"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

ROMANIA / Human and Animal Physiology. Excretion. I

Abs Jour: Ref Zhur-Biol., No 9, 1958, 41438.

Author : Bals, M. G.
Inst : Not Given.
Title : Circulation of Water and Electrolytes. II Disturbances of Water and Electrolytes Balance and Their Treatment.

Orig Pub: Viata med., 1956, 3, No 10, 3-27.

Abstract: No abstract.

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APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7"

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RUMANIA

Prof N.G. BALS, Second Infectious Diseases Clinic (Clinica a II-a de boli contagioase,) Dr.I. HAFTA, Dr Eugenia ZILISTEANU, Dr I. NICULESCU and Dr Nina GHEORGHIU, Influenza Section of the Institute (Secia de gripa, Institutul) "Dr. I. Cantacuzino," Bucharest.

"Serologic Diagnosis of Influenza by Means of Fluorescent Antibodies."

Bucharest, Microbiologia, Parazitologia, Epidemiologia, Vol 7, No 6, Nov-Dec 1962: pp 541-544.

Abstract: Description and brief discussion of four methods - direct positive (antigen with fluorochrome-coupled antiserum,) direct negative (antigen, serum, fluorescent anti-influenza serum,) indirect (antigen, serum, caprine anti-human fluorescent serum,) and complement fixation (anti-guinea pig serum fluoresces) used in study with A_2 influenza strain from the Bucharest 1959 epidemic kept in ovo since then; results generally unsatisfactory. Discussion of technic and its value. Nine Western references.

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ANTONESCU, Em.; BALS, St.; GEORGESCU, F.; GEORGESCU, V.; MANTEA, Gh.; MIHAILESCU, N.; PANIN, N.; TOMESCU, C.

Sedimentologic data on the Senonian-Danian deposits in the Vintu de Jos Geoagiu region. Studii cerc geol 8 no. 2: 215-234 '63.

1. Comunicare prezentata de academician G. Murgeanu.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BALSAN, I.

Illness caused by high altitude is overcome. p. 28. ARIPILE PATRIEI. (Asociatia Voluntara pentru Sprijinirea Apararii Patriei) Bucuresti. Vol. 2, no. 3, Mar. 1956.

So. East European Accessions List Vol. 5, No. 9 September, 1956

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

RUMANIA

DRAGOMIRESCU, L., Dr, Lt-Col, BALSANU, I., Dr, Col, MIRON, Al., Dr, Lt-Col, RIMANOCZY, C., Dr, and KANYADY, T., Dr [affiliation not given]

"In Connection with Five Operated Retroperitoneal Tumors."

Bucharest, Revista Sanitara Militara, Vol 62, No 2, Mar-Apr 66, pp 271-278.

Abstract: A discussion of the unusual features and diagnostic difficulties associated with retroperitoneal tumors, on the basis of five case histories.

Includes 3 figures and 9 references, of which 2 Rumanian and 7 Western.

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BALSAY, I.

TECHNOLOGY

PERIODICAL: KOHASZATI LAPOK. Vol. 13, no. 7, July 1958

Balsay, I. Weldable structural steel having a great yield limit of the S. 52 type. p. 326.

Monthly list of East European Accessions (EEAI) LC, Vol. 8, No. 2, February 1959, Unclass.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BALSAY, I.

Rotor-steel production and the outlook for its future. Pt. 1. p. 177.

KOHASZATI LAPOK. (Magyar Banyaszati es Kohaszati Egyesulet) Budapest, Hungary
Vol. 14, no. 5, May 1959.

Monthly list of East European Accessions (EEAI), LC, Vol. 8, No. 8,
August 1959.
Uncla.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7"

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BALSAY, L.

Afforestation of Hansag; also, remarks by Karoly Botvay and others. p. 35. (Kozlemenyei, Budapest, Vol. 4, no. 1/2, 1954)

SO: Monthly list of East European Accessions (EEAL), LC Vol 4, no. 6, June 1955 Uncl

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BALSAY, L.

AZ ERDO. (Orszagos Erdeszeti Egyesulet) Budapest.

Remark on the deer problem. p. 34.

Vol. 8, No. 1, Jan. 1959.

Monthly List of East European Accessions (EEAI), LC, Vol. 8, No. 3, March 1959 Unclass.

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BALSAY, Laszlo

On the problem of maintaining our horned cattle stock. Erdo 11 no.10:457-462 O '62.

1. Erdeszetvezeto, Kapuvar.

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BENTSIANOVA, V.M., dotsent (Moskva, Zubovskiy bul'var, d.16/20, kv.87);
BAL'SEVICH, S.Ya.

Radiation therapy for giant-cell tumors of the jaws. Vest. rent. i rad. 35 no. 5:44-50 My-Je '60. (MIRA 14:2)

1. Iz kafedry rentgenologii radiologii (zav. - prof. I.A. Shekhter) Moskovskogo meditsinskogo stomatologicheskogo instituta (direktor - dotsent G.N. Beletskiy) i radiologicheskogo otdeleniya (zav. S.Ya. Bal'sevich) bol'nitsy imeni A.A. Ostroumova (glavnyy vrach P.V. Abashkina).
(JAWS—TUMORS) (RADIOTHERAPY)

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BAL'SEVICH, S. Ya.

Diagnosis of giant cell tumors of the jaw and the characteristics of radiotherapy of them. Med. rad. no.2:71-78 '62. (MIRA 15:7)

1. Iz kafedry rentgenologii i radiologii (zav. - prof. I. A. Shekhter) Moskovskogo meditsinskogo stomatologicheskogo instituta i radiologicheskogo otdeleniya (zav. S. Ya. Bal'sevich) klinicheskoy bol'nitsy No. 33 imeni A. A. Ostroumova.

(JAWS--TUMORS) (RADIOTHERAPY)

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BAL'SEVICH, S.Ya.; VTYURIN, B.M.

P32 treatment of vascular complications of erythremia. Med.rad. 9 no.9:22-26 S '64. (MIRA 18:4)

1. Kafedra rentgenologii i radiologii (zav. - prof. I.A.Shekhter) Moskovskogo . ,ditsinskogo stomatologicheskogo instituta i Instituta meditsinskoy radiologii AMN SSSR.

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BALSH, M.G.

Treatment of acute bacterial dysentery by intravenous injection of antibiotics. Antibiotiki 6 no.10:946-947 O '61. (MIRA 14:12)

1. II klinika infektsionnykh bolezney (zav. - prof. M.G.Balsh) fakul'teta usovershenstvovaniya vrachey Bukharestskogo meditsinskogo instituta.
(DYSENTERY) (ANTIBIOTICS)

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

AUTHOR: Makaruk, P. M.; Bal'shadone[illegible] I.

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BAL'SHAYA, L.I.

Category : USSR/Optics - Physical Optics

K-5

Abs Jour : Ref Zhur - Fizika, No 1, 1957 No 2422

Author : Bal'shaya, L.I.

Title : Control of Spectral Composition of Light Sources in the Process of Printing and Copying Color Films

Orig Pub : Tr. Leningr. in-ta kinoinzh., 1955, vyp. 3, 25-30

Abstract : Two versions of an instrument for the measurement of the color temperature of incandescent lamp, based on the "red-blue ratio" method, are considered. 1. Pyrometer with Electronic Ratio Meter. The action of the ratio meter is based on the use of the exponential relationship between the grid current and the voltage of a vacuum tube. The accuracy in the measurement of the color temperature near the nominal value (T_{nom} = 2500°K) is 50°K. 2. Pyrometer with permanent-magnet ratio-meter. It is intended for the measurement of the color temperatures over a 2500-3500°K range, and the value of each division is 10-30°K in the central portion of the scale. The transducer employed is a specially-constructed selenium photocell. The purpose of the instrument is control over the spectral composition of the illumination produced by the window of the copying apparatus.

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M

Copper Powder for Metallo-Ceramic Applications. R. A. Borok, M. I. Balshin, and N. A. Gavrilov (*Niimash* (*Bull. Sci. Res. Inst. Machinebuilding and Metal Treatment*), 1955, (3), 27-33).—[In Russian.] The production of copper powder by electrolysis and its properties are described.—N. A.

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On the Theory of Metallo-Ceramic Processes. I.—On the Theory of Sintering. M. J. Balshin (*Vestnik Metallopromishlennosti* (*Messenger Metal Ind.*), 1936, 16, (17), 87–120).—[In Russian.] Existing theories of the sintering of metallic powders are discussed. In the recrystallization of compact metals, the new crystallites can grow only into the space formerly occupied by the old ones, whereas in the recrystallization of pressed powders, growth can also take place into the pores between the particles. Density changes during sintering are considered to be due to two kinds of forces, one tending to press the particles together and the other to separate them. The former type prevail in the looser structures, and the latter in the more compactly pressed powders. Measurements are recorded of the effect of sintering in hydrogen on the volume and linear dimensions of cubes pressed from copper and iron powders (grain-size 10^{-6} – 10^{-4} cm.), apparent d 0·46–4·57 and 0·67–3·7, respectively. A study was made of the influence of: size and shape of the original particles; presence of impurities; degree of compression; temperature and duration of sintering; hardening by cold-working; and annealing of powders before pressing. Comparison of the shrinkage of powders with different apparent densities shows that the degree of compression is a more important factor than the absolute value of the pressure used. The shrinkage is greater in the direction of pressing than transverse thereto, this effect being more marked with copper than with iron. The looser the powder, the greater is the shrinkage on sintering. Compact powders increase in volume on sintering. Increase in temperature and in duration of sintering increases the shrinkage of loose powders and decreases that of the more compact ones. Addition of graphite decreases the shrinkage of copper. The results can be explained by B.'s theory, without taking into consideration secondary effects, *e.g.* those due to adsorbed gases or oxide films, although the possible influence of these effects is not denied.—D. N. S.

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Cw

The theory of metallo-ceramic processes. II. Special methods for the investigation of metallo-ceramic technology. M. Ya. Balshin. *Vestnik Metallopromyshl.* No. 18, 82-91(1936); cf. *C. A.* 32, 9010[8].—The quality of metal powders as well as the changes which they undergo during pressing and vitrifying can be obtained in a simple and accurate manner on the basis of detns. of the relation of the bulk wt. and the relative d. to the resistance to compression and the coeff. of anisotropy, the relation of the bulk wt. to the Shore hardness, and the relation between the vitrifying temp. and the bulk wt. These methods are applicable both to control of production and research. III. Principles for the economic mixing of the components and the problem of vitrification. *Ibid.* 91-9.—On the basis of theoretical considerations math. equations are developed for the calcn. of the bulk wt. of a vitrifying mass consisting of powd. constituents as well as for the changes in dimensions after vitrifying. Through *Chem. Zentr.* 1938, I, 2052. M. G. Moore

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18

*On the Theory of Metallo-Ceramic Processes. III.—Principles of the Rational Preparation of the Mixture and the Problem of Cementation. M. J. Balshin (*Vestnick Metallopromishlennosti* (*Messenger Metal Ind.*), 1936, 16, (18), 91–99).—[In Russian.] See also preceding abstracts. In the sintering of mixed powders prepared from reduced iron (apparent density 0·67 grm./c.c.) and electrolytic iron (2·11 grm./c.c.), the shrinkage is found to be an additive property. The mechanical properties of the sintered product are improved by addition of the finer powder, which acts as a "cement" between the larger particles.—D. N. R.

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23

Balochin, M. Ju. *Metal Ceramics (Powder Metallurgy).* [In Russian.] Pp. 192. 1938. Moscow and Leningrad: Gonti. (Rbl. 3.90.)

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9

The theory of powder metallurgy. IV. The theory of the pressing process. M. Yu. Balshin. *Vestnik Metallo-prom.* 18, No. 2, 124-37(1938); cf. *C. A.* 32, 8839[1].—Analysis of the pressing diagrams leads to the following theoretical relation: $\log p = -L V_0 + C$, in which p is the pressure, V_0 the vol., and L and C are consts. In practice, the values L and C are not const. but depend on the type of press and the condition of the powder. The deformation of the powder is indicated by L, so that the diagram is useful not only for technological calcns. but also for detg. the condition of the powder. The d. of the powder decreases with increasing distance from the stamper, the relation being a linear one. The variations in d. are compensated by the graphite content. V. **Powder-metallurgy alloys and pseudoalloys.** *Ibid.* No. 4, 89-96.—The components used in the production of alloys by sintering are divided into 3 groups: (1) components which in definite stages of the sintering form no solid solns. or chem. compds. in amts. which can be detected by practical means, (2) components which are incompletely sol. in one another and (3) those which are completely mutually sol. For both the last 2 cases the influence of the conditions of manuf., the local irregularities of structure, and the compn. of the metallic alloys on the complete course of the reactions was investigated. The influence of the conditions of manuf. on the properties of the articles produced by metal sintering is discussed. Through *Chem. Zentr.* 1939, I, 240.

M. G. Moore

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Theory of metallo-ceramic processes. M. Yu. Bal'shin. *Vestnik. Metalloprom.* 18, No. 4, 89-96(1938). A discussion of phys. and mech. properties of metallo-ceramic materials, such as Cu-graphite, bronze-graphite, Fe-graphite, Cu-W, etc., as functions of percentage compn. and particle size of the components, nature of binder, temp. at which material is prepd., etc. Ten references.
S. L. Madorsky

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CA

9

Porous antifriction metalloceramic cast iron. M. Yu. Bal'shin and N. G. Korolenko. *Vestnik Metalloprom.* 19, No. 3, 34-41(1939).—The manuf. of metalloceramic cast Fe is discussed under the headings of (1) selection of materials, (2) grinding of the cast iron, (3) preliminary annealing, (4) mixing, (5) pressing, (6) caking and (7) reduction to proper size. The best starting materials are cast irons with min. content of Si and other addns. Si should not exceed 1.7% and optimum content is 0.8-1.3%. White cast iron is preferred to gray or forged because it is not subject to flattening and cleavage during grinding although the last 2 types are to some extent more economical. Grinding of the material to 150-200 mesh is considered adequate for cold pressing. The most satisfactory annealing temp. is 750-900°, the duration depending upon the degree of graphitization desired. Pressure required varies from 2000 to 5000 kg./cm. depending on porosity and size of the object. The optimum temp. for caking is 1100° for periods of 30 min. to 2 hrs. and cooling should be done gradually.

B. Z. Kamich

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4

Porous Anti-Friction Cast Iron Made From Powder. M. Yu. Bal'shin and N. G. Korolenko. (Metallurgia, 1940, vol. 22, June, pp. 59–61). An abridged English translation is presented of a paper in which the authors describe a method of producing a porous bearing metal by the "powder metallurgy" process from powder produced by grinding cast-iron borings and turnings. The article appeared originally in Vestnik Metallopromyshlenosti, 1939, No. 3, pp. 34–41. (*See* Journ. I. and S.I., 1939, No. II., p. 318 A).

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BAL'SHIN, M. YU. PA 17T93

USSR/Metallurgy Jul 1947
Ceramic Materials

"Metal Ceramics in Machine Construction in the New Five-Year Plan," M. Yu. Bal'shin, 12 pp

"Vestnik Mashinost Royeniya" No 7

Discusses work by Soviet scientists on the addition of powered metal (iron, lead, or aluminum) to the clay mixture. Similar work was done by scientists in the US and Germany. Shows some of the objects made by this method.

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CA

9

Porous Fe mass. M. Yu. Bal'shin and V. P. Makhaev. Russ. 50,808, Apr. 30, 1941. An inorg. acid and water are added to the Fe ore or its calcination product and the mass is reduced, impregnated with bitumen and briqueted.

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Porashkovoe Metalloveden'e. (Powder Metallurgy) M. Yu. Bal'shin. 332 pages. 1948. State Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Moscow.

A handbook for production engineers, research workers, and students. Theoretical basis are thoroughly reviewed. Methods of production in the USSR and abroad are compared. Physical and chemical processes taking place during the production are explained. Mechanical properties of finished products are indicated and applications of individual products are described. Tables, diagrams, photomicrographs, and graphs are included. 156 ref.

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539.217.1

2750. Dependence of the setting and properties of powdered materials on their density (porosity). Balmen, M. Yu. *J. Tech. Phys., USSR*, 18, 1179-84 (*Sept.*, 1948) *In Russian.*—The linear dependence of the fritting on the density (porosity) found previously has not the character of a universal law and refers to special cases only within a wide range of porosities (up to 60%). For most of the practically important powders there is rather a near-linear dependence of the porosity reduction at fritting on the initial porosity. The same relations were found to apply to multiple-phase powders as to single-phase ones. Some empirical formulae were established. An explanation is presented of the relations between fritting, growth and mechanical properties on one hand, and porosity on the other hand. Deviations from these relations are usually due to the presence of oxides in the powdered materials. B. F. K.

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6

Certain Comments on Ivensen's Article: "Investigation of the Process of Shrinkage of Metal-Ceramic Bodies." (In Russian.) M. Yu. Bal'shin. *Zhurnal Tekhnicheskoi Fiziki* (Journal of Technical Physics), v. 18, Oct. 1948, p. 1332-1335.

Refers to article on p. 1290-1305 (this issue). Presents refutation of Ivensen's criticism of his book.

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RAKOVSKIY, V.S., kand. tekhn. nauk; BAL'SHIN, M.Yu., kand. tekhn. nauk, retsenzent; MALOV, A.N., kand. tekhn. nauk, red.; POPOV, S.M., tekhn. red.

[Powdered metals in the machinery industry] Metallokeramika v mashinostroenii. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1948. 119 p. (MIRA 11:8)

(Powder metallurgy)

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TSUKERMAN, S.A.; BAL'SHIN, M.Yu, otvetstvennyy redaktor; RAKOVSKIY, V.S., redaktor izdatel'stva; NEVRAYEVA, N.A., tekhnicheskiy redaktor

[Powder metallurgy and its industrial application] Poroshkovaia metallurgiia i ee promyshlennoe primenenie. Moskva, Izd-vo Akademii nauk SSSR, 1949 87 p. (MLRA 9:7)

(Powder metallurgy)

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USSR/Academy of Sciences Apr 49
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"Annotations on Works Published in 1948 by Academicians and Corresponding Members of the Academy of Sciences and Other Scientific Workers of the Department of Technical Sciences, Academy of Sciences" 4 pp

"Iz Ak Nauk SSSR, Otdel Tekh Nauk" No 4

Includes I. V. Abramov's book, "Methods of Technological Progress in Soviet Machine Construction," M. Yu. Bal'shin's book, "Powder Metallurgy," M. L. Zaroshchinskiy's "Steel Rolling," "Dynamics and Durability of Crankshafts" (collection of articles edited by

45/49T6

USSR/Academy of Sciences (Contd) Apr 49

S. V. Serensen), and A. V. Gorinov's 3-volume work, "Railroad Design."

45/49T6

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7"

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BAL'SHIN, M. YU.

USSR/Academy of Sciences Jun 49
Science
Publications

"Annotations on Works Published in 1948 and 1949 by Academicians and Corresponding Members of the Academy of Sciences and Other Scientific Collaborators of the Department of Technical Sciences" 3 pp

"Iz Ak Nauk SSSR, Otdel Tekh Nauk" No 6

Includes annotations on following books: M. Yu. Bal'shin's "Powder Metallurgy," S. A. Chaplygin's "Collection of Papers: Vol. II,

52/49T8

USSR/Academy of Sciences (Contd) Jun 49

Hydrodynamics and Aerodynamics," and Vol VI, No 21 and 22, of "Works of the Seminar on the Theory of Machines and Mechanisms."

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CH

9

Relation between the mechanical properties and the porosity of powder metallurgy products, and the limiting properties of porous metal-ceramic materials. M. Yu. Bal'shin (Acad. Sci. U.S.S.R.). *Doklady Akad. Nauk S.S.S.R.* 67, 831-4(1949).—A strength property of a metal-ceramic powder compact is approx. independent of porosity when it is referred to a, the ratio of the contact cross-section to the total initial cross-section. $S/a_1 = S_b$ = const., where S_b is the strength property referred to the true contact cross-section. S_b is a const. only when it is not a function of work-hardening. The deformation of a powder compact, $d\epsilon$, is roughly proportional to the change in stress per unit contact cross-section: $dS_b = dS/a = \pm k\, d\epsilon$, where k is a proportionality const. This equation is valid in both the elastic and plastic regions, provided the work-hardening effect is corrected. The relations between the relative d., θ, of the powder compact, and the nominal pressing pressure, σ, are, $d\sigma/\sigma = m\, d\theta/\theta$, $\ln \sigma = m \ln \theta + \ln \sigma_{max.}$, $\sigma/\sigma_{max.} = \theta^m$, where m is a const. and $\sigma_{max.}$ is the pressure for θ = 100% and is approx. equal to the contact pressure of pressing, σ_b. But $\sigma/a = \sigma_b$, therefore $d\sigma/\sigma = d\sigma_b/a$, and $a/a_{max.} = a = \theta^m$. Plots of the logarithms of (1) Brinell hardness, (2) Young's modulus, (3) pressing pressure, and (4) yield strength of unsintered Cu compacts against ln θ give straight lines with m values of (1) 4.3, (2) 4.8, (3) 4.9, and (4) 5.5. The same kind of plots for Cu compacts sintered 1.5 hrs. at 750° give m values of 3.4, 3.2, 3.4, 3.9, and 1.6 for Young's modulus, Brinell hardness, % elongation, tensile strength, and yield strength. The extrapolated tensile strength value for θ = 100% is about the same as that of the cast material after working by compression followed by annealing. Under optimum process conditions m = 3. This conclusion was checked satisfactorily against the results of several investigators.

A. G. Guy

Evaluation B-79294

Metallurgical Inst. im A. A. Baykov, Acad. Sci. USSR

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BALSHIN, M. YU.

USSR/Metals - Sintering Apr 52

"The Mechanism of Sintering," M. Yu. Balshin

"Zhur Tekh Fiz" Vol XXII, No 4, pp 686-695

Criticizes preceding article by V.A. Ivensen (see preceding abstract) and points out deficiencies. Refers to his own works (cf "Powder Metallurgy," 1948; "Metallic Ceramics," 1938). Explains mechanism of sintering by 2 groups of processes, one contributing to consolidation and the other counteracting it.

216T58

In the study of mech details of sintering a predominating part of some group of atoms may be established in a particular case. Received 15 Jul 51.

216T58

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USSR/Metallurgy - Powder Metallurgy, Sintering Jan 53

"Certain Points of the Theory of Sintering in Connection With Theoretical Conceptions of M. Yu. Bal'shin," V. A. Ivensen

Zhur Tekh Fiz, Vol 23, No 1, pp 183-194

Disputes some assumptions accepted by Bal'shin in his works in field of powder metallurgy. Major conclusions are as follows: Bal'shin's notions of inevitable coexistence of processes of compaction and expansion under any conditions of sintering, and his

270T91

theory of zonal isolation are not substantiated neither theoretically nor experimentally; attempts of considering process of compaction simultaneously from various viewpoints, without adequate evaluation of possible influence of individual elementary processes which take place during sintering, lead to complication and vagueness of Bal'shin's theoretical conceptions; formulas suggested for description of compaction process are inadequate; comparison of compaction due to sintering with mech compaction is merely formal and therefore purposeless.

270T91

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BAL'SHIN, M. YU

Pulvermetallurgie. Halle (Saale) Knapp, 1954.
285 p. Illus., Diagrs., Tables Translation from the Russian, "Poroshkovoya Metallurgiya"
Moscow (1946?)
"Literaturverzeichnis": P. 252-258

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

129-12-2/11

AUTHORS: Bal'shin, M. Yu. and Samsonov, G.V., Candidates of Technical Sciences.

TITLE: Forty years of powder metallurgy in the Soviet Union. (40 let Sovetskoy poroshkovoy metallurgii).

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1957, No.12, pp. 15-25 (U.S.S.R.)

ABSTRACT: The first part of the paper deals with prewar and pre-1917 developments, mentioning that in 1932 fifty tons of "pobedite", thirty tons of "vokar" and sixty-nine tons of "stalinite" were produced and during that year these cemented carbides were used in 1400 Soviet plants. An All Union Scientific Research Institute for Cemented Carbides (Vsesoyuzniy Nauchno-Issledovatel'skiy Institut Tverdykh Splavov) was organised, the work of which determined to a certain extent the development of the Soviet cemented carbide producing industry during the post war years. This Institute contributed a great deal to the development of the process of manufacture of shaped cemented carbide components. It is claimed that the Soviet Union is in the forefront as regards production of cemented carbides and this resulted in considerable successes in the fields of machining of metals, mining, oil and geological drilling. Between 1949 and 1951 a highly efficient method of

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Forty years of powder metallurgy in the Soviet Union. 129-12-2/11

producing pure borides of high melting point elements was developed (Ref.8) and also methods of producing silicides and a number of diagrams of state of carbides, borides, silicides and nitrides were investigated (Refs.9-11). Cemented carbides were used as substitutes for diamonds in trueing grinding wheels and for machining hard watch and instrument jewels of the type of rubies and leucosapphires. New thermo-emitters for electronic devices (lanthanum boride) were developed and also high resistance resistors. At the Institute of Metalloceramics of Special Alloys, Ac.Sc. Ukraine (Institut Metallokeramiki Spetssplavov AN Ukr.SSR) intensive investigations are proceeding relating to cermets which consist of composition of oxides with carbides and of metals with oxides; a considerable part of this work was carried out by Ya. S. Umanskiy, G. A. Meyerson, B. F. Ormont and V.V. Grigor'yev (Ref.12). An important contribution to the theory of alloys of hard, high melting point compounds was made by I. I. Kornilov (Ref.13). The Soviet chemical industry developed methods of production of boron-silicate powders. F. I. Shamra and V. N. Yeremenko investigated

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Forty years of powder metallurgy in the Soviet Union. 129-12-2/11

the equilibrium in high melting point systems. The Institute of Metalloceramic and Special Alloys, Ac.Sc., Ukraine, under the direction of G. S. Pisarenko, has developed theoretical fundamentals and techniques for strength tests of cermets (Ref.14). The most extensively used method of producing iron powders is that of reduction of powders from scale. The most economic method proved to be that of reduction of scale from rolling by means of thermo-coal dust, the waste product of anthracite; this method was developed in TsNIIChermet by V. F. Knyazev, I. L. Lur'e and N. N. Timoshenko and has been used by the Sulinsk Metallurgical Works (Sulinsk Metallurgicheskiy Zavod) since 1951 and in 1955,1414 tons of iron were produced there in this way. Other methods are also being used, for instance, vortex pulverising (I. M. Chulkov and V. G. Filimonov), electrolytic (B. A. Borok) and carbonyl processes; A. F. Silayev, V. I. Prosvirin and V. S. Rakovskiy (Ref.18) carried out work on atomising molten iron. N. T. Kudryavtsev, G. A. Meyerson and others (Refs.19 and 20) developed methods of producing powders of most non-ferrous metals and of a number of

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

Forty years of powder metallurgy in the Soviet Union. 129-12-2/11

alloys. P. I. Rebinder, V. I. Likhtman and I.N.Smirnova, Institute of Physical Chemistry, Ac.Sc. (Institut Fizicheskoy Khimii AN SSSR) contributed a great deal to the study of the relations governing the structural transformations in iron-graphite materials (Ref.16); their results enable evolving a rational technology for producing materials with an iron structure.

Bimetallic lead bronze liners on a steel strip base and also trimetallic liners (steel base, powdered copper-nickel layer, tin babbite) were developed by V. V. Saklinskiy, A. A. Kokorev, V. A. Khazov and G. S. Konstantinov. Of great importance are welding electrodes, the coatings of which contain waste steel powders; their use simplifies welding and increases the productivity by over 30%. A. S. Zaymovskiy and others have developed sintered magnetic materials, particularly the alloy alsifer (7.5% Al, 10% Si, 82.5% Fe). The technology of producing permanent magnets and pressed magnets from alni and alnico alloys was developed by Zaymovskiy, A. B. Al'tman and others. Work on developing magnetically soft cermet materials was carried out by N. I. Frantsevich and his team in the Institute of

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Forty years of powder metallurgy in the Soviet Union. 129-12-2/11

Metalloceramic Special Alloys, Ac.Sc. Ukraine (Ref.17). In separate chapters the author reviews the following: progress in powder metallurgy techniques in the Soviet Union; the technique of pressing; the pulverising and preliminary treatment of the powders; the technique of sintering and post-sintering operations; apparatus for sintering; hot pressing; new methods of producing metalloceramic materials; technical control and testing, mentioning the development of a new branch of powder metallurgy, namely, the metallurgy of producing fine metallic wires from the molten metal; development of the theoretical foundations of powder metallurgy in the Soviet Union.
There are 33 references, all of which are Slavic.

AVAILABLE: Library of Congress.

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137-58-6-12089

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 129 (USSR)

AUTHOR: Bal'shin, M.Yu.

TITLE: The Kinetics of Changes in Individual Contact Under Constant Loading and its Significance for the Theories of Creep and Sintering (Kinetika izmeneniya individual'nogo kontakta pod postoyannoy nagruzkoy i yeye znacheniye dlya teorii kripa i teorii spekaniya)

PERIODICAL: V sb.: Issled. po zharoprochn. splavam. Vol 2, Moscow, AN SSSR, 1957, pp 359-369

ABSTRACT: Deformation under contact occurs as the result of two processes: 1) a slow, quasiviscous flow (QF), and 2) a rapid plastic deformation (PD) which is completed within approximately one minute. At high temperatures the velocity of QF is proportional to σ^2, where σ is the magnitude of the applied stress. The influence of PD may be taken into account by introducing a quantity t_0 which represents the time necessary to achieve a degree of deformation through the QF identical to that achieved by the PD. At high temperatures, in accordance with the theory presented above, there must be a proportional

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The Kinetics of Changes in Individual Contact Under Constant Loading (cont.)

relationship between y^4 and $(t + t_o)$, where y is the diagonal dimension of the pyramidal indenting point and t is the length of time during which the load is applied. Experiments dealing with the determination of hot hardness, performed on specimens of Cu and Fe at temperatures on the order of 70-90% of the absolute melting point, have revealed the existence of such a relationship and thus corroborated the theory being advanced. In the course of the experiments the value of t_o amounted to 10-40 minutes and was independent of the magnitude of the load. For the process of sintering of spherical particles the theoretical computations result in a proportional relationship between y^4 and $(t + t_o)$, where y is the radius of the contact surface and t is the duration of the sintering process, while t_o has the same meaning as in the case of the hot-hardness experiments. This relationship may be replaced by an approximate proportional relationship between y^m and t. By assigning values on the order of 10-40 minutes for t_o at high temperatures, i.e., the values obtained in experiments dealing with the measurement of hot hardness, values for m are obtained which range from 4 to 6-7. Thus the values arrived at in the well-known experiments of Kuchinskiy (from 4.5 to almost 7) may be explained in the light of the combined action of the QF and the PD. It is noted that a number of authors base their theoretical analysis of processes on the incorrect formula $dv/dt = Ddc/dy A$, where v is the

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The Kinetics of Changes in Individual Contact Under Constant Loading (cont.)

volume that has been deformed; dc/dy, the gradient of the concentration of voids; D, the coefficient of diffusion of voids, and A, the area of the contact regions. It is pointed out that a correction factor ℓ/δ must be introduced into this formula where ℓ is the length of the object and δ the spacing between the atoms.

N.D.

1. Plastic flow--Theory 2. Metals--Deformation 3. Sintering--Theory
4. Mathematics--Applications

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BAL'SHIN, M.Yu., kand. tekhn. nauk; SAMSONOV, G.V., kand. tekhn. nauk.

Forty years of Soviet powder metallurgy. Metalloved. i obr. met. no.12:15-25 D '57. (MIRA 11:1)

(Powder metallurgy)

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TSUKERMAN, Samariy Aronovich,; BAL'SHIN, M.Yu., otv. red.; SILAYEV, A.F., red. izd-va,; GUSEVA, A.P., tekhn. red.

[Powder metallurgy] Poroshkovaia metallurgiia. Moskva, Izd-vo Akad. nauk SSSR, 1958. 158 p. (MIRA 11:12)
(Powder metallurgy)

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BAL'SHIN, M. Yu.

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Turbines Under Conditions of Non-Steady State Thermal

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at elevated temperatures.

"Technique of High Temperature Tests Applied by VNIITS" and that of Ye. N. German (VIAM) "On Certain New Methods of Testing High Temperature Metalloceramic Materials" and

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BAL'SHIN, M.Yu.

Some problems in the heat resistance theory. Issl. po zharopr. splav. 3:339-345 ' 58. (MIRA 11:11)
(Powder metallurgy) (Metals at high temperature)

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BAL'SHIN, M.Yu., kand.tekhn.nauk

"Hard compounds made of high melting point metals" by G.V. Samsonova, IA.S.Umanskii. Reviewed by M.IU.Bal'shin. Metalloved. i obr. met. no.10:63 O '58. (MIRA 11:10)

(Powder metallurgy)

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BAL'SHIN, M. YU.

18(7) PHASE I BOOK EXPLOITATION SOV/3355

Akademiya nauk SSSR. Institut metallurgii. Nauchnyy sovet po probleme zharoprochnykh splavov

Issledovaniya po zharoprochnym splavam, t. IV (Studies on Heat-Resistant Alloys, vol. 4), Moscow, Izd-vo AN SSSR, 1959. 400 p. Errata slip inserted. 2,200 copies printed.

Ed. of Publishing House: V. A. Klimov; Tech. Ed.: A. P. Guseva; Editorial Board: I. P. Bardin, Academician; G. V. Kurdyumov, Academician; N. V. Ageyev; Corresponding Member, USSR Academy of Sciences; I. A. Oding, I. M. Pavlov, and I. F. Zudin, Candidate of Technical Sciences.

PURPOSE: This book is intended for metallurgists concerned with the structural metallurgy of alloys.

COVERAGE: This is a collection of specialized studies of various problems in the structural metallurgy of heat-resistant alloys. Some are concerned with theoretical principles, some with descriptions of new equipment and methods, others with properties of specific materials. Various phenomena occurring under specified conditions are studied and reported on. For details, see Table of Contents. The articles are accompanied by a number of references, both Soviet and non-Soviet.

Fines, B. Ya., and A. F. Sirenko. Investigation of Diffusion Creep in Cermets 301

Bal'shin, M. Yu. Some Problems in the Theory of Sintering and Creep 311

Grigor'yeva, V. V., and V. N. Klimenko. Properties of Chromium Carbides and of Cermets Based on Them 317

Svet, D. Ya. Radiant Emissivity of Metals 323

Frantsevich, I. N., and V. A. Lavrenko. High Temperature Oxidation of Tungsten, Molybdenum, Tantalum, and Rhenium in the Recrystallized and Work-hardened States 329

Arkharov, V. I., and B. S. Borisov. Effect of Alloying Elements on the Scale Resistance of Alloys and on Bond Strength in Oxide-phase Lattices in Scale. Effect of Nickel and the Combined Effect of Chrome and Nickel on the Bond Strength in Hematite 340

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BAL'SHIN, M. Yu.

Handbook on Machine-Building (Cont.) SOV/3505

Spravochnik po mashinostroitel'nym materialam v chetyrekh tomakh, tom 8: Tsvetnyye metally i ikh splavy (Handbook on Machine-Building Materials in 4 Vol. Vol. 2, Nonferrous metals and alloys) Moscow, Mashgiz, 1959, 639pp.

Cast tungsten carbides 562
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Handbook on Machine-Building (Cont.)

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Heat-resistant materials 605
Other cermets 613

References 614

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Principal groups of ply metals 617

Corrosion- and wear-resistant ply metals 626
Bimetals for thermocouples 629

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BALISHIN, M. Yu.

18(0) PHASE I BOOK EXPLOITATION SOV/2516

Akademiya nauk SSSR. Institut nauchnoy i tekhnicheskoy informatsii

Metallurgiya SSSR, 1917-1957: [t.] II (Metallurgy in the USSR, 1917 - 1957; Vol 2) Moscow, Metallurgizdat, 1959. 813 p. Errata slip inserted. 3,000 copies printed.

Ed. (Title page): I. P. Bardin, Academician; Ed. (Inside book): G. V. Popova; Tech. Ed.: P. G. Zalent'yeva.

PURPOSE: This book is intended for metallurgists.

COVERAGE: The articles in this collection present historical data on the achievements of Soviet metallurgy, both ferrous and nonferrous, during the period 1917-1957. Advances in theory and practical application are thoroughly discussed. Many of the articles describe the present status of individual branches of metallurgy and give an idea of what may be expected in the future. Advances made in other countries are also discussed. The articles are accompanied by a large number of references. For further coverage, see Table of Contents.

Finkmsovich, Candidate of Technical Sciences; and A. G. Nikonov, Candidate of Technical Sciences. (Institute of Metallurgy imeni A. A. Baykov, USSR Academy of Sciences) Achievements in Railroad Wheel and Tire Production 101

Changes in engineering specifications and improvements in production techniques and quality of tires and solid wheels in the USSR since 1940 are discussed. Further progress in this field is predicted.

Zimin, A. I., Professor, Doctor of Technical Sciences. (MVTU) Forging and Stamping Methods 113

This is a historical survey of developments in forging and stamping processes in Russia from prerevolutionary times up to 1957.

Levi, L. I. Candidate of Technical Sciences. (Moscow Institute of Machine Design) Production of Castings 141

The paper traces the general course of development and discusses problems in the theory of casting, casting alloys, basic melting processes, molding and core materials, nonmetallic molds, special casting methods (permanent mold casting, die casting, continuous casting, centrifugal casting, investment casting, etc.), equipment, mechanization, and automation.

Bal'shin, M. Yu., Candidate of Technical Sciences; and G. V. Samsonov, Candidate of Technical Sciences. (Institute of Metallurgy imeni A. A. Baykov, USSR Academy of Sciences; and Institute of Powder Metallurgy, Ukrainian Academy of Sciences) Powder Metallurgy 175

The article is a general survey of the development and present state of powder metallurgy in the USSR. Theoretical and practical aspects of the preparation of cemented and sintered metal products are discussed.

Rykalin, N. N., Corresponding Member, USSR Academy of Sciences; N. O. Okerblom, Professor, Doctor of Technical Sciences; A. A. Yerokhin, Candidate of Technical Sciences; and M. Kh. Khorshorov, Candidate of Technical Sciences. (Institute of Metallurgy imeni A. A. Baykov, USSR Academy of Sciences; and Leningrad Polytechnic Institute) Progress in the Science of Welding Metals in the USSR 194

The authors discuss the studies that have been made in the USSR of the theoretical aspects of welding, beginning in the latter part of the nineteenth century. Specific topics are: investigation of the arc,

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A006/A101

5.4400

AUTHOR: Bal'shin, M. Yu.

TITLE: On the problem of the theoretical calculation of surface tension and some other characteristics of solids and liquids

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 3, 1962, 7, abstract 3A43 ("Byul. In-t metallokeram. i spetssplavov AN UkrSSR", 1959, no. 4, 5 - 37)

TEXT: During the formation of a free surface the rupture of one bond for each bare atom takes place. Therefore the decrease in the bond energy is equal to surface energy. The scaling of energy Q to 1 g-atom makes it possible to find the surface energy of one gram-atom of the substance γ: $Q = K\gamma$; Q is equal to the sublimation heat of the body into single-atom gas; K is the coefficient, taking into account the fraction of broken bonds, and depends on the structure of the body. It is asserted that the amount of heat consumed for preheating the body, is compensated by an equal decrease of the total energy of bonds between the atoms, and that the total energy of bonds at $0^{\circ}K$ exceeds the energy at $T^{\circ}K$ by the increase of enthalpy during preheating. This makes it possible to scale

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from $0^{\circ}K$ to other temperatures. The rapid deformability at small loads where all atoms can simultaneously participate, is considered as the difference between the liquid and solid body. The transition of a solid into a liquid takes place when the heat consumed for preheating ΔH_T is sufficient for the rupture of one bond for each atom. Formulae are given to calculate the surface energy. The values calculated differ from experimental data by less than 7.4%. The surface energy of one gram-atom of the substance does not depend on temperature, but, related to 1 cm^2, decreases due to increasing surface. The author assumes that the latent melting heat is consumed for the destruction of bonds and connects this with the boundary tension of the liquid and the crystal. Considering the concepts submitted, the author discusses problems of the deformation and strength of bodies.

S. Popel'

[Abstracter's note: Complete translation]

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Akademiya nauk SSSR. Nauchnyy sovet po probleme zharoprochnykh splavov

Issledovaniya po zharoprochnym splavam, tom 6 (Investigations of Heat-Resistant Alloys, Vol. 6) Moscow, 1960. 319 p. Errata slip inserted. 3,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A. A. Baykova. Nauchnyy sovet po probleme zharoprochnykh splavov.

Editorial Board: I. P. Bardin (Deceased) Academician, G. V. Kurdyumov, N. V. Agayev, Corresponding Member, Academy of Sciences USSR (Resp. Ed.), L. A. Oding, I. N. Fedorov, and I. F. Zubin, Candidate of Technical Sciences; Ed. of Publishing House: V. A. Klimov; Tech. Ed.: S. G. Tikhomirova.

PURPOSE: This book is intended for research workers in the field of physics of metals and for metallurgists, particularly those working on heat-resistant alloys.

COVERAGE: This collection of 45 articles deals with various problems in the production of heat-resistant alloys. Special attention is paid to the mechanisms of deformation of such metals as aluminum, copper, iron, and nickel. Various defects and failures of metals are analyzed, and means for increasing the heat resistance and plasticity are described. Among the special problems discussed are: electrolytic conductivity of iron-aluminum alloys in the solid state; the mobility of atoms in nickel-iron alloys, depending upon defects of their crystalline structure; the kinetics of change in isolated pores; the irreversible thermal transformation of solid bodies, etc. No personalities are mentioned. References follow each article.

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SAMSONOV, Grigoriy Valentinovich; PORTNOY, Kim Isayevich; FRANTSEVICH, I.N., retsenzent; SKLYAROV, N.M., doktor tekhn. nauk, prof., retsenzent; BAL'SHIN, M.Yu., kand. tekhn. nauk, retsenzent; BOCHVAR, M.A., inzh., red.; VINOGRADSKAYA, S.I., red. izd-va; ROZHIN, V.P., tekhn. red.

[Alloys made of high-melting compounds] Splavy na osnove tugoplavkikh soedinenii. Moskva, Gos. nauchno-tekhn. izd-vo Oborongiz, 1961. 303 p. (MIRA 14:9)

1. Chlen-korrespondent AN USSR (for Frantsevich).
(Heat-resistant alloys) (Ceramic metals)

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FRIDLYANDER, I.N., doktor tekhn. nauk, red.; MATVEYEV, B.I., kand. tekhn. nauk, red.; BAZHENOV, M.F., inzh., retsenzent; BAL'SHIN, M.Yu., kand. tekhn. nauk, retsenzent; BOCHVAR, M.A., inzh., red.; VINOGRADSKAYA, S.I., red. izd-va; ORESHKINA, V.I., tekhn. red.

[Heat-resistant material made of baked aluminum powder (SAP); a collection of articles] Teploprochnyi material iz spechennoi aliuminievoi pudry (SAP); sbornik statei. Pod red. I.N.Fridliandera i B.I.Matveeva. Moskva, Gos.nauchno-tekhn. izd-vo Oborongiz, 1961. 122 p. (MIRA 14:6)

(Aluminum) (Powder metallurgy)

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FEDORCHENKO, Ivan Mikhaylovich; ANDRIYEVSKIY, Rostislav Aleksandrovich; BAL'SHIN, M.Yu., kand. tekhn.nauk, retsenzent; BOROK, B.A., kand. tekhn.nauk, retsenzent; GEGUZIN, Ya.Ye., prof., doktor fiz.-mat.nauk, retsenzent; SAMSONOV, G.V., prof., doktor tekhn.nauk, retsenzent; POKROVSKAYA, Z.S., red.; KADASHEVICH, O.A., tekhn. red.

[Principles of powder metallurgy] Osnovy poroshkovoi metallurgii. Kiev, Izd-vo Akad.nauk USSR, 1961. 420 p. (MIRA 14:12)
(Powder metallurgy)

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A060/A101

1.1600 1521

AUTHORS: Bal'shin, M. Yu., Trofimova, A. A.

TITLE: On the problem of sintering under pressure

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 1, 1962, 38, abstract 1G286 ("Poroshk. metallurgiya", 1961, no. 1, 82 - 91 [English summary])

TEXT: The investigation of the laws of sintering of freely poured powders with the application of external pressure has some methodological advantages over the usual methods of studying sintering. Experiments were carried out upon powders of Cu, Ni, Fe in graphite and alundum pressing molds (7 mm dia) at temperatures of 500 - 1,000°C at pressures up to 32 kg/cm^2. Just as for the usual sintering, the shrinkage rate is approximately inversely proportional to the sintering time. The kinetics of shrinkage cannot be expressed by a single universal formula, but by a family of formulae. The contraction rate of coarse powders is reduced with the passage of time at a considerably slower rate than that of fine powders. The contraction kinetics of powders with various dispersities are compared. The anomalous behaviour of eddy-current Fe-powder under

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On the problem of sintering under pressure

sintering in the α and the γ regions was observed: in the α region the fine powders were sintered more intensively, and in the γ-region - the coarse powders.

R. Andriyevskiy

[Abstracter's note: Complete translation]

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4016, 2807, 1418, 280

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E073/E535

18 8200

AUTHORS: Bal'shin, M. Yu. and Tai Shou-huei (Moscow)

TITLE: Certain Problems of Thermal Cycling Stability

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1961, No.3, pp.73-76

TEXT: The aim of the work was to verify experimentally the mechanism of phenomena in solid bodies caused by cyclic heat treatment with fast temperature changes. In previous work of one of the authors (Ref.1: Izd-vo AN SSSR, 1958, Vol.3, p.339) the stresses arising during cyclic heat treatment were subdivided into the following two groups: 1) internal compression and tensile forces caused by temperature gradients during heat treatment. The total effect of the stresses of this group is a decrease in the contact surface between the structural elements of the solid body and an increase of the volume of the pores, i.e. to a drop in density as a result of thermal cycling. 2) Stresses caused by the presence of fine vacancies (pores) in the solid body. If fine porosities are present, compression stresses up to 2-10 kg/cm^2 may arise. The total effect of stresses of this

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group is an increase in the contact surface between the structural elements, an increase in density and a decrease in the porosity. The effects caused by the two mentioned stresses act opposite to each other. The stresses of the second group and their effect can be considerable only in metallic or non-metallic powdery materials with some degree of fine porosity. A change in the density of a body by 1% corresponds to a change in the contact surface between the individual structural elements by 3 to 15%; in some cases a considerable increase of the contact surface will occur without any appreciable increase in the density. Therefore, the effect of cyclic heat treatment should be investigated by methods associated with the change in the contact surface. The effect of cyclic heat treatment can be detected sufficiently accurately only if it is studied on a single specimen, i.e. the intermediate investigations should not result in destruction of the specimens. Therefore, measurement of the electric resistance during cyclic heat treatment is the most suitable method, in spite of the fact that it has some limitations. The investigations were carried out on graphite, since no solid oxides form on it. In the first series two grades of differing

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electric conductivity (2 and 1.8 g/cm^3) were studied; the graphite was sintered well above 1000°C and no self-healing of microdefects could be expected. To elucidate the influence of size and shape, specimens of the following three sizes were used in all the experiments: 9 mm dia., 30 mm long; 40 mm dia., 60 mm long; rectangular 9 x 9 x 40 mm. Generally, the resistance increased with increasing numbers of thermal cycles, indicating a growing quantity of microdefects. This was found to depend on the original density and the shape and size of the specimens. High density graphite and small and cylindrical specimens showed a considerably smaller increase in resistance than low density graphite, large specimens and specimens with a rectangular cross-section; the effect of shape and size was more pronounced than that of density. In a second series of experiments, bakelite impregnated graphite was used to promote self-healing of microdefects by carbon particles formed as a result of breakdown of bakelite at 1000°C; this improve considerably the resistance to thermal shocks. In a third series of experiments, bakelite impregnated graphite with bakelite impregnated cotton fabric glued on to its surface and sintered at 1250°C to prevent any self-healing and to form a thin porous surface coating

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was used. No drop in the electrical resistance was observed; the coating prevented rapid cooling, thus softening the thermal shock. Regardless of shape and size, the electrical resistance of all specimens remained constant for as long as 22 cycles. The experiments confirmed that the internal stresses caused by the temperature gradient during cyclic heat treatment lead to a decrease in the contact surface, i.e. to an increase in the electrical resistance. The compression stresses associated with presence of micro-voids in bodies containing disperse particles have the opposite effect, namely, they cause a drop in the electrical resistance and an increase in the contact surface (effect of sintering or self-healing). The resistance to thermal cycling is determined not only by the properties of the material but also by its size and shape. Surface coatings can improve the resistance to thermal cycling. There are 3 figures and 4 references: 3 Soviet-bloc and 1 non-Soviet-bloc.

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E021/E135

AUTHORS: Bal'shin, M.Yu., and Trofimova, A.A. (Moscow)

TITLE: The influence of loading on the process of isothermal sintering of metallic powders

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no.6, 1961, 45-51

TEXT: The sintering under pressure of copper, nickel and iron powders was studied using special dilatometric apparatus at pressures of 2 - 64 kg/cm^2 and at various temperatures. The rate of heating was 12 °C/min and the pressure was applied when the required temperature was attained. The pressures were maintained for up to 256 min and changes in dimensions of the samples after 1, 2, 4, 8, 16, 32, 64, 128 and 256 min were measured. Sintering and cooling was carried out in a hydrogen atmosphere. Fig.3 shows the change of density of the powders with sintering time at different pressures. Graph a is for electrolytic copper at 700 °C with curves 1, 2, 3, 4, 5 and 6 corresponding to 2, 4, 8, 16, 32 and 64 kg/cm^2 respectively. Graph б is for carbonyl nickel at 950 °C with curves 1, 2, 3, 4 corresponding to 4, 8, 16 and

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32 kg/cm^2 respectively. This shows that plastic deformation plays an important role in the first few minutes of sintering under pressure. Microphotographs are included showing the plastic deformation of spherical copper powder. After the first few minutes of the process the pressure increases the rate of sintering according to the formula:

$$V_1/V_2 = (p_1/p_2)^n, \quad \text{where} \quad n \geqslant 2$$

where V_1 and V_2 are the rates of densification and p_1 and p_2 are the pressures. The fall in the rate of sintering of powders at a given time decreases with decrease in pressure. Pressure considerably increases the rate of sintering both because of an increase in plastic deformation with pressure, and because of an increase in creep rate. There are 3 figures, 3 tables and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The English language reference reads as follows:

Ref.3: J. Williams. Conference of powder metallurgy. London, 1956. pp. 112-124.

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D217/D303

18.6200

AUTHOR: Bal'shin, M.Yu.

TITLE: A few points on the theory of sintering and creep

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Issledovaniya po zharoprochnym splavam, v. 7, 1961, 129 - 141

TEXT: The basic deformation mechanism of powder metallurgical bodies, being independent of temperature and of the origin of the forces causing the deformation (e.g. external pressure during compacting by hot pressing, sintering under pressure; capillary pressure due to surface tension), depends on the proportionality between the contact cross section and the nominal stress: $\sigma/\sigma_k = \alpha = A_k/A_n$, and $d\sigma/\sigma_k = d\alpha$, where σ is the stress per unit area of normal cross section of the powder metallurgical body; σ_k is the stress per unit area of contact cross section of the powder metallurgical body; α is the relative contact cross section, i.e. the ratio between contact cross section surface A_k and the area of nominal cross section

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$A_n(A_k/A_n)$. Isothermal sintering under a constant external load P is a diametrically opposite case. If $P \gg P_k$, where P_k is the total sum of forces due to capillarity caused by surface tension forces, then the stress per unit nominal cross section $\sigma = P/A$ = const. and the ratio σ/σ_k is determined only by the value of the denominator σ_k. The quasi-viscous flow is characteristic for most metals and for a number of compounds at sintering temperatures used in practice. As α increase, so the material becomes stronger and new contacts form. Therefore, rapid deformation occurs in the powder conglomerate not only at the first instant of sintering, but also for a long time thereafter. On sintering without application of external pressure, both the numerator and denominator of the expression σ/σ_k change simultaneously under the natural capillary pressure P_k; this also happens in cases of sintering under external pressure P, when $P \ll P_k$. During sintering, the main factor causing an increase in capillary pressure is an increase contact cross-section. The main factor cau-

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sing P_k and σ to decrease with sintering time is the growth (recrystallization) and zonal separation of the particles. The common assumption that the drastic fall in the rate of strengthening during sintering and as the result of preliminary annealing, is caused by a drastic fall in 'activity' of the powder, is in the authors' opinion erroneous. The kinetics of normal sintering without applying external pressure cannot in principle be described by a single universal formula. Some properties of compacted or sintered powder materials (strength, hardness, modulus of elasticity, electrical conductivity) are approximately proportional to the contact cross section α. The deformability of powder metallurgical bodies can remain constant, increase (particularly for spherical particles), or decrease under the influence of purely geometrical factors. The change in deformability on pressing and sintering under the influence of structural and strength factors also varies for powders of different metals and even for components of different sizes. In the usual isothermal sintering, the value of the ratio σ/σ_k for a powder with identical characteristics, compacted to various initial strengths, depends on the initial degree of strengthening. Strengthening and

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increase in contact surface proceeds to completion when $\sigma/\sigma_k = 1$. It is evident that in quasi-plastic flow, the process of isothermal sintering without applying external pressure cannot proceed to completion, since when $t \rightarrow \infty$, $\sigma \rightarrow 0$, and $\sigma_k \rightarrow \sigma_o$ (critical creep limit), i.e. $\sigma/\sigma_k \rightarrow 0$. There are 6 figures, 3 tables and 16 references: 12 Soviet-bloc and 4 non-Soviet-bloc. The references to the English-language publications read as follows: G.C. Kurzcynsky, J. of Metals, February 1949; W. Bockstiegel, J. of Metals, 1958; J.M. Fedorchenko, and R.A. Andriewsky, Powder Met., 1959; G.B. Smith, Met. Ind., 72, 1948.

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BAL'SHIN, M.Yu. (Moskva); TROFIMOVA, A.A. (Moskva)

Effect of loading on the process of isothermal sintering of metal powders. Izv. AN SSSR. Otd. tekh. nauk. Met. i topl. no.6:45-51 N-D '61. (MIRA 14:12)

(Powder metallurgy)

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BAL'SHIN, M.Yu.

Some problems in the theory of sintering and creep. Issl. po zharopr. splav. 7:129-141 '61. (MIRA 14:11)
(Powder metallurgy) (Creep of metals)

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BAL'SHIN, M.Yu.; DUBROVSKIY, A.P.

Some problems of the hydrostatic pressing of powders. Dokl. AN SSSR 136 no.2:332-335 '61. (MIRA 14:1)

1. Institut metallurgii imeni A.A. Baykova Akademii nauk SSSR. Predstavleno akademikom A. A. Bochvarom.
(Powder metallurgy)

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RAKOVSKIY, V.S.; BAL'SHIN, M.Yu., kand. tekhn. nauk, retsenzent; MAKOVSKIY, G.M., inzh., red.; SYUBAYEVA, A.A., red.izd-va; NOVIK, A.Ya., tekhn. red.

[Fundamentals of powder metallography] Osnovy poroshkovogo metallovedeniia. Moskva, Gos. nauchno-tekhn. izd-vo Oborongiz, 1962. 87 p. (MIRA 15:4)
(Ceramic metals—Metallography)

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I048/I248

15.2250

AUTHORS: Bal'shin, M.Yu., and Likhtman, V.I.

TITLE: Some problems of the theory of heat resistance of metalloceramic materials

SOURCE: Akademiya nauk SSSR. Institut metallurgii, Issledovaniya po zharoprochnym splavam. v.8. 1962. 110-116

TEXT: Results from a study of the effect of structure and size of $TiC-Cr_3C_2$-graphite and $SiC-B_4C$-graphite products on their heat resistance are reported. Increasing the diameter of $TiC-Cr_3C_2-C$ cylinders caused a considerable reduction in their heat resistance, cracking being observed after 17 heating (to 1200°C) - quenching (in water) cycles for cylinders 12 mm. in diameter, and after 10 such cycles for cylinders 15 mm. in diameter; the decrease in heat resistance was accompanied by an increase in electrical resistivity. Granulation of the powders used in the preparation of these products (either by cementing with an organic cement of by sintering) caused

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Some problems of the theory...

a large increase in the strength of the products; this is attributed both to the lower porosity of the final product and to the increased strength of the intergranular bonds. There is an optimum particle size for the granulated powders, namely, 160 microns in the case of $TiC-Cr_3C_2-C$ and 315-350 microns in that of $SiC-B_4C-C$. The results obtained with granulated materials of uniform chemical composition were superior to those obtained with non-uniform materials. The shape of the granules was of importance, the best results being obtained with flake- or fibre-shaped ones. It is assumed that the finished products are built of structural "units" strongly bound to each other; the decrease in heat resistance with increasing "unit" size above the optimum values is attributed to cracking both along the "unit" boundaries and within the "units" themselves. There are 2 figures and 6 tables.

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BAL'SHIN, M.Yu.; TROFIMOVA, A.A.

Sintering under pressure. Porosh.met. 2 no.1:102-103 Ja-F '62. (MIRA 15:8)

(Sintering)

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BAL'SHIN, M.Yu.

"Ceramic metal solid solutions" by V.I.Tret'iakov. Reviewed by M.IU. Bal'shin. Porosh. met. 2 no.6:104-105 N-D '62. (MIRA 15:12)
(Ceramic metals)

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BAL'SHIN, M.Yu.; LIKHTMAN, V.I.

Some problems in the thermal stability theory of ceramic metal materials. Issl.po zharopr.splav. 8:110-116 '62. (MIRA 16:6)

(Ceramic metals—Thermal properties)

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"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

SAMSONOV, Grigoriy Valentinovich; KRESTOVNIKOV, A.N., doktor tekhn. nauk, prof., retsenzent; ORMONT, B.F., prof., doktor khim. nauk, retsenzent; BAL'SHIN, M.Yu., kand. tekhn. nauk, retsenzent; OL'KHOV, I.I., red.; ARKHANGEL'SKAYA, M.S., red. izd-va; ISLENT'YEVA, P.G., tekhn. red.

[High-melting compounds; manual on properties and uses] Tugoplavkie soedineniia; spravochnik po svoistvam i primeneniiu. Moskva, Metallurgizdat, 1963. 397 p. (MIRA 16:5)
(Refractory materials)

APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7"

"APPROVED FOR RELEASE: 06/06/2000 CIA-RDP86-00513R000103320014-7

BAL'SHIN, M. YU.

"Some problems of sintering and mechanical compacting."

TITLE: The sixth All-Union conference on Powder Metallurgy (Held at Moscow, 21 November 1962

SOURCE: Poroshkovaya metallurgiya, no. 3, 1963. p. 110

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BAL'SHIN, M.Yu.

Contact section of powder compacts and sintered products and the significance of their mechanical properties in the contact section area. Porosh. met. 3 no.4:29-32 Jl-Ag '63. (MIRA 16:10)

1. Institut metallurgii im. A.A. Baykova AN SSSR.
(Metal powder products—Testing)

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ACCESSION NR: AP4040467 S/0226/64/000/003/0016/0022

AUTHOR: Bal'shin, M. Yu.; Ry*bal'chenko, M. K.; Padalko, O. V.; Eskina, N. P.

TITLE: Some problems of fiber metallurgy

SOURCE: Poroshkovaya metallurgiya, no. 3 (21), 1964, 16-22

TOPIC TAGS: metal fiber, fiber compacting, fiber sintering, fiber metallurgy, metal felt, copper fiber, fiber structure, fiber compact property, molybdenum fiber

ABSTRACT: The properties of copper obtained by compacting and sintering of fibers 100 μ in diameter and 10—15, 5—8, and 2—4 mm in length have been studied. Test specimens were prepared by compacting copper felt obtained by filtration of a copper fiber suspension in glycerin. Specimens were then sintered in hydrogen at 980C for two hours. It was found that specimens made of fibers 10—15 and 5—8 mm long had the same strength, while specimens made of fibers 2—4 mm long had 10--15% less strength. Therefore, further experiments were conducted

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with fibers 5—8 mm long. Fibers compact better than powders; for instance, the porosity of powder specimens compacted under a pressure of 20 to 30 dan/mm^2 varied from 36 to 26%, while fiber compacts made under the same pressure had a porosity of 30 to 20%. Fiber compacts, however, show much greater spring-back than powder compacts. After repeated compacting and sintering, the strength of fiber compacts is 31 dan/mm^2 compared with 22—24 dan/mm^2 for cast or sintered copper. Compacts made of fibers 50 μ in diameter have even higher strength. The impact strength of fiber compacts decreased with increasing tensile strength, with the same porosity, and varied from 0.62 to 2.5 kgm/cm^2. Copper fiber compacts impregnated with bakelite have a tensile strength 2—4 dan/mm^2 higher, but an impact strength 0.1—0.2 kgm/cm^2 less than unimpregnated compacts. Some experiments were also conducted with molybdenum fibers 50 μ in diameter. Molybdenum fiber compacts were found to have an impact strength of 1.40—1.58 kgm/mm^2; that is, several times higher than powder compacts. Orig. art. has: 6 figures, 3 tables, and 2 formulas.

ASSOCIATION: Institut metallurgii im. A. A. Baykova (Institute of Metallurgy imeni Baykov)

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BAL'SHIN, M.Yu.

Relationship between the porosity, contact cross section, and properties of powders. Dokl. AN SSSR 154 no.1:80-82 Ja'64. (MIRA 17:2)

1. Institut metallurgii im. A.A. Baykova. Predstavleno akademikom P.A. Rebinderom.

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POZDNYAK, N.Z., kand. tekhn. nauk; KRUSHINSKIY, A.N., inzh.;
BAL'SHIN, M.Yu., kand. tekhn. nauk, retsenzent;
MARKIZ, Yu.L., inzh., red.

[Designing and equipping powder metallurgy plants]
Proektirovanie i oborudovanie tsekhov poroshkovoi metallurgii. Moskva, Mashinostroenie, 1965. 298 p.
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