

ACCESSION NR: AT4042637

S/3104/64/000/005/0048/0054

AUTHOR: Shteynberg, M. M., (Doctor of Technical Sciences); Molchanova, I. P.,  
(Engineer)

TITLE: Effect of neodymium on the breakdown of undercooled grade 25Kh1MF austenite steel

SOURCE: Ural'skiy mashinostroitel'ny'y zavod, Sverdlovsk. Nauchno-issledovatel'skiy institut tyazhelogo mashinostroyeniya. Proizvodstvo krupny\*kh mashin, no. 5, 1964. Metallovedeniye i termicheskaya obrabotka (Metallography and heat treatment); sbornik statey, 48-54

TOPIC TAGS: neodymium, neodymium alloy, steel undercooling, austenite transformation, austenite breakdown, alloy steel, 25Kh1MF steel

ABSTRACT: Rare earth metals are being ever more widely used in metallurgy since they affect the structure and properties of iron-carbon alloys. The published information, however, considers mainly master alloys containing cerium and similar rare earth elements. The present investigation is concerned with the effect of neodymium on the breakdown of

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ACCESSION NR: AT4042637

undercooled, austenitic, grade 25Kh1MF steel (R2 steel) used for steam turbine rotors. Samples were prepared with 0.05, 0.10, 0.15 and 0.20% neodymium added to the steel. The samples were homogenized, normalized and tempered. Austenitic transformation was studied both under isothermal conditions and under a constant cooling rate. The austenite structure was examined by the structural and magnetic particle inspection methods under isothermal conditions and by dilatometry at constant cooling rates. The cooling temperature interval for the structural method was between 775 and 300C. Beginning at 550C and lower, the magnetic device designed by D. S. Shteynberg was used. The "Chevenar" dilatometer was used for investigating austenitic transformation under constant cooling rates of about 1800C per hour in air, and 800, 400, 300, 250 and 100C per hour in a furnace. The authors found that 0.10-0.15% neodymium increases austenite stability significantly during the first stage of transformation. A further increase in the neodymium content (up to 0.25%) does not affect the kinetics of the breakdown process. Alloying with neodymium leads to a slight increase in the first stage temperature (25C). The effect of

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neodymium during the second stage is insignificant. Addition of neodymium as an alloy to 25Kh1MF steel improves the bainite annealing properties, allowing the zone depth free of excess ferrite to be increased significantly in large sections, thus improving the heat resistance of the steel. Orig. art. has: 6 graphs and 1 table.

ASSOCIATION: Nauchno-issledovatel'skiy institut tyazhelogo mashinostroyeniya, Ural'skiy mashinostroitel'nyy zavod, Sverdlovsk (Scientific Research Institute for Heavy Machine Building, Urals Machine Design Plant)

SUBMITTED: 00

ENCL: 00

SUB CODE: MM

NO REF SOV: 002

OTHER: 000

Card 3/3

ACCESSION NR: AP4033703

S/0148/64/000/004/0119/0123

AUTHOR: Gel'd, P. V.; Gol'tsov, V. A.; Shteynberg, M. M.; Kosheleva, V. Yu.

TITLE: The effect of Plastic Deformation and Subsequent Annealing on the Rate of Hydrogen Penetration in Austenite

SOURCE: IVUZ. Chernaya metallurgiya, no. 4, 1964, 119-123

TOPIC TAGS: plastic deformation, annealing, interrupted quenching, Fe Ni alloy, induction furnace, hydrogen permeability, Ni austenite, activation energy, pre exponential factor, polyterm, crystal structure imperfection, complicated migration

ABSTRACT: The authors investigated the diffusion of hydrogen in an Fe-29% Ni alloy melted in a 60 kg induction furnace for the purpose of determining the water permeability of work-hardened austenite. The specimens were reduced by 25% since this degree of reduction intensified the work-hardening of Ni austenite. Quenching from 365 C affects permeability and a disruption appears on the polytherm below which the process is characterized by activation energy and a pre-exponential factor corresponding to equilibrium austenite. Annealing at continuously

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ACCESSION NR: AP4033703

increasing temperatures lowered the parameters of austenite permeability, as calculated, from the high-temperature sections of the polytherm to values which approximated those calculated from the low-temperature sections. In order to obtain data which would supplement earlier studies of the imperfections accounting for the anomalous changes in hydrogen permeability, the authors investigated the recovered hardness during a 30-minute annealing of 10 x 10 x 2.5 specimens reduced by 27%. At 500 C hardness was recovered by 18% and activation energy of permeability by 32%. The authors conclude that the recovery of diffusion characteristics occurs within a lower temperature range than the recovery of hardness. Hydrogen permeability parameters, as affected by plastic deformation and annealing, have an exponential relationship  $p_0 \approx \exp E$  analogous to that determined in earlier studies for phase-hardened austenite. Experimental results are explained in the light of an earlier theory on crystal lattice imperfections which affect diffusion by entraining hydrogen and making migration in their vicinity difficult. Orig. art. has:

ASSOCIATION: Ural'skiy politekhnicheskii institut (Urals Polytechnic Institute)

SUBMITTED: 28Jul63

DATE ACQ: 07May64

ENCL: 00

Card 2/3

ACCESSION NR: AP4033703

SUB CODE: MM

NO REF SOV: 009

OTHER: 001

Card 3/3

S/0126/64/017/003/0469/0470

ACCESSION NR: AB4029007

AUTHOR: Shteynberg, M. M.; Gol'tsov, V. A.; Gel'd, P. V.; Zhuravelev, L. G.

TITLE: A change in the mechanical properties of austenite and the parameters of its hydrogen permeability as a result of phase cold hardening in  $\gamma \rightarrow \epsilon \rightarrow \gamma$  conversion

SOURCE: Fizika metallov i metallovdeniye, vol. 17, no. 3, 1964, 469-470

TOPIC TAGS: austenite, hydrogen permeability, mechanical properties, phase cold hardening,  $\gamma \rightarrow \epsilon \rightarrow \gamma$  conversion

ABSTRACT: In a previous paper, the authors have shown that phase cold hardening in a  $\gamma \rightarrow \epsilon \rightarrow \gamma$  conversion increases substantially the activation energy and the pre-exponential multiplier of the process of hydrogen penetration in manganese austenite. Similar properties of hydrogen permeability may be satisfactorily explained provided that the defects of the crystal lattice are contained in hydrogen "traps," in the vicinity of which the elementary act of diffusion becomes complex. A description of the experiment is given; the results are plotted on a graph; the result of phase conversion changed not only the mechanical, but also the diffusion properties of austenite. Changes may also be expected in many of its other physical properties.

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ACCESSION NR: AP4029007

The concept of "phase cold hardening" should be considered in a much broader form than simple mechanical hardening during phase conversions. Orig. art. has: 1 figure.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S.M. Kirova (Ural Polytechnical Institute)

SUBMITTED: 10Jly63

DATE ACQ: 27Apr64

ENCL: 00

SUB CODE: ML

NO REF SOV: 002

OTHER: 000

Card 2/2



SMIRNOV, M.A. (Sverdlovsk); DOKOLKOV, Ye.N. (Sverdlovsk); SHTEYBERG, M.N.  
(Sverdlovsk)

Effect of the temperature of plastic deformation on the kinetics  
of aging of heat resistant austenitic steels. Izv. AN SSSR. Met.  
no.5:149-155 S-0 '65. (MIRA 18:10)

L 8877-65 EWP(m)/T/EWP(q)/EWP(b) ASD(m)=3 MJW/JD

ACCESSION NR: AP4009388

S/0126/63/016/006/0923/0925

AUTHOR: Shteynberg, M. M.; Trifonov, G. A.

TITLE: Effect of rapid cooling on the heat resistance of austenitic steel

SOURCE: Fizika metallov i metallovedeniye, v. 16, no. 6, 1963, 923-925

TOPIC TAGS: austenitic steel, <sup>18</sup>Kh18N9 steel, heat resistant steel, water quenching, steel precooling, steel <sup>18</sup>quenching, steel creep, steel rupture life

ABSTRACT: Experiments were carried out with Kh18N9 steel to find the optimal cooling temperatures and exposure periods in relation to their effect on the heat resistance of austenitic steel. Test samples (cross section 13 x 13 mm) were heated to 1100C, then cooled in a salt bath to 850 or 800C and in a lead bath to 750 or 700C. The cooling exposure period was varied from 20 to 150 sec. The pieces were then quenched in water and some were later tempered at 400-800C for 10 hours. The standard was water-quenched from 1100C and tempered at 700C for 15 hours. Subsequent fatigue tests showed a significant benefit from rapid cooling, endurance of the pieces increasing due to lessening rate of creep (see Fig. 1 in the Enclosure). A stable polygonized structure, which the author suspects develops during such processing, is offered as the explanation of these effects. Orig. art. has: 1 table, 1 graph and 2 illustrations.

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L 8877-65

ACCESSION NR: AP4009388

ASSOCIATION: Ural'skiy politeknicheskiy institut im. S. M. Kirova (Ural Poly-  
technic Institute)

SUBMITTED: 21 May 63

ENCL: 01

SUB CODE: MM

NO REF SOV: 003

OTHER: 001

Card 2/3

L 8877-65

ACCESSION NR: AP4009388

ENCLOSURE: 01

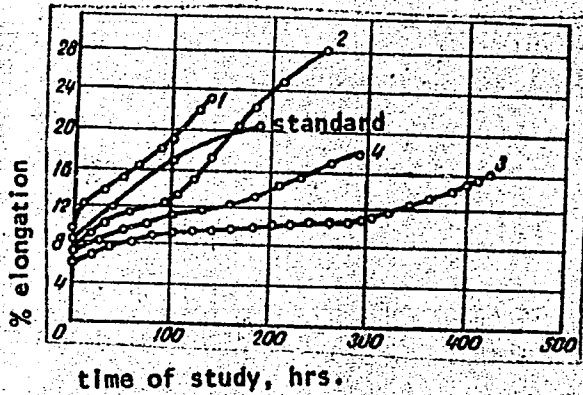


Fig. 1. Creep of samples of steel Kh18N9 at 575C and a stress of 24 kg/mm<sup>2</sup> after rapid cooling to 800C and maintenance for: 1-20; 2-40; 3-90; 4-150 seconds.

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L 37013-65 EWT(m)/EWA(d)/T/EWP(k)/EWP(t)/EWP(b)/EWA(c) Pf-4 JD/HW

ACCESSION NR: AP5002269

S/0148/64/000/012/0112/0115 34

AUTHOR: Smirnov, M. A. ; Shteynberg, M. M. ; Sokolov, Ye. N. 32  
B

TITLE: Effect of temperature and degree of plastic deformation on hardening of chromium-nickel-manganese austenitic steel 16

SOURCE: IVUZ. Chernaya metallurgiya, no. 12, 1964, 112-115

TOPIC TAGS: austenitic steel, chromium nickel manganese steel, plastic deformation, solid solution, solid solution decomposition, age hardening, heat treatment 16

ABSTRACT: The effects of temperature and of plastic deformation on the aging and hardening of Cr-Ni-Mn (12.4, 7.5, 8.9%, respectively) austenitic steel were studied. Rapid cooling of the steel from the hardening temperature to 400-1100C caused a breakdown of the solid solution, as confirmed by a reduction of the lattice constants and increase in hardness. Plastic deformation in this temperature range caused more intense breakdown than the cooling; the decomposition was greater the greater the degree of plastic deformation. Maximum decomposition

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L 37013-65

ACCESSION NR: AP5002269

2

due to both cooling and plastic deformation occurred at 800-1100C. Prevention of preliminary decomposition was possible only at deformation temperatures below 1180C. The processes of solid solution decomposition affected the hardening of the steel on subsequent aging. The hardness of samples cooled to 600-1100C and aged, or subjected to plastic deformation at this temperature, decreased rapidly and attained optimum values only after deformation at 1180C. Some increase in hardness was observed in samples deformed at 20-400C. Thus cooling and plastic deformation must be considered in selecting conditions for the thermomechanical treatment and age hardening. Orig. art. has: 3 figures

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnical Institute); Institut fiziki metallov AN SSSR (Institute of the Physics of Metals, AN SSSR)

SUBMITTED: 17Mar64

ENCL: 00

SUB CODE: MM

NR REF SOV: 006

OTHER: 000

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Card 2/2

L 56054-65 EWT(m)/EPF(c)/EWA(d)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c)  
PF-4/PF-4/Pad IJP(c) JD/JW/HW  
ACCESSION NR: AP5010553 UR/0129/65/000/004/0014/0017  
539.217.5:669.15-194:669.24

53  
79  
B

ADTHOR: Gol'tsov, V. A.; Gel'd, P. V.; Shteynberg, M. M.

TITLE. Effect of external and phase work-hardening on the rate of penetration of hydrogen into ferrite

SOURCF. Metallovedeniye i termicheskaya obrabotka metallov, no. 4, 1965, 14-17

TOPIC TAGS: work hardening, nickel ferrite, nickel alloy, phase hardening, alloy structure, ferrite phase composition, hydrogen permeability, ferrite heat treatment, plastic deformation, ferrite crystal lattice

ABSTRACT: An iron-nickel<sup>1</sup> alloy (6.24% Ni, 0.11% C, 0.52% Mn, 0.04% Cr, 0.05% Si, 0.023% P, 0.024% S) prepared in a high-frequency induction furnace was studied. Experiments showed that the  $\delta \rightarrow \gamma$  transformation occurs at 620-750C. The effect of compressive deformation and quenching from the  $\gamma$  region from 1000C on the hardening of the alloy and the effect of subsequent annealing on its softening were studied. The penetration of hydrogen into the deformed ferrite up to 575C is characterized by an activation energy that is 13% higher than in the case of annealed ferrite. Cold plastic deformation and phase work-hardening raise the

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L 56054-65

ACCESSION NR: AP5010553

activation energy, and the preexponential factor in the expression for the temperature dependence of hydrogen penetration also increases. The increase in the parameters of hydrogen penetration is promoted by crystal lattice defects, which apparently act as collectors (traps) of hydrogen. The change in the diffusion constants of hydrogen penetration is reversible; annealing at 450-600C decreases them, and subsequent hardening increases them again. The temperature interval of fast mechanical softening of nickel ferrite and the interval of rapid change in its hydrogen permeability do not coincide. Orig. art. has: 4 figures.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural'sk Polytechnic Institute)

SUBMITTED: 00

ENCL: 00

SUB CODE: MM

NO REF SOV: 006

OTHER: 000

Card 2/2



L 49452-65 EPF(n)-2/EPR/EWA(c)/EWT(m)/EWP(b)/T/EWP(t) Ps-4/Pu-4 IJP(c) JW/  
JD/JG

ACCESSION NR: AP5010988

UR/0148/65/000/004/0164/0168

AUTHOR: Farafonov, V. K.; Shteynberg, M. M.; Olesov, V. N.

37  
35

TITLE: Effect of titanium, niobium, silicon and aluminum on the softening of chromium-nickel austenite B

SOURCE: IVUZ. Chernaya metallurgiya, no. 4, 1965, 164-168

TOPIC TAGS: austenitic steel / heat treatment, recrystallization b

ABSTRACT: To facilitate the selection of optimal austenitic steel composition, a dozen samples containing relatively low amounts of the alloying elements--titanium, niobium, silicon and aluminum--were tested for softening, recrystallization threshold and activation energy of recrystallization. Samples were water-quenched from four temperatures from 1000 to 1150°C, with different holding times at each temperature, and subjected to cold working and "thermal" deformation with reductions from 20% to over 80%. Hardness tests of quenched alloys revealed only slight differences with respect to the concentrations of alloying elements used. Titanium and niobium, the latter even at a concentration of only 0.16%, very effectively inhibit the softening of chromium-nickel austenitic steel, increase the recrystallization threshold and activation energy of this process, and also inhibit grain growth at elevat-

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L 49452-65

ACCESSION NR: AP5010988

ed temperatures. With Titanium, an appreciable increase in the recrystallization threshold and inhibition of the softening process begins only at concentrations of about 0.4%. Silicon and aluminum have no significant effect on these processes. The role of  $\alpha$ -phase transformations is also taken into account. Further tests are needed to determine the effect of carbon in these alloys. Orig. art. has: 6 figures, 1 table

ASSOCIATION: Ural'skiy politekhnicheskii institut (Ural polytechnical Institute)

SUBMITTED: 25May64

ENCL: 00

SUB CODE: MM

NO REF SOV: 004

OTHER: 000

Card 2/2 CC

I 53693-65 EWT(M)/EWP(w)/EPF(n)-2/EWA(d)/EPR/T/EWP(t)/EWP(z)/EWP(b)/  
EWA(c) Pad/PB-4/Pu-4 IJP(c) JD/HW/JG

ACCESSION NR: AP5008787

S/0126/65/019/003/0411/0417  
539.292; 548. 53

48  
46  
B

AUTHOR: Shteynberg, M. M.; Farafonov, V. K.; Tret'yakova, E. G.; Mirzoyev, D. A.

TITLE: Effect of alloying on the softening and heat resistance of chromium-nickel austenite

SOURCE: Fizika metallov i metallovedeniye, v. 19, no. 3, 1965, 411-417

TOPIC TAGS: austenite, refractory, chromium alloy, nickel alloy

ABSTRACT: Various alloying elements are studied with regard to their effect on the heat resistance of austenite to determine an optimal composition for austenite steels. The material investigated was a chromium-nickel austenite for which the content of nickel and chromium (12.5-13% Ni; 14.5-15.5% Cr; 0.07-0.08% C) was selected so that quenched alloys with aluminum, molybdenum, tungsten, vanadium, titanium, niobium, and silicon in quantities from 1.5 to 3.5% would retain a purely austenitic structure. It is assumed that when a chromium-nickel austenite is alloyed with molybdenum, tungsten, niobium, and titanium, its heat resistance should increase. The heat resistance should also increase with the concentration of these

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L 53693-65

ACCESSION NR: AP5008787

elements in approximate conformity with the rate of retardation in the softening process and increase in the threshold of recrystallization. Silicon and aluminum have no effect on either of these factors and hence would not increase the heat resistance of a chromium-nickel austenite. The particular effectiveness shown by small additions of niobium and titanium is tied in with the state of the carbide phase and also with the possibility of an interaction of these elements with packing imperfections. Orig. art. has: 4 figures, 3 tables.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute);  
NIITYaZhMASH UZTM

SUBMITTED: 30Sep63

ENCL: 00

SUB CODE: MM

NO REF SOV: 003

OTHER: 001

Card 2/2

L 63499-65 EWP(k)/EWP(z)/EWA(c)/EWT(m)/EWP(b)/T/EWA(d)/EWP(w)/EWP(t) MJW/JD/HW

ACCESSION NR: AP5018862

UR/0126/65/020/001/0120/C127  
539.389:669.15

AUTHOR: Sokolov, Ye. N.; Smirnov, M. A.; Shteynberg, M. M.; Nichkova, M. M.

TITLE: Effect of the temperature of plastic deformation on the kinetics of aging of heat-resistant austenitic steel strengthened by carbide precipitation

SOURCE: Fizika metallov i metallovedeniye, v. 20, no. 1, 1965, 120-127

TOPIC TAGS: steel treatment, thermomechanical treatment, austenitic chromium steel, nickel containing steel, manganese containing steel, carbide precipitation strengthened steel /EI481 steel

ABSTRACT: The effect of the temperature of plastic deformation on the kinetics of aging of heat-resistant austenitic EI481 steel [0.36% C, 12.4% Cr, 7.5% Ni, 8.9% Mn, 1.23% Mo, 1.25% V, 0.25% Ni, and 0.5% Si] has been investigated. The steel was austenitized at 1180C, cooled rapidly to 1100-400C or to room temperature, rolled with reductions of up to 28%, and immediately water quenched. This was followed by aging for 1-256 hr at 650, 700, 750, and 800C. It was found that plastic deformation at all the investigated temperatures intensified decomposition of austenite and coagulation of the carbide phase and facilitated recrystallization during subsequent aging. The

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L 63499-65

ACCESSION NR: AP5018862

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lower the deformation temperature, the more intense the austenite decomposition, e.g., after aging for 1 hr at 650, austenite decomposition was 30% in the metal deformed at 20C compared with 11% in conventionally quenched metal. On cooling from the austenitizing temperature (1180C) to 1100-700C, a partial decomposition of the solid solution occurred. In specimens quenched from these temperatures without deformation, a noticeable decrease in the strengthening effect of aging at 700-800C was observed. Plastic deformation at 20C and at 1100-400C produced noticeable strengthening only by aging at 650C. With increasing aging temperature (700-800C) an appreciable increase in strengthening as compared with conventional heat treatment was obtained only after deformation in the 900-400C range. It is concluded that in steels such as EI481, which are strengthened by carbide precipitation, no significant strengthening by thermomechanical treatment can be obtained owing to an intensive coagulation of the precipitated carbide phase. On the contrary, in steel such as EI612K, in which an intermetallic compound is precipitated, a higher degree of strengthening can be obtained by changing the kinetics of aging since the coagulation of the strengthening phase proceeds at a substantially lower rate. Orig. art. has: 5 figures and 2 tables. [MS]

ASSOCIATION: Institut fiziki metallov AN SSSR (44,55 Institute of Metals Physics AN SSSR)  
Ural'skiy politekhnicheskiy institut im. S. M. Kirova (44,55 Ural Politechnical Institute)

Card 2/3

L 63499-65

ACCESSION NR: AP5018862

SUBMITTED: 11Jul64

ENCL: 00

SUB CODE: MM, MT

NO REF SOV: 004

OTHER: 000

ATD PRESS: 4673

Card <sup>kc</sup> 3/3

GOL'TSOV, V.A.; GEL'D, P.V.; SHTEYNBERG, M.M.

Effect of strain and precipitation hardening on the rate of  
hydrogen penetration into ferrite. *Metalloved.* 1 term. obr.  
met. no.4:14-17 Ap '65. (MIRA 18:6)

I. Ural'skiy politekhnicheskiy institut.



L 00852-66 EWT(m)/EWP(w)/EPF(n)-2/EWA(d)/T/EWP(t)/EWP(z)/EWP(b)/EWA(c) IJP(c)  
JD/JG

ACCESSION NR: AP5020707

UR/0129/65/000/008/0025/0027  
66.046.51:669.14.018.45/

AUTHOR: Shteynberg, M. M. 44, 55

TITLE: Effect of alloy elements on high-temperature iron-base alloys

SOURCE: Metallovedeniye i termicheskaya obrabotka <sup>55 14 44</sup> metallov, no. 8, 1965, 25-27

TOPIC TAGS: alloy element, iron base alloy, high temperature alloy, heat resistant alloy, recrystallization threshold, retarded softening, creep rate, softening kinetics, interatomic bond, molybdenum containing alloy, niobium containing alloy

ABSTRACT: There is a scarcity of systematic data on the individual and combined effect of alloy elements on ferritic and austenitic bases at elevated temperatures, and similarly more detailed information is needed on the relationship between alloying and the formation of structure of heat-resistant and high-temperature alloys. In this connection, the author evaluates the findings of previous experimental investigations (Shteynberg et al. FMM, 1962, vol. 14, no. y; 1963, vol. 16, no. 3; 1963, vol. 15, no. 2; 1965, vol. 19, no. 3) of the effect of alloy elements on the softening and heat resistance of ferritic steel (base 3-3.8% Cr) and austenitic steel (base 14.5-15.5% Cr and 13% Ni) which made it possible to determine certain common features. Thus, it was established that alloy elements (such as Mo, W, Nb) which inhibit the softening of a deformed or work-hardened (in the process of phase

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transformations) alloy enhance the temperature of the recrystallization threshold, the activation of the softening process, and the forces of interatomic bonds in the solvent lattice. This is confirmed by measurements of the temperature dependence of Young's moduli and linear expansion coefficients. The elements which enhance the interatomic bond forces reduce the rate of reversible temperature-dependent softening of alloys. The retardation of softening and enhancement of heat resistance of ferrite and austenite are accomplished only after a definite minimum concentration of alloy element, which differs for different elements, is attained. Mo and V (3.0-4.0%) appear to be best suited to inhibit softening, while Nb, Ti, and V are preferable so far as reducing the creep rate of austenite is concerned. Vanadium ( $\leq 2\%$ ) does not increase the energy of interatomic bonds in  $\alpha$ -solution and does not retard softening and creep rate in ferrite, but it greatly enhances the heat resistance of steels of the ferritic-pearlitic class by preventing the transition of W and Mo to carbide phase and impeding its coagulation. Combined alloying with Mo and W is particularly effective, since then creep rate may decrease by one order as compared with separate alloying. Analysis of overall findings gives reason to believe that the effect of alloy elements on the softening kinetics and recrystallization temperature threshold of ferrite and austenite corresponds to the effect on their heat resistance. Such a correspond-

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L 00852-01

ACCESSION NR: AP5020707

ence makes it possible, when investigating a large number of alloys, to select with relative ease the group of alloys which it is worthwhile to subject to long-time creep tests. Orig. art. has: 1 photo, 1 figure.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute)

3  
SUB CODE: 74.55 MM, SS

SUBMITTED: 00

ENCL: 00

NR REF SOV: 007

OTHER: 001

Card 3/3

E 11204-66 EWT(m)/EWA(d)/T/EWP(t)/EWP(z)/EWP(b)/EWA(c) MJW/JD  
ACC NR: AP5026363 SOURCE CODE: UR/0370/65/000/005/0149/0155

AUTHOR: Smirnov, M. A. (Sverdlovsk); Sokolov, Ye. N. (Sverdlovsk); Shteynberg, M. M. (Sverdlovsk) 44,55  
44,55 6.7 44,55  
6.4  
B

ORG: none

TITLE: Effect of plastic deformation temperature on the kinetics of age hardening in heat resistant/austenite steel 44,55

SOURCE: AN SSSR. Izvestiya. Metally, no. 5, 1965, 149-155

TOPIC TAGS: austenite steel, carbide phase, steel microstructure, hardness, metal aging, plastic deformation, metal hardening, heat resistant steel, metal heat treatment, solid mechanical property, phase composition

ABSTRACT: The effect of the temperature of plastic deformation on the kinetics of age hardening in heat resistant austenite EI481 and EI612K steels was investigated. EI48 steel was reinforced with Cr<sub>23</sub>C<sub>6</sub> and VC carbides and EI612K steel was reinforced with γ'-phase and some TiC. Steel samples (13 × 13 × 70 mm) were heated to 1180°C, held at this temperature for 2 hours and then cooled to 110-400°C at a rate of 500°C/minute. Next, the steel samples were soaked for 3 minutes, first in a furnace at 1100-700°C and then in a salt bath at 600° and 400°C. Following this, one portion of samples was deformed prior to hardening (reduced by 25-28%), and another portion was hardened directly. Some samples were quenched in water (directly from 1180°C) and subjected to deformation at room temperature. The EI481 steel samples were hard-

UDC: 669.14.018.44-157.8

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L 11204-66

ACC NR: AP5026363

ened at 650°, 700°, 750°, and 800°C; and EI612K steel samples were hardened at 700°, 750°, and 800°C. Plastic deformation on steel age hardening increases with deformation temperature as well as with the rise in age hardening temperature. In contrast to EI612K steel, high-temperature plastic deformation in EI481 carbide steel results in reduced strength due to age hardening at 700°-800°C. Cold and warm plastic deformations accelerate these coagulation processes in the hardening phase which are beneficial from the material hardness viewpoint. For EI612K steel, the domains located next to the grain boundaries are more dense after the high-temperature plastic deformation than either after direct quenching or after warm deformation.

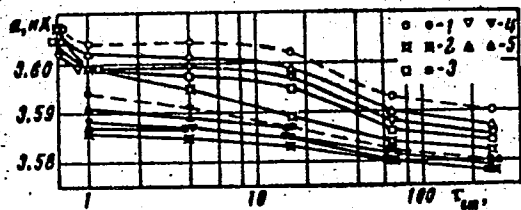


Fig. 1. Variation of lattice parameter "a" of the solid solution of EI481 steel as a function of time. (Light symbols indicate 650°C; solid symbols indicate 800°C). 1--directly quenched samples; 2--plastic deformation at 20°C; 3--plastic deformation at 600°C; 4--plastic deformation at 900°C; 5--plastic deformation at 1100°C.

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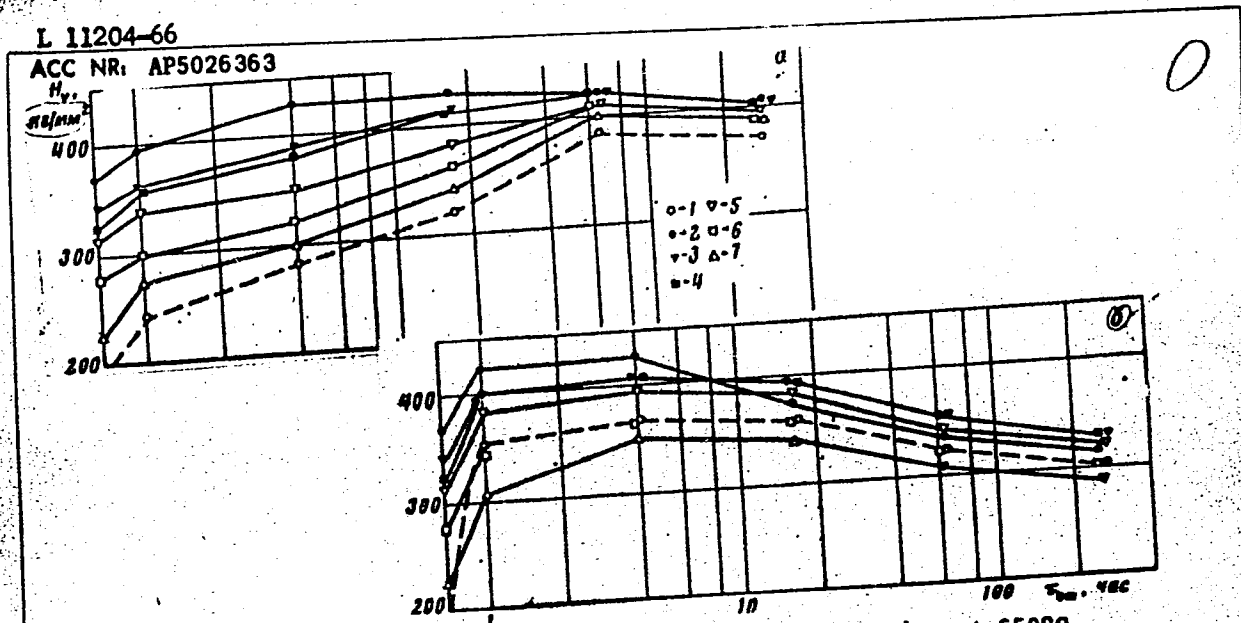


Fig. 2. Dependence of EI481 steel hardness upon aging duration at 650°C.  
a--650°C; b--750°C; where numbers correspond to various steel treatment conditions:  
1--quenched steel; 2--deformation at 20°C; 3--deformation at 400°C; 4--deformation at 600°C; 5--deformation at 900°C; 6--deformation at 1000°C; 7--deformation at 1100°C.

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L 11204-66

ACC NR: AP5026363

3

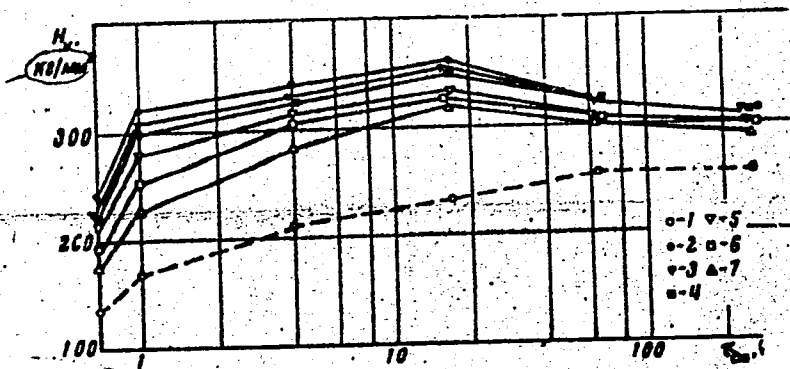


Fig. 3. Dependence of EI612K steel hardness upon aging duration at 700°C after various treatment: 1--quenched steel; 2--deformation at 20°C; 3--deformation at 400°C; 4--deformation at 600°C; 5--deformation at 900°C; 6--deformation at 1000°C; 7--deformation at 1100°C.

The steel microstructures were determined in cooperation with V. A. Yudin. Orig. art. has: 4 figures, 3 tables.

44/55

SUB CODE: 11/

SUBM DATE: 06May65/

ORIG REF: 003/

OTH REF: 001

Card

SHTEYNBERG, M.M.

Addition alloying of heat resistant iron-base alloys. Metalloved.  
i term. obr. met. no.8:25-27 Ag '65. (MIRA 18:9)

1. Ural'skiy politekhnicheskii institut.



SOKOLKOV, Ye.N.; SMIRNOV, M.A.; SHTEYNBERG, M.M.; NICHKOVA, M.M.

Effect of the temperature of plastic deformation on the kinetics  
of the aging of heat-resistant austenitic steel with carbide  
precipitation hardening. Fiz. met. i metalloved. 20 no.1:120-127  
Jl '65. (MIRA 18:11)

1. Institut fiziki metallov AN SSSR i Ural'skiy politekhnicheskiy  
institut imeni S.M.Kirova.

SIMAKOV, Yu.P.; GEL'D, P.V.; SHTEYNBERG, M.M.; GOL'TSOV, V.A.

Effect of ordering on hydrogen penetration of Ni<sub>3</sub>Mn.  
Fiz. met. i metalloved. 20 no.4:524-530 0 '65.

(MIRA 18:11)

1. Ural'skiy politekhnicheskiy institut imeni S.M.Kirova.

ACC NR: AP6021070 SOURCE CODE: UR/0148/66/000/006/0125/0130

AUTHOR: Shteynberg, M. M.; Smirnov, M. A.; Zhuravlev, L. G.; Sokolov, Ye. N.

ORG: Ural Polytechnic Institute (Ural'skiy politekhnicheskiy institut); Institute of Metal Physics, AN SSSR (Institut fiziki metallov AN SSSR)

TITLE: Effect of the temperature of plastic deformation on the mechanical properties of high-temperature austenitic steels

SOURCE: IVUZ. Chernaya metallurgiya, no. 6, 1966, 125-130

TOPIC TAGS: high temperature steel, austenitic steel, plastic deformation, ultimate strength, plastic strength/EI481 high-temperature steel, EI612K high-temperature steel

ABSTRACT: This effect was investigated with respect to austenitic high-temperature steels EI481 (Cr-Ni-Mn) and EI612K (Ni-Cr) after they were subjected to 25-28% reduction by hot or cold rolling. To this end the specimens were subjected to tensile tests at room temperature and at 650°C. Findings: for steel EI481 in aged state (two-stage aging: 660°C for 16 hr and 760°C for 16 hr) under conditions of hot tests maximum strength is attained following deformation at 600°C, and maximum plasticity, at 1000-1100°C; in the latter case, altering the re-

Card 1/2

UDC: 669.14.018.45-12:620.17

L 41271-66

ACC NR: AP6021070

2

gime of aging (reducing the aging temperature to 730°C) makes it possible to optimize both strength and plasticity. For steel EI612K (single-stage aging at 700°C for 25 hr), plastic deformation over the entire range of temperatures considered (up to 1100°C) enhances the steel's strength but its plasticity remains low; this can be remedied by introducing two-stage aging, but then strength is not as high. By contrast with EI481 steel, the optimal mechanical properties in hot tests of EI612K steel are assured not by high-temperature deformation but by warm and, particularly, cold deformation. The differences in the strain-hardening kinetics of these steels are chiefly due to the differences in their kinetics of aging and in the distribution and, particularly, coagulation rate of the particles of their hardening phases (carbide phase in the case of EI481 steel and intermetallic phase in the case of EI612K steel). Orig. art. has: 2 figures and 1 table.

SUB CODE: 11,13/

SUBM DATE: 02Jul65/

ORIG REF: 004

Card 2/2 LC

L 18738-66 EWT(m)/EWA(d)/EWP(t) JD/WB

ACC NR: AP6005136

SOURCE CODE: UR/0126/66/021/001/0048/0053

AUTHOR: Shklyar, R. S.; Smirnov, M. A.; Shteynberg, M. M.; Sokolov, Ye. N.; Farber, V. M.

52  
8

ORG: Ural Polytechnic Institute im. S. M. Kirov (Ural'skiy politekhnicheskiy institut); Institute of Metal Physics, AS USSR (Institut fiziki metallov AN SSSR)

TITLE: Investigation of the fine structure of austenitic steel with intermetallide hardening, deformed over a broad range of temperatures

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 1, 1966, 48-53

TOPIC TAGS: fine structure, austenitic steel, x ray analysis, plastic deformation, metal grain structure/EI612K austenitic heat resistant steel

ABSTRACT: Knowledge of the type of fine structure arising in the hot- and cold-worked metal as a function of the regime of its deformation is a prerequisite to selecting the optimal regimes of its hardening. In this connection, the authors radiographically examined fine structure of austenitic heat-resistant steel EI612K (0.08% C, 14.9% Cr, 36.1% Ni, 3.25% W, 3.8% Co, 0.65% Ti, 1.26% Al) according to the shape, structure and intensity of the (220) $\alpha$  and (311) $\beta$  reflexes, with measurements of the lattice constant of the solid solution. Hardening phases were isolated by means of electrolytic dissolution. Texture was examined following various regimes of defor-

Card 1/2

UDC: 669.15.018.45 + 157.97

L 16738-66

ACC NR: AP6005136

0

mation. Prior to their radiographic examination the specimens were heated to 1180°C for 2 hours, whereupon they were partially cooled at an average rate of 500 deg/min to various temperatures within the 1100-400°C range. The exposure to various partial-cooling temperatures in the furnace (1100-700°C) and in a salt bath (600 and 400°C) lasted 3 minutes. After this part of the specimens was deformed at these temperatures in a grooved rolling mill with 25-30% reduction in area and with subsequent water quenching, while the other part was quenched without prior deformation. It was established that quick partial cooling leads to the comminution of grains into fragments. Plastic deformation at 1100 and 1000°C intensifies this fragmentation of structure. At lower deformation temperatures (900-20°C) the formation of fragmented structure is not observed. Decomposition of the supersaturated solid solution was observed throughout the temperature range investigated. Texture-formation occurs already in the presence of relatively small deformation (20-30%) and this must be taken into account, since texturedness of the material complicates the analysis of radiographic data. Roentgenograms of the specimens display a large number of Laue reflections, as well as isolated distinct reflexes  $(220)_\alpha$  and  $(311)_\beta$ . The Laue reflections often consist of two spots displaced relative to each other and linked by a common background; the reflexes  $(220)_\alpha$  and  $(311)_\beta$  became subdivided into several overlapping subspots; all this points to an intensive fragmentation of the grains, particularly on partial cooling to 800-700°C. Orig. art. has: 3 figures and 2 tables.

SUB CODE: 11, 13, 20/ SUBM DATE: 20Jan65/ ORIG REF: 008/ OTH REF: 001

Card 2/25W

L 18744-66 EWT(m)/T/EWP(t) IJP(c) JD/HW

ACC NR: AP6005148

SOURCE CODE: UR/0126/66/021/001/0148/0150

AUTHOR: Gel'd, P. V.; Simakov, Yu. P.; Shteynberg, M. M.; Gol'tsov, V. A.

ORG: Ural Polytechnic Institute im. S. M. Kirov (Ural'skiy politekhnicheskiy institut)

TITLE: Effect of ordering on the hydrogen absorption of the alloys of iron with cobalt

SOURCE: Fizika metallov i metallovedeniye, v. 21, no. 1, 1966, 148-150

55-  
B

TOPIC TAGS: ordered alloy, iron alloy, cobalt alloy, second order phase transition, hydrogen, temperature dependence

ABSTRACT: The statistical theory of the diffusion (and absorption) of interstitial atoms in the lattices of the alloys undergoing ordering processes claims that the anomalies of the temperature dependence of the diffusion coefficient D in the neighborhood of the temperature T<sub>0</sub> of the order  $\rightleftharpoons$  disorder transformation differ depending on whether the phase transformation is of the first or of the second kind. In the former case a sharp change in D and in the activation energy E of the process is to be expected whereas in the latter case only a change in E is to be expected. To verify whether the conclusions of this theory apply to alloys in which ordering occurs as a phase transformation of the second kind, the authors investigated hydrogen absorption in FeCo alloys (FeCo; FeCo + 1.8% V; Fe + 60% Co) by means of techniques

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UDC: 548.53

L 18714-66

ACC NR: AP6005148

described earlier (Simakov, Yu. P., et al. FMM, 1965. 20, 4, 524; Ryabov, R. A., Gel'd, P. V. FMM, 1957, 4, 289; 1959, 7, 733). Repeated measurements of the rate of penetration of hydrogen into the equiatomic alloy FeCo showed that in the 700-720°C temperature region, which is sufficiently close to  $T_0$ , the curve of the temperature dependence of hydrogen absorption undergoes a sharp inflection; at temperatures below  $T_0$  the alloy's ability to absorb hydrogen decreases much more rapidly; thus, there is no discontinuity in the temperature dependence of hydrogen absorption for the FeCo alloy in the neighborhood of  $T_0$  and the inflection of the experimental curve is due to the change in diffusion parameters. Similar results were obtained for the alloys FeCo + 1.8% V and Fe + 60% Co. In all these cases the degree of short-range order was found to increase on cooling of the alloy below  $T_0$ . Hence, when discussing the temperature dependence of hydrogen absorption for  $T < T_0$ , it is pointless to speak of the activation energy of the process as a quantity characterizing a fixed potential barrier. These experimental findings indicate that during the ordering of FeCo alloys the temperature coefficient of hydrogen absorption markedly increases. It is important to note that a reversed pattern was observed for Ni<sub>3</sub>Mn (an alloy in which the ordering process takes place as a phase transformation of the first kind): ordering led to an increase in its hydrogen absorption and decrease in its temperature coefficient. Thus, the pattern of variation in the ability to absorb hydrogen in the neighborhood of  $T_0$  essentially depends on whether the ordering process is a phase transformation of the first or second kind. It is worth noting that a distinctive change in the rate of hydrogen absorption was observed between 350 and 500°C during

Card 2/3



L 18744-66

ACC NR:AP6005148

the study of both the equiatomic (Fig. 1) and other FeCo alloys; as is known, it is exactly within this range of temperatures that anomalies in various other physical properties of the alloys have previously been observed. This phenomenon may be associated with the ordering kinetics; at any rate, it deserves further investigation. Orig. art. has: 1 figure and 1 formula. 0

SUB CODE: 11, 13, 20/ SUBM DATE: 25Mar65/ ORIG REF: 007/ OTH REF: 001

Card 3/3 *smv*

SHTENBERG, M.V. (Odessa)

Calculating continuous cylindrical shells. Stroi. mekh. i rasch.  
sooruzh. 5 no.631-8 '63 (MIRA 1963)

L 27970-66 EWA(h)/EWP(k)/EWI(d)/EWI(m)/ETC(m)-6/EWP(w)/EWP(v) IJP(c) EM/WW  
ACC NR: AP6017672 SOURCE CODE: UR/0198/65/001/007/0028/0036

AUTHOR: Shteynberg, M. V. (Odessa)  
ORG: Odessa Construction Engineering Institute (Odesskiy inzhenerno-stroitel'nyy institut)

TITLE: Calculation of circular cylindrical shells with thickness variable in the direction of the generatrix

SOURCE: Prikladnaya mekhanika, v. 1, no. 7, 1965, 28-36

TOPIC TAGS: cylindrical shell structure, thin shell structure

ABSTRACT: A method is suggested for the calculation of a thin circular cylindrical shell with diverse fixing of the longitudinal and transverse edges and with a thickness constant in the direction of the arc and changing in the direction of the generatrix. The change in the thickness of the shell is according to the law:

$$\delta = \frac{\delta_0}{(1 + \lambda \xi)^2}$$

which, given sufficiently small values of  $\lambda$ , is very close to linear. Forces, displacements and loads are expanded in series in terms of fundamental functions of the central angle which satisfy any homogeneous boundary conditions at the longitudinal edges. The boundary conditions at the curvilinear edges may also be non-homogeneous. The method indicated makes it possible to reduce the

Card 1/2

L 27970-66

ACC NR: AP6017672

resolvent equation of the bending of the shell to an equation with constant coefficients. The article considers in detail the case of cantilever shell of variable thickness and indicates the possibility of calculating more complex systems. Orig. art. has: 4 figures, 41 formulas, and 1 table. [JFRS]

SUB CODE: 13 / SUBM DATE: 15Jan65 / ORIG REF: 011 / OTH REF: 001

Card 2/2 CU

SHTEYNBERG, N.; FREYNDLIKH, V.

Operation of gas generators at granaries of the All-Union Office  
for Storage and Distribution of Grain. Muk.-elev. prom. 20 no.4:  
24 Ap '54. (MLRA 7:7)

1. Zhitomirskaya oblastnaya kontora Zagotzerno.  
(Gas generators)

SHTEYNBERG, N. S.

Ob usloviyakh, dostatochnykh dlya monogennosti funktsii kompleksnogo peremennogo. Matem. sb., 17 (59), (1945), 45-58.

SO: Mathematics in the USSR, 1917-1947  
edited by Kurosh, A.G.,  
Markushevich, A.I.,  
Rashevskiy, P.K.  
Moscow-Leningrad, 1948

USSR/Mathematics - Interpolation of Entire (Integral) functions May/June 52

"Interpolation of Entire (Integral) Functions,"  
N. S. Shteynberg, Sverdllovsk

"Matemat Spor" Vol XXX (72), No 3, pp 559-574

Develops the methods of M. V. Keldysh and I. I. Ibragimov in connection with the demonstration of conditions sufficient for the convergence of the Newton and Abel-Goncharov interpolational series. In current article the author considers  $\theta$  as a function of  $r$  or  $\bar{r}$ ; where  $\theta$  and  $r$  appear in the

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inequality  $\log M(\rho) \leq C(\theta)n(\theta r)$ , where  $C < \frac{\log 1-\theta}{\theta}$  and  $\theta < 1/2$ , and  $M(r)$  is the max of the modulus of the entire function  $f(z)$  in the circle  $|z| = r$  and  $n(r)$  is the number of interpolation nodes in this circle. Submitted 5 Nov 51.

SHTEYNBERG, N. S. , SVERELOVSK

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29844  
S/044/61/000/007/013/055  
C111/G222

AUTHOR: Shteynberg, N.S.

TITLE: On a transformation of double power series

PERIODICAL: Referativnyy zhurnal. Matematika, no. 7, 1961, 12,  
abstract 7 B 50. ("Uch. zap. Ural'skogo un-ta", 1960, vyp 23,  
no. 2, 65-72)

TEXT: The author generalizes the following theorem due to A.A. Temlyakov:  
The absolute convergence of the series

$$\sum_{n,m} a_{nm} z^n w^m \tag{1}$$

in the hypercone  $|z| + |w| < R$  is equivalent to the absolute convergence  
of the series

$$\sum_{n,m} a_{nm} \frac{n!m!}{(n+m)!} z^n w^m \tag{2}$$

in the bicylinder  $|z| < R, |w| < R$ . The author proves that the absolute

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On a transformation of double ...

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S/044/61/000/007/013/055  
C111/G222

convergence of (1) in the region

$$\left(\frac{|z|}{R_1}\right)^{1/q} + \left(\frac{|w|}{R_2}\right)^{1/q} < 1, \quad q > 1$$

is equivalent to the absolute convergence of (2) in the region

$$\left(\frac{|z|}{R_1}\right)^{1/(q-1)} + \left(\frac{|w|}{R_2}\right)^{1/(q-1)} < 1.$$

This theorem and its conclusions are used for obtaining estimations for the coefficients of the series (1).

[Abstracter's note: Complete translation.]

LUKOMSKAYA, M.A.; SHTEYNBERG, N.S.

Relation between  $\sum$ -integration and integration by conjugate variables. Dokl. AN BSSR 7 no.10:653-654 0 '63.

(MIRA 16:11)

1. Belorusskiy gosudarstvennyy universitet imeni Lenina i Sverdlovskiy pedagogicheskiy institut. Predstavleno akademikom AN BSSR V.I. Krylovym.

SHTEYNBERG, O.; SHCHEGLOV, Yu. [Shcheglov, IU.]

Sun for all. Znan. ta pratsia no.7:5-7 J1 '61. (MIRA 14:8)  
(Labor and laboring classes--Dwellings)

SHEVING, C.

Descendants of motion pictures. Trans. to pratsia no.12:13-  
15 D '61. (CIB 14:11)  
(Motion pictures--Special effects)

S/121/60/000/012/014/015  
A004/A001

AUTHORS: Shteynberg, O. G., Torba, V. A.

TITLE: The Broaching of Outer Surfaces by Generating Broaches

PERIODICAL: Stanki i Instrument, 1960, No. 12, pp. 31-32

TEXT: The dizelestroitel'nyye zavod im. Kirova (Diesel Engine Plant im. Kirov) at B. Tokmak machines the nine surfaces of crankshaft bearing covers in one operation with the aid of a few tunnel-shaped generating broach. Formerly this required six operations. The authors call the employed method of progressive broaching the most effective of all mechanical machining operations. This method consists in the following: each tooth of the broach removes the full thickness of the allowance, cutting a strip of the surface being machined which is equal to the magnitude of feed per tooth. Since the teeth of such broaches cut the metal layer located under the casting skin, the wear of the broach teeth during

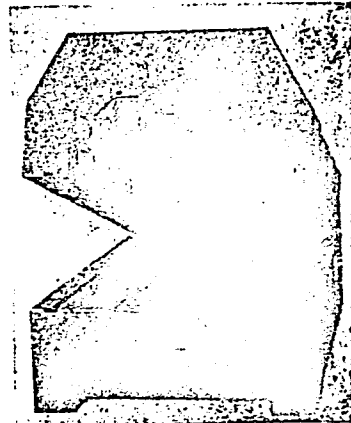


Figure 1:

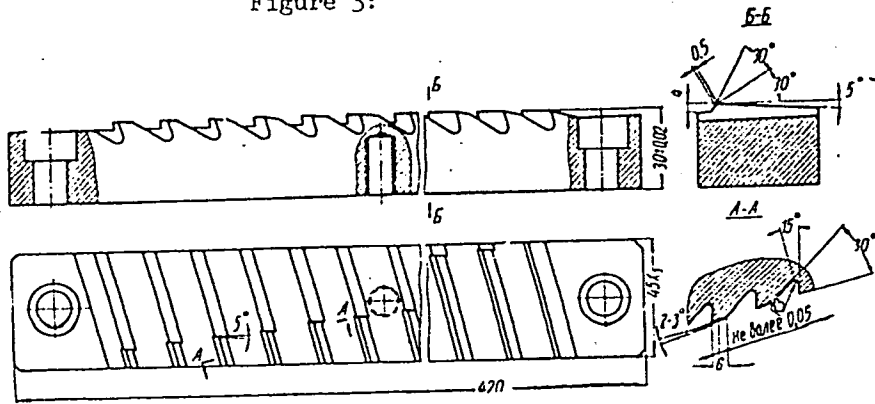
Card 1/5

S/121/60/000/012/014/015  
A004/A001

The Broaching of Outer Surfaces by Generating Broaches

progressive broaching is considerably lower than with ordinary broaching methods. Moreover, all teeth are worn to the same degree. The broach was made of individual sections which were combined in the stationary part of the device. To facilitate the mounting and setting of the broaches, the stationary part of the broaching

Figure 3:



device was made detachable as it is shown in Figure 2. To insure the right position of the broaches fixed in the upper part of the device relative to those in the lower part both halves of the device are set with the aid of two keys placed in the joining plane of the device. Figure 3

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S/121/60/000/012/014/015  
A004/A001

The Broaching of Outer Surfaces by Generating Broaches

shows one of the flat progressive broaches, the teeth of which have a rake of  $15^\circ$  which produces the rake angle of cut for the lateral cutting edges. The lateral cutting edges are placed at an angle of  $60^\circ$  relative to the broach base and have a ground back edge. The rake of  $15^\circ$  ensures a uniform distribution of the cutting stresses which creates favorable infeed conditions and reduces vibrations. The direction of rake was selected in such a way that the broach under the effect of the lateral composite broaching stress is pressed towards the body of the device. The broach has five cutting teeth of 0.1 mm lead and four calibrating teeth.

Figure 4:

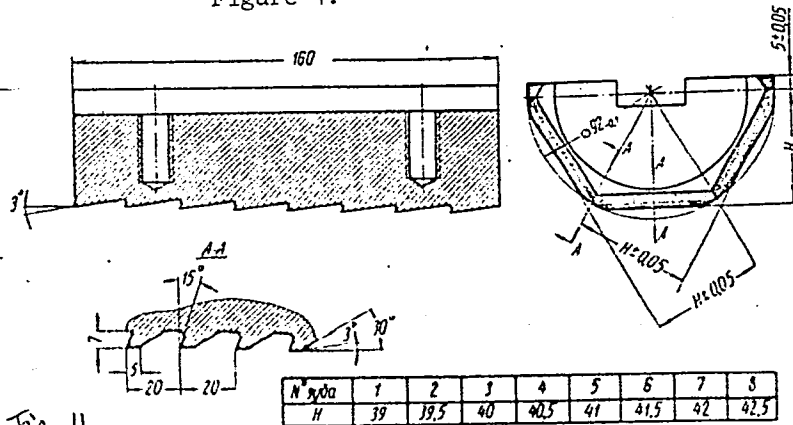


Fig. 4

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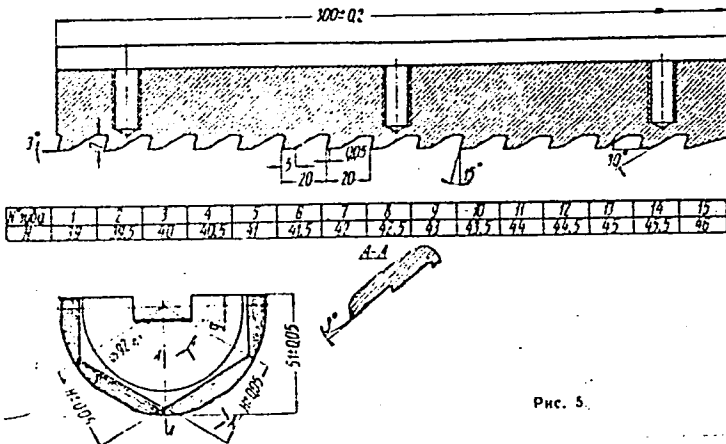
S/121/60/C00/012/014/015

A004/A001

The Broaching of Outer Surfaces by Generating Broaches

Figures 4 and 5 show the generating broaches for the machining of the curved surface of the component. The cutting scheme of the broaches has been selected in the following way: each tooth of the first and second broach has the profile of

Figure 5:



half a hexahedron, distance H from the center to the sides of which increases from tooth to tooth by 0.5 mm. The first broach removes thus four small sections of the cylindrical surface over the full depth of the allowance. The profile of the second broach relative to the profile of the first is shifted through 30°. In such a way the second broach cuts the sections located between the parts machined by the first broach. The broaches have a

Рис. 5.

Card 4/5



The Broaching of Outer Surfaces by Generating Broaches

S/121/60/000/012/014/015  
A004/A001

long life. Since their introduction at the Plant more than 20,000 bearings of gray cast iron have been machined without re-grinding the broaches. Broaching is effected on a horizontal broaching machine with hydraulic drive. The maximum broaching stress amounts to 40 tons. The introduction of the new broaching process has reduced the labor consumption of machining the nine surfaces of the component by more than 4 times. There are 5 figures.

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Card 5/5

SHTEYNBERG, O.G.

Broach with helical teeth. Stan. i instr. 31 no.9:39 S '60.  
(MIRA 13:9)

(Broaching machines)

SHTEYNBERG, O.G.; TORBA, V.A.

Broaching external surfaces with generator broaches. Stan.1 instr.  
31 no.12:31-32 D '60. (MIRA 13:11)  
(Broaching machines)

SHTEYNBERG, O.G., inzh.

Broaches with helical teeth. Vest.mash. 40 no.10:75 0'60.(MIRA 13:10)  
(Broaching machines)

SHTEYNBERG, O.G., inzh.; TORBA, V.A., inzh.

Broaching block for machining external surfaces of bearing caps.  
Vest.mash. 41 no.1:69-74 Ja '61. (MIRA 14:3)  
(Broaching machines)

СШТАУУУСР, Р.И.

FRRRI, A.; SHTEYNBERG, R.I. [translator]; LEVANTOVSKIY, V.I., redaktor;  
AKHLAMOV, S.N., tekhnicheskiy redaktor.

[Aerodynamics of supersonic flow] Aerodinamika sverkhsvukovykh techenii.  
Perevod s angliiskogo R.I.Shteinberga. Moskva, Gos. izd-vo tekhniko-  
teoret. lit-ry, 1953. 463 p. (MLRA 7:8)  
(Aerodynamics, Supersonic)

*Handwritten:* Zaytseva, K.

PHASE I BOOK EXPLOITATION

80V/3952

Moscow. Fiziko-tekhnicheskiy institut

Issledovaniya po mekhanike i prikladnoy matematike (Studies in Mechanics and Applied Mathematics) Moscow, Oborongiz, 1959. 282 p. (Series: Its Trudy, vyp. 3) 2,150 copies printed.

Sponsoring Agency: USSR. Ministerstvo vysshego obrazovaniya.

Ed.: K. Ya. Zaytseva, Engineer; Ed. of Publishing House: S. D. Antonova;  
Tech. Ed.: N. A. Pukhlikova; Managing Ed.: A. S. Zaymovskaya, Engineer.

PURPOSE: This book is intended for scientific workers, engineers, and senior students working in the appropriate fields of science and technology.

COVERAGE: The book, the third issue of the Proceedings of the Moskovskiy fiziko-tekhnicheskiy institut (Moscow Physical and Technical Institute), contains a number of articles. The first half of the book concerns hydroaerodynamical problems (motion of a heavy liquid, calculation of pressure distribution along a solid of revolution, surface waves, etc.). The second half of the book is

Card 1/4

Studies in Mechanics and Applied (Cont.)

SOV/3952

devoted to the theoretical and experimental study of the deformation of media (design of a thin-walled spherical shell, plastic torsion, etc.) and to certain problems of applied mathematics. No personalities are mentioned. References are given after most of the articles.

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Shteynberg, R. I., and V. P. Drozbov. Approximate Method of Calculating the Distribution of Pressure Along a Solid of Revolution Under an Angle of Attack at Supersonic Velocities	60
Sung Ts'ao. The Behavior of Surface Waves on a Linearly Varying Flow	66
Tirskiy, G. A. The Exact Solution for Heat Transfer Through a Disk Rotating in a Viscous Incompressible Liquid	85

Card 2/4



SHTEYNBERG, R.I., kand.tekhn.nauk; DROZDOV, V.P., kand.tekhn.nauk

Approximate calculation of pressure distribution over bodies  
of revolution at the angle of attack and at supersonic speeds.  
Trudy MFTI no.3:60-65 '59. (MIRA 13:5)  
(Airfoils)

SHTEYNBERG, R.V.

Use of an automatic machine for the inspection of filled and sealed  
bottles in canneries. Kons. i ov. prom. 14 no.6:16-17 Je '59.  
(MIRA 12:8)

1.Odesskiy konservnyy kombinat.  
(Canning industry--Equipment and supplies)

KUNYANSKIY, N.A.; SHTEYNBERG, R.V.; DOLGIY, V.I.

Mechanization of the hanging up and removing of glass jars from  
hooks of a forked chain conveyer. Kons.i ov.prom. 15 no.10:11-12  
0 '60. (MIRA 13:10)

1. Ukrainskiy nauchno-issledovatel'skiy institut konservnoy pro-  
myshlennosti.  
(Canning industry--Equipment and supplies)

SHEYNBERG, R.V.; MARKH, Z.A.; OL'SHEVSKIY, A.P.; LYUBIMOVA, L.D.

Continuous deaerator of puree food products for children. Kons.i  
ov.prom. 15 no.11:11-13 N '60. (MIRA 13:10)

1. Ukrainskiy nauchno-issledovatel'skiy institut konservnoy pro-  
myshlennosti.

(Children--Nutrition)

SHEYNBERG, R.V.; SHVCHUK, A.S.; TROSTINSKAYA, L.O. [Trostyns'ka, L.O.]

Simplified method for the preparation of bone broth. Kharch.prom. no.4:  
56-58 O-D '63. (MIRA 17:1)

(A) L 12136-66

ACC NR: AP5023545

SOURCE CODE: UR/0330/65/000/008/0018/0022

AUTHOR: Shteynberg, R. V. (Senior research associate); <sup>44</sup>Bereznyak, Ye. D. (Senior research associate); <sup>44</sup>Tröstinskaya, L. O. (Senior research associate)

ORG: Ukrainian Scientific-Research Institute of Canned Food Industries (Ukrainskiy nauchno-issledovatel'skiy institut konservnoy promyshlennosti) <sup>44</sup>

TITLE: Selection of conditions for tomato juice sterilization without counterpressure <sup>24</sup>  
<sup>B</sup>

SOURCE: Konservnaya i ovoshchesushil'naya promyshlennost', no. 8, 1966, 18-22

TOPIC TAGS: food product machinery, food technology

ABSTRACT: Tests, described in detail in this article, showed that it is possible to sterilize without counterpressure tomato juice packed in SKO-83-3 bottles. The critical cover pressure for such bottles is  $(1.82-1.93) \cdot 10^5$  n/m<sup>2</sup>. During sterilization in boiling water this critical pressure drops to  $(0.81-1.37) \cdot 10^5$  n/m<sup>2</sup>. The pressure within the bottles during sterilization of tomato juice packed at 90C does not exceed  $(0.71-0.72) \cdot 10^5$  n/m<sup>2</sup>. Heat removal reduces the critical cover pressure to  $(0.12-0.16) \cdot 10^5$  n/m<sup>2</sup> making possible the sterilization outside autoclaves, in simple, continuously operating devices. Appropriate apparatus, designed by the Ukrainian Scientific-Research Institute of Canned Food Industries (Ukrainskiy nauchno-issledovatel'skiy institut konservnoy promyshlennosti), has been successfully operated for several years. The juice is packed at temperatures not less than 85C and is sealed and

Card 1/2

UDC: 664.8.617.089.036.5: 614.48

L 12136-66

ACC NR: AP5023545

sterilized in hot water at 96 — 98C for 35 — 45 min, then cooled in water at 45C for 33 min. Temperature diagrams taken inside the bottles by means of thermocouples show that this is sufficient for complete sterilization of seed-free tomato juice. One of the machines produces 1400 bottles per hour. It is 15,500 mm long with an operating chamber 2680 mm wide and 1650 mm high. Orig. art. has: 3 figures.

SUB CODE: 06 / SUBM DATE: none

HW

Card 2/2

SHTYINBERG, S.

The sixth victory. Gradzhd.av. 17 no.1:9-10 Ja '60.  
(MIRA 13:5)

1. Nachal'nik Leningradskogo stroitel'no-montazhnogo upravleniya  
No.1.  
(Leningrad-Airports)



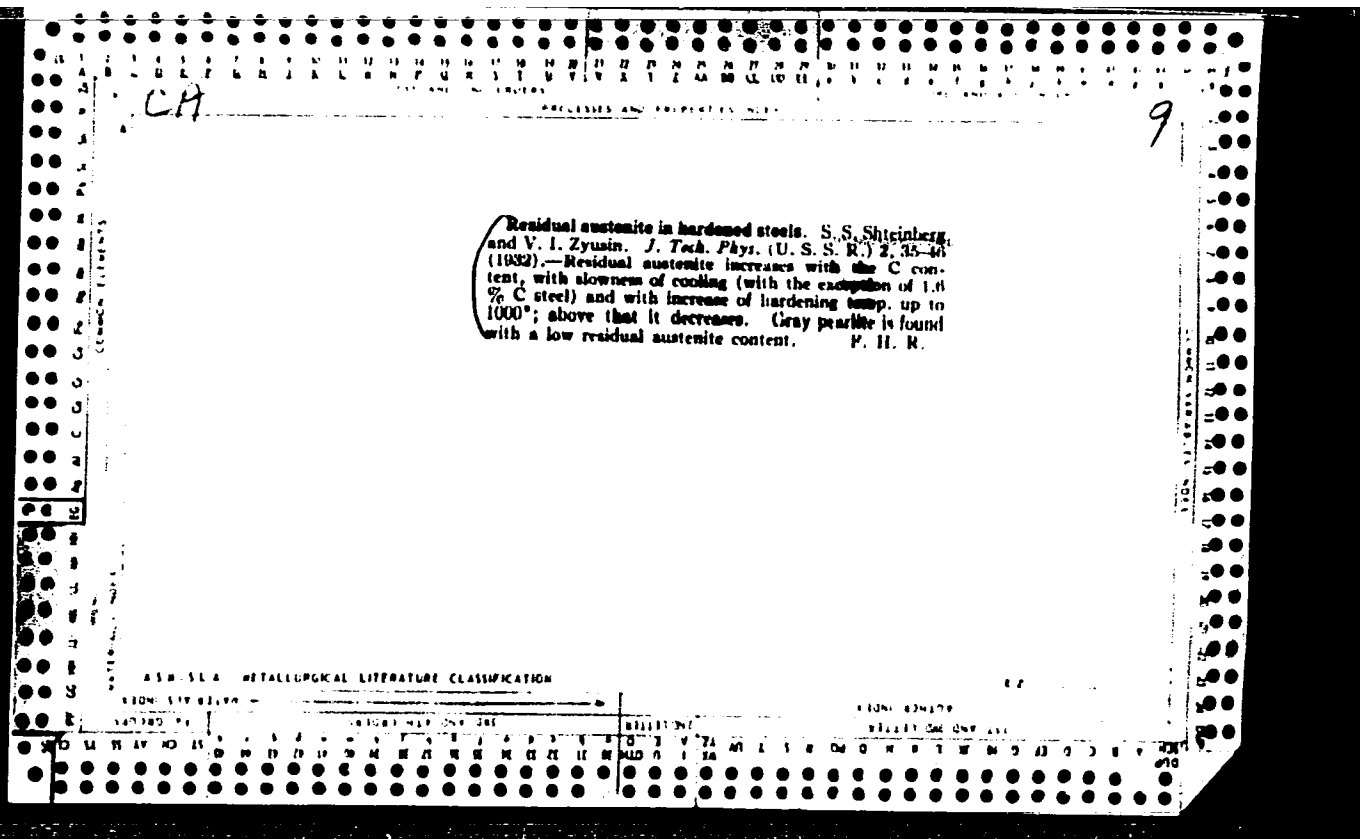
SHTEYNBERG, S.L.

Blood plasma proteins in endocarditis patients during blood  
transfusion. Nauch.trudy L'vov.obl.terap.ob-va no.1:178-179  
'61. (MIRA 16:5)

1. Kafedra propovedvticheskoy terapii lechebnogo fakul'teta  
L'vovskogo meditsinskogo instituta (zav. kafedroy - dotsent  
V.I. Chernov).  
(BLOOD PROTEINS) (ENDOCARDITIS) (BLOOD—TRANSFUSION)

SHTEYNBERG, S.M. [deceased] (Moscow)

Treatment of schizophrenia; a survey of foreign literature. Zhur.  
nevr. i psikh. 58 no.6:752-763 '58 (MIRA 11:7)  
(SCHIZOPHRENIA, therapy  
review (Rus))



PROCESSES AND PROPERTIES OF STEEL

9

Transformation of austenite and the theory of hardening of steel. S. S. Steingerg. *J. Tech. Phys. (U. S. S. R.)* 5, 467-62 (in Russian); *Tech. Phys. U. S. S. R.* 1, 395-401 (1955) (in English); cf. *C. A.* 29, 249<sup>2</sup>.—Expts. with 0.7 and 1.4% C steel, high-speed steel, and Cr steel contg. 12% Cr and 2% C indicate that austenite decomposes in 3 ways. Between  $A_r'$  and  $300^\circ$  pearlite or troostite is formed, between  $300^\circ$  and  $A_r'$  cubic martensite is formed, and below  $A_r'$  tetragonal martensite. In the 3rd case, tension existing in the steel is alone sufficient to cause the transformation. Above  $A_r'$  the tensile stresses are insufficient and diffusion phenomena are required to initiate the decomposition. H. W. Rothmann

450 51.6 METALLURGICAL LITERATURE CLASSIFICATION

CHETTYBERG, S.

Polymerphous and Magnetic Transformation

Metallurgist 9, 6, 36

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

PROCESSES AND PROPERTIES INDEX

TRANSFORMATION OF AUSTENITE IN CARBON AND ALLOY STEELS  
 S. S. Shteynberg and V. I. Zyusim. *Metallurg* 11, No. 8, 3-15 (1960).—Magnetometric investigation shows that the beginning of the austenite-martensite transformation depends mainly on the concn. of C and other elements in  $\gamma$  Fe. Each 0.1% C lowers the transformation point by 20°, 0.1% Mn by 0°, 0.1% Cr by 2.5° and 0.1% Ni by 1.5°. Faster cooling raises the point. Slower cooling of austenite from temp. above the crit. increases the amt. of undecompd. austenite. Holding austenite near the transformation point lowers the transformation point for the remaining austenite. In C steels, the stability of supercooled austenite increases with lower temp. and increased C content. The decompn. products of austenite produced by isothermal decompn. at 200-300° have a magnetic satn. 11-13% higher than annealed steels. The Curie point is very slight after isothermal decompn. at 250-300° but after isothermal decompn. at 400° is equal to that of annealed steels. H. W. Rathmann

9

ASB-51A METALLURGICAL LITERATURE CLASSIFICATION

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ca

9

Influence of heating temperature and grain size on austenitic transformation and hardness penetration. S. Shitelberg, V. Skluev and S. Nosireva. *Kachestvennyi Stal* 3, No. 1, 21-3 (1937); *Met. Abstracts (in Metals & Alloys)* 8, 736. --Specimens of eutectoid steel were heated to 800° and 1100° and subjected to isothermal decomposition. Curves plotted indicated that initial heating to the higher temp. increases 3-4 times the period required for starting transformation and the time consumed for total decompn. between 250° and 650°. In order to find the influence of austenite grain size independently of the temp. of its formation a wedge-shaped specimen was heated to the desired temp., deformed into a plate with a single blow of a hammer, immediately returned to the furnace at the same temp. for 10 min. and subjected to interrupted quenching. This produced specimens with medium-size grain in slightly deformed section, fine grain in greatly deformed and exceptionally large in critically deformed. Grain size of austenite produced at the same temp. affects neither the critical period nor the time required for total transformation.

M. W. B.

COMMON ELEMENTS

MATERIALS INDEX

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

GROUPS

LETTERS

PROCESSES AND PROPERTIES INDEX

*Ca*

**Influence of aluminum deoxidation on sensitivity to overheating and mechanical properties of carbon steel.**  
 N. Malyshev and S. Shtrnberg. *Koskoshennaya Stal* 5, No. 2, 11-17(1937); *Met. Abstracts (in Metals & Alloys)* 9, No. 2, 113(1938).-- A detailed expl. study of specimens prepd. by adding Al to 50-kg. lots of ordinary C steel. Heated under 1000°. Al-deoxidized steel has a smaller grain size, slower grain growth and less uniform grain than a steel which was not deoxidized. Above 1000° the trend is reversed. Large grain produced by heating Al-deoxidized steel above 1000° is broken by reheating at 800°, the large grain of untreated steels remaining the same. Grain structure produced by heating Al-deoxidized steel below 1000° is made less uniform by reheating to 800°. M. W. B.

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ASME SE A METALLURGICAL LITERATURE CLASSIFICATION



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PROCESSES AND PROPERTIES INDEX

The influence of hot-bath hardening and of repeated tempering on the hardness and the "hot" hardness of high-speed steel. S. S. Shigler, *Kachestvennyi* *Metal* 5, No. 3, 22 (1967); *Chem. Zentr.* 1937, II, 3655; *C. A.* 30, 1007. Two high-speed steels, one contg. C 0.7, Mn 0.22, Si 0.24, W 17.3, Cr 4.13 and V 0.5 and the other C 0.8, Si 0.24, W 18.41, Cr 4.63 and V 0.50% were studied. The ability to hold an edge was essentially improved by a step by step hardening in hot baths with subsequent repeated annealing rather than the normal treatment with quenching in oil and simple annealing.

M. G. Moore

ASB-55A METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES OF STEEL

9

Martensitic transformation of austenite. S. S. Shuen  
*Bull. Acad. Sci. K. S. S., Chinese in math  
 nat. Sci. phys.* 1937, No. 6, 841-40. in English 840. (I  
 C. I. 31, 6505). The *Martensitic point* is but slightly  
 affected by the rate of cooling. Magnetometric investi-  
 gation of three steels contg. C 1.17, Mn 0.90, Si 0.26  
 (I), C 1.41, Mn 0.11, Si 0.27 (II), C 1.00, Mn 0.39,  
 Si 0.27% (III) during a slow quench shows conversion is  
 approx. complete for I at 180°, for II at 110°, for  
 III at 70-120° and the martensitic points are: 180°  
 I, 110° II and 70° III. Photomicrographs illustrate the  
 various phases. Spatial lattice bands and strains imposed  
 by grain structure det. the temp. at which a rearrange-  
 ment (M) occurs. Mech. shocks also affect the resultant  
 structure. The martensitic transformation is an irrever-  
 sible process. Sergius Kobalnick

ANALYTICAL LITERATURE CLASSIFICATION

THEORY AND PRACTICE OF ISOTHERMAL QUENCHING

*S. S. Stempel, Metallurg 12, No. 12, 318 (1957).* The transformation of austenite to martensite below 300° is caused by stresses produced by internal forces which tend to change the face-centered lattice into the body-centered. These stresses increase at lower temp. and when they exceed the elastic limit martensite forms. The transformation is practically instantaneous and does not follow Tammann's laws of crystal growth. Direct transformation of austenite to pearlite or troostite at 500-700° is superior to quenching and drawing as less deformation occurs.

H. W. Rathmann

ASB SCA METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

9

The influence of the addition of aluminum on the grain size and the properties of steel of medium carbon content. M. F. Stroganova and S. S. Shteinberg. *Ural. Nauch.-Issledovatel. Inst. Chernykh Metallov. Trudy* 1938, 2, Sammelband, 24-42; *Chem. Zentr.* 1940, II, 1923. — The addn. of Al to steel of medium C content (about 0.5%) produced a fine-grained structure only when the Al concn. was within the limits of 0.03-0.08%. If the Al content was more or less than this range, coarse grains were produced. All the steels investigated with the exception of steel with 0.02% Al showed slight sensitivity to overheating; coarsening of the grain occurred only from 1000° on (at 900° for steel with 0.02% Al). The austenite decompn. in the region of the perlite-troostite transition began sooner and was completed more rapidly in the fine-grained steels than in the coarse-grained. The impact resistance was higher for the fine-grained steels; the other mech. properties were independent of the grain size. M. G. Moore

ASA-SLA METALLURGICAL LITERATURE CLASSIFICATION

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621.77.016	621.77.016

RELATIONS AMONG RATE OF COOLING, RATE OF TRANSFORMATION, DEGREE OF SUPERCOOLING OF AUSTENITE AND CRITICAL QUENCHING SPEED. S. S. SHTEINBERG. *Metallurg* 13, No. 1, 7-12 (1938). The rate of transformation of austenite at any temp. is defined as  $1/L$  where  $L$  is the length of the incubation period at that temp. On cooling austenite below  $A_1$  the time  $x$  at which the first pearlite or troostite nuclei are formed is detd. by the equation  $\int_{A_1}^x dt (1/L) = 1$ . If the cooling rate is known  $L$  can be expressed as a function of time and the temp. corresponding to  $x$  can be detd. This temp. represents the degree of supercooling of the austenite and if it is below  $A_{0.1}$  the crit. quenching speed has been exceeded. A graphical method of solving is presented. H. W. Rathmann

ASME-SLA METALLURGICAL LITERATURE CLASSIFICATION

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GROUPS										SERIES															
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

PROCESSES AND PROPERTIES INDEX

9

CA

Kinetics of growth of austenite grains in medium-carbon steel. S. S. Shteinberg. *Bull. acad. sci. U. R. S. S., Classe sci. tech.* 1939, No. 5, 49-61. -Grain growth at 950° is accelerated when H, N, or especially CO, is blown through the molten metal. Tempering at 1200° removes the effect of H and N, but not that of CO; 0.05% of Al counteracts the effect of the gases. Grain growth in a nongasified steel is retarded by 0.05% of Al, especially in presence of 0.1% of Ti or 0.2% of V. The rate increases when the molten metal solidifies more slowly, but the effect of rate of cooling is controlled by subsequent forging. Forging of a steel contg. Mn, Si and Al or Mn, Si and Ti accelerates the growth. Annealing of a steel contg. 0.05% of Al at 710° raises, and at 1200° lowers, the rate of growth; Al-free steel shows an opposite behavior. Cr and Mo retard grain growth in steel. One at.-% of Cd, Ni, Al, Pb, Sb, Cr or Ag retards grain growth in Cu; 1% of Zn, Mn, Si, Fe, Co or Mo and 0.1% of Al accelerates it.

B. C. P. A.

METALLURGICAL LITERATURE CLASSIFICATION

18

PROCESSES AND PROPERTIES INDEX

**Influence of Reductants, Forging and Heat Treatments on the Structure and Mechanical Properties of Steel with and without Additions of Aluminium.** S. Shtrynberg. (Stal, 1940, No. 9, pp. 28-31). (In Russian). Four 2-ton ingots were top-poured from a basic open-hearth heat of 0.40% carbon steel, additions of 400 g. of aluminium per ton being made in two of the moulds. Two cylindrical forgings with different reductions were made from each ingot. The different forgings were annealed, normalised, quenched and tempered. The microstructure was studied near the surface and in the core of the forgings and samples for mechanical tests were taken from the same regions, the samples being cut in longitudinal and transverse directions. The tensile and impact strengths were determined. The grain size of the aluminium-treated steel in all forgings was smaller. With a few exceptions, the impact strength of all specimens of aluminium-treated steel was higher than that of the plain carbon steel. The aluminium had no effect on the tensile strength. The impact strength of aluminium-treated steel increased with the degree of reduction by forging, whilst the tensile strength was not noticeably affected. The best results were obtained by quenching from 810° C., and tempering at 630° C. Normalising at 830° C. was the next best heat treatment as this increased both the impact and tensile strengths. Annealing at 830° C. slightly increased the mechanical properties of the material.

over

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

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14N082	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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near the centre, but lower than those of the material nearer the surface. Anisotropy of impact strength increased with the degree of forging—the impact strength being greater in longitudinal than in tangential specimens. Anisotropy is unaffected by additions of aluminium.



~~SHTEYNBERG, S.S.; BOGACHEV, I.N., redaktor; GUTERMAN, S.G., redaktor;~~  
~~MALYSHEV, K.A., redaktor; SADOVSKIY, V.D., redaktor~~

[Heat treatment of steel] Osnovy termicheskoi obrabotki stali.  
Red.obrabotka brigady NI'VO metallurgov Vostoka v sostave: I.N.

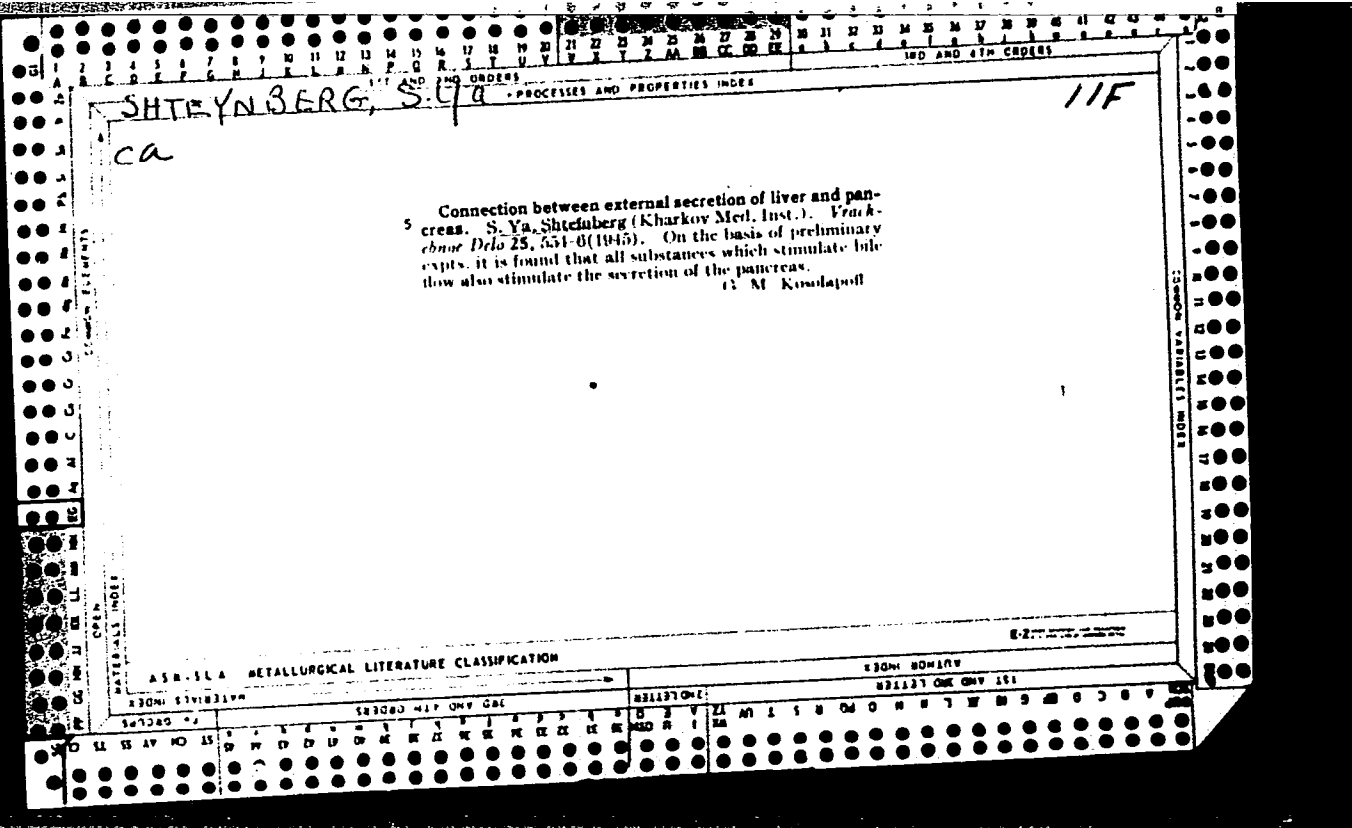
Bogacheva i dr. Sverdlovsk, Gos.nauchno-tekhn.izd-vo, lit,ry  
po cherno i tsvetnoi metallurgii, 1945. 153 p. (MLRA 8:10)

1. Chlen-korrespondent Akademii nauk SSSR (for Shteynberg)  
(Steel--Heat treatment)

SHTEYNBERG, Sergey Samoylovich; Primalni uchastiye: BOGACHEV, I.N., prof.; YESIN, O.A.; ZUBOV, V.Ya.; POPOV, A.A.; SADOVSKIY, V.D., prof.; SHTEYNBERG, M.M.; SKOROBOGACHEVA, A.P., red. izd-va; TURKINA, Ye.D., tekhn. red.

[Physical metallurgy] Metallovedenie. Izd. perer. i dop. Pod red. I.N. Bogacheva i V.D.Sadovskogo. Sverdlovsk, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii. Sverdlovskoe otd-nie, 1961. 598 p. (MIRA 14:8)

1. Chlen-korrespondent AN SSSR (for Shteynberg).  
(Physical metallurgy)



SHTSYNBERG. S.Ya.

Shteynberg, S.Ya. and Malaya, L.T. "Tubercular diagnosis and tubercular therapy in the internal disease clinic", Vracheb. delo, 1949, No. 1, paragraphs 17-24.

SO: U-3042, 11 March 53 (Letopis 'nykh Statey, No. 9, 1949)

SHTEYNBERG, S. Ya.

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SO: U-4392, 19 August 53, (Ietopis 'Zhurnal 'nykh Statey, No 21, 1949).

SHTEYNSBERG, S. YA.

3 464. 0 sosudouasshiryayushchem deystvii mentola. Vracheb. delo, 1949,  
No. 11, stb. 977-80.

Letopis' Zh rnal'nykh Statey, Vol. 48, Moskva, 1949

LIBERMAN, K.D., vrach; SHTEYNBERG, S.Ya., professor, doktor meditsinskikh nauk, redaktor; BELOUSOV, V.A., professor doktor meditsinskikh nauk, redaktor

[Rheumatism; a bibliography of Soviet literature published from 1934 to 1953] Revmatizm; bibliografiia otechestvennoi literatury 1934-1953 gg. Khar'kov, 1954. 237 p. (MLRA 10:8)

1. Glavnyy bibliograf Khar'kovskoy gosudarstvennoy nauchno-meditsinskoy biblioteki (for Liberman). 2. Kharkov. Gosudarstvennaya nauchno-meditsinskaya biblioteka.

(BIBLIOGRAPHY--RHEUMATIC FEVER)

SHTEYNBERG, S.Ya., prof.

Some remarks concerning K.IA.Mishchenko's article "On the diagnostic significance of the fourth intercostal lead." Vrach. delo no.12:1317 D '56. (MIRA 12:10)

1. Fakul'tetskaya terapevticheskaya klinika (zav. - prof.S.Ya. Shteynberg) Khar'kovskogo meditsinskogo instituta. (ELECTROCARDIOGRAPHY) (MISHCHENKO, K.IA.)



SHTEYNBERG, S.Ya., professor (Khar'kov)

Letter to the editor. Vrach.delo no.2:217 F '57. (MLRA 10:6)  
(PIETHYSMOGRAPH)

SHTEYNBERG, S.Ya., professor; POCHETSOV, V.G., dotsent

Vascular reflex. Vrach.delo no.6:577-581 Je '57.

(MLRA 10:8)

1. Kafedra fakul'tetskoy terapii (zav. - prof. S.Ya.Shteynberg)  
Khar'kovskogo meditsinskogo instituta  
(REFLEXES) (BLOOD VESSELS--INNERVATION)

SHTEYNBERG, S.Ya., prof.; NEPOMNYASHCHAYA, M.Ya. (Khar'kov)

Therapeutic effect of reserpine in thyrotoxicosis. Vrach.  
delo no.2:123-126 P '59. (MIRA 12:6)

1. Fakul'tetskaya terapevticheskaya klinika (zav. - prof.  
S.Ya.Shteynberg) Khar'kovskogo meditsinskogo instituta.  
(RESERPINE) (THYROID GLAND--DISEASES)

SHTEYNBERG, S.Ya., prof.

Treatment of chronic circulatory insufficiency. Vrach.delo no.8:  
789-794 Ag '59. (MIRA 12:12)

1. Fakul'tetskaya t erapevticheskaya klinika (zav. - prof. S.Ya.  
Shteynberg) Khar'kovskogo meditsinskogo instituta.  
(CARDIOVASCULAR SYSTEM--DISEASES)