16(1)

AUTHORS: Barbashin, Ye.A., and Liberman, L.Kh. SOV/155-58-3-4/37

TITLE: On the Stability of the Solutions of a System of Integro-Differential Equations (Ob ustoychivosti resheniy sistemy integro-differentsial'nykh uravneniy)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Fiziko-matematicheskiye nauki, 1958, Nr 3, pp 18-22 (USSR)

ABSTRACT: The author considers the system

$$(1)\quad \begin{cases} \dfrac{\partial\varphi(x,u,v)}{\partial u} = \displaystyle\int_a^b K_1(x,s,u,\varphi(s,u,v))ds + F_1(x,u,\varphi(x,u,v)) \\ \dfrac{\partial\varphi(x,u,v)}{\partial v} = \displaystyle\int_a^b K_2(x,s,v,\varphi(s,u,v))ds + F_2(x,v,\varphi(x,u,v)), \end{cases}$$

where the functions K_1, K_2, F_1, F_2 in D: $a \leq x$, $s \leq b$, $0 \leq u$, $v < +\infty$, $|\varphi| < r$ belong to the class C_1, and the auxiliary equations

$$(2)\quad \frac{d\varphi(x,u,v)}{du} = \int_a^b K_1(x,s,u,\varphi)ds + F_1(x,u,\varphi)$$

Card 1/2

AUTHOR: Liberman, L.Kh.

TITLE: On the Stability of the Solutions of Integro-Differential Equations (Ob ustoychivosti resheniy integro-differentsial'nykh uravneniy)

SOV/140-58-3-17/34

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, 1958, Nr 3, pp 142-151 (USSR)

ABSTRACT: The equation

$$(1)\quad \frac{\partial\varphi(x,t)}{\partial t} = \int_a^b K(x,s,t,\varphi(s,t))ds + F(x,t,\varphi(x,t))$$

is considered, where K and F are defined and continuous in H: $a \leq x \leq b$, $a \leq s \leq b$, $|\varphi| \leq r$, $0 \leq t < \infty$; $K(x,s,t,0) = F(x,t,0) \equiv 0$. With the aid of the contracting mapping it is proved that, if K and F satisfy the Lipschitz condition in φ, (1) possesses a unique solution $\varphi(x,t)$ in the interval $t_o - h < t < t_o + h$ which for $t = t_o$ coincides with a given function $f(x)$ (here it must be $|f(x)| < r_1 < r$ and $f(x)$ is permitted to possess finitely many ordinary discontinuities

Card 1/3

in $a \leqslant x \leqslant b$) .
Besides (1) also the equation

$$(2) \quad \frac{\partial \varphi(x,t)}{\partial t} = \int_a^b \overline{K}(x,s,t,\varphi)ds + \overline{F}(x,t,\varphi)$$

is considered, whereby $\overline{K}$ and $\overline{F}$ satisfy the same conditions as K and F and furthermore

$$|\overline{K} - K| < \gamma_1(t)|\varphi(x,t)| \quad , \quad |\overline{F} - F| < r_1(t)|\varphi(x,t)| \quad .$$

Theorem: Let the trivial solution $\varphi = 0$ of (1) be uniformly asymptotically stable; let there exist constants $\alpha > 0$, $B \geqslant 1$, so that

$$(3) \quad |\varphi(x,t)| < B\delta e^{-\alpha(t-t_o)} \qquad \text{for} \quad t > t_o$$

if $|\varphi(x,t_o)| < \delta < r$. Furthermore let

$$(4) \quad \frac{1}{T}\int_t^{t+T} \gamma_1 dt < \eta_1 \; , \; \frac{1}{T}\int_t^{t+T} r_1 dt < \eta_2 \; , \text{where } T = \frac{1}{\alpha} \ln 4B$$

Card 2/3

On the Stability of the Solutions of Integro-Differential Equations SOV/140-58-3-17/34

Then the trivial solution $\bar{\varphi} = 0$ of (2) is uniformly asymptotically stable too, and every solution of (2) satisfies an inequality of the type (3).
Under similar assumptions a third theorem says that from the uniform asymptotic stability of the trivial solution of (1) follows the uniform asymptotic stability of the trivial solution of the "disturbed" system (2), if only the disturbances are small in the mean i.e. if they satisfy conditions of the type (4).
There are 4 Soviet references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut imeni S.M. Kirova (Ural Polytechnic Institute imeni S.M.Kirov)
SUBMITTED: October 31, 1957

Card 3/3

AUTHOR: Liberman, L.Kh.

SOV/140-58-6-16/27

TITLE: Integro-Differential Equations With a Retarding Argument and the Stability of Their Solutions (Integro-differentsial'nyye uravneniya s zapazdyvayushchim argumentom i ustoychivost'ikh resheniy)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, 1958, Nr 6, pp 161-175 (USSR)

ABSTRACT: The author considers the equation

$$\frac{\partial \varphi(x,t)}{\partial t} = \int_a^b K\left[x,s,t,\varphi(s,t-\tau_1(t)),\ldots,\varphi(s,t-\tau_n(t))\right]ds +$$

$$+ F\left[x,t,\varphi(x,t-\tau_1(t)),\ldots,\varphi(x,t-\tau_n(t))\right].$$

The proved theorems generalize the results obtained in an earlier paper of the author [Ref 1] and they are analogous to the assertions of Repin [Ref 2] for ordinary differential equations with a retarding argument. The most essential result of the paper are the estimations obtained for the change of the solution for the variation of the functions K and F. Ten long theorems and lemmas are formulated.

There are 3 Soviet references.

Card 1/2

Integro-Differential Equations With a Retarding Argument and the Stability of Their Solutions SOV/140-58-6-16/27

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

SUBMITTED: February 17, 1958

Card 2/2

16(1) SOV/140-59-1-9/25

AUTHOR: Liberman, L.Kh.

TITLE: On the Question of Stability of the Solutions of Integro-Difference Equations (K voprosu ob ustoychivosti resheniy integro-raznostnykh uravneniy)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, 1959, Nr 1, pp 91-104 (USSR)

ABSTRACT: Beside of the integro-differential equations

$$(1) \quad \frac{\partial \varphi(x,t)}{\partial t} = \int_a^b K(x,s,t,\varphi(s,t))ds + F(x,t,\varphi(x,t))$$

the author considers the integro-difference equations

$$(2) \quad \Delta\varphi_i^h = h\left[\int_a^b K(x,s,h,t_i,\varphi^h(s,t_i))ds + F(x,h,t_i,\varphi^h(x,t_i))\right].$$

He investigates the connection between the behavior of stability of the solutions of (1) and (2), especially conditions under

Card 1/2

On the Question of Stability of the Solutions of Integro-Difference Equations

SOV/140-59-1-9/25

which the stability of the solution remains preserved for the transition from (1) to (2). The formulated theorems are similar to those of Skalkina [Ref 1,2] on the stability of difference equations.
There are 4 Soviet references.

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

SUBMITTED: March 3, 1958

Card 2/2

69767
S/155/59/000/02/008/036

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AUTHOR: Liberman, L.Kh. 16

TITLE: On the Conservation of the Stability Property of the Solution of an Integro-Difference Equation Under Variation of the Step Width 16

PERIODICAL: Nauchnyye doklady vysshey shkoly. Piziko-matematicheskiye nauki, 1959, No. 2, pp. 46-48

TEXT: Let the equations

(1) $\varphi^h_{i+1}(x) - \varphi^h_i(x) = h\left[\int_a^b K(x,s,h,t^h_i,\varphi^h_i(s))ds + F(x,h,t^h_i,\varphi^h_i(x))\right]$ be given

where it is $\varphi^h_i(x) = \varphi^h(x,t_i)$, and (2) which arises from (1) by taking the new step l $(0<l<h)$ instead of h. Let K and F be defined in $D\{a\leq x\leq b, a\leq s\leq b, |\varphi|\leq r, 0\leq h\leq\bar{h}, 0\leq t<\infty\}$ and continuous; $\frac{\partial K}{\partial\varphi}$, $\frac{\partial F}{\partial\varphi}$ bounded in D; $\frac{\partial K}{\partial t}$, $\frac{\partial F}{\partial t}$, $\frac{\partial K}{\partial h}$, $\frac{\partial F}{\partial h}$ are assumed to satisfy the Lipschitz condition in

Card 1/2

DIBERMAN, L.Kh.

Some problems pertaining to the stability of the solutions of nonlinear differential equations in Banach space. Sib. mat. zhur. 1 no. 4:611-616 N-D '60. (MIRA 14:2)
(Differential equations) (Banach space)

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S/199/63/004/001/004/005
B112/B102

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AUTHOR: Liberman, L. Kh.

TITLE: The stability of retarded differential operator equations with respect to perturbations confined on the average

PERIODICAL: Sibirskiy matematicheskiy zhurnal, v. 4, no. 1, 1963, 138-144

TEXT: The operator equation $dx/dt = f(x(t - \tau_i(t)), t)$ $(i = 1, 2, \ldots, n)$ (1) is considered under the assumptions that $f(x,t)$ is continuous with respect to t and satisfies the Lipschitz condition

$$\|f(x'(t-\tau_i(t)), t)-f(x''(t-\tau_i(t)), t)\| \leqslant L\sum_{i=1}^{n}\|x'(t-\tau_i(t))-x''(t-\tau_i(t))\|. \quad (2)$$

with respect to x, and that $f(0,t) = 0$. By means of a continuous and bounded linear mapping φ a Banach space X containing an operator $\bar{f}$ is associated with the Banach space X containing the operator f. It is shown that the trivial solution of the equation $d\bar{x}/dt = \bar{f}(\bar{x}(t-\tau_i(t)), t)$ $(i = 1, 2, \ldots, n)$ (5) is stable against perturbations small on the average

Card 1/2

The stability of retarded ...

if the trivial solution of the equation (1) is uniformly asymptotically stable, and if an inequality $\| f(\varphi^{-1}\bar{x}(t), t) - \varphi^{-1}\bar{f}(\bar{x}(t),t)\| \leq \gamma(t)$ (10) holds, where $\gamma(t)$ is integrable and is small on the average.

SUBMITTED: November 24, 1960

Card 2/2

ACCESSION NR: AP4039629 S/0140/64/000/003/0088/0092

AUTHOR: Liberman, L. Kh. (Sverdlovsk)

TITLE: Problems in the theory of approximate solutions of differential operator equations in Hilbert space

SOURCE: IVUZ. Matematika, no. 3, 1964, 88-92

TOPIC TAGS: approximate solution theory, differential operator equation, Hilbert space, nonlinear equation, nonlinear operator, control, mean square deviation

ABSTRACT: Let $f(x)$ and $\phi(c_1,\ldots,c_m,u_1(t),\ldots,u_n(t), t)$ be nonlinear operators satisfying certain conditions; $x,u_1,\ldots,u_n$, for given t, are elements of Hilbert space; $c_1,\ldots,c_m$ are numbers. The author studies some problems in the theory of approximate solutions of nonlinear differential-operator equations of the form

$$\frac{dx}{dt} = f(x, t) + \varphi(c_1, \ldots, c_m, u_1(t), \ldots, u_n(t), t), \quad (1)$$

Card 1/2

LIBERMAN, L.L.

Testing small concentrations of insulin by means of the isolated epididymal fat from a rat. Biul. eksp. biol. i med. 52 no.7:121-124 Jl '61. (MIRA 15:3)

1. Iz endokrinologicheskoy laboratorii (nauchnyy rukovoditel' - deystvitel'nyy chlen AMN SSSR V.G. Baranov) Instituta akusherstva i ginekologii (direktor - chlen-korrespondent AMN SSSR prof. P.A. Beloshapko [deceased]) AMN SSSR, Leningrad. Predstavlena deystvitel'nym chlenom AMN SSSR V.G. Baranovym.

(INSULIN)
(ADIPOSE TISSUES)

LIBERMAN, L.L. (Kokhtla-Yarve)

Problem of insulin-resistant forms of diabets mellitus. Probl.endok. i gorm. 2 no.4:88-89 Jl-Ag '56. (MLRA 9:11)

1. Iz endokrinologicheskogo kabineta i terapevticheskogo otdeleniya gorodskoy bol'nitsy g. Kokhtla-Yarve (glavnyy vrach B.K.Volkov) Estonskoy SSR.
(INSULIN, therapeutic use,
diabetes mellitus, resist. (Rus))

LIBERMAN, L.L. (Kohtla-Yarve).

Effect of respiratory insufficiency on basal metabolism. Probl. endokr. i gorm. 4 no.5:60-67 S-O '58. (MIRA 11:12)

1. Iz laboratorii osnovnogo obmena gorodskoy bol'nitsy Kohtla-Yarve Estonskoy SSR (glavnyy vrach A.D. Zhdanova), nauchnyy rukovoditel' raboty - doktor med. nauk A.G. Dembo.

(RESPIRATION,
insuff., eff. on basal metab. (Rus))
(BASAL METABOLISM, physiol.
eff. of resp. insuff. (Rus))

LIBERMAN, L.L.

Pulmonary respiratory function in thyrotoxicosis. Vrach.delo no.7 747 Jl '58 (MIRA 11:9)

1. Gorodskaya bol'nitsa g. Kohtla-Yarva Estonskoy SSSR (nauchnyy rukovoditel' - doktor med. nauk A.G. Dembo).
(RESPIRATION)
(THYROID GLAND--DISEASES)

LIBERMAN, L.L.

Insufficiency of external respiration in cardiovascular diseases. (MIRA 11:9)
Terap.arkh. 30 no.8:24-32 Ag '58

1. Iz gorodskoy bol'nitsy Kohtla-Yarve Estonskoy SSR (glavnyy vrach A.D. Zhdanova, nauchnyy rukovoditel' raboty - doktor med.nauk A.G. Dembo).
(CARDIOVASCULAR DISEASES, physiol.
resp. (Rus))
(RESPIRATION,
insuff. in cardiovasc.dis. (Rus))

LIBERMAN, L. L.: Master Med Sci (diss) -- "The function of external respiration and basal metabolism in patients with throtoxicosis, and chronic cardiovascular and pulmonary diseases". Leningrad, 1959. 22 pp (Acad Sci USSR, Inst of Physiology im I. P. Pavlov),. 150 copies (KL, No 8, 1959, 138)

LIBERMAN, L.L.

Vital capacity, maximum ventilation of the lungs and reserve ventilation as functional indexes of external respiration. Vrach.delo no.6: 617-630 Je '59. (MIRA 12:12)

1. Gorodskaya bol'nitsa g. Kokhtla-Yarve (Estonskaya SSR).
(RESPIRATION)

LIBERMAN, I.L.

Spirographic study of patients with disorders of thyroid gland function. Probl. endok. i gorm. 6 no.6:43-47 '60. (MIRA 14:2)
(THYROID GLAND--DISEASES) (SPIROSCOPY)

LIBERMAN, L.L.

Hyperventilation syndrome. Sov.med. 24 no.3:52-55 Mr '60.
(MIRA 14:3)

1. Iz Gorodskoy bol'nitsy g. Kokhtla-Yarve (glavnyy vrach A.D.Zhdanova) Estonskoy SSR.

(RESPIRATION)

DEMBO, A.G., prof.; LIBERMAN, L.L., kand.med.nauk (Leningrad)

Current status of the problem of hypertension of the lesser circulation; survey of foreign literature. Terap.arkh. 32 no.9:3-14 '60. (MIRA 14:1)
(HYPERTENSION) (PULMONARY ARTERY--DISEASES)

DEMBO, A.G., prof.; LIBERMAN, L.L., kand.med.nauk (Leningrad)

Classification of respiratory insufficiency; survey of the literature. Terap.arkh. 33 no.3:3-11 Mr '61. (MIRA 14:3)
(RESPIRATORY ORGANS--DISEASES)

LIBERMAN, L.L.; DRIZGALOVICH-YEGOROVA

Insulin activity of the blood plasma in young and newborn rabbits in alloxan diabetes produced at various stages of pregnancy. Biul. eksp. biol. i med. 53 no.2:63-66 F '62. (MIRA 15:3)

1. Iz endokrinologicheskoy laboratorii (nauchnyy rukovoditel' - deystvitel'nyy chlen AMN SSSR prof. V.G. Baranov) i patofiziologicheskiy laboratorii (zav. - prof. N.L. Garmasheva) Instituta akusherstva i ginekologii (dir. - prof. M.A. Petrov-Maslakov) AMN SSSR, Leningrad. Predstavlena deystvitel'nym chlenom AMN SSSR V.G. Baranovym.

(INSULIN) (DIABETES)
(PREGNANCY, COMPLICATIONS OF) (ALLOXAN)

LIBERMAN, L.I.; DMITRENKO, L.V.; Prinimal uchastiye ZAROSHEVSKIY, Yu.A.

Isolation of substances with insulin activity from the blood plasma and urine with the aid of ion-exchange resins. Vop. med. khim. 8 no.4:420-423 Jl-Ag '62. (MIRA 17:11)

1. Endokronologicheskaya laboratoriya Instituta akusherstva i ginekologii AMN SSSR i laboratoriya kolloidnoy khimii Instituta vysokomolekulyarnykh soyedineniy AN SSSR, Leningrad.

RASKIN, A.M. (Leningrad); LIBERMAN, L.L. (Leningrad)

Role of male and female sex hormones in the origination and maintenance of the sexual instince in women. Trudy Gos. nauch. issl. psikhonevr. inst. 20:359-367 '63. (MIRA 17:8)

LIBERMAN, L.L. (Leningrad)

Insulin activity of the blood. Usp. sovr. biol. 55 no.2:296-312 '63. (MIRA 17:8)

BARANOV, V.G.; LIBERMAN, L.L.; RASKIN, A.M. (Leningrad)

Diabetes mellitus in pregnancy. Sovr. vop. endok. no.2:214-239
Sovr. vop. endok. no.2:214-239 '63. (MIRA 18:9)

1. Institut akusherstva i ginekologii AMN SSSR, Leningrad.

LIBERMAN, L.L.

Separation of free and bound insulin in blood plasma on [illegible] exchange resins. Vop. med. khim. 10 no.1:80-83 Ja-F '64. (MIRA 17:12)

1. Laboratory of Endocrinology, Institute of Obstetrics and Gynecology, Academy of Medical Sciences of the U.S.S.R., Leningrad.

BARANOV, V.G., prof.; LESHCHINSKAYA, A.F.; LIBERMAN, L.L., kand. med. nauk; SAMSONOVA, N.K.; SHNEYDERMAN I.M.

Incidence of diabetes mellitus according to a survey of the Leningrad population. Sov. med. 28 no.4:57-61 Ap '64. (MIRA 17:12)

1. Laboratoriya vozrastnoy fiziologii i patologii cheloveka Instituta fiziologii AN SSSR i endokrinologicheskiy otdel Instituta akusherstva i ginekologii AMN SSSR, Leningrad. 2. Deystvitel'nyy chlen AMN SSSR (for Baranov).

LIBERMAN, L.L.; YAROSHEVSKIY, Yu.A.

Insulin function of the mother and fetus. Biul. eksp. biol. i med. 56 no.8:21-24 Ag '63. (MIRA 17:7)

1. Iz endokrinologicheskoy laboratorii (nauchnyy rukovoditel' - deystvitel'nyy chlen AMN SSSR prof. V.G. Baranov) Instituta akusherstva i ginekologii (direktor - prof. M.A. Petrov - Maslakov) AMN SSSR, Leningrad. Predstavlena deystvitel'nym chlenom AMN SSSR V.G. Baranovym.

LIBERMAN, L.L.

Regulation of the insular function in man. Fiziol.zhur. 50 no.6:750-755 Je '64. (MIRA 18:2)

1. Otdel endokrinologii Instituta akusherstva i ginekologii AMN SSSR, Leningrad.

LIBERMAN, L.L., kand. med. nauk

Insulin activity of the blood and urine in hyperinsulinism. Vest. khir. 93 no.9:25-28 S '64. (MIRA 18:4)

1. Iz endokrinologicheskoy laboratorii (nauchnyy rukovoditel'- prof. V.G.Baranov) Leningradskogo instituta akusherstva i ginekologii AMN SSSR.

LIBERMAN, L.L.

Formation of insulin and problems of the pathogenesis of diabetes mellitus; survey of the literature. Probl. endok. i gorm. 11 no.1: 119-127 Ja-F '65. (MIRA 18:5)

1. Otdel endokrinologii (nauchnyy rukovoditel' - prof. V.G. Baranov) Instituta akusherstva i ginekologii (dir. - prof. M.A. Petrov-Maslakov) AMN SSSR, Leningrad.

LIBERMAN, L.L.

Two fractions of blood insulin and their physiological equilibrium. Ukr. biokhim. zhur. 37 no.3:447-454 '65. (MIRA 18:7)

1. Otdel endokrinologii Instituta akusherstva i ginekologii AMN SSSR, Leningrad.

LIBERMAN, L.L.; RASKIN, A.M.; SAVCHENKO, O.N.; STEPANOV, G.S.

Mechanism of depressed sexual development in women with congenital virilizing adrenocortical hyperplasia. Probl. endok. i gorm. 10 no.4:13-17 Jl-Ag '64. (MIRA 18:6)

1. Laboratoriya endokrinologii (nauchnyy rukovoditel' - deystvitel'nyy chlen AMN SSSR prof. V.G.Baranov) Instituta akusherstva i ginekologii (dir. - prof. M.A.Petrov-Maslakov) AMN SSSR i laboratoriya vozrastnoy fiziologii i patologii endokrinnoy sistemy cheloveka (zav. - deystvitel'nyy chlen AMN SSSR prof. V.G.Baranov) Instituta fiziologii imeni Pavlova (dir. - akademik V.N.Chernigovskiy) AN SSSR, Leningrad.

KAZHBITS, I.A.; [illegible], L.L.; [illegible], G.A.

Pregnancy, labor, and lactation in diabetes mellitus. Akush. i gin. no.[illegible]:135-137 '[illegible]. (MIRA 18:10)

1. Institut akusherstva i ginekologii (direktor - chlen-korrespondent AMN SSSR prof. M.A.Petrov-Maslakov) AMN SSSR, Leningrad.

BARANOV, V.G.; LIBERMAN, L.L.; SOKOLOVEROVA, I.M.

Some fundamental problems of the pathogenesis of diabetes mellitus. Vest. AMN SSSR 20 no.10:35-47 '65.

(MIRA 18:10)

1. Institut fiziologii imeni I.P.Pavlova AN SSSR i Institut akusherstva i ginekologii AMN SSSR, Leningrad.

LIBERMAN, L.L.

Case of clinical remission of diabetes. Probl. endok. i gorm. 11 no.6:49-50 N-D '65. (MIRA 18:12)

1. Otdel endokrinologii (nauchnyy rukovoditel' - deystvitel'nyy chlen AMN SSSR prof. V.G. Baranov) Instituta akusherstva i ginekologii (dir. - chlen-korrespondent AMN SSSR prof. M.A. Petrov-Maslakov) AMN SSSR, Leningrad.

YANSON, V.M.; LIBERMAN, L.M.

Selection of clearances and fits for bearings made of polycaprolactam. Plast.massy no.2:51-56 '61. (MIRA 14:2)
(Hexamethylenimine) (Bearings (Machinery))

S/653/61/000/000/007/051
I042/I242

AUTHOR: Liberman, L.M.

TITLE: The application of plastics in agricultural machinery

SOURCE: Plastmassy v mashinostroyenii i priborostroyenii. Pervaya resp. nauch.-tekh. konfer. po vopr. prim. plastmass v mashinostr. i priborostr., Kiev, 1959. Kiev, Gostekhizdat, 1961, 68-73

TEXT: The Latviyskaya cel'skokhozyaystvennaya akademiya (Latvian Agricultural Academy) is making efforts to introduce plastics into the construction of agricultural machinery in order to economize on bronze, cut down on weight, and simplify production. Polycaprolactame (caprone) has already been used with success in bearings which do not require lubrication. The advantages of this arrangement are outlined. The procedure for casting caprone parts is given. Various

Card 1/2

S/653/61/000/000/007/051
I042/I242

The application of plastics....

field tests of caprone bearings, bushings, and nuts, are described. Caprone bearings require a relatively large clearance to allow for expansion. Formulas for calculating the size of these clearances are given. A survey of Riga factories manufacturing caprone parts revealed that dimensional accuracy varies between the 4th and 5th class of ГОСТ (GOST). There are 2 tables.

Card 2/2

KLIMS, E.P.; LIBERMAN, L.M.; PRIYEDITIS, D.B.

Depositing powdered plastics in a vibrating fluidized bed.
Plast.massy no.7:35-37 '62. (MIRA 15:7)
(Protective coatings)

DECEASED

LIBERMAN, L. M. 1964

METALLURGY C. '63

P. LIBERMANN, Lucy

Psychological institutions in Rome. Magy pszichol szemle 17 no.2:207-209 '60.

1. Budapesti Orvostudomanyi Egyetem I.sz. Gyermekklinikaja; Magyar Tudomanyos Akademia Pszichologiai Bizottsaga Modszertani Albizottsaga elnoke; "Magyar Pszichologiai Szemle" szerkeszto bizottsagi tagja.

AUTHOR: LIBERMAN, L.S. 109-7-15/17

TITLE: A Method of Voltage Standing-Wave Ratio Measurement of Videodetectors. (Metod izmereniya KSVN videodetektorov, Russian)

PERIODICAL: Radiotekhnika i Elektronika, 1957, Vol 2, Nr 7, pp 941-942 (U.S.S.R.)

ABSTRACT: These measurements have to be undertaken at a very low efficiency level. At such levels, however, the usual line of measurements, especially within the millimeter wave domain, is full of grave errors. Besides, the "uncoupling" desired on the occasion of such changes according to the generator from 5 - 10 db cannot always be warranted.
These difficulties are eliminated if the method worked out here is used. If the load phase is changed by means of the pressure line, the highest and the lowest value of the rectified current can be obtained which would correspond to the highest and lowest decline of power.
For the method described here a power level of less than 1 μW would be sufficient, and no uncoupling attenuator would be

Card 1/2

109-7-15/17

A Method of Voltage Standing-Wave Ratio Measurement of Videodetectors.

necessary.
The amplifier 28-I was used as an indicator of the rectified current. (With 1 Illustrations).

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

Card 2/2

SOV/115-59-5-22/27

8(3), 9(3)

AUTHOR: Liberman, L.S.

TITLE: Measuring of a Generator's Reflection Factor with a Phase Rotator

PERIODICAL: Izmeritel'naya Tekhnika, 1959, Nr 5, pp 52-53 (USSR)

ABSTRACT: The author presents a method of measuring a generator's reflection factor with a phase rotator instead of a transformer (Fig.1) Ref.1. The source of power is linked with the detector through a phase rotator. The article gives the calculation of the dependence between the dimishing of power and phase of the reflection factor. The calculation gives the possibility of measuring the reflection factor by measuring the maximum and minimum rectified current (or voltage) of a phase rotator. The method is suitable for measuring a broad range of waves, provided that the condition $G_n=1$ (G_n = reflection factor of the load) is accomplished. There are 1 layout, 2 equations and 3 Soviet references.

Card 1/1

LIBERMAN, L.S.

Growth of a p-n junction breakdown voltage at superhigh frequancies.
Radiotekh. i elektron. 8 no.10:1795 O '63. (MIRA 16:10)

ACCESSION NR AT5004891 S/2657/64/000/012/0032/0057

621.382.014.2

AUTHOR: Sestroretskiy, B. V.; Liberman, L. S.

TITLE: Theory of shf semiconductor-diode switches

SOURCE: Poluprovodnikovyye pribory i ikh primeneniye; sbornik statey, no. 12, 1964, 32-57

TOPIC TAGS: semiconductor diode, semiconductor diode switch

ABSTRACT: A general method of analysis of shf semiconductor-diode switches is proposed. One-diode switches are considered, and optimal conditions for a switch operating at a specified frequency are found. The power is switched by changing the capacitance and resistance of the p-n junction by application of an external voltage. By regarding the one-diode switch as a reversible reactive [illegible] network, general formulas [illegible] are developed for the [illegible] by the switch in its closed and open states. The relation [illegible]

L 55225-65
ACCESSION NR: AT5004891

between the above losses characterizes the switch performance. The performance-determining parameters can be measured if the diode is tested under these three conditions: no-load, short-circuit, and a definite load. Orig. art. has: 13 figures and 78 formulas.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: EC

NO REF SOV: 000 OTHER: 000

Card 2/2

L 9289-66 EWT(1)/EWT(m)/EEC(k)-2/T/EWP(t)/EWP(b)/EWA(h) IJP(c) JD

ACC NR: AT5025633 SOURCE CODE: UR/2657/65/000/013/0003/0022

AUTHOR: Liberman, L. S. 44

ORG: none

50
B+1

TITLE: Shf p-n junction switching diodes

SOURCE: Poluprovodnikovyye pribory i ikh primeneniye; sbornik statey, no. 13, 1965, 3-22

TOPIC TAGS: semiconductor diode, 25,44 junction diode, germanium 27 diode, switching circuit, pn junction

ABSTRACT: Descriptions are given of the general operation of p-n junction germanium diodes used in switching circuits and of a new type of shf germanium diode based on the resonance principle. The new switching diode is designed for operation in the microwave region and has the following parameters: transmission losses, less than 0.2 db; cutoff, higher than 30 db; and switching time, 20 nanosec. Due to the small interelectrode gap, the breakdown voltage does not exceed 200 v, thus limiting the amplitude of shf signals which can be manipulated by the diode. In this respect, p-n junction diodes with a thin base are inferior to diodes with a p-i-n structure, because the latter can operate at a higher shf power (e.g., 1—10 kw). However, p-i-n diodes have a longer switching time and consequently a lower Q. The accompany-

Card 1/2 UDC: 621.382.2.029.64

L 9289-66

ACC NR: AT5025633

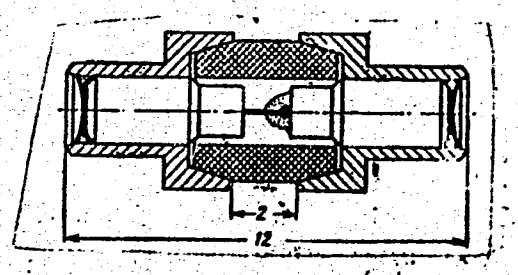
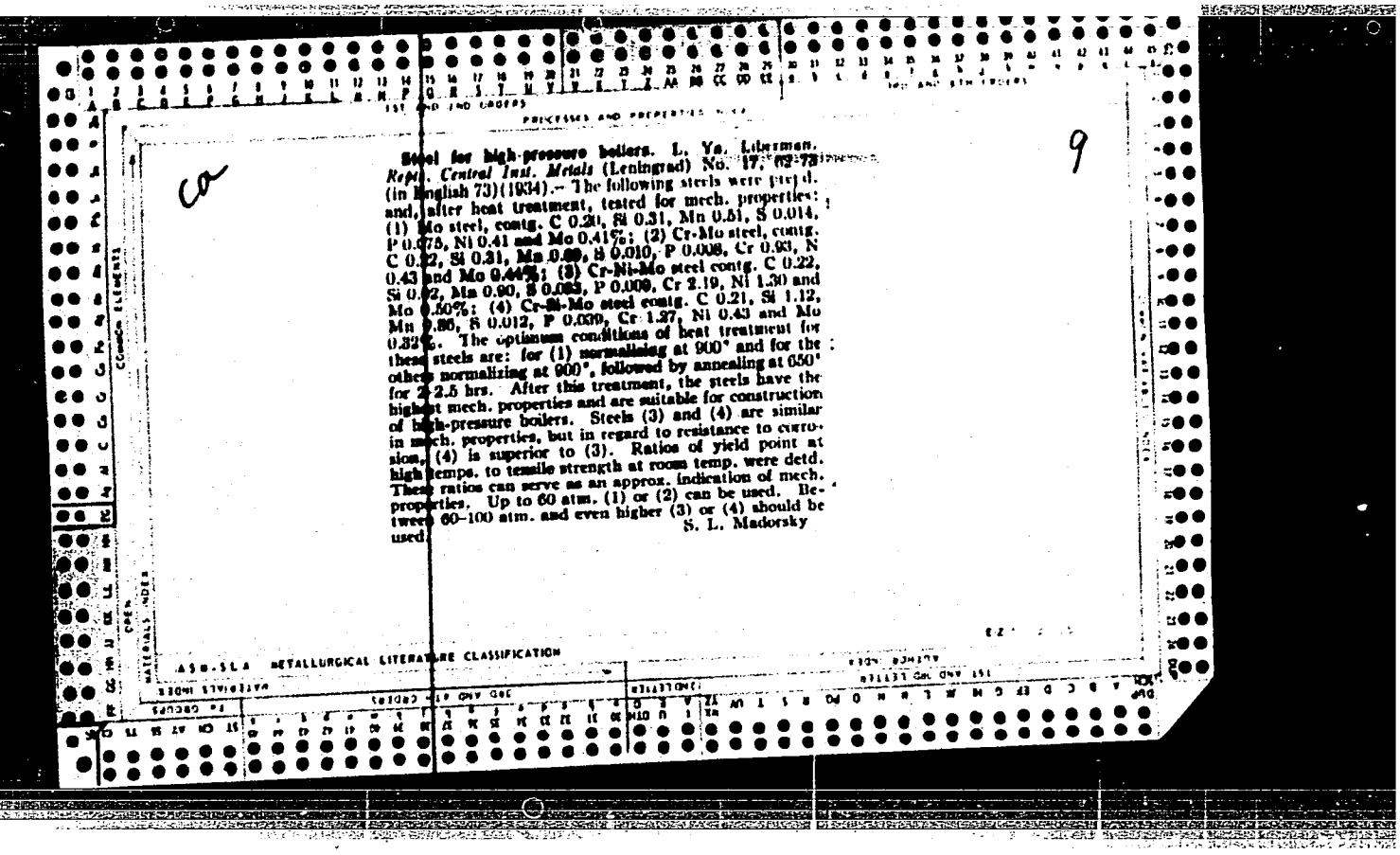


Fig. 1. Cutaway view of the shf switching diode

ing figure shows an alloy-diffused p-n junction switching diode. Orig. art. has: 9 figures. [JR]

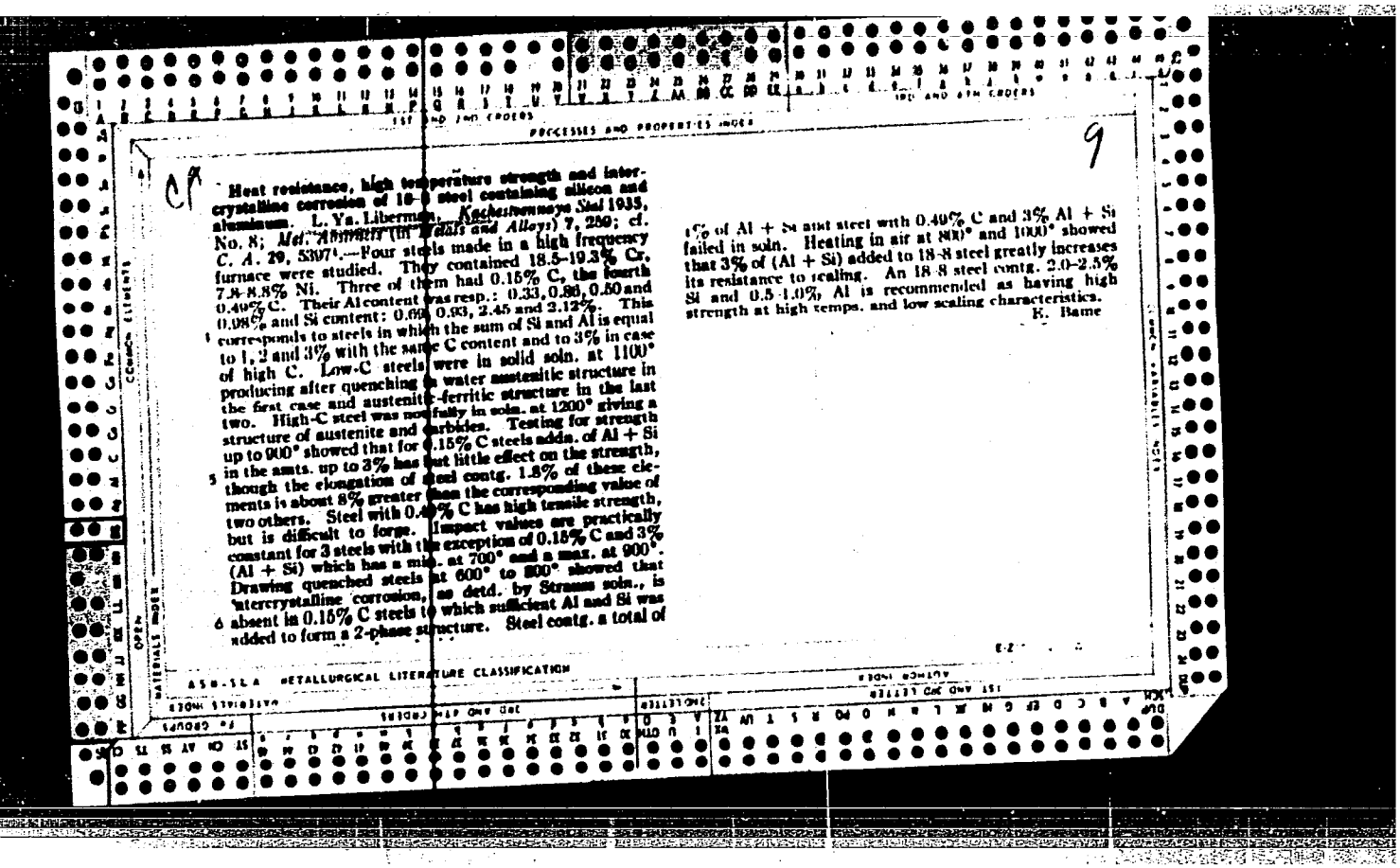
SUB CODE: 09/ SUBM DATE: none/ ORIG REF: 002/ OTH REF: 001/ ATD PRESS: 4153

Card 2/2



Steel for high-pressure boilers. L. Ya. Liberman. *Repts. Central Inst. Metals* (Leningrad) No. 17, 69–73 (in English 73) (1934).— The following steels were prepd. and, after heat treatment, tested for mech. properties: (1) Mo steel, contg. C 0.20, Si 0.31, Mn 0.51, S 0.014, P 0.075, Ni 0.41 and Mo 0.41%; (2) Cr-Mo steel, contg. C 0.12, Si 0.31, Mn 0.69, S 0.010, P 0.008, Cr 0.93, Ni 0.43 and Mo 0.44%; (3) Cr-Ni-Mo steel contg. C 0.22, Si 0.42, Mn 0.90, S 0.033, P 0.009, Cr 2.19, Ni 1.30 and Mo 0.50%; (4) Cr-Si-Mo steel contg. C 0.21, Si 1.12, Mn 0.80, S 0.012, P 0.039, Cr 1.27, Ni 0.43 and Mo 0.32%. The optimum conditions of heat treatment for these steels are: for (1) normalising at 900° and for the others normalizing at 900°, followed by annealing at 650° for 2–2.5 hrs. After this treatment, the steels have the highest mech. properties and are suitable for construction of high-pressure boilers. Steels (3) and (4) are similar in mech. properties, but in regard to resistance to corrosion, (4) is superior to (3). Ratios of yield point at high temps. to tensile strength at room temp. were detd. These ratios can serve as an approx. indication of mech. properties. Up to 60 atm. (1) or (2) can be used. Between 60–100 atm. and even higher (3) or (4) should be used.

S. L. Madorsky



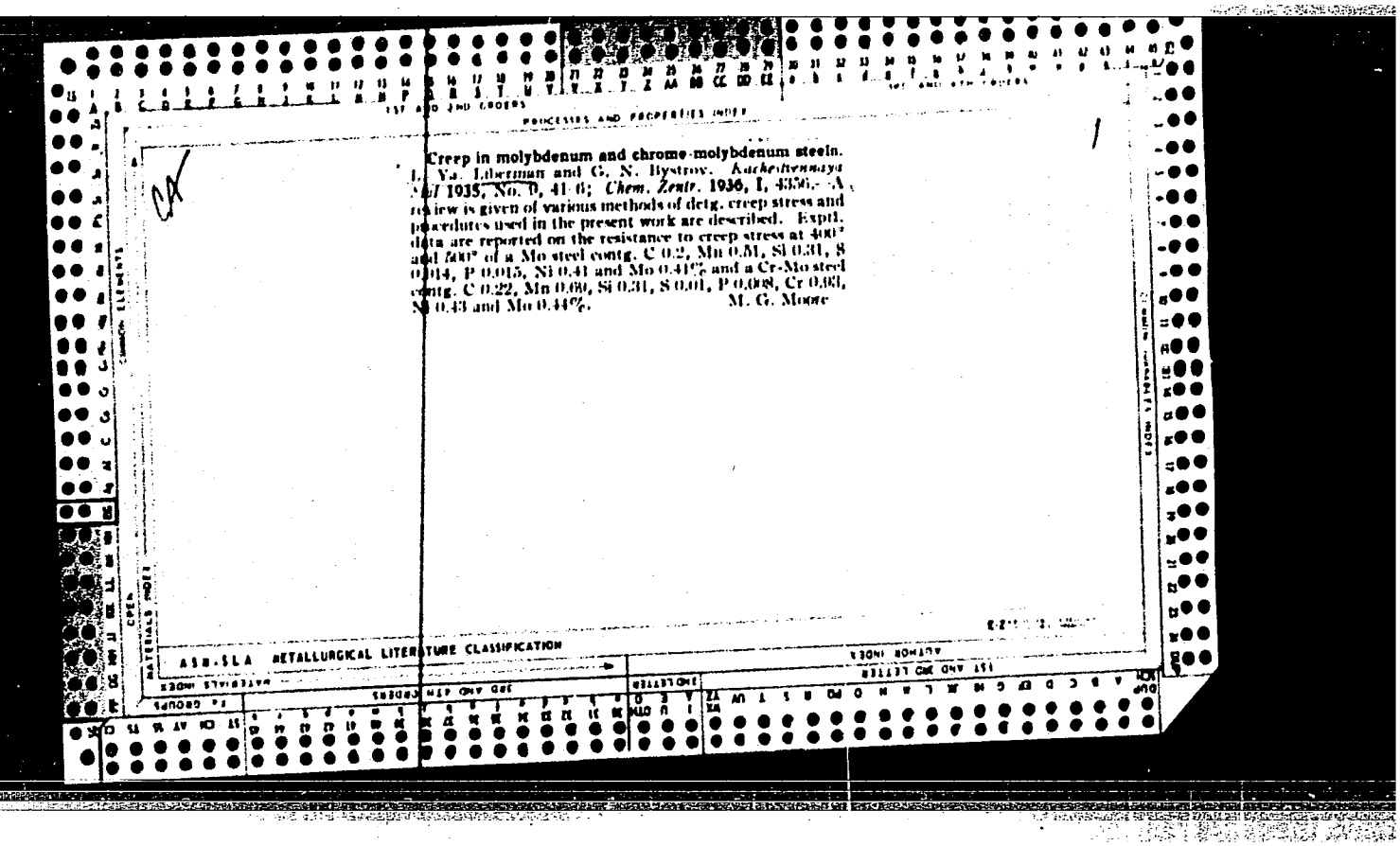
PROCESSES AND PROPERTIES INDEX

9

Heat resistance, high temperature strength and intercrystalline corrosion of 18-8 steel containing silicon and aluminum. L. Ya. Liberman. *Kachestvennaya Stal* 1935, No. 8; *Met. Abstracts (Ind. Metals and Alloys)* 7, 280; cf. *C. A.* 29, 5307⁶.—Four steels made in a high frequency furnace were studied. They contained 18.5–19.3% Cr, 7.8–8.8% Ni. Three of them had 0.15% C, the fourth 0.49% C. Their Al content was resp.: 0.33, 0.86, 0.50 and 0.08% and Si content: 0.69, 0.93, 2.45 and 2.12%. This corresponds to steels in which the sum of Si and Al is equal to 1, 2 and 3% with the same C content and to 3% in case of high C. Low-C steels were in solid soln. at 1100° producing after quenching a water austenitic structure in the first case and austenitic-ferritic structure in the last two. High-C steel was not fully in soln. at 1200° giving a structure of austenite and carbides. Testing for strength up to 900° showed that for 0.15% C steels addns. of Al + Si in the amts. up to 3% has but little effect on the strength, though the elongation of steel contg. 1.8% of these elements is about 8% greater than the corresponding value of two others. Steel with 0.49% C has high tensile strength, but is difficult to forge. Impact values are practically constant for 3 steels with the exception of 0.15% C and 3% (Al + Si) which has a min. at 700° and a max. at 900°. Drawing quenched steels at 600° to 800° showed that intercrystalline corrosion, as detd. by Strauss soln., is absent in 0.15% C steels to which sufficient Al and Si was added to form a 2-phase structure. Steel contg. a total of 4% of Al + Si and steel with 0.49% C and 3% Al + Si failed in soln. Heating in air at 800° and 1000° showed that 3% of (Al + Si) added to 18-8 steel greatly increases its resistance to scaling. An 18-8 steel contg. 2.0–2.5% Si and 0.5–1.0% Al is recommended as having high strength at high temps. and low scaling characteristics.

K. Bame

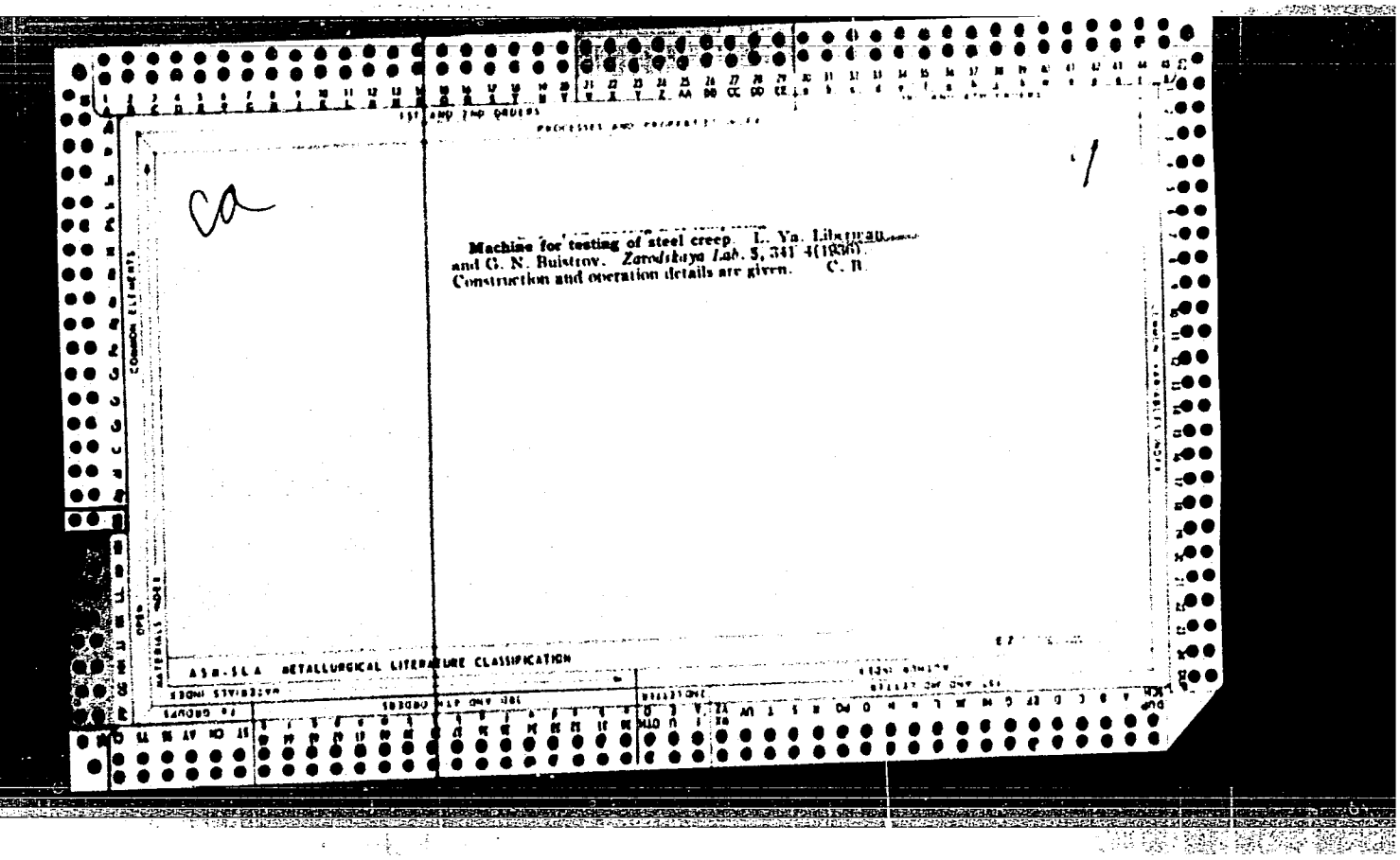
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



PROCESSES AND PROPERTIES INDEX

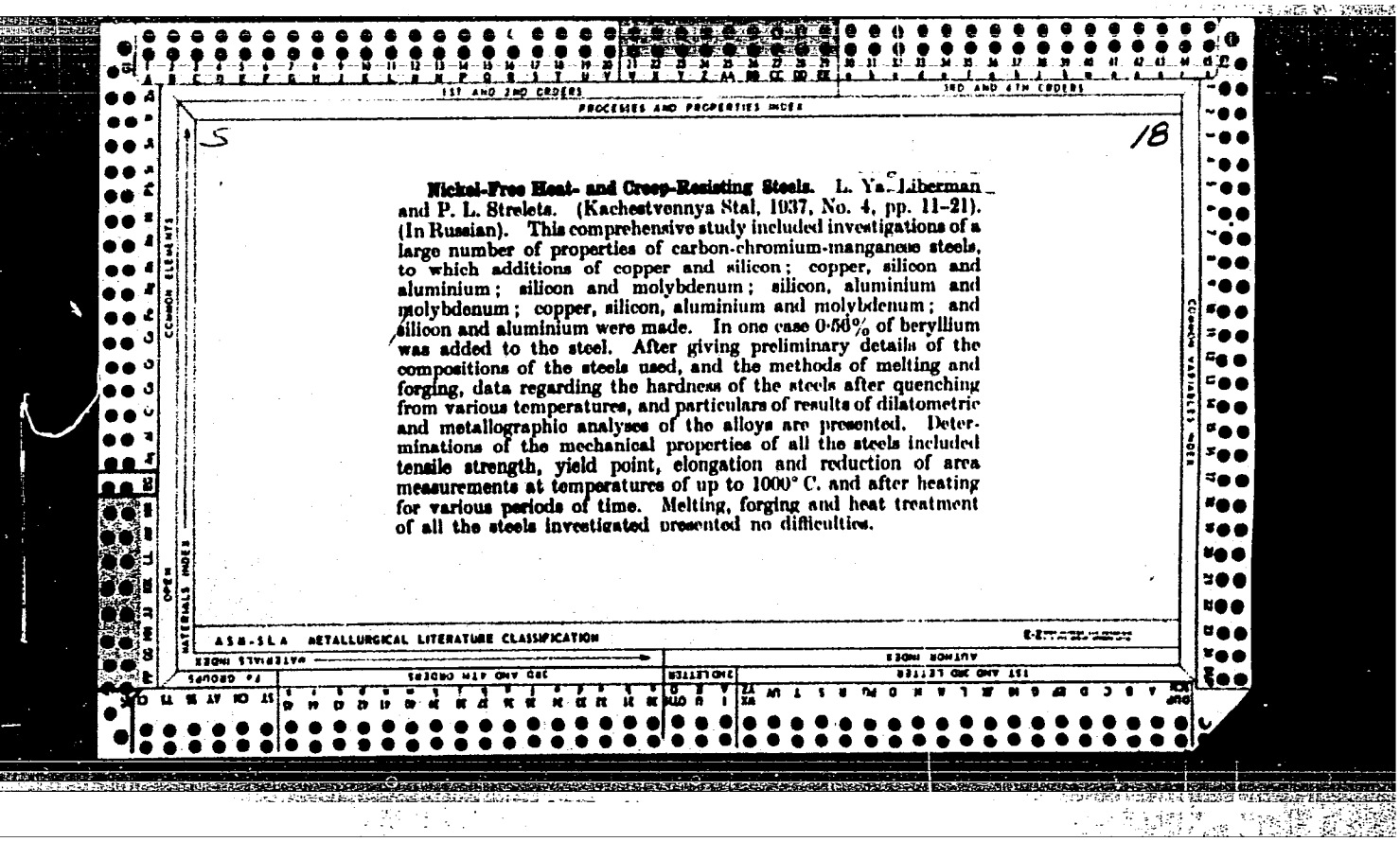
Creep in molybdenum and chrome-molybdenum steels. L. Ya. Liberman and G. N. Bystrov. *Kachestvennaya Stal* 1935, No. 9, 41–6; *Chem. Zentr.* 1936, I, 4356.—A review is given of various methods of detg. creep stress and procedures used in the present work are described. Expt. data are reported on the resistance to creep stress at 400° and 500° of a Mo steel contg. C 0.2, Mn 0.51, Si 0.31, S 0.014, P 0.015, Ni 0.41 and Mo 0.41% and a Cr-Mo steel contg. C 0.22, Mn 0.60, Si 0.31, S 0.01, P 0.008, Cr 0.93, Ni 0.43 and Mo 0.44%. M. G. Moore

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



Machine for testing of steel creep. L. Ya. Lilenrau... and G. N. Buistrov. *Zavodskaya Lab.* 5, 341-4(1936). Construction and operation details are given. C. B.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



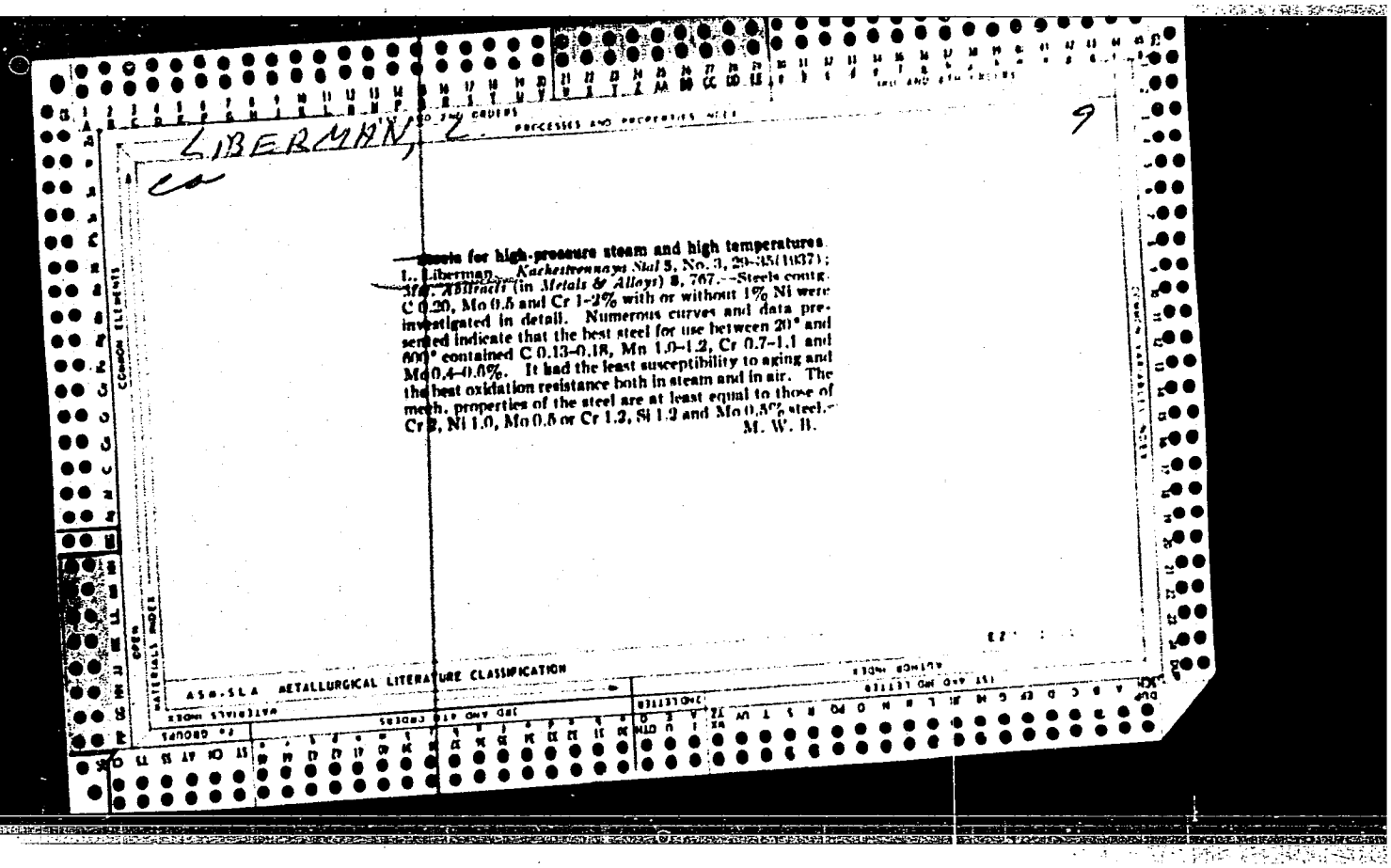
PROCESSES AND PROPERTIES INDEX

5

18

Nickel-Free Heat- and Creep-Resisting Steels. L. Ya. Liberman and P. L. Strelets. (Kachestvennya Stal, 1937, No. 4, pp. 11–21). (In Russian). This comprehensive study included investigations of a large number of properties of carbon-chromium-manganese steels, to which additions of copper and silicon; copper, silicon and aluminium; silicon and molybdenum; silicon, aluminium and molybdenum; copper, silicon, aluminium and molybdenum; and silicon and aluminium were made. In one case 0·50% of beryllium was added to the steel. After giving preliminary details of the compositions of the steels used, and the methods of melting and forging, data regarding the hardness of the steels after quenching from various temperatures, and particulars of results of dilatometric and metallographic analyses of the alloys are presented. Determinations of the mechanical properties of all the steels included tensile strength, yield point, elongation and reduction of area measurements at temperatures of up to 1000° C. and after heating for various periods of time. Melting, forging and heat treatment of all the steels investigated presented no difficulties.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



LIBERMAN, L.

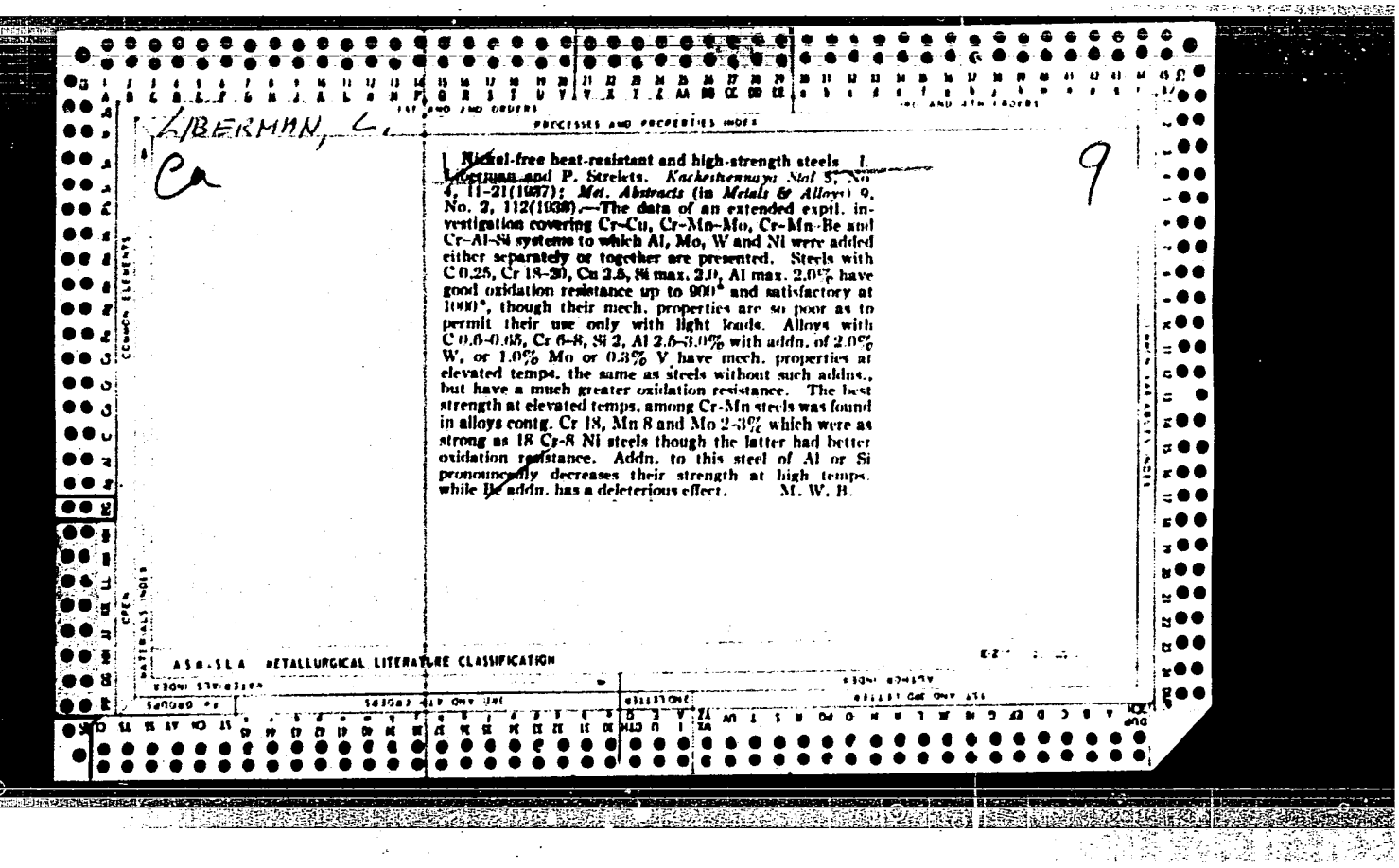
ca

9

Steels for high-pressure steam and high temperatures.

L. Liberman. *Kachestvennaya Stal* 5, No. 3, 29-35 (1937); *Steel. Abstracts* (in *Metals & Alloys*) 8, 767.—Steels containing C 0.20, Mo 0.5 and Cr 1-2% with or without 1% Ni were investigated in detail. Numerous curves and data presented indicate that the best steel for use between 20° and 600° contained C 0.13–0.18, Mn 1.0–1.2, Cr 0.7–1.1 and Mo 0.4–0.6%. It had the least susceptibility to aging and the best oxidation resistance both in steam and in air. The mech. properties of the steel are at least equal to those of Cr 2, Ni 1.0, Mo 0.5 or Cr 1.2, Si 1.2 and Mo 0.5% steel.—M. W. B.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



LIBERMAN, L.

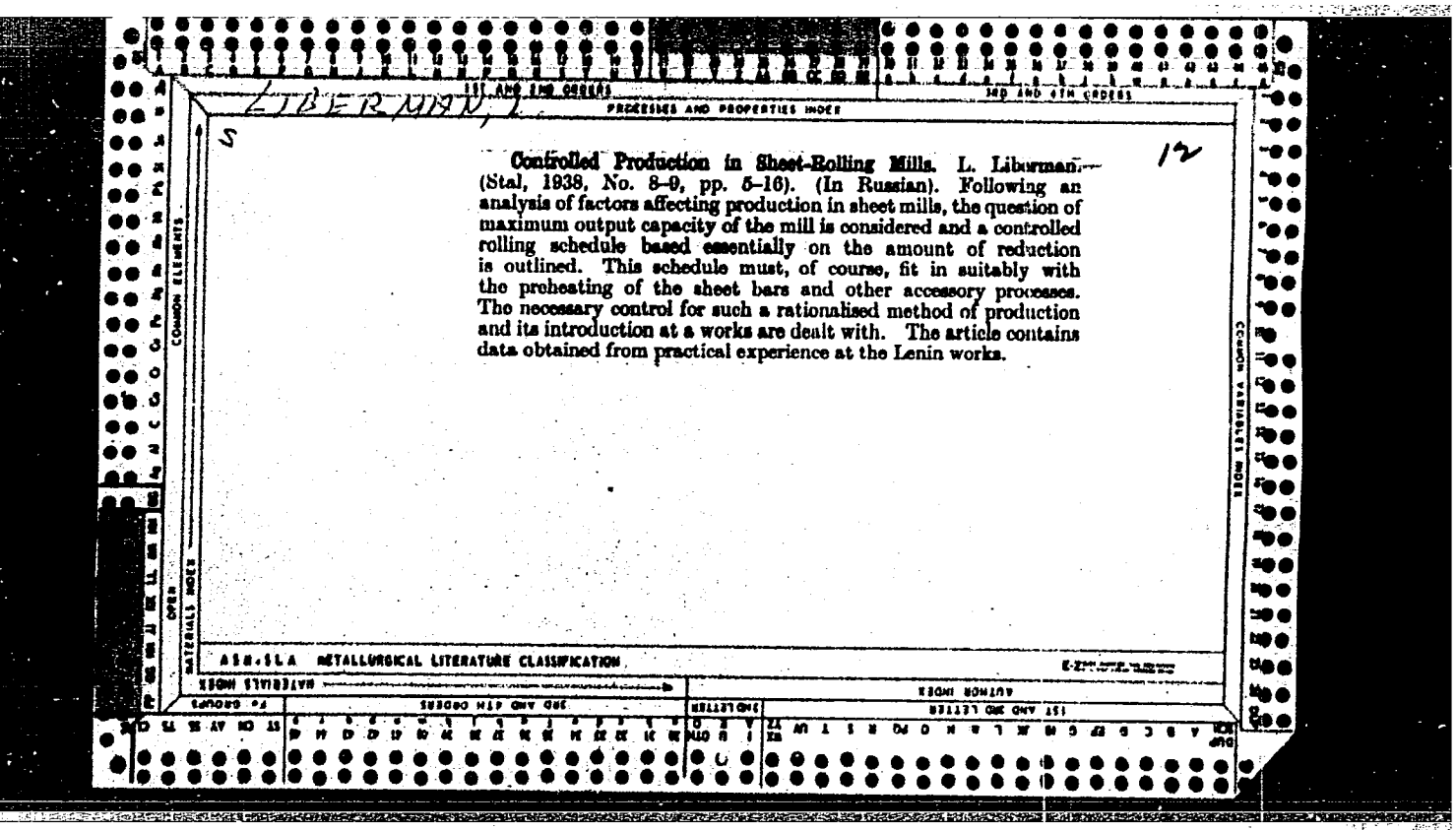
Ca

9

PROCESSES AND PROPERTIES INDEX

Nickel-free heat-resistant and high-strength steels. I. Liberman and P. Strelets. *Kachestvennaya Stal* 5, No. 1, 11–21(1937); *Met. Abstracts* (in *Metals & Alloys*) 9, No. 2, 112(1938).—The data of an extended expil. investigation covering Cr–Cu, Cr–Mn–Mo, Cr–Mn–Be and Cr–Al–Si systems to which Al, Mo, W and Ni were added either separately or together are presented. Steels with C 0.25, Cr 18–20, Cu 2.5, Si max. 2.0, Al max. 2.0% have good oxidation resistance up to 900° and satisfactory at 1000°, though their mech. properties are so poor as to permit their use only with light loads. Alloys with C 0.6–0.65, Cr 6–8, Si 2, Al 2.5–3.0% with addn. of 2.0% W, or 1.0% Mo or 0.3% V have mech. properties at elevated temps. the same as steels without such addns., but have a much greater oxidation resistance. The best strength at elevated temps. among Cr–Mn steels was found in alloys contg. Cr 18, Mn 8 and Mo 2–3% which were as strong as 18 Cr–8 Ni steels though the latter had better oxidation resistance. Addn. to this steel of Al or Si pronouncedly decreases their strength at high temps. while Be addn. has a deleterious effect. M. W. B.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



LIBERMAN, L.

S

12

Controlled Production in Sheet-Rolling Mills. L. Liberman.— (Stal, 1938, No. 8–9, pp. 5–16). (In Russian). Following an analysis of factors affecting production in sheet mills, the question of maximum output capacity of the mill is considered and a controlled rolling schedule based essentially on the amount of reduction is outlined. This schedule must, of course, fit in suitably with the preheating of the sheet bars and other accessory processes. The necessary control for such a rationalised method of production and its introduction at a works are dealt with. The article contains data obtained from practical experience at the Lenin works.

18(0) PHASE I BOOK EXPLOITATION SOV/1936

Liberman, L. Ya., Candidate of Technical Sciences, and M.I. Peysikhis, Engineer.

Spravochnik po svoystvam Staley, primenyayemykh v Kotloturbostroyenii (Handbook on Properties of Steels Used in Boiler and Turbine Construction) 2d ed., enl. Moscow, Mashgiz, 1948. 408 p. (Series: Tsentral'nyy nauchno-issledovatel'skiy kotloturbinnyy institut. [Izdaniya] kn. 32) Errata slip inserted. 8,500 copies printed.

Sponsoring Agency: Tsentral'nyy nauchno-issledovatel'skiy kotloturbinnyy institut.

Ed.: A.A. Kanayev, Candidate of Technical Sciences; Tech. Ed.: P.G. Pol'skaya.

PURPOSE: This handbook is intended for designers, physical metallurgists, metallurgists, metallurgists of boiler and turbine plants, and also personnel of plant laboratories and scientific research institutes of other branches of machine building.

COVERAGE: This is the second edition of a handbook on boiler and turbine steels originally published in 1955. The present edition describes 90 types of steels,

Card 1/9

and is based exclusively on experimental material obtained during the past several years at various Soviet scientific research institutes and plant laboratories. Contributions from TsKII (Central Committee for Heavy Industry), TsNIIMASh (Central Scientific Research Insitute of Heavy Machinery), TsNIIchM (Central Scientific Research Institut of Ferrous Metallurgy), and the laboratories of the Leningradskiy metallicheskiy zavod (Leningrad Metal Plant), Khar'kovskiy turbinnyy zavod (Khar'kov Turbine Plant), Nevskiy machinostroitel'nyy zavod (Neva Machine-building Plant), and the Novo-Kramatorskiy metallurzicheskiy zavod (New Metallurgical Plant in Kramotorsk) are represented. The handbook covers systematically the whole range of materials from carbon steels to the most heat-resistant high-alloy and nonferrous metals used at present, or which may be used in the near future, in manufacturing boiler and steam- and gas-turbines. The authors say that all available information for each type of steel on mechanical properties, stability of properties at various temperatures, data on creep-resistant and creep-rupture properties, and design graphs for selecting design stresses and strains are presented. For those steel types which are intended for fastening parts of boiler and turbine units, stress-relaxation characteristics are also presented. The handbook includes existing GOST (All-Union State Standards) and Technical Specifications for materials used in boiler and turbine making. The thermal conductivity coefficients experimentally determined by Engineer R.Ye, Krzhizhamovskiy, TsKII, and not included in the first edition for many types of steel, are given, The authors thank chief specialist on metallurgy Ya.I. Kulandin of the Gosplan

and Department Head Candidate of Technical Sciences A.V. Stanyukovich for their assistance. There are no references.

TABLE OF CONTENTS:

Card 6/9

Handbook of Properties (Cont.) SOV/1936

AVAILABLE: Library of Congress

Card 9/9

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8-6-59

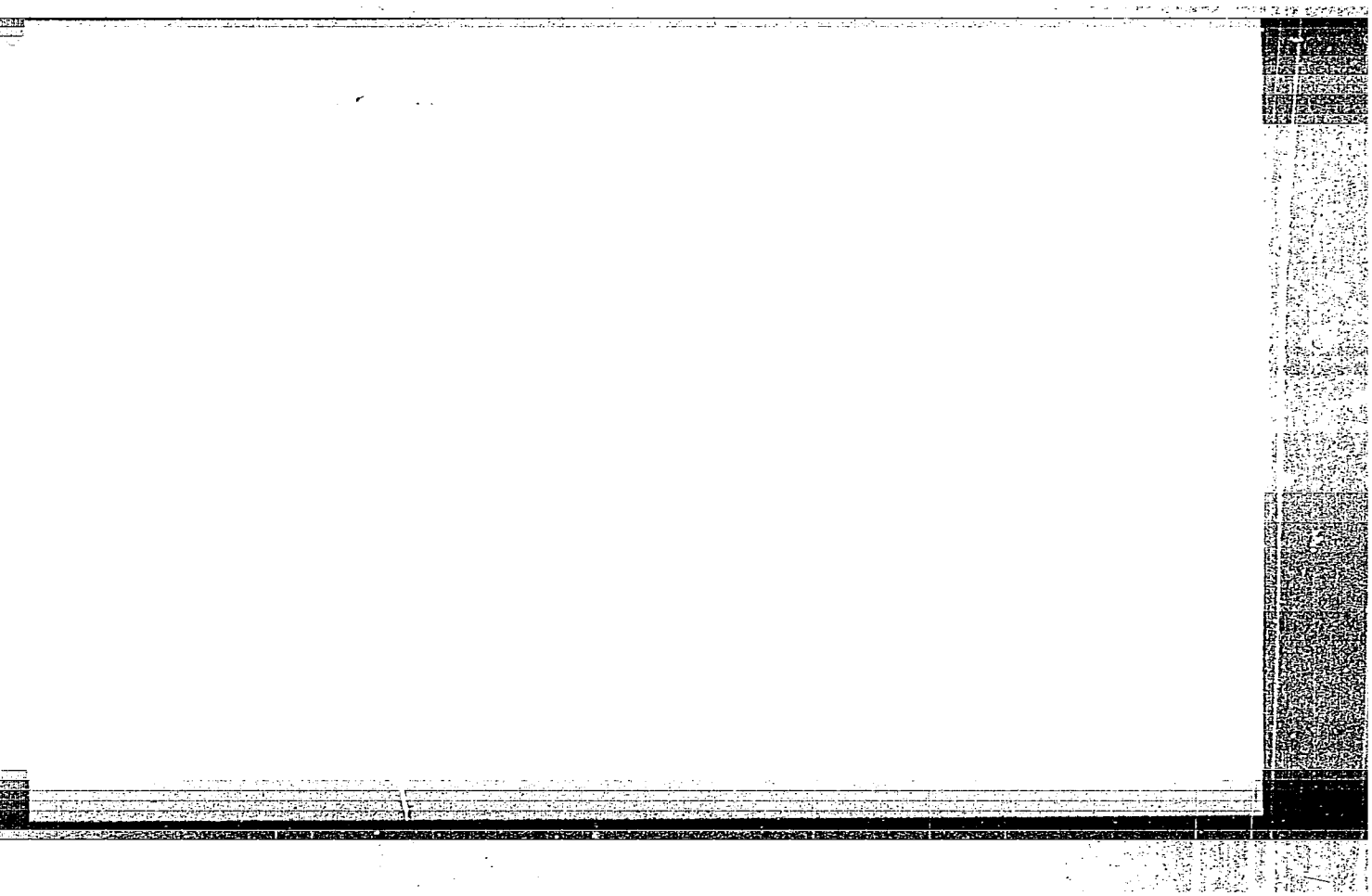
LIBERMAN, L.Ya., kandidat tekhnicheskikh nauk.; PEYSIKHIS, M.I., inzhener; KANAYEV, A.A., kandidat tekhnicheskikh nauk, redaktor; POL'SKAYA, R.G., tekhnicheskiy redaktor

[Handbook on the properties of steels used in marine boiler and turbine building] Spravochnik po svoistva stalei, promeniaemykh v kotloturbostroenii. Moskva, Ges.nauchno-tekhn.izd-vo mashinostroit. lit-ry, 1955. 195 p. (Leningrad. TSentral'nyi nauchno-issledovatel'skii kotloturbinnyi institut. [Trudy], vol. 29.) (MLRA 9:10)
(Steel--Specifications) (Boilers, Marine) (Steam turbines)

LIBERMAN, L.Ya.

Repeated failure test for metals. Zav.lab. 21 no.2:218-222 '55.
(MLRA 8:6)

1. Tsentral'nyy nauchno-issledovatel'skiy kotloturbinyy institut imeni I.I. Polzunova.
(Steel--Testing)



Category : USSR/Solid State Physics - Mechanical properties of crystals and polycrystalline compounds E-9

Abs Jour : Ref Zhur - Fizika, No 1, 1957 No 1363

Author : Liberman, L.Ya., Boyeva, A.V.
Inst : Central Boiler and Turbine Institute, USSR
Title : Heat Resistance and Relaxation Stability of Chrome-Vanadium and Chrome-Tungsten-Vanadium Structural Steels

Orig Pub : Metallovedeniye i obrabotka metallov, 1956, No 4, 2-10

Abstract : An investigation was made to find substitutes for molybdenum-containing steels, satisfying the requirements imposed on materials for bolts and pins, intended for operation at temperatures up to 500°. A study was made of the effect of the V,W, and C content and its influence on the creep resistance long-term strength, relaxation endurance, and sensitivity to tempering brittleness. It was established that the first three characteristics increase with the vanadium content up to 1%; the maximum sensitivity to tempering and thermal brittleness is displayed by chrome-vanadium steels at o.5% V. Chrome-vanadium steels containing 1.25% W and 0.25 -- 0.30% C are insensitive to tempering and thermal brittleness, have high creep resistance, high long-term

Card : 1/2

Category : USSR/Solid State Physics - Mechanical properties of crystals and poly- E-9
crystalline compounds

Abs Jour : Ref Zhur - Fizika, No 1, 1957 No 1363

strength, and high relaxation endurance. The 25Kh2V1F steel, containing o.23 -- o.30% C, 1.2 -- 1.4% Cr, 1 -- o.4% W and 0.2 -- 0.3% V, has a better combination of properties, satisfying the above requirements.

Card : 2/2

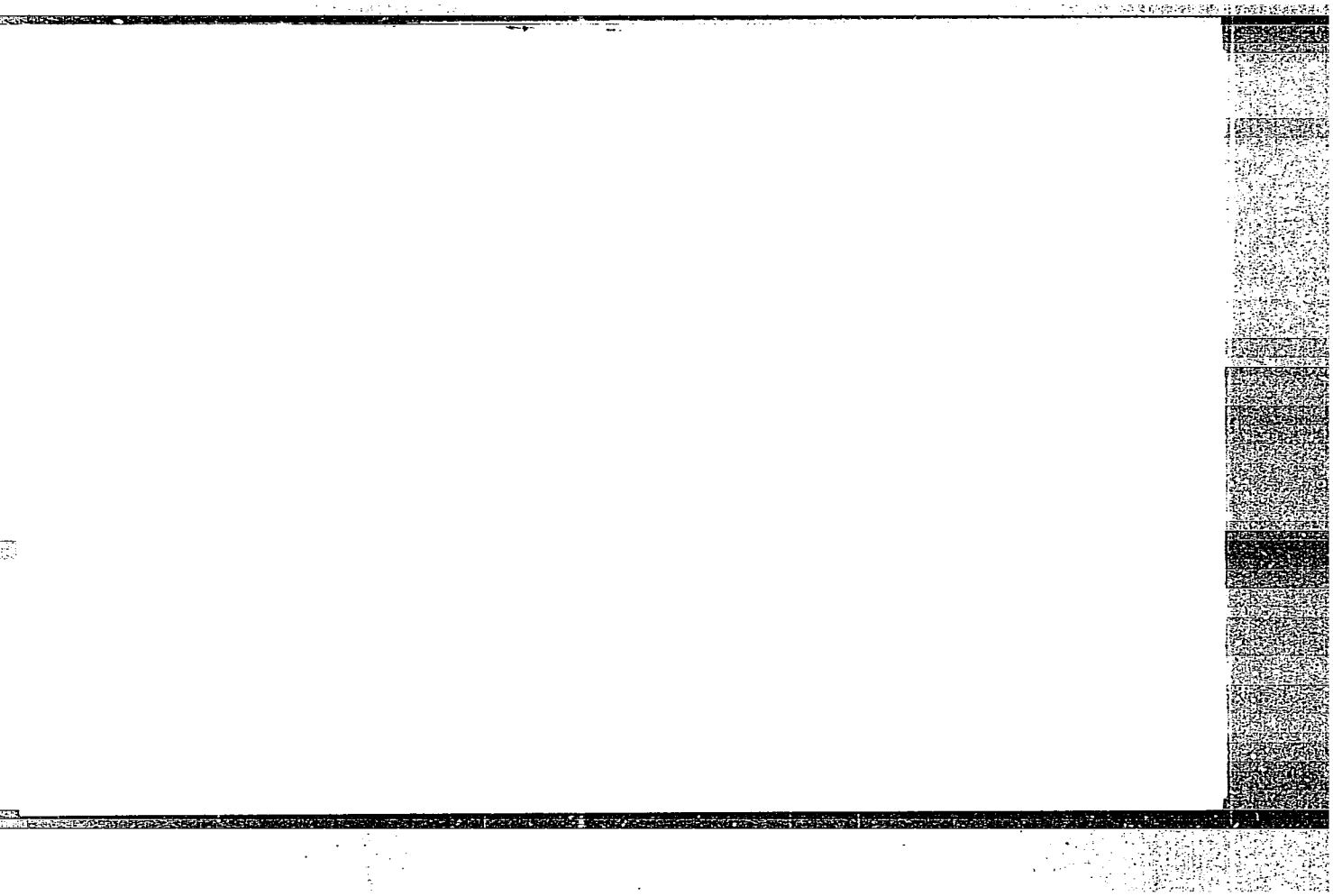
LIBERMAN, L.Ya., kandidat tekhnicheskikh nauk.

Steel for steam power installations; survey of foreign literature.
Energomashinostroenie no.4:26-30 Ap '56. (MLRA 9:7)
(Steel)

LIBERMAN, L.Ya., kandidat tekhnicheskikh nauk; BOYEVA, A.V., inzhener.

Heat-resisting chromium steels to be used at 550 - 600°.
Metalloved. i obr. met. no.6:16-25 Je '56. (MLRA 9:9)

1. TSentral'nyy nauchno-issledovatel'skiy kotloturbinnyy institut imeni I.I. Polzunova.
(Heat resisting alloys--Testing)



APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000929810(

LIBERMAN, L.Ya., kand.tekhn.nauk; PEYSIKHIS, M.I., inzh.; KANAYEV, A.A., kand.tekhn.nauk, red.; POL'SKAYA, R.G., tekhn.red.

[Handbook on properties of steel used in boiler and turbine construction] Spravochnik po svoistvam stalei, primeniaemykh v kotloturbostroenii. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1958. 408 p. (Leningrad. TSentral'nyi nauchno-issledovatel'skii kotloturbinnyi institut. [Trudy] vol.32) (MIRA 12:2)

(Steel)

AUTHOR: Liberman, L. Ya., Candidate of Techn. Sc. 129-2-8/11

TITLE: High Temperature Properties of Austenitic Steels During Cyclic Temperature Changes. (Zharoprochnye svoystva austenitnykh staley pri tsiklicheskom izmenenii temperatury)

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1958, No.2, pp. 38 - 49 (USSR).

ABSTRACT: This is a review of foreign practice, based exclusively on work published in the USA and Great Britain.
There are 16 figures, 9 tables and 15 non-Slavic references.

AVAILABLE: Library of Congress

Card 1/1

LIBERMAN, L.Ya., kand.tekhn.nauk

Heat-resistant steels for power plant applications; based on foreign sources. Energomashinostroenie 4 no.5:44-48 My '58. (MIRA 11:9)
(Steel)

LIBERMAN, L.Ya., kand.tekhn.nauk; LEVIN, Ye.Ye., kand.tekhn.nauk

Industrial conference on heat-resistant materials. Energomashinostroenie 4 no.11:40-42 N '58. (MIRA 11:11)
(Refractory materials--Congresses)

18(2)

AUTHOR: Liberman, L. Ya.

SOV/32-24-12-33/45

TITLE: Parametric Methods for Determining the Endurance of Heat-Resistant Alloys (Parametricheskiye metody dlya otsenki dlitel'noy prochnosti zharoprochnykh splavov) Survey (Obzor)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol 24, Nr 12, pp 1501 - 1509 (USSR)

ABSTRACT: In recent years parametric methods of determination have found an ever increasing applicability in testing and interpreting experimental results on endurance. Most used is the parametric function between time, temperature, and tension suggested by Larson and Miller (Refs 1,2). Since the assumption that the energy of activation Q and the time τ are dependent on the tension had not been experimentally confirmed, appropriate experiments were carried out by La Rocca (Lya Rokka) (Ref 3). The observation that the constant C changes from 13 to 14 agrees with the results obtained by N'yukhauz and Van Ullen (Ref 1). Nisbet and Hibbard (Ref 4) found C = 11 in various cobalt

Card 1/3

alloys. Krisch and Wepner (Krish and Vepner) (Ref 5) found that in most cases the parametric function σ-T(C+lg τ) is expressed by not one but several curves and leads to several values for C in various kinds of steel (Table 1). A comparison table of the experimental and calculated values for the limit of endurance is given (Table 2). From this it is apparent that the error for the majority of the steels varies from +5 to -15%. Bandel et al. (Ref 7) give a diagram for the distribution of the values for the constant C for pearlite and austenite steels (Fig 3). Manson and Brown (Menson and Broun) (Ref 9) determined a linear function lg τ-T with σ = constant. (T = testing temperature). Orr, Sherby and Dorn (Sherbi) (Ref 11) find a correlation between the test results on creeping and the length of time before decomposition at constant tension and various temperatures and deduce a parameter on the basis of which a parametric function is given in the coordinates σ-γ for four different materials (Fig 7). Several other sets of data from different authors are given with corresponding tables and diagrams.There are 10

Parametric Methods for Determining the Endurance of Heat- SOV/32-24-12-33/45
Resistant Alloys .Survey

figures, 5 tables and 17 references, 2 of which are
Soviet.

Card 3/3

LIBERMAN, L. Ya., kand. tekhn. nauk

Long-time operational properties of ferrite and austenite pipe and structural steels at high temperatures. Energomashinostroenie 6 no.6:45-48 Je '60. (MIRA 13:8)
(Steel)

LIBERMAN, L.Ya., kand. tekhn. nauk; STANYUKOVICH, A.V., kand. tekhn. nauk, red.; LEBEDEVA, N.I., red.; PODCHUFAROVA, S.I., red.; GROSMAN, L.A., red.; KOVAL'SKAYA, I.F., tekhn. red.

[Materials used in the manufacture of power machinery]Materialy, primeniaemye v energomashinostroenii. Moskva, TsINTIMASh, 1961. 181 p. (MIRA 16:4)
(Electric machinery industry--Equipment and supplies)
(Electric engineering--Materials)

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S/096/61/000/005/001/003
E111/E552

18.1110

AUTHORS: Liberman, L. Ya., Candidate of Technical Sciences and Sokolova, M. N., Engineer

TITLE: Heat Resisting Steel for Fastenings in Power Installations

PERIODICAL: Teploenergetika, 1961, No.4, pp.28-34

TEXT: The authors give results of their investigation aimed at finding steels for use as bolts, pins etc. in installations working with steam at 580°C and 240 atm. The properties required are superior to those of type ЭИ-909 (20Х1М1Ф1) (EI-909 (20Kh1M1F1)) similar to the British steel Durehete 950. The chemical composition of the steels studied and dilatometrically determined critical points are shown in Table 1 (the first column shows the type of steel, X = Kh, M = M, Ф = F, Б = B, B = V, T = T, P = R; the second the heat number and weight in kg; first line gives the permitted range of composition of 20Kh1M1F1 steel). Six of the heats were melted in a 100 kg induction furnace and forged into 70 x 40 mm or 70 mm diameter blanks; and two in a 500 kg arc furnace and forged to 70 mm diameter blanks. Blanks were annealed at 950°C for two hours

Card 1/6

Heat Resisting Steel for ...

and cooled to 300°C in the furnace. Most heats correspond to the V/C = 4 value shown to be desirable (Ref.2). Steel 20Kh1M1F1 was taken as the basis, and alloyed as required. A study of the effect of hardening from 950-1050°C and tempering at 650-720°C showed that the properties of all the steels were similar and little affected by differences in heat treatment. The carbide electrolytically separated from the steels heat treated in various ways was weighed and analysed. For the basic steel the amount was little dependent on hardening temperature. With hardening from 950°C the precipitate contained about 0.4% V; with higher hardening temperature the V content was 0.05-0.09. Tempering always led to increase in the amount of precipitate and its iron content while the vanadium content corresponds roughly to the hardened-from-950°C state. X-ray analysis in the refined state shows the carbide phase to be VC with Mo and Fe present. For 20Kh1M1F1B (20Kh1M1F1B) steel in the refined state the amount of iron content of the deposit was greater and the carbide phase was NbC and VC (V content low). With 20Kh1M1F1TR (20Kh1M1F1TR) steel in the refined state the amount of precipitate is about the same as in the basic steel and the V content is that of the steel itself. With the basic steel double

Card 2/6

hardening followed by tempering gives a uniform fine structure. Type 20Kh1M1F1B contains irregularly distributed ferrite and undissolved-carbide regions; the third steel differs from the others in having a larger grain of unequal etchability, bainite structure and the presence of primary titanium carbides and carbonitrides. The authors concluded from these and other experiments that for their steels oil hardening from 980 or 1000°C and tempering at 700°C to get the required mechanical properties is sound, and used 5-7 hours tempering (yield-point strength 75-80 kg/mm^2). All the steels had very similar mechanical and plastic properties at 20-600°C, but 20Kh1M1F1TR steel had considerably higher toughness (16-20 kg.m/cm^2) than the others (8-15). Tensile tests with various rates of deformation showed that hardening from 980°C gives the best plasticity for 20Kh1M1F1 and 20Kh1M1F1TR steels. No tendency to temper brittleness was found in any of the steels. The properties of all steels remained satisfactory on prolonged heating for 3000-5000 hours, at 565°C and no important structural changes occurred. Coefficients of linear expansion for 20Kh1M1F1TR and 20Kh1M1F1 steels were measured for various ranges, overall values (20-600°C) being 13.55 and 13.8 (presumably x10^{-6} - abstractor), respectively.

20502

Heat Resisting Steel for ... S/096/61/000/005/001/003
E111/E552

Relaxation properties at 565 and 580°C were studied using the ring-test method of I. A. Oding (not described) and tensile testing cylindrical specimens on УИМ-5 (UIM-5) machines. Some differences in results obtained by the two methods were found. Both 20Kh1M1F1 and 20Kh1M1F1TR showed improvement at 565°C with increasing hardening temperature and were better than the other steels; the latter at 580°C has specially high relaxation stability (residual stresses after 10 000 hours are not less than 11 kg/mm^2). Fig.4 shows the ratio of residual stress to initial (the "relative relaxation stability") as functions of V:C ratio for 20Kh1M1F1 steel for various test durations (curves 1-5 correspond to 1000-10000 hours) at 565°C (oil hardening from 1050, tempering at 700°C). Creep tests at 560°C and 12 kg/mm^2 showed 20Kh1M1F1TR steel to be best (11-12 kg/mm^2 for a creep rate of 10^{-5} %/hour); creep for 2000-3000 hours had no appreciable effect on mechanical properties or toughness. Determinations of the long-time strength at 565°C of the steels (of smooth and notched specimens) showed that 20Kh1M1F1TR steel is better than the type ЭИ723(EI723) and ЭИ415 (EI415) pearlitic steels commonly used for fastenings. This is attributed

Card 4/6

to the joint presence of titanium and boron. The authors conclude that 20Kh1M1F1TR steel can be used for fastenings (bolts, pins etc.) for prolonged service at metal working temperatures of 565-580°C, and also at lower temperatures when high relaxation stability is needed; the heat-resisting and relaxation properties of 20Kh1M1F1 steel satisfy its use for fastenings at temperatures up to 565-580°C. There are 6 figures, 7 tables and 4 references: 3 Soviet and 1 non-Soviet.

(Ref.2: Eng. No.4690, 824, 180, 1955).

ASSOCIATION: Tsentral'nyy kotloturbinnyy institut
(Central Boiler and Turbine Institute)

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B124/B203

AUTHORS: Liberman, L.Ya., and Volkova, N.V.

TITLE: Tests for relaxation and creeping under tensile load until destruction

PERIODICAL: Zavodskaya laboratoriya, v. 27, no. 6, 1961, 724-729

TEXT: The present paper gives the principal results obtained in developing a method of testing the relaxation of stress in one-dimensional elongation of smooth cylindrical specimens under repeated and cyclic load, as well as a method of combined relaxation tests until destruction of the specimens. The authors tested austenitic steel type EI612 (EI612) (0.06% C, 14.9% Cr, 34.92% Ni, 3.68% W, 1.13% Ti), structural steel type 20Kh1M1F1 (20Kh1M1F1) (0.21% C, 1.27% Cr, 1.02% Mo, 0.84% V), and steel type 28KhVFTs (28KhVFTs) (0.28% C, 1.72% Cr, 0.64% W, 0.64% V, 0.16% Zr); the mechanical properties of these steels are tabulated. In the relaxation tests under repeated load, the specimens were loaded repeatedly to the given initial load for 700 - 1000 hr (sometimes longer). In cyclic relaxation tests, the specimen was loaded to the initial stress for 100 hr each until its destruction. The

Card 1/9

relaxation stability rises with repeated loading. For studying the effect of previously accumulated plastic deformation on stress relaxation, the method of combined testing for relaxation and creeping was used instead of cyclic relaxation, in which the specimen had previously been in the condition of isothermal creeping at constant nominal stress until reaching the given plastic deformation of 0.1 - 1.0%. After reaching it, the specimen was released and tested for relaxation at the same temperature and an initial stress equal to, or slightly lower than the stress in creeping. The course of relaxation at different accumulated plastic deformation until destruction of the specimen was clarified by alternating creeping and relaxation tests. The Ref. 4 by V.I. Danilovskaya, G.M. Ivanova, and Yu.N. Rabotnov, Izvestiya AN SSSR, OTN, No. 5 (1955) is mentioned in this connection. Fig.1,a shows the relaxation curves (1-6) and curve 7 characterizing the plastic deformation in all creeping and relaxation cycles of the same specimen of EI612 steel; Fig.1,б shows the same curves for another specimen of the same steel. Every creeping cycle of the first specimen was continued until reaching the plastic deformation of 0.1 - 0.3%, of the second specimen up to 0.7%; in the former case, the creeping cycle lasted 50-80 hr. in the latter case, 40 hr, the relaxation

cycles lasted 200-450, and 300-600 hr, respectively. Fig.2 illustrates the relation between residual stress and plastic deformation in creeping before each relaxation cycle. The formation of plastic deformation in relaxation, or relaxation and creeping, effects a damage to the steel which, in turn, accelerates the course of relaxation. The degree of damage can be determined by the quantity $\varepsilon_{pd}/\delta_d$, where ε_{pd} is the arbitrarily (by relaxation, creeping, or relaxation and creeping) accumulated plastic deformation before starting the relaxation test, and δ_d is the elongation at break in creeping, determining the plasticity reserve of the steel. The quantity $1 - \varepsilon_{pd}/\delta_d$ characterizes the plasticity reserve conserved. The relation between relaxation stability (σ_{rst}/δ_d) and damage ($\varepsilon_{pd}/\delta_d$) or plasticity reserve ($1 - \varepsilon_{pd}/\delta_d$) of EI612 steel is given in Fig.3. The elongation at break in the last relaxation of creeping cycle was 1.1 - 2.4%. In 28KhVFTs steel, the stress drop is delayed and the relaxation stability rises with increasing accumulated plastic deformation. In 20Kh1M1F1 steel, the relaxation stability rises continuously with plastic deformation almost to the instant of destruction. In austenitic steel EI612, the relaxation

stability drops continuously with rising plastic deformation and consumption of the plasticity reserve, whereas in perlite steels with high (28KhVFTs) and low (20Kh1M1F1) plasticity reserves it rises, and reaches a maximum near the destruction limit. In austenitic steel, the damage increases with plastic deformation, and the intergranular cracks enlarge under the action of stress, which accelerates relaxation, while the damages in perlite steels may "heal on their own", particularly at steadily dropping stress. There are 5 figures, 1 table, and 4 Soviet-bloc references.

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TITLE: Relaxation stability of steels EI612 (EI612) and 20Kh1M1F1 (20Kh1M1F1) in tension and fracture

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, no. 4, 1962, 6 - 13

TEXT: The object of the present investigation was to assess the notch sensitivity of steels EI612 and 20Kh1M1F1 by determining the, so-called, "plasticity reserve" of these materials. To this end stress relaxation was studied on smooth specimens (12 mm diameter, 155 mm gauge length), tested to fracture in tension. The composition and mechanical properties of the steels studied are given in Table 1. Three types of tests were carried out: 1) specimens, heated to a given test temperature, were loaded and held under conditions of constant strain for 700 - 1 000 h, after which the stress was increased to the initial level; 2) specimens were tested to fracture under conditions of cyclic relaxation which entailed increasing the stress to the initial level every 100 - 120 h; 3) specimens were tested under

Card 1/4

Relaxation stability ....

conditions of alternating relaxation and creep. The results, which are reproduced graphically, can be summarized as follows.
a) Accumulation of plastic strain accelerates the relaxation process in the austenitic steel EI612; in the case of pearlitic steel 20KhlM1F1 the resistance to relaxation continuously increases, the decrease in stress being delayed until practically the entire "plasticity reserve" (0.90 - 0.95%) is used up.
b) Fracture of specimens tested under conditions of stress relaxation (alone or alternating with periods of creep) takes place as a result of the entire "plasticity reserve" being used up. In the case of unnotched specimens, tested under conditions of stress relaxation, the extent to which the specimen has progressed towards fracture can be characterized by the $\varepsilon_{n\Pi}/\delta_p$ ratio, where $\varepsilon_{n\Pi}$ denotes the plastic strain at a given moment and δ_p elongation at the moment of fracture. This ratio can serve as a criterion of vulnerability of the specimen whose "plasticity reserve" is given by $1 - \varepsilon_{n\Pi}/\delta_p$.

Card 2/4