

Theory of Dislocations (Cont.)

SOV/2575

first steps have been taken in the application of the theory to the analysis of structural changes and phase transformations. Further applications would appear to hold considerable promise in the development of basically new methods of increasing the strength of metals. In the light of these considerations, the author believes it probable that the theory may be used for making broad generalizations about the nature of diverse processes occurring in metals, as well as for developing new methods of controlling these processes as a means of producing new properties. No personalities are mentioned. There are 49 references: 13 Soviet, 30 English, 5 German, and 1 Dutch.

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18(7)

PHASE I BOOK EXPLOITATION

SOV/2575

Oding, Ivan Avgustovich, Corresponding Member, Academy of Sciences,
USSR

Teoriya dislokatsiy v metallakh i yeye primeneniye (Theory of
Dislocations in Metals and Its Application) Moscow, Izd-vo AN
SSSR, 1959. 82 p. Errata slip inserted. 4,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii.

Ed. of Publishing House: V. S. Rzheznikov; Tech. Ed.: Yu V. Rylina.

PURPOSE: This book is intended for physical metallurgists and solid-
state physicists.

COVERAGE: The first half of the book deals with theory. Types of
lattice imperfections, types and motion of dislocations, the field
of force, formation of dislocations, dislocation reactions, etc.
are described. Applications of the theory are discussed in the
second half. In the opinion of the author, these applications
demonstrate the value of the theory in solving a great many prob-
lems in physical metallurgy, particularly those involving
strength and plasticity of metals. In addition, he states, the

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A New Law of Lasting Resistance

SOV/20-122-2-16/42

essentially simplified by replacing the individual parts of the corresponding curve by simpler expressions, (i.e. by replacing the continuous curve by a curve composed of several parts). The carrying out of this operation is discussed. The analysis of 130 curves of lasting resistance (which were collected from the literature) confirm the correctness of the suggested expressions. The dependence of the lasting resistance for durations of use (srok sluzhby) up to 100 000 hours in the coordinates $\sigma - \lg t$ may be represented either by a single straight line or by 2 parts of straight lines of different inclination. The basis of the alloy must be the essential characteristic of this alloy. There are 4 figures and 15 references, 5 of which are Soviet.

SUBMITTED: June 5, 1958

Card 3/3

A New Law of Lasting Resistance

SOV/20-122-2-16/42

a more exact experimental and theoretical analysis of the experimental data, the equation $t = A/sh\delta\sigma.sh\beta\sigma$ gives too low values of the life time of the metal. This equation describes only the accumulation of the vacancies. The most favorable spaces for the gathering of vacancy colonies are those metal volumes which are placed on the surface of the samples. The boundaries of the grains and of the blocks, the slide planes, the boundaries of the twins, and also the surfaces of the micro-pores and of the microcracks belong to these surfaces. The surfaces of the secondary phases (phases of aging (stareniye)), the gaseous occlusions, and the non-metallic inclusions have to be treated as separating surfaces. In all these places, the highest values and gradients of the tensions, and therefore an accumulation and a deposition of the vacancies must be expected. Simultaneously with the accumulation of the scattered vacancies and with the increase of the dimensions of their colonies, there is a decrease of their dimensions caused by the annihilation of the vacancies which collide with straying atoms. Because of these and other facts, the equation $t = A/sh\alpha\sigma.sh\beta\sigma$ must be replaced by the equation $t^m = A_1/sh[\alpha(\sigma-k/\sigma)] .sh\beta\sigma$. However, this equation is too complicated for practical use. But it can be

Card 2/3

15(0)

AUTHORS:

SOV/20-122-2-16/42

~~Oding, I. A.~~ Corresponding Member, Academy of Sciences, USSR,
Geminov, V. H.

TITLE:

A New Law of Lasting Resistance (Novaya zakonomernost' dlitel'noy prochnosti)

PERIODICAL:

Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 2, pp 222-225 (USSR)

ABSTRACT:

Some previous papers (Refs 1 - 6) proved that the lasting resistance cannot be described by an exponential law, and they suggested the exponential law $t = A'e^{-\alpha'\sigma}$.

Some of these papers (Refs 3 - 6) pointed out that the validity of the exponential law is only an approximate one, and that it may be applied only for $\alpha'\sigma > 1.6$. In 2 papers (Refs 5, 6) the equation $t = A/sh \alpha \sigma.sh \beta \sigma$ was deduced; t denotes the duration of the strain, σ - the tension; α' , α , β' , β , A' , B , A - coefficients. If a metal is used under tension, vacancies produced by moving dislocations are accumulated, and they subsequently coagulate to micropores and microcracks, which finally cause the rupture of the metal. But according to

Card 1/3

ODING, I.A.; GEMINOV, V.N.

Strength and plasticity of metals. Priroda 47 no.3:17-25 Nr '58.
(MIRA 11:3)

1. Institut metallurgii AN SSSR, Moskva. 2. Chlen-korrespondent AN
SSSR (for Oding).

(Metallography) (Plasticity) (Strength of materials)

A Meeting of the French Society of Metallurgists

30-1-25/39

AVAILABLE: Library of Congress

1. Metallurgy-France

Card 2/2

ODING I. A.

AUTHOR: Serensen, S. V., Member of the AS, Ukrainian BSR 30-1-25/39

TITLE: A Meeting of the French Society of Metallurgists (Sessiya Frantsuzskogo obshchestva metallurgov)

PERIODICAL: Vestnik AN SSSR, 1958, Vol. 28, Nr 1, pp. 107-108 (USSR)

ABSTRACT: The meeting took place in Paris from October 7 - 11, 1957. Problems of material fatigue were discussed, with French, English, Italian, Russian, American and Swedish scientists taking part. The processes in fatigued steel were determined by means of measurements of the magnetic resistance. Problems of fatigue with increased temperatures were discussed. Experiments with motor elements, auto-chassis and riveted airplane constructions were discussed. The Soviet scientists reported on fatigue problems:
 S. V. Serensen (Fatigue of Cast Iron in Connection with the Character of State of Stress and Structure),
 G. V. Uzhik (On the Influence of the Concentration of Tensional Stress on Fatigue),
 A. G. Nikonov (On the Fatigue Phenomena in Rolling with Sliding),
 I. A. Oding (On the Structure Theory of Creeping).

Card 1/2

The Effective Stress Computation on Toroidal Samples
at Creep and Relaxation

SOV/32-24-7- 39/65

load. It decreases at an increase of deformation and tends towards an asymmetrical minimum. The stress distribution across the sample varies considerably. It is assumed that in the relaxation as in creeping the stress distribution changes from a triangular to a trapezoidal one (in first approximation). A somewhat modified shape of the sample is given in a diagram in the chapter dealing with the creeping. Making reference to the paper by G.F.Lepin (Ref 8) it is stated that the equations used and the computations made are correct, as the results coincide with the experimental curves, as well as with the relaxation and creeping tests. There are 7 figures and 8 references, which are Soviet.

ASSOCIATION: Institut metallurgii im. A.A.Baykova Akademii nauk SSSR
(Institute of Metallurgy imeni A.A.Baykov, AS USSR)

Card 2/2

SOV/32-24-7-30'65

AUTHORS: Oding, I. A., Lepin, G. F.

TITLE: The Effective Stress Computation on Toroidal Samples at Creep and Relaxation (Raschet deystvuyushchikh napryazheniy v kol'tsevom obraztse pri polzuchesti i relaksatsii)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol. 24, Nr 7, pp. 845 - 848 (USSR)

ABSTRACT: A number of papers have hitherto dealt with the method developed by Oding (Refs 1,2); this problem has, however, not yet been solved completely. From a figure showing the distribution of forces in the toroidal sample it may be seen that the test part has a rectangular cross-section with a linear distribution of force. The analytical results which are represented graphically and are given according to S.I. Yatskevich (Ref 3), that of polarization-optical determinations of the stress distribution which are given according to M.M. Saverin (Ref 4) and N.I. Prigorovskiy et al. (Ref 5) agree well with each other. In the deformation process in the toroidal sample the strain in the surface layers does not remain constant under a constant flexure

Card 1/2

I.
ODING, W.A.; GEMINOV, V.N.

Some problems of plastic flow and phase transformation from the dislocation theory viewpoint. Trudy Inst.met. no.3:108-121 '58.

(MIRA 12:3)

(Deformations (Mechanics)) (Phase rule and equilibrium)
(Crystal lattices)

Strength and Plasticity of Metals

SOV-26-58-3-3/51

There are 16 diagrams, 2 photos, 1 graph and 9 references,
6 of which are Soviet, 1 German and 2 English.

ASSOCIATION: Institut metallurgii AN SSSR-Moskva (Institute of Metallurgy
AS USSR-Moscow)

1. Metals--Mechanical properties
2. Metals--Deformation
3. Metals--Crystal structure

Card 2/2

SOV-26-58-3-3/51

AUTHORS: Oding, I.A., Corresponding Member of the AS USSR; Geminov
V.N.

TITLE: Strength and Plasticity of Metals (Prochnost' i plastichnost'
metallov)

PERIODICAL: Priroda, 1958, Nr 3, pp 17-25 (USSR)

ABSTRACT: The theory of the imperfection of the crystal lattice of
metals, with stress on the aspect of dislocation and plastic
flow, is related and applies to such processes and phenomena
of metals as strength, hardening, mechanical aging, yielding,
blue brittleness and creep. It is concluded that the theory
of dislocation can be satisfactorily applied to many highly
diverse phenomena that are observed in the process of plastic
deformation and destruction of metals. Soviet physicists
Ya.I. Frenkel' and I.A. Oding have applied the idea of the
motion of the vacancies and accumulations of imperfections
in metals, arising from moving dislocations, to enumerate a
series of measures for raising the durable strength of metals.

Card 1/2

IVANOVA, V.S.; ODING, I.A.

Changes in microstructure, hardness, and electrical conductivity
during the creep process in heat-resistant kinds of steel. Issl. po
zharopr.splav. 3:3-11 '58. (MIRA 11:11)
(Heat-resistant alloys--Metallography) (Creep of metals)

ODING, I.A.; ARONOVICH, M.S.

"Steels and alloys for work at high temperatures" by M.L. Bernshtein.
Reviewed by I.A. Oding, M.S. Aronovich. Metalloved i obr. met. no.2:
56-57 F '58. (MIRA 11:2)

(Heat-resistant alloys)

ODING, I.A.

~~ODING, I.A.~~

"Effect of temperature on the mechanical properties of metals and alloys" by E.M. Savitskii. Reviewed by I.A. Oding. Metalloved. 1 obr. met. no.1:57-58 Ja '58. (MIRA 11:2)

1. Chlen-korrespondent AN SSSR.
(Metals, Effect of temperature on)
(Savitskii, E.M.)

24-1-1/26

Creep of austenitic steel in the case of complicated stress states.

case of non-uniaxial stress states, a redistribution of the main creep speeds is observed whereby the creep speeds in the main directions v_1 and v_2 are equalised and the creep speed in the third main direction, v_3 , tends to become zero.

7. Under conditions of long duration tests, the creep theory, which is based on the assumption of isotropic behaviour of real commercial alloys, requires corrections which can be established by studying the physical nature of creep in the case of complicated stress states. There are 2 tables, 8 figures and 12 references - 6 Russian, 6 English.

SUBMITTED: March 6, 1957.

AVAILABLE: Library of Congress.

Card 6/6

24-1-1/26

Creep of austenitic steel in the case of complicated stress states.

of plastic flow of Hankey. However, the relation $v_i = F(\tau_i)$ is not entirely fulfilled since the tension and torsion curves are not identical in octahedric coordinates.

4. In the case of low creep speeds, the most accurate and theoretically the most justified is an exponential dependence between the speed of creep and the stress. This relation is correct for all the investigated types of stress states. The speed of steady state three-dimensional creep should be calculated in accordance with Eq.(6), p.5.

5. For the tested austenitic steel 1X18H9T, the power dependence between the creep speed and the stress for a temperature of 600°C approximates satisfactorily the exponential dependence for a wide range of creep speeds (from $10^{-4}\%$ /hr and higher) and, therefore, the exponential dependence can be used for practical calculations since it is simpler and more convenient.

6. Creep tests of the austenitic steel 1X18H9T in tension and torsion did not confirm the assumption of coincidence of the directions of the main stresses and the main axes of the deformation speeds over long periods. In the

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24-1-1/26

Creep of austenitic steel in the case of complicated stress states.

than 1000 hours, namely, in the case of stresses at which a transition to the third stage of creep obviously took place. The results are entered in Table 1 and graphed in Figs.2-8. The experimentally determined values are compared with values calculated by means of Eq.(1) in Table 2, p.9; on the average the experimentally determined creep speeds are 2.5 to 3 times as high as the values calculated by means of Eq.(1). The authors of this paper propose using for the same purpose Eqs.(6) and (7), p.5. The authors arrived at the following conclusions:

1. The experimental results confirm the applicability of the creep theory which is based on the theory of plastic flow for describing the process of steady state creep for durations up to 2000 hours.
2. The stress calculations for components operating under creep conditions with a complex stress state can be affected on the basis of creep test results in tension but it is necessary to improve the accuracy of the experimentally determined calculation coefficients for each group of materials under consideration.
3. A material which is under creep stress conditions in

Card 4/6

tension and torsion generally complies with the criterion

24-1-1/26

Creep of austenitic steel in the case of complicated stress state.

were effected in a special test rig described in earlier work (Ref.11) in which 32/20 tubes (as shown in Fig.1) of current industrial manufacture were subject to the effect of a constant tension and a constant torsion moment. The specimens were made of austenitic steel with the following composition: 0.09% C, 0.78% Mn, 0.36% Si, 0.010% S, 0.018% P, 17.16% Cr, 10.68% Ni, 0.47% Ti. The heat treatment consisted of annealing for thirty minutes at 1100°C followed by cooling in air (austenitisation), each specimen was subjected solely to a single experiment with a constant ratio of the tensile stresses, σ , to the torsion stresses, τ . The following τ to σ ratios were chosen: $\tau/\sigma = \infty, 2.0, 1.0, 0.6, 0.5, 0.4, 0.3, 0$; for each τ to σ ratio at least two specimens were tested. The duration of a single test depended on the magnitude of the applied stresses; in each case the experiments were continued until the steady state second section of the creep curve was reached. Most experiments lasted 1500 to 2000 hours during which usually a constant creep speed became established. This duration is also adequate from the point of view of overcoming the period of most intensive ageing. Some experiments lasted less

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Creep of austenitic steel in the case of complicated stress states.

means of the theory of creep which represents a further development of the theory of flow of Il'yushin, A.A. (Ref.3), Malinin, N. N. (Ref.4) and also of the theories of Soderberg, C.R. (Ref.5), Marin, J. (Ref.6) and Odquist, F. (Ref.7). On the basis of a number of special experiments, Bailey, R.W. (Ref.8) recommends a different formula for calculating three-dimensional creep, whilst Johnson, A. E. (Refs.9 and 10) recommends another formula. Eq.(1) contains only two constants A and n , which can be determined from creep tests in tension. The formula of Bailey contains a larger number of constants, which have to be determined from creep tests at a different stress state, whilst the equations of Johnson are more cumbersome and less convenient for practical calculations. Creep tests, carried out by Bailey and Johnson (Refs.8-10), in tension and in torsion on thin walled tubular specimens fundamentally confirm the here expressed views. However, the duration of these tests was only 150 hours which is not long enough. In this paper the results are described of long duration creep tests under complex stress conditions at a temperature of 600°C . The experiments

Card 2/6

ODING, I. A.

AUTHORS: Oding, I.A., and Tulyakov, G. A. (Moscow). 24-1-1/26

TITLE: Creep of austenitic steel in the case of complicated stress states. (Polzuchest' austenitnoy stali pri slozhno-napryazhenom sostoyanii).

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, No.1, pp. 3-10 (USSR).

ABSTRACT: Most of the theories of creep in the case of complex stress states are essentially extensions of the theory of plasticity. N. M. Belyayev (Ref.1) and Yu. N. Rebotnov (Ref.2) proposed using the theory of small elastic-plastic deformations. In the case of steady state creep the analytical expression for the speed of creep, which is not limited to a single axis, can be expressed by the following equation:

$$v_1 = \frac{A}{2} \frac{n-1}{3^2} \tau_1^{n-1} [(\sigma_1 - \sigma_2) - (\sigma_3 - \sigma_1)] \quad (123) \quad (1)$$

where A and n are constant coefficients and depend on $v = A\sigma^n$ which are determined by means of tensile creep tests, whilst the symbol (123) denotes that the formulae for v_2 and v_3 are obtained by suitably changing the indices in rotation. Similar relations are obtained by

Card 1/6

ODING, I. A.

18(0) **FRASE I BOOK EXPLORATION** **SOV/1728**
 Akademiya Nauk SSSR. Institut metallurgii
 Sovremennyye problemy metallurgii (Modern Problems in Metallurgy)
 Moscow, Izdatvo AN SSSR, 1956. 840 p. 3,000 copies printed.
 Resp. Ed.: A.M. Samarin. Corresponding Member, USSR Academy of
 Sciences; Eds. of Publishing House: V.S. Kuznetsov, and
 A.N. Bernov; Tech. Ed.: T.V. Polyakova.
FRASE I: This book is intended for scientific and technical per-
 sons in the field of metallurgy.

COVERAGE: This is a collection of articles on certain aspects of
 Soviet metallurgy. The book is dedicated to Academician
 Ivan Pavlovich Bardin on the occasion of his 75th birthday. The
 book is divided into seven parts on the basis of the following
 the articles presenting a brief account of the first part consists of
 professional activity of the Soviet metallurgists. It includes an
 article by Jean Chipman, Nicholas Grant, and John Ellis, includes an
 MA, by Jean Chipman, Nicholas Grant, and John Ellis, includes an
 visit to the United States. The second part consists of three
 articles and deals with raw materials and fuels for the Soviet
 metallurgical industry. The third part represents the major
 portion of the book; it consists of 25 articles dealing with
 the various aspects of the technology of pig iron and steel.
 The fourth part consists of two articles dealing with the
 technology of nonferrous metals. The fifth part consists of three
 articles on the forging of metals. The sixth part consists of three
 articles discussing certain aspects of physical metallurgy
 and metallurgy dealing with general problems in the field
 of metallurgy. References are given after each article. No
 paracommities are mentioned.

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6

20-1-18/44

AUTHOR: Oding, I.A., Corresponding Member AS USSR

TITLE: An Interpretation of the General Equation for the Creeping of Metals (Interpretatsiya obshchego uravneniya polzuchesti metallov)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 1, pp. 66 - 69 (USSR)

ABSTRACT: The author showed in the course of a lecture that the velocity of creeping $v_p = d \epsilon_p / dt$ is proportional to the amount of such dislocations n_0 ready to move at the point of time t . In the case of damped creeping it is true that $v_p = AW_0 / (1 + \alpha t)^m$ and in the case of creeping with increasing velocity it holds that $v_p = AW_0 (1 + \alpha t)^m$. Here the coefficients A , α and m depend on the nature of the metal and on the experimental conditions. W_0 denotes the dislocations ready for motion at the moment t . Proceeding from these equations the basic equations for the curves of creeping obtained by various authors are obtained. These equations are here given for damped creeping, the creeping with constant velocity, and for the creeping with increasing velocity. The general validity of the aforementioned equations and their good agreement with experimental data, which are obtained by experiments carried out under various conditions and with va-

Card 1/2

ODING, I.A.: PETROPAVLOVSKAYA, Z.N., kandidat tekhnicheskikh nauk.

Effect of heat treatment on relaxation resistance of austenite.
[Trudy] TSNIITMASH no.79:61-80 '57. (MLBA 10:6)

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

The Development of the Theory concerning the Fatigue of Metals. PA - 2845

deformation in the case of a cyclical stress in monocrystals. Eventually, it was found that neither microstructural nor radiostructural investigations are able to furnish reliable criteria which signal fatigue. The influence exercised by surroundings has, as yet, not been investigated with sufficient thoroughness. It may be hoped that the theory of the dislocations and free places of the crystal lattice may be useful for the solution of many problems.

ASSOCIATION: Not given
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress

Card 2/2

Odin, I.A.

AUTHOR: ODING, I.A., Corresponding Member of the Academy PA - 2845
 TITLE: ~~The Development of the Theory concerning the Fatigue of Metals.~~
 (Razvitiie teorii ustalosti metallov, Russian)
 PERIODICAL: Vestnik Akademii Nauk SSSR, 1957, Vol 27, Nr 4, pp 24-30 (U.S.S.R.)
 Received: 6 / 1957 Reviewed: 7 / 1957

ABSTRACT:

Since the works by the scientist A. VALERA, which were published about a hundred years ago, knowledge has made considerable progress. The great importance that is attached to this problem is proved by the fact that 6 international conferences dealt with it in the course of the past 10 years. Many problems are, however, still far from being solved, which has repeatedly given rise to heated discussions. Research work carried out in the course of the first 50 years brought very little change. Until 1910 the limit of fatigue was simply considered to be a maximum stress. A sensational discovery was made in 1929-30, when it was found that the criteria of fatigue react with great sensitivity to the dimensions of the metal object concerned. Later it was discovered that various sorts of steel and other metals have different degrees of sensitivity.

Development of the Fatigue Theory: Until 1929 fatigue was considered to be very uncomplicated. Later, attention was devoted to plastic

Card 1/2

Investigation of Plastic Deformation Limitation in
Creep under Composed Tension

32-12-33/71

ASSOCIATION: Central Scientific Research Institute for Technology and
Machine Building (Tsentral'nyy nauchno-issledovatel'skiy institut
tekhnologii i mashinostroyeniya).

AVAILABLE: Library of Congress

Card 3/3 1. Plastics-Deformation-Creep 2. Plastics-Deformation-Tension

Investigation of Plastic Deformation Limitation in
Creep under Composed Tension

32-12-33/71

time the changes of the distances between the markings and also their position were accurately measured. On the basis of investigations carried out with several samples criteria of these changes were determined, which are shown in a diagram. The average value of these criteria result from the following formulae:

$$i_{av.} = \frac{\varepsilon_{max.}}{\varepsilon_{av.}} ; i_{av.} = \frac{j_{max.}}{j_{av.}} \quad \text{and the maximum values:}$$

$i_{max.} = \frac{\varepsilon_{max.}}{\varepsilon_{min.}} ; i_{max.} = \frac{j_{max.}}{j_{min.}}$. The relative deformations in the part of the sample with the maximum of deformation are: ε_{av} and j_{av} in the part of the sample with average deformation, and ε_{min} and j_{min} in the part with a minimum of deformation. The material used for the samples (pieces of tubes) was austenite steel IX18H9T. There are 4 figures and 5 Slavic references.

Card 2/3

AUTHORS: Oding, I.A., Tulyakov, G.A.

32-12-33/71

TITLE: Investigation of Plastic Deformation Limitation in Creep under
Composed Tension (Issledovaniya
lokal'nosti plasticheskoy deformatsii pri polzuchesti v
usloviyakh slozhnonapryazhennogo sostoyaniya).

PERIODICAL: Zavodskaya Laboratoriya, 1957, Vol. 23, Nr 12, pp. 1478-1480 (USSR)

ABSTRACT: In the introduction to this paper it is said that this field has not been sufficiently investigated, especially with respect to gliding. This is true, above all, for processes occurring in metal if the latter is subjected to a stress of long duration at high temperatures and under simultaneous tensional stress. It is further said that no investigation at all has been carried out of the locality of plastic microdeformation in contrast to visible expansion as a result of tension. An example of such an investigation carried out with a tube sample is described. On the surface of the samples the rows of impacts were made by means of the Vickers hardness testing apparatus with an interspacing of exactly 10 mm. The samples were then subjected to tensional-, pressure-, or torsional stress at high temperatures and different durations of stress, and each

Card 1/3

On the third Period of Crooked Relaxation Stress. 32-7-26/49

disturbance as well as a result of the increasing dislocation pressure overcoming the disturbance. The sliding velocity is therefore determined by the intensity of the latter process. As a result relaxation stress is characterized by means of a diagram curve with a I. and II. period. In the case of "creeping", however, the viscosity of the II. period is hereby caused. There are 9 formulae.

ASSOCIATION Metallurgical Institute im. A.A.Baykov of the Acad.of Sciences of the USSR
(Institut metallurgii imeni A.A.Baykova Akademii nauk S.S.S.R.)
AVAILABLE Library of Congress
Card 2/2

O. D. N. G. I. A.

32-7-26/49

AUTHORS Oding I.A., Burdukskiy V.V.,

TITLE On the Third Period of Crooked Relaxation Stress.

PERIODICAL (O tretyem uchastke krivoy relaksatsii napryazheniy - Russian) Zavodskaya Laboratoriya, 1957, Vol 23, Nr 7, pp 843-845, (U.S.S.R.)

ABSTRACT The aforementioned period corresponds to the third period of "creeping" which has been recently much discussed. This phenomenon plays an important part in connection with the possibility of using metal at very high temperatures. Here the so-called "ring method" of investigation is used. Relaxation stress represents a "creeping" of the metal which takes place with the decrease of stress by stages (proportional to the accumulating plastic deformation). This third period characterizes a sharp decrease of the strength of the metal or an increase of stress instead of the diminishing cross section. According to this theory "creeping" is the result of the following processes: a) the process of the generation of the so-called "Frank-Ried" sources with an intensity of the stresses which happen to be active. With an increase of stress the number of generating sources increases at the cost of being included within the process of reduced sources. b) Dislocation deceleration processes caused by "Frank-Ried" sources and turn out to be disturbances of various nature; an intensification of disturbances always entail a greater accumulation of dislocation within one unit of circumference. c) A process of liberation of blocking dislocations develops as a result of the diffusion of

Card 1/2

OPING, I. A.

ODING, I.A.

~~_____~~
Fatigue of metals. Zav. lab. 23 no.3:350-356 '57.
(Metals--Fatigue)

(MIRA 10:6)

PA - 2159

Fatigue of Metals in the Case of Contact Friction.

by friction which pulsates according to its amount because of the change of resistance. If the direction of the thermoelectric current is changed by the selection of a corresponding contact material (or if a countercurrent is allowed to pass through) it is possible to slow down or to paralyze the effect of electro-erosion altogether and thus to increase the fatigue limit. The course taken by destruction by fatigue in the case of contact friction can be considered to be a formation of free places in the crystal lattice by displacement of the metal during the electro-erosion process. (8 illustrations).

ASSOCIATION: Not given.
PRESENTED BY:
SUBMITTED: 9.7.1956
AVAILABLE: Library of Congress.

Card 2/2

ODING, I.A.

AUTHOR:

IVANOVA, V.S., ODING, I.A.

TITLE:

Fatigue of Metals in the Case of Contact Friction.
(Ustalost' metallov pri kontaktnom trenii, Russian).

PA - 2159

PERIODICAL:

Izvestia Akad. Nauk SSSR, Otdel. Tekhn., 1957,
Nr 1, pp 95 - 102 (U.S.S.R.)

Received: 3 / 1957

Reviewed: 4 / 1957

ABSTRACT:

Two brands of Cr-Ni-Mo steels which differed only with respect to their Ni-content, were investigated. Experiments were carried out under such conditions that it was possible, in the case of a symmetric flexure, to examine the samples in air as well as in hydrogen. Besides, the possibility was offered to carry out investigations in the case of contact friction. It was found that there was no decrease of the fatigue limit in molecular hydrogen. By experiments carried out up to 250 million cycles it was shown that, in the case of contact friction, a continuous decrease of cyclic strength takes place both in the air as also in hydrogen. Utilization of experimental results according to the Weibull method showed that the fatigue limit of Cr-Ni-Mo steel is equal to zero in the case of contact friction and that its value is very low. The decrease of the fatigue limit in the case of contact friction is explained by the process of electro-erosion. This process takes place under the influence of the thermoelectric current produced

Card 1/2

137-58-5-10620

Application of the Theory (cont.)

creating favorable conditions for their merger and settling upon the surfaces of pores and growing micro- and macroscopic cracks. Bibliography: 21 references.

V.N.

1. Metals--Mechanical properties
2. Metals--Temperature factors

Card 3/3

137-58-5-10620

Application of the Theory (cont.)

increase in creep strength. It is noted that a change in the number of D retarded by O is reflected in the rate of creep: As the number of retarded D rises, there is a rise in the pressure they exercise upon the O, and this is conducive to overcoming the energy barriers created by the O. However, the O themselves are not absolutely stable, and their diffusion results in liberating the blocked D. At every time instant there is a number of D ready to move and this number (not the number of the retained D) determines the rate of creep. This mechanism of the creep phenomenon is taken as the foundation of a general creep equation in the form $d\varepsilon/dt = AW_0(1+\alpha t)^m$, where ε is the deformation, t the time, W_0 the initial number of D prepared to move, A is a coefficient dependent upon the material and the stress, and α and m are constants for the given conditions of creep. Depending upon the exponent m , the equation describes all possible types of creep curves experimentally obtained. Analysis of the process of long-term rupture of metals shows that the greatest acceptance is accorded the theory explaining the mechanism of this phenomenon by the merger of vacant atom sites in the crystal lattice which settle on microscopic and ultramicroscopic pores in the metal. The processes of D traversal, the embracing of O by dislocations, the emergence of the D from slip planes, and the processes of gas and electrolytic corrosion and electroerosion result in large-scale generation and concentration of voids.

Card 2/3

ODING, I.A.

137-58-5-10620

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 5, p 251 (USSR)

AUTHOR: Oding, I.A.

TITLE: Application of the Theory of Dislocations to Problems of Strength at Elevated Temperatures (Primeneniye teorii dislokatsiy k voprosam zharoprochnosti)

PERIODICAL: V sb. Issled. po zharoprochn. splavam, Vol 2, Moscow, AN SSSR, 1957, pp 320-328

ABSTRACT: The problem of strength at elevated temperatures is examined in the light of dislocation concepts of the strength and ductility of metals. It is shown that the movement of dislocations (D) in real metals is complicated by obstacles (O) (vacancies in the crystal lattice, dislocated and foreign atoms, etc.). The effectiveness of the O depends unstably upon temperature, upon their own mobility, and their inhibiting influence. The most stable O are "flat" O of the "zonal" type, such as the Guinier-Preston zones, and O of a three-dimensional nature - a cloud of foreign atoms dissolved around the D. The inhibiting influence of the cloud is demonstrated only at definite rates of creep, at which the cloud is pulled after the D. In that case there is an

Card 1/3

137-1957 12-25046

The Effect of Heat Transfer on the Relaxation Stability (cont.)

reduced stability of the solid solution and in a lower RS. This is explained by the presence of cubic Cr carbide in these steels, which can change its composition within a rather wide range and is capable of reacting with the solid solution, thus reducing the stability of the metal structure. The employment of multi-stage A is recommended as a means of increasing the strength of structurally stable austenite steels, operating for a long time under conditions which cause relaxation.

L. G.

1. Austenitic steel-Stability-Effects of heat treatment
2. Austenitic steel-Properties-Temperature factors

Card 3/3

137-1957-12-25046

The Effect of Heat Treatment on the Relaxation Stability (cont.)

of I. A. Odling; prior to the test the magnitude of E at various temperatures was determined for all grades of steel by electronic means. In addition, the influence of the conditions of A on the mechanical properties and on microstructural changes in austenite steels was also investigated. It is shown that the RS of the steels considered depends on the state of the solid solution and of the carbide phases, as well as of their dispersion and the interaction between them. The less stable the solid solution and the smaller the amount of the hardening phases, the lower the RS. An analogous effect is produced by an increased degree of dispersion of the particles which are separated out and an increased non-uniformity of their distribution. The multi-stage conditions of stabilizing A strongly influences the formation of hardening phases. Under repeated heating further deposition of carbides upon the already formed submicroscopic crystallization nuclei is observed in the multi-stage A process; thus the hardening phases are distributed more uniformly and are more finely dispersed than in the case of single-stage A , which explains the improved RS observed in the EI402 steel after it has been exposed to multi-stage A . In the EI388 and EI488 steels the formation of phases is retarded in the course of multi-stage A , which results in a

Card 2/3

ODING, I. A.

137-1957-12-25046

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 12, p 302 (USSR)

AUTHOR: Oding, I. A., Petropavlovskaya, Z. N.

TITLE: The Effect of Heat Treatment on the Relaxation Stability of Austenite Steel (Vliyaniye termicheskoy obrabotki na relaksatsionnyuyu ustoychivost' austenitnoy stali)

PERIODICAL: V sb.: Ispytaniya i svoystva zharoprochn. materialov. Moscow, Mashgiz, 1957, pp 61-80

ABSTRACT: An investigation of the effect of various heat treatment procedures on the heat resistance properties of austenite steels and, in particular, on their relaxation stability (RS). Specimens of the EI 388, EI 402, and EI 448 steels, in the shape of forged and rolled rods, were quenched and then subjected to either single-stage or multi-stage aging (A), which was carried out in accordance with one of two procedures. In the first version the initial heating took place at a temperature below that of the second heating, but with longer exposures (100-500 hrs), in order to prepare the solid solution for the subsequent separation of phases and to create a large number of submicroscopic nuclei. The RS was studied on annular specimens by means of the method

Card 1/3

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AVAILABLE: Library of Congress
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VK/mas
 7-23-58

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Card 3/4

Relaxation of Stresses in Metals(cont)

458

The author cites recent contributions to the study of stress relaxation and creep made by the following Soviet researchers: 1) N.N. Davidenkov, P.I. Yuzvinskaya, I.A. Odina, L.M. Kachanov, Yu.N. Rabotnov, and V.I. Rozenblyum (interrelation of stress relaxation and creep phenomena) and 2) N.N. Davidenkov, G.V. Kurdyumov, S.T. Konobeyevskiy, B.V. Rovinskiy, M.A. Bol'shanina (problems of crystal lattice deformation). There are 205 references, of which 131 are Russian (126 Soviet and 5 pre-1917), 65 English, 7 German, and 2 French.

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Card 2/4	

ODING, A.

458

PHASE I BOOK EXPLOITATION

Gintsburg, Yakov Solomonovich, Candidate of Technical Sciences

! Relaksatsiya napryazheniy v metallakh (Relaxation of Stresses in Metals)
Moscow, Mashgiz, 1957. 169 p. 5,000 copies printed.

Reviewer: Oding, A., Corresponding Member of the Academy of Sciences, USSR;
Ed.: Pogodin-Alekseyev, G.I., Doctor of Technical Sciences, Professor;
Ed. of Publishing House: Leykina, T.L.; Tech. Ed.: Sokolova, L.V.;
Chief Ed. of the Leningrad Branch of Mashgiz: Bol'shakov, S.A., Engineer

PURPOSE: This book is intended for engineers in plant laboratories, designers, and scientific personnel in research institutes.

COVERAGE: This book deals with relaxation of stresses in metals. The author discusses the formal and physical theories of stress relaxation and the basic factors of this phenomenon. A description is given of the methods of investigation, the processing and utilization of the results of testing metals for stress relaxation. Methods for increasing relaxation stability of metals are also described. The interrelation between creep and stress relaxation in metals is treated briefly.

Card 1/4

ODING, I. A., Moscow

"Theorie Structurale du Fluage des Metaux," a paper submitted
for the Annual Meeting of the French Society of Metallurgy, paris, 7-12 Oct 57
C-3,800,355

ODING, I.A.

International Conference on the fatigue of metals. Vest.AN SSSR
26 no.12:91-92 D '56. (MIRA 10:1)

1. Chlen-korrespondent Akademii nauk SSSR.
(London--Metals--Congresses)

Oding, I.A.

USSR / Mechanical Properties of Crystals and Polycrystalline
Compounds.

E-9

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 9441

Author : Ivanova, V.S., Oding, I.A.

Title : Creep of Cast Iron with Globular Graphite.

Orig Pub : An. Rom.-Sov. Metalurgie si constr. masini, 1956, 10, No 2,
119-122.

Abstract : Translation from the journal "Izv. AN SSSR", division of
technical sciences, 1955, No 7 (Referat Zhurnal - Fizika,
1956, 22890).

Card : 1/1

USSR / Mechanical Properties of Crystals and Polycrystalline
Compounds.

E-9

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 9439

Abstract : the experimental data on the long-life strength be carried out on a plot in which the coordinates are the stress and the logarithm of the time. To estimate the properties of refractory metals it is recommended to use a generalized diagram of creep criteria, which represents the following relationship (at constant temperatures): (at constant temperatures): (1) Logarithm of rate of creep vs. stress. (2) Stress vs. logarithm of rate of service. (3) Logarithm of plasticity reserve vs. the logarithm of the service life.

Card : 2/2

ODING, I.A.

USSR / Mechanical Properties of Crystals and Polycrystalline
Compounds

E-9

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 9439

Author : Odin, I.A., Ivanova, V.S.

Title : Generalized Diagram of Criteria of Creep, Using New Relations
Between the Stress, Rate of Creep, and the Service Life of
a Metal.

Orig Pub : Issledovaniya po zharoprochiyue Splarom. M. AN SSSR, 1956,
52-59

Abstract : For a more complete description of the creep of alloys, a-
long with the limits of long-time strength and creep, the
authors employ a new criterion -- the plasticity reserve,
i.e. the deformation obtained by the specimen at a given ra-
te of creep during the service life, which the authors equa-
te to the long-life strength. In order to obtain more ac-
curate results it is recommended that the extrapolation of

Card : 1/2

TREYER, V.N.; ODING, I.A., retsenezent; KAPUSTIN, I.I., professor,
doktor tekhnicheskikh nauk, redaktor; MATVEYEVA, Ye.N., tekhnicheskii redaktor

[Design of machine parts for wear] Rascheti detalei mashin na
dolgovechnost'. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit.
lit-ry, 1956. 134 p. (MLRA 9:11)

1. Chlen-korrespondent Akademii nauk SSSR. (for Oding)
(Machinery--Design) (Mechanical wear)

ODING, I. A. and IVANOVA, V. S.

"Fatigue of metals under contact friction," a paper presented at
International Conference on Fatigue of Metals, London, Sep. 56.

DSI. No, 103

ODING, I. A.

Oding, I. A. (Corr. Mbr. AS USSR), Ivanova, V. S., "General Diagram of the Criteria of Creep with the Utilization of New Relations (dependencies) Between Pressure (stress), Speed of Creep and Term of Service of the Metal."

in book Research on Heat Resistant Alloys, pub by Acad. Sci. USSR, Moscow., 1956, 160 pp.

Inst. Metallurgy im A. A. Baykov

ODING, I. A.

USSR/ Engineering - Metal creep

Part 1/1 Pub. 22 20/46

Authors : Oding, I. A., Mem.-Corresp., Acad. of Sc., USSR; and Ivanova, V. S.

Title : On the process of decomposition of metals during creep

Periodical : Dok. AN SSSR 103/1, 77-80, Jul 1, 1955

Abstract : Causes of the formation of cracks in metals during creep, which leads to the metal fracture, are discussed. An analysis of various theories to explain the process of metal fracture during creep leads to the following conclusion based on the hypothesis of the so-called "vacant spaces": the diffusion of the vacant spaces, gathering them into colonies near pores, and the developing of these pores into a crack and growing the crack at the expense of new vacant spaces are the real causes of fracture during creep. Ten references: 1 USSR, 4 Germ., and 5 USA (1925-1954). Diagram.

Institution : Acad. of Sc., USSR, Institute of Metallurgy imeni A. A. Baykov

Submitted : February 25, 1955

ODING, I.A.

Critical survey of some theories of creep in metals. [Trudy]
TSNIITMASH 71:7-37 '55. (MLRA 9:8)

1. Chlen-korrespondent AN SSSR.
(Creep of metals)

Oding, I. A.

USSR/Engineering - Metallurgy

Card 1/1 Pub. 128 - 92/93

Authors : Oding, I. A., Memb. Corr., Acad. of Sc., USSR, and Ivanova, V. S., Cand. Tech. Sc.

Title : Analysis and application of certain creep criteria

Periodical : Vest. Mash, 35/5, 62-66, May 1955

Abstract : The two basic physical properties of a metal which predetermine its malleability under creep conditions are explained. The creep criteria closely connected with the physical properties of metal are discussed. It is explained that the source of plasticity is a criteria characterizing a special property of a metal, namely, its plasticity during long period of service under stress at high temperature. The plasticity criterion shows the homology between creep and strength criteria which is of great importance in metallurgy and in construction. Table; graphs.

Institution :

Submitted :

ODING, I.A., professor, doktor tekhnicheskikh nauk; IVANOVA, V.S., kandidat tekhnicheskikh nauk.

Tabular-differential method of determining the safety factor in machine building. Trudy MBI no.17:85-101 '55. (MLRA 9:7)

1.Chlen-korrespondent AN SSSR (for Oding).2.Kafedra tekhnologii metallov.
(Machinery--Design)

ODING, I. A.

Subject : USSR/Engineering AID P - 1244

Card 1/1 Pub. 110-a - 5/17

Authors : Oding, I. A., Corr. Mem., Academy of Sciences, USSR and
Ivanova, V. S., Kand. of Tech. Sci.

Title : Interrelation between different criteria of heat resistance

Periodical : Teploenergetika, 1, 24-27, Ja 1955

Abstract : Recommendations are made concerning the margin of strength when the plastic properties of material are taken into consideration for those machine parts which work under high temperatures. A new equation is suggested for the extrapolation of the relation "stress-time" when testing for a long-lasting strength. Diagrams. References: 3 Russian, (1948-1953), 4 non-Russian, (1941-1952).

Institution : Institute of Metallurgy im. A. A. Baykov

Submitted : No date

ODING, I. A.

"Mechanism of Fracture of Metals by Cyclic Loading," a paper submitted at the SYMPOSIUM on Metal Fatigue, (IUTAM), 25-27 May 55, Stockholm.

ODING, I. A.

USSR

The following report was submitted at the Colloquium on the Deformation and Flow of Solids of the International Union of Theoretical and Applied Mechanics, Madrid, 26 - 29 Sept 1955:

Ansammlung der Beschadigungen beim Kriechen.

Prof. Dr. I. A. Oding
Korr. Mitglied der Akademie
NAUK Moskau (USSR)

SOURCE: A-7315, Mechanics, Intl. Union of Theoretical & Applied. (IUTAM) Colloquium on the Deformation and Flow of Solids, Madrid, 26 - 29 Sept 1955. Unclassified.

USSR/Miscellaneous - Metallurgy

Card : 1/1 Pub. 128 - 11/32

Authors : Odina, I. A. and Shishkova, A. P.

Title : The influence of a preliminary treatment of austenite steel on its strength

Periodical : Vest. mash. 34/7, 40 - 45, July 1954

Abstract : The preliminary heat treatment of austenite steel and its influence on steel strength, was investigated. Two types of steel were used for this purpose (mark E1257, and E169). The steels were heated up to 450, 500, 600 and 700°, at which temperatures the changes in steel microstructure, hardness, resistance and plasticity, were investigated by means of chemical and magneto-metallographical methods. Four references. Graphs; tables.

Institution : ...

Subjected : ...

Translation B-82533, 2 Feb 55

ODING, I. A.

Chemical Abstracts
May 25, 1954
Metallurgy and Metallography

Methods for studying the structure of metals and alloys at high temperatures. I. A. Oding and M. G. ~~... ..~~ ² ³
Vestnik Mashinostroyeniya, 1954, No. 1, 64-65 (1954).—improved app. for heating metallurgical specimens in vacuum by radiation or by elec. resistance of samples are described, as well as the app. for studying thermal transformations for long periods at temps. up to 3000° under a microscope at 420 magnifications. In the latter, the I. A. Andin objective with a focal length of 16 mm. is used, and the deposition of vaporized material on the observation glass is prevented by interposing between it and the hot specimen a movable screen of Mo foil. Photomicrographs give the appearance of austenite heated between 1000 and 1340°. Grain growth occurs at 1180° and instantaneously, since it is not possible to see the gradual absorption of smaller grains by larger ones, after which grain size increases but much slower. Original grain boundaries, appearing as grooves, persist after recrystn. and disappear only at 1340°. Cooling austenite to 850° developed in it a relief image formed by a series of straight parallel lines never observed before and which, conceivably, might be similar in origin to martensitic transformations taking place on much faster cooling but assoc. with pronounced slippage phenomena during ferrite formation. Heating W wire contg. 0.06% Al to 3000° converted original elongated grain: composed of many differently oriented smaller crystals into single grains of the same orientation, but widened grain boundaries about 3 times owing to the evapn. of impurities segregated in them. Photomicrographs of gray iron at 20, 900, 1000, and 1100° show the nonuniformity of austenite caused by increasing temp. and the grain growth assoc. with the formation of a solid soln. Color photomicrographs of heat-treated Ni, Armeo Fe, and a Cr-Mo alloy are given. J. D. Gut...

Translation B-79031, 22 Sept 54

USSR/Engineering - Metallurgy

FD-1591

ODING, I. A.

Card 1/1 : Pub. 41-12/18

Author : Oding, I. A., Moscow

Title : Contemporary conceptions of mechanisms of plastic deformation and breakdown in creep of metals

Periodical : Izv. AN SSSR. Otd. tekhn. nauk 8, 110-118, Aug 1954

Abstract : Presents contemporary conceptions of mechanisms of plastic deformation and breakdown in creep of metals and the causes of reduction in long-time test strength with increase in life of metal (life of metal determined by time until breakdown of metal at given constant load and constant temperature). Discusses theories on process of breakdown during prolonged service of metal. Graphs; photomicrographs. Thirteen references; six Russian (all since 1942).

Institution :

Submitted : May 14, 1954

USSR/Engineering - Metallurgy

FD-1112

Card 1/1 Pub. 41-6/13

Author : Oding, I. A. and Ivanova, V. S., Moscow

Title : ~~Some~~ Some properties of diffusion plasticity during stress relaxation in metals.

Periodicals : Izv. AN SSSR, Otd. tekhn. nauk 5, 81-90, May 1954

Abstract : Discusses two mechanisms in process of relaxation of metals: (1) diffusion and (2) mechanical. Gives results of investigation of (1) diffusion processes on the first portion of the relaxation curve and their role and effectiveness in an evaluation of the relaxation stability of metal and (2) the mechanism of diffusion plasticity. Graphs; tables. Sixteen references.

Institution : Institute of Metallurgy imeni A. A. Baykov

Submitted : February 20, 1954

ODING, I. A.

1 Jul 53

USSR/Metallurgy - Vacuum Method in Metallography, Grain Growth

"On the Shift of Grain Boundaries in Heated Metal," I. A. Oding, Corr Mem Acad Sci USSR; M. G. Lozinskiy, S. G. Fedotov; Inst of Machine Science, Acad Sci USSR

DAN SSSR, Vol 91, No 1, pp 75-76

Presents results of investigations into kinetics of grain growth in steel and Sn-bronze during isothermal holding in vacuum chamber, showing successive positions of growing grain boundaries on two micrographs. Discusses behavior of grain in growth process and calculates linear rate of boundary movement.

266T56

ODING, I.A., chlen-korrespondent Akademii nauk SSSR; IVANOVA, V.S., inzhener.

Scientific achievements of construction bureaus in problems of strength.
Applying some new scientific achievements in the design of machine parts.
Vest.mash. 33 no.10:3-10 0 '53. (MLRA 6:10)

1. Akademiya nauk SSSR (for Oding). (Mechanical engineering)

HOVINSKIY, B.M.; LYUTSBAU, V.G.; ODING, I.A., chlen-korrespondent.

Poisson's ratio in stress relaxation. Izv.AN SSSR Otd.tekh.nauk no.10:1471-
1474 0 '53. (MLRA 6:11)

1. Akademiya nauk SSSR (for Oding). (Deformations (Mechanics))

ROVINSKIY, B.M.; RYBAKOVA, L.M.; ODING, I.A., chlen-korrespondent.

Structural changes in metals under conditions of creep. Izv.AN SSSR Otd.tekh.
nauk no.9:1241-1247 S '53. (MLRA 6:10)

1. Akademiya nauk SSSR (for Oding).

(Creep of metals)

GOL'DENBLAT, I.I. [author]; ODING, I.A.; SOROKIN, O.V. [reviewers].

"Introduction to the theory of creep in building materials." I.I. Gol'den-
blat. Reviewed by I.A. Oding, O.V. Sorokin. Sov. kniga no. 8:42-43 Ag '53.
(MLRA 6:8)
(Strength of materials) (Gol'denblat, I.I.)

ODING, IA.

10-1-2

2
3

Chemical Abst.
Vol. 48 No. 4
Feb. 25, 1954
Metallurgy and Metallography

No. 7 Structure of austenite at high temperature. I. A. Oding and M. G. Lozinskiĭ. *Izvest. Akad. Nauk S.S.S.R., Otdel. Tekh. Nauk* 1953, 1035-43. —Austenite is examd. at 1300° under high vacuum and the app. used is described. After being heated to high temp. austenite develops flat blocks in its grains and increases in chem. heterogeneity of the grains, which leads to a peculiar dendritic pattern or a martensite pattern on the surface of a polished sample. The effect varies somewhat with different grades of steel. The selectivity of vacuum evapn. of metals is exhibited not only in a locally geometric sense, but also in a chem. sense, in that the various components of an alloy evap. at different rates and alter the compn. G. M. Kosolapoff

ODING, I.A.; KULIKOV, F.V.

Investigating the properties of rolled babbitt. Tren. i izn. mash.
no. 7:119-150 '53. (MLRA 9:9)

1. Chlen-korrespondent AN SSSR (for Oding).
(Babbitt metal) (Bearings (Machinery))

CHUDAKOV, Ye.A., akademik; ODING, I.A.

Scientific activity of Professor M.M.Khrushchov. Tren. i izn.mash.
no.7:3-7 '53. (MLRA 9:9)

1.Chlen-korrespondent AN SSSR (for Oding).
(Khrushchov, Mikhail Mikhailovich, 1890-)

ODING, Ya.

Grozin, B. D.

Mechanical properties of tempered steel. B. D. Grozin. Reviewed by Ya. Oding.
Sov. kniga No. 3, 1953.

Monthly List of Russian Accessions, Library of Congress, June 1953. Uncl.

ODING, I.A.; VOLOSATOVA, Ye.N.; IVANOVA, V.S.

Investigation of relaxation, creep and endurance properties of the
E1a-1T Armko iron and steel at fluctuating temperatures. Trudy Sem.
po proch. det. mash.1 no.2:3-30 '53. (MLRA 7:1)

1. Chlen-korrespondent Akademii nauk SSSR (for Oding).
(Steel) (Iron) (Creep of metals)

ODING, I. A. and IVANOVA, V. S.

"Investigation of the Locality of Plastic Deformation in Tension," Iz. Ak. Nauk SSSR, Otdel. Tekh. Nauk, No.1, pp 96-105, 1953.

Experimenting with 3 grades of steel (EYa-IT, EI-454 and Armco-iroh), establishes that plastic deformation at normal as well as at elevated temps has local nature and different metals show different extent of locality in plastic deformation. Inhomogeneity of plastic deformation of steels tested decreases with increase of deformation (except in steel EI-454 at high temps). 256T83

KHRUSHCHOV, Mikhail Mikhaylovich; BERKOVICH, Ye.S.; ODING, I.A., redaktor.

[Precise determination of machine part wear and tear] ~~Technoe opredelenie isnosa detalei mashin.~~ Technoe opredelenie isnosa detalei mashin. Moskva, Izd-vo Akademii nauk SSSR, 1953. 115 p. (MLRA 6:12)

1. Chlen-korrespondent Akademii nauk SSSR (for Oding).
(Machinery) (Mechanical wear)

ODING, I. A.

Metallurgical Abstr.
 Vol. 21 May 1954
 Structure

(C.A. 48 no. 2: 519 '54)

Structure of Grains of Metal at High Temperature. I. A. Odling and M. G. Loziniky (Doklady Akad. Nauk S.S.S.R., 1952, 88, (4), 707-709; In Russian). To investigate the internal structure of the grains, plate specimens (60 x 10 x 3 mm.) of pure metal, ground and polished on one surface, were heated in a vacuum of 10^{-4} to 10^{-5} mm. Hg. by passing 50 c./s. A.C. through them for periods of from a few min. to some hr. Up to 1400° C. the temp. was measured with a thermocouple spot-welded to the specimen surface; higher temp. were deduced from the elect. resistance of the specimen. As a result of selective evaporation, the grain boundaries of the prepared surface were clearly visible (cf. L. *ibid.*, 1952, 82, 53; M.A., 21, 790). After heating at temp. of $0.8-0.75 T$, where T is the m.p., the grains had a laminated structure. If the grains be assumed to be made up of flat mosaic blocks, $\sim 10^2-10^3$ lattice parameters (a) thick, then this structure can be attributed to variations in the intensity of evaporation, owing to differences in the bond energies. Photomicrographs of this structure are given for W heated for 15 min. at 2000° C. and Mo heated at 1450° C. for 20 min., the thickness of the mosaic block being ~ 400 and $\sim 500 a$, resp., with some variation for individual blocks in a grain. Length was much greater than thickness. The blocks are bent near the grain boundaries, which may indicate that the strength at the grain boundary differs from that in the grain, for pure metals. Various explanations are given for the slightly different orientation of the blocks observed in 0.45% C steel heated at 1100° C. for 11 hr. (block thickness 400-1500 a).—G. V. E. T.

USSR/Metallurgy - Industrial Research, Diff- Sep 52
Fusion

"Thermal Diffusion in Metals," I. A. Odling, Corr Mem,
Acad Sci USSR

"Dok Ak Nauk SSSR" Vol 86, No 1, pp 67-70

Suggests eq which more completely generalizes regu-
larities of diffusion processes. Addnl 3d term in
right part of this eq depicts thermofusion caused
by existence of temp gradient in metal. Thermofu-
sion promotes migration of C atoms into hotter
portions of nonuniformly heated steel and may be used

234753

For improving industrial processes, in particular for
more complete and quick removal of hydrogen from
steel castings or forgings. It also affects behav-
ior of steel parts in service increasing, e.g., rates
of creep and relaxation when temp gradient appears in
these parts.

234753

ODING, I. A.

ODING, I.A.; BABUSHEIN, L.O. [deceased]

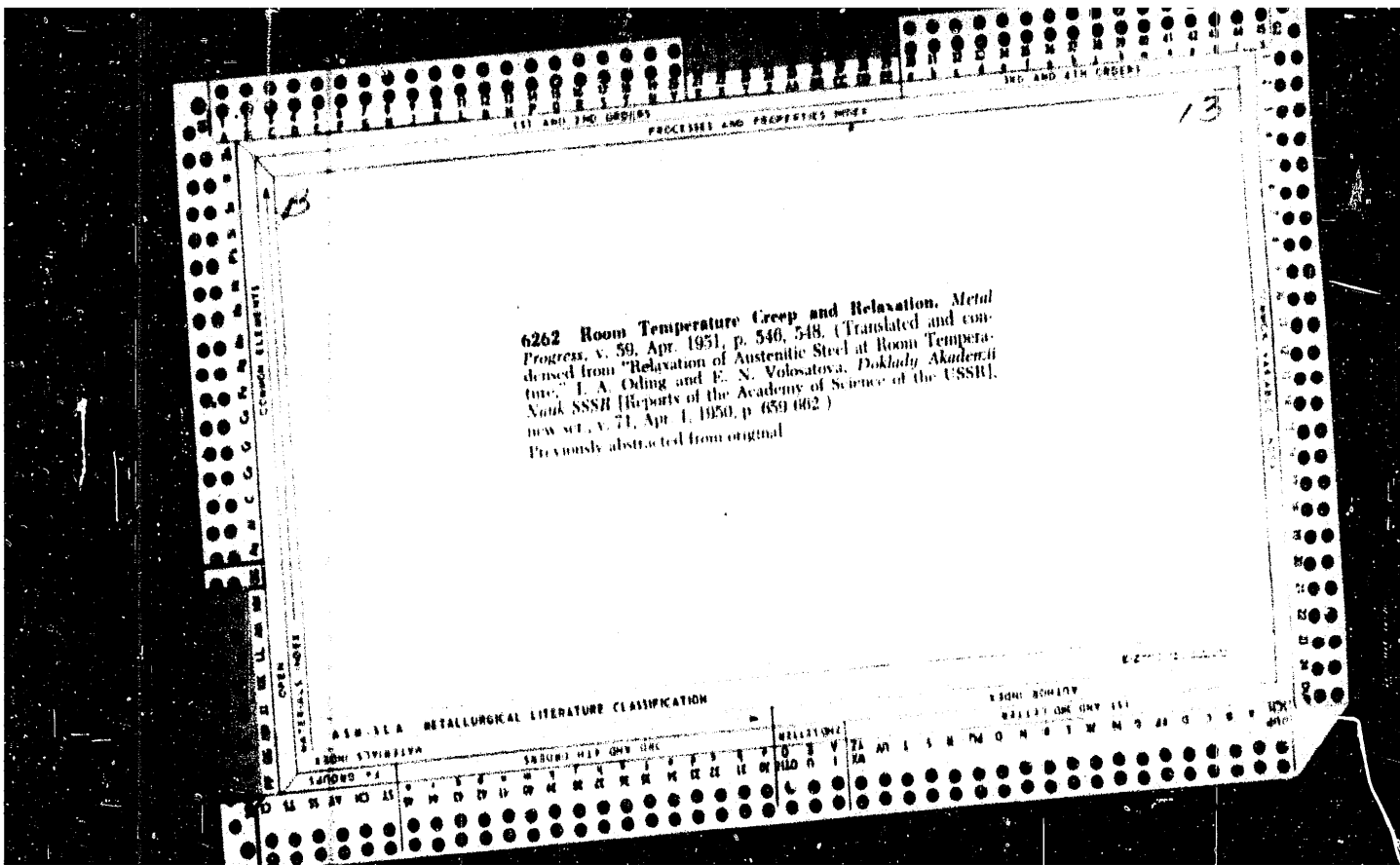
Effect of small intermediate plastic deformation on the process of
creeping. Trudy TSNIITMASH 45:39-64 '52. (MIRA 9:2)

1.Chlen-korrespondent AN SSSR (for Oding)
(Creep of metals) (Steel--Testing)

ODING, I.A.; VOLKOVA, T.I., kandidat tekhnicheskikh nauk.

On the stress relaxation limit. Trudy TSNITMASH 45:5-17 '52
(MLRA 9:2)

1.Chlen-korrespondent AN SSSR (for Oding)
(Creep of metals) (Steel--Testing)



6262 Room Temperature Creep and Relaxation. *Metal Progress*, v. 59, Apr. 1951, p. 546, 548. (Translated and condensed from "Relaxation of Austenitic Steel at Room Temperature," I. A. Odling and E. N. Volosatova, *Doklady Akademii Nauk SSSR* [Reports of the Academy of Science of the USSR], new ser., v. 71, Apr. 1, 1950, p. 659 662.)
Previously abstracted from original

ASNT-USA METALLURGICAL LITERATURE CLASSIFICATION

GENERAL INDEX
SUBJECT INDEX
RELATIONS
AND OTHER INDEXES

41729. Čížek, J. A. How to ascertain the cause of fatigue failures from structure and shape of the fracture surface. (In Czech, transl. from Russian). Prague, Pentaos. (dateless). 1981. 90 pp., 60 figs.

How metals break is a young science but of great importance for design, and every publication on research on the laws in this field is welcome. As most failures in machine parts are due to fatigue, this well-known author occupies himself here only with fatigue failures. He treats the laws of fatigue strength, the reasons which induce it, the shape and appearance of fatigue fractures, the change of structure in consequence of fatigue which can be ascertained by microscope and x rays. Booklet is a critical and ordered assembling of research results, most of which are scattered in the Russian literature. It contains numerous figures and literature references and can be recommended to designers and technologists.

Pavel K. Ho, Czechoslovakia

928
WAT

USSR/Metals - Creep

"Relation Between the Rates
Relaxation of Austenitic Ste
Metals, Acad Sci USSR

"Dokl Ak Nauk SSSR" Vol LXXV,

Four kinds of cast heat-resis
tested for substantiating Odi
between rates of creep and re
dicates possibility of using a
sive method of relaxation for
strength of steel under condi
Theory permits better apprais
resistant steels, the factor

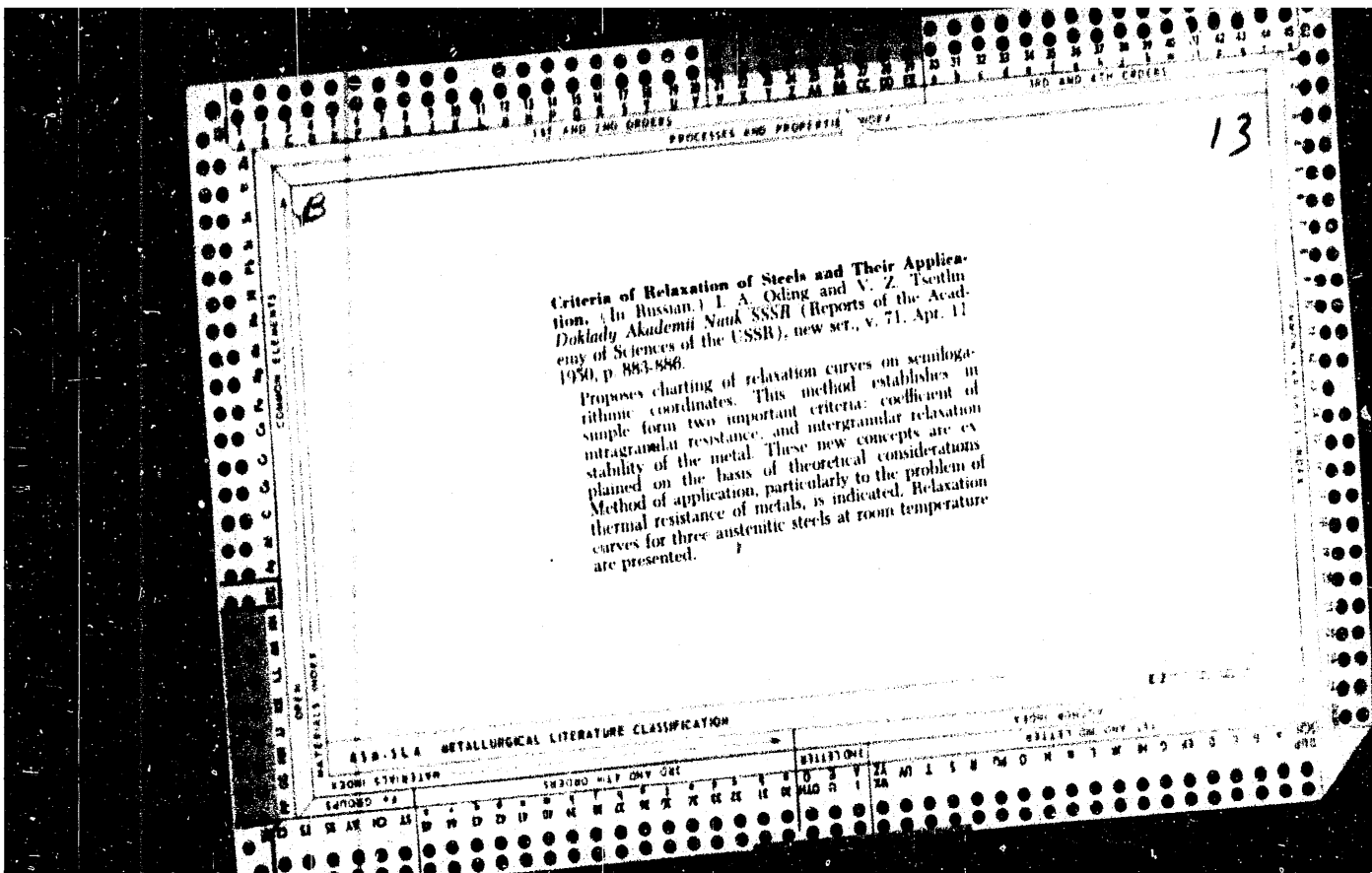
USSR/Metals - Creep (Contd)

of common and heat treatment of
Submitted 25 Aug 50.

47 11 0110

Oding I.A.

Oding I.A. How to ascertain the cause of failure
failure from structure and shape of the fracture surface (in
Czech, transl. from Russian), Prague, Pttentol. Institute



ODING, I. A.

PA 175T60

USSR/Metals - Austenite

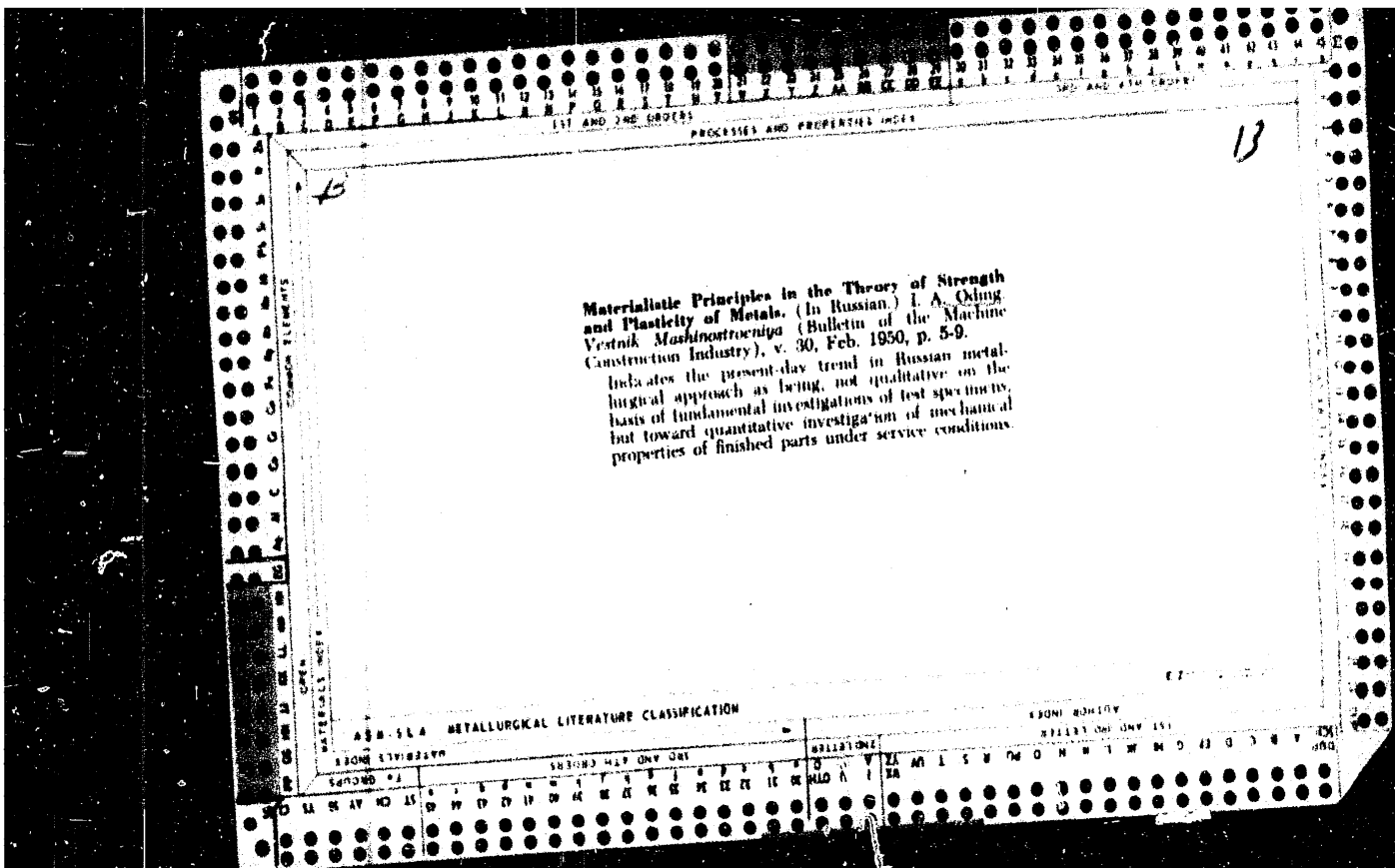
1 Apr 50

"Relaxation of Austenite Steel at Room Temperature," I. A. Oding, Corr Mem, Acad of Sci USSR, Ye. N. Volosatova

"Dok Ak Nauk SSSR" Vol LXXI, No 4, pp 659-662

Relaxation curves for low-carbon steel-alpha and austenite steel EYalT (i.e., stress in kg/sq mm, 0-25, vs time in hours, 0-1,600). Other types of austenite steels similarly studied, at room temp were EI-395, 402, 69, 452, 432. Relaxation studied for repeated loads on EYalT. Submitted 31 Jan 50.

175T60



I. A. ODING

"Paths of Development of the Soviet Science of Strength and
Plasticity of Metals in Connection with the Problems of
Machinery Construction."

Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, #9, 50

so; W-16362, 22 Jan 51

ODING, IVAN AVGUSTOVICH

Za materialisticheskie printsipy v teorii prochnosti i plastichnosti metallov.
(Vestn. Mash., 1950, no.2, p. 5-9)

In favor of materialistic principles in the theory of strength and plasticity
of metals.

ELC: TN4.V4

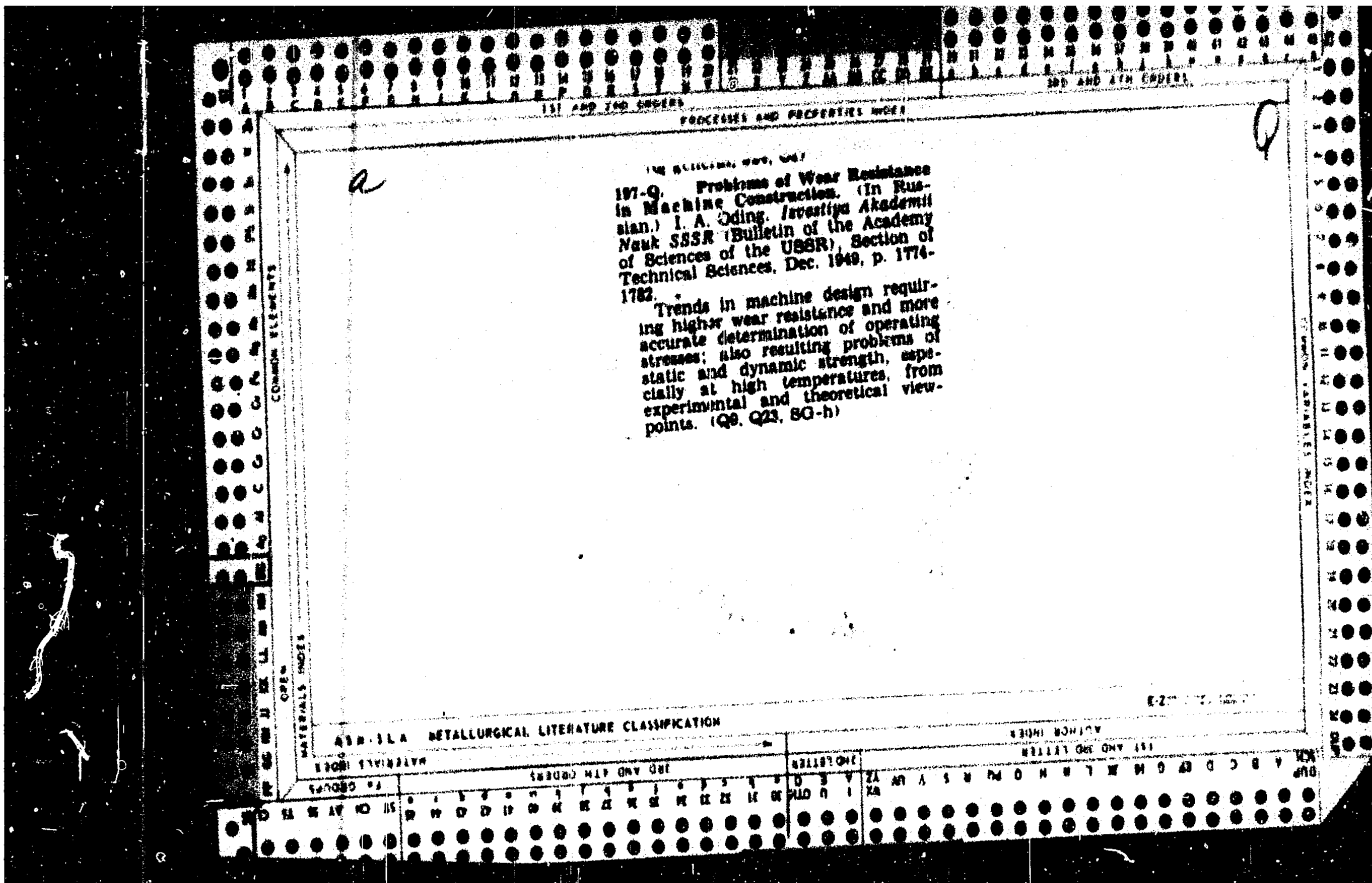
SO: Manufacturing and Mechanical Engineering in the Soviet Union, Library
of Congress, 1953.

ODING, I. A.

"An Investigation of the Endurance of Armco Iron and $\text{D}\text{A}-\text{IT}$ Steel Under Conditions of Constant and Alternate Load Application," by Oding and V. S. Ivanova, Voprosy Mashinovedenia, Moscow, 1950.

and

"The Effect of Preliminary Loading upon Relaxation of Armco Iron and Steel $\text{D}\text{A}-\text{IT}$, by Oding and E. N. Volosatova, Voprosy Mashinovedenia, Moscow, 1950.



ODING, IVAN AVGUSTOVICH

Osnovy prochnosti metallov parovykh kotlov, turbin i turbogeneratorov. Dop. v kachestve uchebn. posobia dlia energ. vuzov. Moskva, Gosenergoizdat, 1949. 560 p. illus.

Bibliography; p. (552)-554

Fundamentals of the strength of metals of steamboilers, turbines and turbo-generators.

MLC: TJ291.04

SO: Manufacturing and Mechanical Engineering in the Soviet Union, Library of Congress, 1953.

ODING, IVAN AVGUSTOVICH

Issledovanie ustalostnoi prochnosti konstruktsionnykh staley. (TSNIITMASH, kn. 24.) Moskva, Mashgiz, 1949. 122 p.

Study of the fatigue strength of structural steel.)

SO: Manufacturing and Mechanical Engineering in the Soviet Union
Library of Congress, 1953.

ODING, I.A.

"A New Method of Investigation of Relaxation and Creep of Metals, Symposium",
Mashgiz, 1949, 116 pp.

This symposium contains reports of a team of research workers on new methods of relaxation and creep tests of metals by using ring specimens with a uniform bending resistance. A part of the information has already been published earlier in various journals.

This symposium contains fundamental data on the proposed method, a short description of the test apparatus, an analysis of the stress distribution in the ring shaped specimen in the initial period (during elastic deformation) and after creep and relaxation has started (i.e. during plastic deformation), and information is also given on the preparation of test samples.

SO: 806034, 25 April 1952

ODING, I. A.

"Structural Signs of Fatigue in Metals as a Means for Establishing Causes of Machine Breakdown." Academy of Sciences USSR, Institute of Machine Studies, 1949, 80 pp.

ODING, IVAN AVGUSTOVICH

Strukturnye priznaki ustalosti metallov kak sredstvo ustanovleniia prichin avarii mashin. Moskva, AN SSSR, 1949. 77 p. illus.

Structural indications of the fatigue of metals as means of determining the causes of the breakdown of machines.

DLC: TA460. 0313

SO: Manufacturing and Mechanical Engineering in the Soviet Union, Library of Congress, 1953.

ODING, IVAN AUGUSTOVICH

Problema konstruktivnoi prochnosti v mashinostroeni. Stenogramma publichnoi lektsii, pročit. v Moskve. Moskva Pravda 1949. 23 p. diagra.

Problem of structural strength in machine building.

DLC: TJ233.03

SO: Manufacturing and Mechanical Engineering in the Soviet Union, Library of Congress, 1953.

ODING, I. A.

PA 64/49T106

USSR/Metals
Testing Procedures
High Temperatures

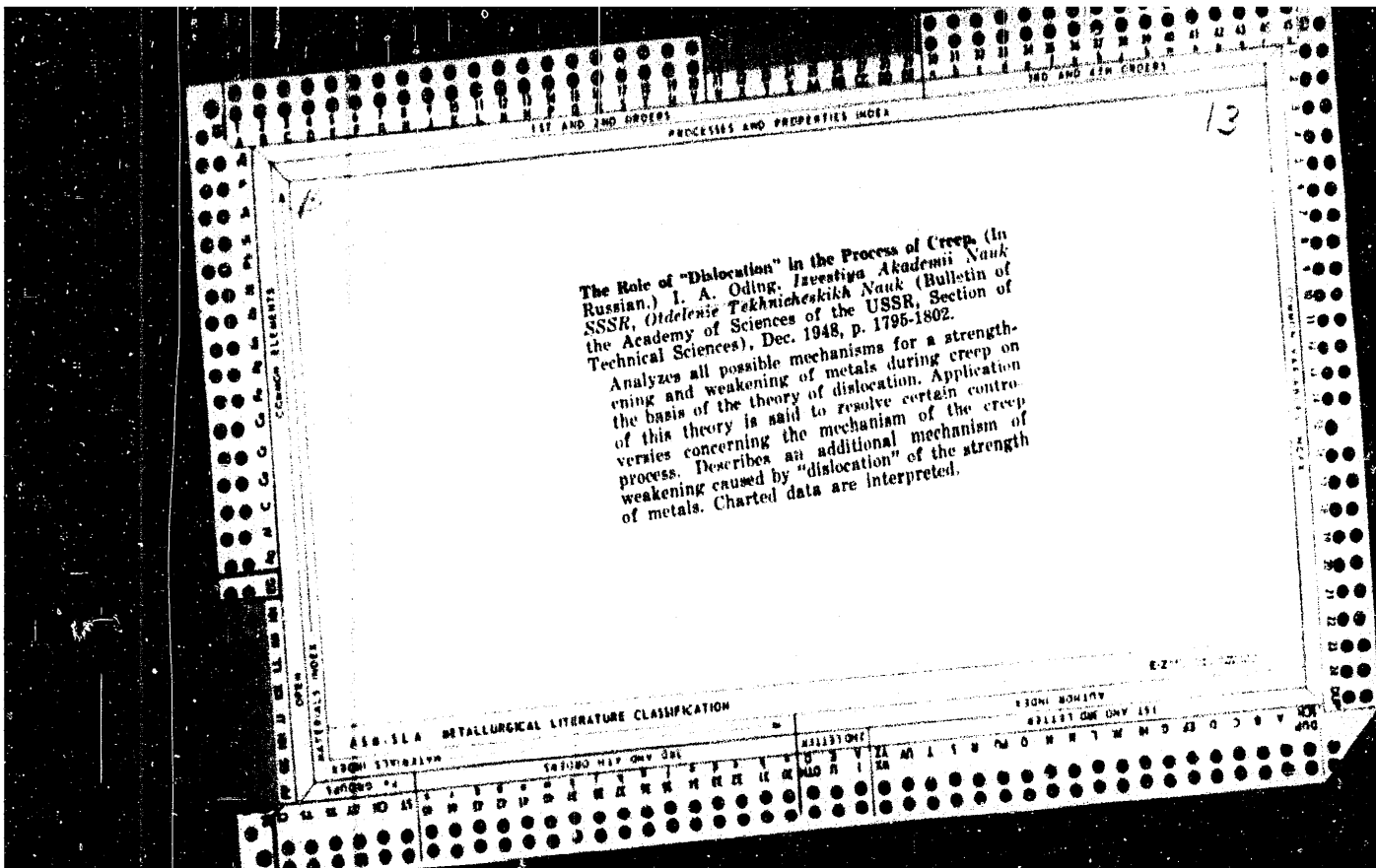
Nov 48

"Analysis of Some Indicators of Stability of
Metals at High Temperatures, I. A. Oding, 12 pp

"Zavod Lab" Vol XIV, No 11

Discusses classification of the deformation meth-
ods of testing metals at high temperatures, and
the relationship between some of the various meth-
ods for determining the stability of metals at
high temperatures. Submitted at the Moscow Sci
Tech Conf on Testing Mach 18 Jun 48.

64/49T106



18

191 APP. 110 CHIEFS
PROCESSING AND PROPERTIES INDEX

COMPARATIVE CREEP TESTS ON RING-SHAPED AND CYLINDRICAL SPECIMENS FOR BENDING AND STRETCHING, RESPECTIVELY. I.A. Odling and S.I. Matveev. (Zavodskaya Laboratoriya, 1948, vol 14, May, pp 595-607). (in Russian). An account is presented of the creep testing of ring-shaped and cylindrical specimens for bending and stretching respectively. The apparatus developed for these purposes, which enables the simultaneous testing of several specimens to be carried out, is described with special reference to the circuits used for close temperature control. The results obtained by the two methods are compared and figures obtained for three alloy steels at 550-650°C are given. Except for one anomalous case (stated to be due to fluctuation of temperature) the bend and tensile tests gave concordant results.--S.K.

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