained by this method. For the preparation of the HBF_4 solution, chemically pure H_3BO_3 and an HF solution (whose concentration was determined from its density) were used in the stoichiometric ratio, H_3BO_3 being added (a small quantity at a time) to the continuously stirred and ice-cooled HF solution. To the obtained HBF_4 solution, also continuously cooled, nickel carbonate (a small quantity at a time) was added and in this manner it was possible to obtain solutions containing up to 180 g/litre nickel in the form of

Card1/8

Electrode Processes in Electro-deposition of Nickel from Fluoborate Electrolytes

fluoborate (density approx. 1.5), which could then be diluted to any required concentration. The characteristics of the experimental electrolytes (pH = 3 in all cases) are given in Table 1 which shows the nickel concentration (N = 1 to 4), the content (in g/litre) of fluorine, F_1, present in the form of BF_3OH, the content of fluorine, F_2, present in the form of BF_4^-, the total fluorine content $F = F_1 + F_2$, the B content, the F/B and F/Ni ratios, the $NiCl_2 \cdot 6H_2O$ content, and the density at 20 °C. Nickel anodes and steel, copper or brass cathodes were used in the experiments, the results of which are reproduced graphically. The effect of the current density (A/dm^2) on the cathode potential is illustrated in Figure 1, where graphs 1, 2, 3 and 4 correspond to the nickel concentrations of 1N, 2N, 3N and 4N, respectively. Figure 2 illustrates the current-density/cathode-potential relationship for electrolytes with no excess of H_3BO_3

Electrode Processes in Electro-deposition of Nickel From Fluoborate Electrolytes

(graph 1) and with 5, 10 and 15g/litre H_3BO_3 in excess of the stoichiometric ratio (graphs 2,3 and 4). The results of the tests in which the current-density/cathode-potential relationship was studied for 3N electrolytes containing no Cl ions at 20 °C and those containing 15, 30 and 50 g/litre $NiCl_2.6H_2O$ at 50 °C are reproduced in Figure 3 (graphs 1, 2, 3 and 4, respectively). The same relationship for a 3N electrolyte with no excess of H_3BO_3 at 20, 30, 40 and 50 °C is shown in Figure 4 (graphs 1 to 4). A 3N electrolyte was also used for investigating the effect of the pH number which was varied between 1 and 5 by means of HBF_4 or sodium iodide additions. It was found that at pH = 5 , the electrolyte is unstable and contains black, insoluble particles (most likely $Ni(OH)_2$ with basic salts) held in suspension. Pitting occurs and a dendritic deposit is obtained which at low current densities (1 to 5 A/dm^2) becomes dark. At pH = 4 , low current

Electrode Processes in Electro-deposition of Nickel From Fluoborate Electrolytes

densities result in a dark deposit, while dendrites are formed at high current densities. At pH = 1 or 2 , intensive evolution of hydrogen takes place on the cathode surface, the evolved gas forming bubbles which adhere to the cathode and cause pitting. Best quality deposits are obtained at pH = 3 . Yield per unit current varies in all cases between 89.6 and 99.7%, increasing with increasing current density and at high pH (3 to 4) values, and falling sharply at low current densities and at pH = 1 or 2 . In the next stage of the investigation the anodic processes were studied. Four types of electrolytes were used containing (in g/litre): (A) 25 $Ni(BF_4)_2$, 68.5 F_1, 138.7 F_2 and 34.4 B; (B) same as (A) plus 15 $NiCl_2.6H_2O$; (C) 240 $NiSO_4.7H_2O$, 30 H_3BO_3; (D) same as (C) plus 20 NaCl. Cathodes were made of electrolytic nickel or of non-passivating nickel containing C 0.2%, Si 0.2% and S 0.005 (Ref 12). To reduce to minimum the difference between their true and the geometric surface areas, the cathodes were

Electrode Processes in Electro-deposition of Nickel From Fluoborate Electrolytes

polished first mechanically and then electrolytically (to remove the plastically deformed layer). The results, in the form of graphs showing the relationship between the anodic current density and the anode potential, are reproduced in Figure 5: graph (1) - non-passivating nickel anode in electrolyte C; graph (2) - as (1) but electrolyte D used; graph (3) - non-passivating nickel anode in electrolyte A; graph (4) - as (3) but in electrolyte B; graphs (5) and (6) - electrolytic nickel anode in electrolytes C and D, respectively. When the ratio of the anode and cathode surface areas was S_a/S_k = 2:1, the yield of the dissolved metal per unit current was high even in the absence of chlorides in the electrolyte but for S_a/S_k = 1:1, a slightly lower yield was obtained. After the bath was operated for the equivalent of 800 A.hour per 1 litre of electrolyte, the concentration of the nickel-bearing salt in the solution was unchanged and only a slight rise in the pH number was observed. In their conclusions the authors state that: i) the main advantage

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to be gained by using the fluoborate electrolyte instead of a sulphate solution for nickel plating is that the process can be intensified, i.e. higher current densities can be employed without affecting the quality of the deposit and yet without reducing the yield per unit current. The maximum permissible current density can be increased by increasing the Ni concentration in the electrolyte (up to 3N) and by using higher temperatures; ii) when the concentration of H_3BO_3 in the electrolyte is increased, the cathode potential is reduced and so is the maximum permissible current density. In spite of this effect, which is probably due to partial dissociation of $Ni(BF_4)_2$ to $Ni(BF_3OH)_2$ and to a decrease in the activity of the nickel ions in the electrolyte, it is recommended to maintain the H_3BO_3 concentration slightly (approx. 15 g/litre) above the value corresponding to the stoichiometric ratio, since free H_3BO_3 improves the stability of the electrolyte and makes it less reactive;

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iii) the effect of chlorides introduced in the electrolyte in the form of $NiCl_2.6H_2O$ in amounts up to 15 g/litre is beneficial, since they reduce polarisation. However, at high (more than 30 g/litre) chlorides concentrations, the maximum permissible current density is lower and the quality of the deposit is adversely affected. At 50 °C, the effect of the chlorine ions becomes insignificant, most likely owing to the reduced adsorption of these ions on the cathode surface and to sufficiently high activity of the anode, particularly when made of non-passivating material. Owing to the latter factor, the fluoborate electrolytes are quite stable, so that in operation it is only necessary to replenish the fluoboric acid in order to maintain constant pH, since the anodic yield per unit current is slightly higher than the cathodic;
(iv) the optimum value of the pH number of a fluoborate solution for nickel plating is between 3 and 3.5. At pH = 1 , the yield per unit current is too much affected by the variation of the current density, while at

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pH = 4.5 , the electrolyte becomes unstable and subject to hydrolysis and dark deposits are obtained;
(v) tendency to pitting is one of the shortcomings of the fluoborate solutions for nickel plating. This undesirable effect can be minimised by application of stirring and by addition of reagents reducing the surface tension of the electrolyte.
There are 5 figures, 1 table and 12 references, 3 of which are Soviet and 9 English.

ASSOCIATION: Moskovskiy institut tsvetnykh metallov i zolota. Kafedra elektrokhimii i korrozii (Moscow Institute of Non-ferrous Metals and Gold. Chair of Electrochemistry and Corrosion.)

SUBMITTED: January 14, 1958

25(1) PHASE I BOOK EXPLOITATION SOV/2693

Layner, Vladimir Il'ich, Professor, Doctor

Gal'vanicheskiye pokrytiya legkikh splavov (Electroplating of Light Alloys) Moscow, Metallurgizdat, 1959. 137 p. 6,200 copies printed.

Reviewers: A.V. Shreyder, Candidate of Technical Sciences, and L.I. Stoklitskiy, Engineer; Ed.: A.V. Shreyder; Ed. of Publishing House: M.S. Arkhangel'skaya; Tech. Ed.: L.V. Dobuzhinskaya.

PURPOSE: This book is intended for engineers and technicians in electroplating shops. It may also be useful to students of vuzes.

COVERAGE: The author discusses the electroplating of articles made of aluminum, magnesium, beryllium, and titanium alloys. Preparatory operations and methods of application are described. Chrome-plating processes for increasing wear resistance and for decorative and protective purposes are treated in detail. The author thanks Yu.A. Velichko, G.S. Galimova, Z.G. Smorodova, G.S. Konstantinova, V.V. Syagina, and T.M. Marenkova for their

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assistance. There are 70 references: 7 Soviet, 50 English, 8 German, and 5 French.

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