GELLER, V.M.; SENDERZON, M.E.

Methods for increasing the stability and improving the energy parameters of distributive amplifiers. Izv. SO AN SSSR no.2. Ser. tekh. nauk no.1:63-68 '64. (MIRA 17:8)

1. Novosibirskiy elektrotekhnicheskiy institut.

ACC NR: AR6035215 SOURCE CODE: UR/0274/66/000/008/A060/A060

AUTHOR: Geller, V. M.; Nikiforov, I. N.

TITLE: Wide-band coaxial-helix transformer

SOURCE: Ref. zh. Radiotekhnika i elektrosvyaz', Abs. 8A449

REF SOURCE: Tr. Novosib. elektrotekhn. in-t svyazi, vyp. 1, 1965, 142-146

TOPIC TAGS: transformer, wide band transformer, coaxial transformer, strip line, strip conductor

ABSTRACT: The authors analyze the possibility of connecting a coaxial line with a shielded helix using an nonsymmetric strip line. When the transverse dimensions of the shielded helix are large and the distance between the screen and helix is small and the delay is extensive, it is possible to equalize the wave resistance of the shielded helix and the coaxial line. It is shown that by matching the dimensions of the strip line and making its wave resistance equal to that of the coaxial line, a wide frequency band can be achieved for the device. The calculations are confirmed by the experiments within the 200—800 Mc range. The original article has 3 figures and a bibliography of 3 titles. [Translation of abstract] [NT]

Card 1/1 SUB CODE: 17/ UDC: 621.372.852.6

L 35488-65

ACCESSION NR: AP5007835 S/0288/64/000/003/0051/0060

AUTHOR: Geller, V.M.

TITLE: A study of the influence of losses on the energy parameters of distributed power amplifiers

SOURCE: AN SSSR. Sibirskoye otdeleniye. Izvestiya. Seriya tekhnicheskikh nauk, no. 3, 1964, 51-60

TOPIC TAGS: distributed power amplifier, grid circuit loss, power amplifier stability, wide band amplifier, amplifier parameter

ABSTRACT: Distributed amplification is often used lately for the construction of wide-band power amplifiers in the short and meter wavelengths (see, e.g., J. Caldwel, O. Hoch, IRE Trans., 1956, ≠ D-3, 1, 6; A.I. Zhivotovskiy, A.S. Krivenko, V.V. Polevoy, Izv. VUZ MVSSO SSSR, Radiotekhnika, 1962, no. 2). However, in spite of significant advances in the field, views concerning various aspects of the problem are still often divergent. In addition to voltage amplification, one must study the power processes during distributed power amplification in detail. The basic difference between the distributed amplification of voltage and power is due to the fact that, in the case of the voltage, the amplification of the stage is larger than the amplification of the individual tube, while it is the other way

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R000514630001-1"

L 35488-65

ACCESSION NR: AP5007835

around in the case of power. This is basically caused by an irrecuperable loss of part of the input power within the matching impedance of the grid line. In order to suppress reflections and damping effects, i.e., to achieve an efficient composition of power within a wide range of frequencies, one must increase the input resistances of the tubes (operate without grid currents) and utilize the power potentialities of the tubes only poorly. On the other hand, to increase the output power of the stage with satisfactory use of the tubes, one should scatter the better part of the power fed into the grid line over the input resistances of the tubes. Consequently, the demands imposed on the circuit, if one wants to attain a maximum utilization of the power of the tubes, are incompatible with the requirements resulting from the attempts to transfer a maximum of power through the distributed power amplifier (DPA). After discussing the attempts of other investigators to cope with this dilemma, the author proposes a new approach to DPA design based on a better use of tubes. Such a solution exhibits a weak dependence of the transfer coefficient of the power stage on the damping within the lines, which indicates a large dynamic range with a simultaneous favorable use of the power of the tubes. This is achieved by a slight decrease in transfer coefficient and a considerable reduction in the number of tubes. Orig. art. has: 23 formulas and 5 figures.

Card 2/3

L 35438-65
ACCESSION NR: AP5007835

ASSOCIATION: Novosibirskiy elektrotekhnicheskiy institut (Novosibirsk Electrical Engineering Institute)

SUBMITTED: 04Jul64 ENCL: 00 SUB CODE: EC, EE

NO REF SOV: 010 OTHER: 002

Card 3/3

L 10896-67

ACC NR: AR6032292 SOURCE CODE: UR/0275/66/000/007/A...A017

AUTHOR: Geller, V. M.

TITLE: Matching a system with a spiral in a dielectric tube between two conductor cylinders and a coaxial channel

SOURCE: Ref. zh. Elektronika i yeye primeneniye, Abs. 7A121

REF SOURCE: Tr. Novosib. elektrotekhn. in-t svyazi, vyp. 1, 1965, 147-155

TOPIC TAGS: dielectrics, conductor, wideband matching, matching

ABSTRACT: The possibility of wideband matching of the aforementioned type of system is demonstrated both theoretically and experimentally. [Translation of abstract]

SUB CODE: 09/

Card 1/1

UDC: 621.385.632.3

L 04238-67

ACC NR: AR6031904 SOURCE CODE: UR/0058/66/000/006/H043/H043

56
B

AUTHOR: Geller, V. M.

TITLE: The problem of matching a type of "spiral in a dielectric tube between two conducting cylinders" system with a coaxial channel

SOURCE: Ref. zh. Fizika, Abs. 6Ch302

REF SOURCE: Tr. Novosib. elektrotekhn. in-t svyazi, vyp. 1, 1965, 147-155

TOPIC TAGS: communication channel, coaxial channel, electric engineering

ABSTRACT: The possibility of wideband matching of a type of "spiral in a dielectric tube between two conducting cylinders" system with a coaxial channel is demonstrated both theoretically and experimentally. [Translation of abstract]

SUB CODE: 09/

Card 1/1 *sla*

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R000514630001-1"

GELLER, Ya.

Germination

Effect of oxidation-reduction properties of soil on the germination of seeds. Dokl. AN SSSR 89, No. 2, 1953.

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

[illegible], [illegible].

Soil Oxidation

Effect of plants on the reduction-oxidation potential of the soil. Dokl. AN SSSR 89, No. 3, 1953.

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

GERGARD, A.V.; GELLER, Ya.G.

Device for machining complex-shape holes. TSvet.met. 29 no.4: 79 Ap '56. (MLRA 9:8)

1. Bogoslovskiy alyuminiyevyy zavod.
(Machinists' tools) (Nonferrous ingots)

ANDREYEV, P.; GELLER, Ye.; KARTSEV, A.; TABASARANSKIY, A.

"The fluorescence-bitumen method in petroleum geology" by V.N. Florovskaya. Reviewed by P. Andreev and others. Geol. nefti i gaza 3 no.1:66-68 Ja '59. (MIRA 12:4)
(Fluorescence) (Bitumen) (Florovskaia, V.N.)

GELLER, Ye.M. DECEASED 1962/4

c1960

SEE ILC

GEOCHEMISTRY

ACC NR: AP7002084 SOURCE CODE: UR/0030/66/000/012/0089/0090

AUTHOR: Geller, Ye. S.

ORG: none

TITLE: Electronic equipment for neurophysiology (Conference in Ivanovo)

SOURCE: AN SSSR. Vestnik, no. 12, 1966, 89-90

TOPIC TAGS: MEDICAL EQUIPMENT, NEUROLOGY, HUMAN PHYSIOLOGY, medical conference, cybernetics, electronic equipment, DIGITAL computer, ~~neurophysiology,~~ biotelemetry, electrophysiology, conditioned reflex, radioflexometer/PPM-59 radio flexometer, PPM-62 radio reflexometer

ABSTRACT: The author reports briefly on the first all-union conference on the use of electronic equipment for research in the field of higher nervous activity and neurophysiology. The conference was held from 13 to 15 September in Ivanovo. The Scientific Council for the Complex Problem of Cybernetics attached to the Presidium of the SSSR Academy of Sciences participated in the conference. The use of electronic digital computers in neurophysiological experiments was discussed in detail. A series of reports dealt with automatic methods of analyzing

Card 1/2

ACC NR: AP7002084

experimental data obtained with computers. The work of the Institute of Physiology of the USSR Academy of Sciences in the field of electrophysiology is mentioned in this connection. The growing importance of microelectrode technology, biotelemetry, and radioreflexometry were stressed. New research possibilities afforded by the PPM-59, and PPM-62 radioreflexometers were discussed. A series of reports dealt with methods of studying the autonomic component of conditioned reflexes. [WA-102] [GC]

SUB CODE: 06/SUBM DATE: none/

Card 2/2

GELLER, Yu. A.

The BRAZING OF LOW-ALLOY TOOL TIPS USING POWDERED BRAZING ALLOYS. N. A. Minkevich, N. A. Bukhman and Yu. A. Geller. (Vestnik Metallo-promyshlennosti, 1940, No. 8-9, pp. 45-57). (In Russian). The quenching temperatures of low-alloy chromium-tungsten-molybdenum-vanadium tool steels range from 1175° to 1240°C., and are thus below the melting points of the materials generally used for brazing on tungsten high-speed steel tips. General requirements which brazing alloys for this particular purpose have to satisfy are considered. Ferro-manganese (75%) was selected as a brazing material, its melting point being controlled between 110o and 1280°C. by additions of up to 40% of copper. Two copper-nickel alloys were also tested. Furnace brazing and electrical resistance brazing were employed. Shear tests and heat-treatment and cutting tests were made on the brazed-on tips. The best results were given by a ferro-manganese brazing alloy containing 20-25% of copper. The copper-nichel alloys gave a higher shear strength, but their behaviour during subsequent heat treatment of the tools was unsatisfactory. Attempts to quench tools was unsatisfactory. Attempts to quench tools directly from the brazing temperature resulted in reduced cutting efficiency.

Immediate source clipping

Ca

Effect of residual stresses on the limit of fatigue in
tempered steel. Yu. A. Geller and O. K. Sherfiet. *J.*
Tech. Phys. (U. S. S. R.) 11, 700-10(1941).—The steel
contained C 1.05, Cr 1.45, Mn 0.29 and Ni 0.17%, was
tempered to fine-grained pearlite and had Brinell hardness
192. (1) Detns. of residual stresses were made on prism-
matic rods 13 × 15 × 60 mm.; the specimens were quenched
from 830°, 835° and 850°; corresponding amts. of
residual austenite were 5%, 7% and 9%; Rockwell hardness
R (Scale C) was from 62.5 (830°) to 64 (850°). Distribu-
tion of residual stresses: compression, 10-20 kg./sq. mm.,
in the central zone around the axis, about 1 mm. thick;
extension in the intermediate zone, 1-4 mm. from center,
max. about 30 kg./sq. mm. at about 2.5 mm. from axis of
specimen; once more passing through zero and taking the
sign of compression, max. at the outer surface (6 mm.
from axis), 30 kg./sq. mm. when quenched from 830°,
45 kg./sq. mm. (from 835°), 42 kg./sq. mm. (from 850°).
With quenching from 835° and tempering at 150, 165,
180, 180 and 200°, for 1, 3 and 5 hrs., austenite drops
from 7% (150°) to 5% (200°, 1 hr.), 4% (200°, 4 hrs.);
R from 63 (150°) to 60 (200°, 1 hr.); after 1 hr., 150°,
0.4-0.5% C is in soln.; after 1 hr. at 250°, there is still
0.2% C in soln. Distribution of stresses along the cross-
section is qualitatively the same as in the nontempered
specimen; for 180°, 2 hrs., in the center compression 8 kg./
sq. mm.; middle zone, max. extension 8 kg./sq. mm.; sur-
face, compression 12 kg./sq. mm. At 150°, extension of
tempering beyond 2-3 hrs. does not result in any further
change of the stress at the surface which remains at about
50% of that corresponding to the specimen quenched from
835°; rise of temp. is much more efficient than time:
thus, tempering at 180° for 1 hr. reduces the ultimate
stress more efficiently than 2 hrs. at 165° or 5 hrs. at 150°.
(2) The fatigue endurance limit *L* was detd. by alternating
flexion tests on cylindrical specimens at 4000 revolutions
per min. For specimens quenched from 830°, 835° and
850°, uniformly tempered at 150°, 1 hr., the values of *L*
are found, resp., to be 58, 65, 50 kg./sq. mm., *R* 62,
63.5 and 63.5-64.0; quenching uniformly from 835° and
varying the conditions of tempering (150-180°, 1-3 hrs.)
only results in some straggling of *L* and *R*. There is ob-
viously no parallelism between the dependence of *L* on
thermal treatment and the behavior of residual stresses;
this contradicts the conceptions of Thum. Fatigue en-
durance is merely detd. by the structure obtained as a
result of quenching, *L* being max. for cryptocryst. marten-
site and carbides; tempering in the temp. interval 150°-
180° does not affect the structure, although it has a marked
effect on the relaxation of stresses. Results obtained with
specimens with rectangular cross-sections are not com-
parable with those found with cylindrical specimens.

N. Thon

[illegible]ER, Yu. A.

Cand. of Technical Sciences (-1943-).

*"The Use of Various Grades of High-Speed Steel in Industry", Stanki I Instrument, 14, No. 4-5, 1943.

BR-52059019.

* Excerpts from his report:

GEILER, Yu. A.

Candidate of Technical Sciences.

*"Low-Alloy High-Speed Steel Grade 6-2-1", Stanki I Instrument, 14, No. 4-5, 1943.

BR-52059019.

* Excerpt from his report:

GELLER, YU. A., and NOVIKOV, O. A., ENGINEER

Candidate of Technical Sciences

"Welding High-speed Steel in Voltaic Arc", Stanki I Instrument, 14, No. 11-12, 1943.

BR-52059019.

IYERUSALIMSKIY, V.V.; GELLER, Yu.A.; SHREYBER, G.K.

"The Machinability of Alloyed Structural Steel." Stanki I Instrument Vol.15, No. 3, 1944

BR 52059019

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R000514630001-1"

GELLER, Yu.A.,

Candidate of Technical Sciences

"The Technological Properties of High-Speed Cutting Steel." Stanki I Instrument Vol.15, Nos. 7-8, 1944

BR52059C19

GEILEh, YU. A.

Tool-steel. Moskva, Gos. nauch.-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1945. 332p. (49-39551)

TS320.G37)

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R000514630001-1"

GELLER, Yu. A.; BABAYEV, V. S.;

Instrumental'naya Stal', published by Metallurgizdat, Moscow, 1945

Sum #148

GELLER, Yu A

PA 3T16

USSR/Metals - Transformation Mar 1947
Steel - Cobalt

"Physical Transformation in Rapid Steel with High Cobalt Content," Yu A Geller, O A Novikov, 6 pp
Moscow Inst. of Steel

"Stal'" Vol VII, No 3

Investigation into increase in red hardness and cutting properties of rapid steel containing cobalt permits us to recognize dispersion hardening as one of the causes of this, along with somewhat increasing brittleness of the steel. Illustrated with microphotos and graphs. Bibliography.

3T16

GELLER, YU. A.

Puti povysheniia kachestva instrumenta. (Vestn. Mash. 1949, no. 4, p. 42-50)

Includes bibliography.

(Methods to improve the quality of tools.)

DLC: TN4.V4

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

GELLER, Yu.A.

PHASE I TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 441 - I

BOOK Call No.: TN690.P57

Authors: POGODIN-ALEKSEYEV, G. I., Prof., GELLER, Yu. A., Ass. Prof., RAKHSHTADT, A. G., Ass. Prof.

Full Title: SCIENCE OF METALS. METHODS OF ANALYSIS, LABORATORY WORK AND PROBLEMS

Transliterated Title: Metallovedeniye. Metody analiza laboratornyye raboty i zadachi

Publishing Data

Originating Agency: None

Publishing House: State Publishing House of the Defense Industry

Date: 1950 No. pp.: 455 No. of copies: 15,000

Editorial Staff

Editor of Section VI: Landa, A. F.

Appraisers: Gulyayev, A. P., Dr. of Tech. Sci., and Blanter, M. E., Kand. of Tech. Sci.

Others: Yakhnina, V. D., Fomina, N. N. and Kazarnovskaya, Z. M.

Text Data

Coverage: This excellent textbook gives in its introductory chapter a historical sketch of Russian metallurgical science and in the subsequent sections a description of methods for studying metals, various stages of laboratory work (heat analysis, macro- and microanalysis, hardening measurement, determination of physical properties, heat treatment, etc.) and hundreds of problems on structural diagrams of binary and ternary alloys, analysis of microstructure of metals (steel, cast iron and nonferrous alloys), as well as on selection of the

Metallovedeniye. Metody analiza laboratornyye
raboty i zadachi

proper alloy and the heat treatment conditions. Most problems are equipped with related references. Detailed solutions of problems for every main section are given in order to show the student how to apply the acquired knowledge for practice. In Appendix I the authors give a classified description of standardized alloys most commonly used in the USSR, divided into the following sections: (1) steel, (2) cast iron, (3) copper-base alloys, (4) aluminum-base alloys, (5) magnesium-base alloys, (6) babbitts, and (7) hard metals. Within these sections the alloys are arranged by classes, groups and sub-groups, according to various criteria: means of production, application, composition, properties, etc., whatever is most characteristic for each individual alloy or group of alloys. This part of the book contains valuable information on All-Union Standards for metals: their chemical composition, properties, application, and an explanation of the procedure used in the designation of types of industrial alloys. Emphasis throughout the book is on application of the theoretical material to specific practical problems.

AID 441 - I

Metallovedeniye. Metody analiza laboratornyye raboty i zadachi

TABLE OF CONTENTS

Purpose: A textbook for students of institutes of technology and mechanical engineering

Facilities: None

No. of Russian and Slavic References: Numerous references throughout book.

Available: Library of Congress.

GELLER, Yu A.

6

Chemical Abst.
Vol. 48 No. 9
May 10, 1954
Metallurgy and Metallography

③ Met

Isothermal quenching of high-speed steel. Yu. A. Geller and S. D. Brik (Inst. Chem. Machine Building, Moscow). *Vestnik Mashinostroeniya* 33, No. 10, 65-6(1953).—Isothermal quenching of high-speed steel at 200-300° greatly lowers its magnetic satn. obtained after conventional heat-treatment and produces hardness of only 55-6 Rockwell C. Acicular troostite can be seen after 3 hrs. at 240-300°, composed of α-Fe with the same C and alloy content as oil-quenched martensite tempered at 240-300°. The low hardness can be increased to 62-5 Rockwell C by retempering at 500-600°. This treatment increases the dimensions of the stock more than conventional, but it does not introduce any stresses producing addnl. deformation which, therefore, remains 2.5-3 times lower than in the usual treatment.

J. D. Gat

VOROB'YEV, V.G., kandidat tekhnicheskikh nauk; GELLER, Yu.A., redaktor; GLADKIKH, N.N., tekhnicheskiy redaktor.

[Heat treatment of steel at below zero temperatures] Termicheskaia obrabotka stali pri temperature nizhe nulia. Moskva, Gos. izd-vo oboronnoi promyshl., 1954. 305 p. (MLRA 7:11)
(Steel--Heat treatment)

GELLER, N. Yu. A.

"Basic Methods of Decreasing Deformation of Tools During Hardening," pp 238/251 in Modern Methods of Heat Treating Steel by Dom Inzhenera i Tekhnika imeni F E Dzerzhinskovo. Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Mashinostroitel'noy Literatury, Moscow (1954) 404 pp.

Evaluation B-86350, 30 Jun 55

Geller, Yu. A.

Transformations During Tempering High-Speed Cutting Steel. Yu. A. Geller. (Trud. Nauch. [illegible] Stankin, Mashinostroenie Tekh. Nauk, 1954, (5), 73-80). [In Russian]. Transformations taking place during tempering of high-speed cutting steel were investigated using phase analyses and measurements of physical properties. A decrease in hardness after tempering at 200-400° C is due to separation of carbide of the cementite type cause by a decrease of carbon content in martensite. The phenomena of the secondary hardness after tempering at 500-600° C is caused mainly by dispersion hardening due to the separation of vanadium and to some extent, tungsten carbides. The dispersion hardening takes place mainly in the martensite structure as part of the alloying elements, particularly tungsten, remain in a solution retaining in it a certain amount of carbon. The influence of tungsten and vanadium on transformations and secondary hardness is discussed. The necessity of alloying with both the above elements is stressed. The influence of the transformation of residual austenite on secondary hardness is less important.—V. G.

GELLER, Yu. A.

USSR/Engineering - Steel tempering

Card 1/1 Pub. 103 - 6/29

Authors : Geller, Yu. A.

Title : The isometric tempering of an alloyed tool-steel

Periodical : Stan. i instr. 10, 16-20, Oct 1954

Abstract : The hardness, mechanical properties, anisometry and magnetic saturation of the Kh, KhG, and 9KhS steels were investigated by means of isometric tempering of steel samples at soaking temperatures of from 150 to 200°C. Ten USSR references (1841-1953). Graphs.

Institution : ...

Submitted : ...

GELLER, Yuliy Aleksandrovich, professor, doktor tekhnicheskikh nauk; RAKHSHTADT, A.G., redaktor; GORDON, L.M., redaktor; VAYNSHTEYN, Ye. B., tekhnicheskiy redaktor.

[Tool steel] Instrumental'nye stali. Moskva, Gos.nauchno-tekhn. izd-vo lit-ry, po chernoi i tsvetnoi metallurgii, 1955. 548 p. (Tool steel) (MLRA 8:10)

Gellek, Yu. A.

E-5

USSR / Phase Conversions in Solids.

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 9306

Author : Geller, Yu. A., Leshchinskaya, R.P.

Title : Stabilization of the Residual Austenite of High Speed and High-Chrome Steels Against Tempering.

Orig Pub : Metallovedeniye i obrabotka metallov, 1955, No 1, 26-33

Abstract : The authors study the influence of preliminary soaking at room temperature and above (250°) on the completeness of the transformation of the residual austenite of high speed steel R9 and high-chrome steel Kh12F followed by tempering and heating to the usually employed temperatures (560° for R9 and 510° for Kh12F1). The transformation of the austenite is determined from the change in the magnetic saturation and also of the specific electric resistivity and length of the specimens. It is found that stabilization against tempering develops noticeably as a result of the following: (a) soaking for more than 3 -- 6 hours at sharp temperature,

Card : 1/2

E-5

USSR / Phase Conversions in Solids.

Abs Jour : Ref Zhur - Fizika, No 4, 1957, No 9306

Abstract : with the stabilization increasing upon soaking up to 24 hours, but not increasing any further; (b) low tempering, causing no transformation of the austenite; (c) increasing the chromium content in the austenite. As a result of the stabilization of high speed steel in the first tempering to 560^{0}, complete transformation is reached only as a result of triple tempering. Since the martensitic transformation of the austenite increases the hardness, the wear resistance, and the heat conduction of the steels, it is recommended that stabilization be prevented by tempering immediately after hardening with heating without prolonged soaking at temperatures not high enough to cause transformation of the austenite.

Card : 2/2

GELLER, YU. A.

USSR/ Engineering - Machine tools

Card 1/1 Pub. 103 - 7/19

Authors : Geller, Yu. A.

Title : About increasing the composition of alloyed steel for the manufacture of metal cutting tools

Periodical : Stan. i instr. 2, 22 - 25, Feb 1955

Abstract : The need for improving the chemical composition of alloyed steel used in the manufacture of metal cutting tools is discussed. The types of steel used for the past two decades in the manufacture of machine tools are listed. The technical and mechanical requirements of tool steel, which would meet the standards of modern industry, are described. Six USSR references (1938 - 1954). Graphs.

Institution: .....

Submitted: .....

Geller, Yu. A.

1

Improving the composition of tool steels. Yu. A. Geller (Moscow Inst. Chem. Machine Construction). *Metalloved. i Obrabotka Metallov* 1955, No. 3, 1-10.—A summary review was made of the various grades of Russian tool steels and of their properties relative to possible applications.

A. G. Guy

137-58-2-4113

GELLER, YU A.

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 264 (USSR)

AUTHOR: Geller, Yu.A.

TITLE: Optimum Composition of Alloy Steel to Be Used in Cutting Tools (Ob optimal'nom sostave legirovannoy stali dlya rezhushchikh instrumentov)

PERIODICAL: Sb. statey Vses. zaoch. politekhn. in-ta, 1955, Nr 10, pp 13-35

ABSTRACT: Because the widely used steels 9KhS and Kh have certain technological deficiencies (reduced workability after annealing, tendency toward decarburization [9KhS], insufficient hardenability [steel Kh]), the use of chemically improved steels with better mechanical properties is recommended. As a low-alloy tool steel, a carbon steel is proposed which contains 0.6 - 0.8 percent Cr (from the hypoeutectoid steel U7Kh containing 0.65 - 0.75 percent C and 0.6 - 0.8 percent Cr to the hypereutectoid steel U11Kh containing 1.05 - 1.15 percent C and 0.6 - 0.8 percent Cr). As a multiple-alloy tool steel (in place of 9KhS), steel 95KhGS is recommended. Possessing a higher Mn content, this steel contains 0.95 - 1.05 percent C, 0.7 - 1.0 percent Mn, 0.5 - 0.8 percent Si, and 1.0 - 1.3 percent Cr. Bibliography: 12 references.

A.B.

Card 1/1

1. Steel alloys--Properties 2. Machine tools--Development

GELLER, Yu. A.

Nature of naphthalene fracture of high speed steels. Yu. A. Geller (Inst. Chem. Machine Construction, Moscow). Stal' 15, 630-1(1955).—This type of fracture is assocd. with abnormally coarse grains and a highly alloyed solid soln. On cooling by quenching, a portion of carbides ppts. from austenite and, since the grains are large and the alloying elements of high-speed steels diffuse slowly, these carbides ppt. not only at the grain boundaries but mostly along crystallographic planes within large grains closest to them. Carbides ppt. on tempering continue to ppt. as a continuation of these carbide inclusions forming long practically straight chains tinted by carbide etching reagents responsible for this peculiar fracture. J. D. Gat

GELLER, Yu. A.

Determination of the Quantity of Residual Austenite by the Magnetic Method. Yu. A. Geller. (Zavodskaya Laboratoriya, 1955, 21, (2), 177-181). (In Russian). In the investigation described the effects of various factors on the results of [illegible] magnetic determinations of austenite in [illegible] steels alloyed with carbide-[illegible] were studied, mainly the [illegible] vanadium and tungsten) were studied, mainly the [illegible] the magnetic saturation of the standard and specimen [illegible] produced by the carbides present and by change of the [illegible] position of the solid solution of austenite [illegible] proved methods of [illegible] are developed and applied to several steels. [illegible]

Geller, Yu. A.

Determination of the Mechanical Properties of Tool Steels. Yu. A. Geller. (*Zavodskaya Laboratoriya*, 1952 [illegible]) (In Russian) The [illegible] the mechanical properties of too[illegible] suitable methods are considered [illegible] under impact load, and [illegible] sided compression, torsion and [illegible] is devoted to bend testing, and [illegible] the dependence of breaking deflection and [illegible] end of the elastic range on tempering temperature [illegible] carbon tool steel, and the effect of hardening temperature [illegible] the strength and deflection of an alloy hypereutectoid tool steel and on the strength of a high speed steel [illegible]

VAH

POGODIN-ALEKSEYEV, Georgiy Ivanovich; GELLER, Yuliy Aleksandrovich; RAKHSHTADT, Aleksandr Grigor'yevich; LAKHTIN, Yu.M., professor, doktor tekhnicheskikh nauk, retsenzent; BERNSHTEYN, M.L., dotsent kandidat tekhnicheskikh nauk, redaktor; PETROVA, I.A., izdatel'skiy redaktor; GLADKIKH, N.N., tekhnicheskiy redaktor

[Physical metallurgy; methods of analysis, laboratory work and problems] Metallovedenie; metody analiza, laboratornye raboty i zadachi. Izd. 2-oe, perer. Moskva, Gos. izd-vo obor. promyshl., 1956. 427 p. (MLRA 9:10)
(Physical metallurgy)

GELLER, Yu. A.

AL'TGAUZEN, O.N., kandidat fiziko-matematicheskikh nauk; BERNSHTEYN, M.L., kandidat tekhnicheskikh nauk; BLANTER, M.Ye., doktor tekhnicheskikh nauk; BOKSHTEYN, S.Z., doktor tekhnicheskikh nauk; BOLKHOVITINOVA, Ye.N., kandidat tekhnicheskikh nauk; BORZDYKA, A.M., doktor tekhnicheskikh nauk; BUNIN, K.P., doktor tekhnicheskikh nauk; VINOGRAD, M.I., kandidat tekhnicheskikh nauk; VOLOVIK, B.Ye., doktor tekhnicheskikh nauk [deceased]; GAMOV, M.I., inzhener; GELLER, Yu.A., doktor tekhnicheskikh nauk; GORELIK, S.S., kandidat [redacted] nauk; GOL'DENBERG, A.A., kandidat tekhnicheskikh nauk; GOTLIB, L.I., kandidat tekhnicheskikh nauk; GRIGOROVICH, V.K., kandidat tekhnicheskikh nauk; GULYAYEV, B.B., doktor tekhnicheskikh nauk; DOVGALEVSKIY, Ya.M., kandidat tekhnicheskikh nauk; DUDOVTSEV, P.A., kandidat tekhnicheskikh nauk; KIDIN, I.N., doktor tekhnicheskikh nauk; KIPNIS, S.Kh., inzhener; KORITSKIY, V.G., kandidat tekhnicheskikh nauk; LANDA, A.F., doktor tekhnicheskikh nauk; LEYKIN, I.M., kandidat tekhnicheskikh nauk; LIVSHITS, L.S., kandidat tekhnicheskikh nauk; L'VOV, M.A., kandidat tekhnicheskikh nauk; MALYSHEV, K.A., kandidat tekhnicheskikh nauk; MEYERSON, G.A., doktor tekhnicheskikh nauk; MINKEVICH, A.N., kandidat tekhnicheskikh nauk; MOROZ, L.S., doktor tekhnicheskikh nauk; NATANSON, A.K., kandidat tekhnicheskikh nauk; NAKHIMOV, A.M., inzhener; NAKHIMOV, D.M., kandidat tekhnicheskikh nauk; POGODIN-ALEKSEYEV, G.I., doktor tekhnicheskikh nauk; POPOVA, N.M., kandidat tekhnicheskikh nauk; POPOV, A.A., kandidat tekhnicheskikh nauk; RAKHSHTADT, A.G., kandidat tekhnicheskikh nauk; ROGEL'BERG, I.L., kandidat tekhnicheskikh nauk;

(Continued on next card)

AL'TGAUZEN, O.N.---- (continued) Card 2.
SADOVSKIY, V.D., doktor tekhnicheskikh nauk; SALTYKOV, S.A., inzhener; SOBOLEV, N.D., kandidat tekhnicheskikh nauk; SOLODIKHIN, A.G., kandidat tekhnicheskikh nauk; UMANSKIY, Ya.S., kandidat tekhnicheskikh nauk; UTEVSKIY, L.M., kandidat tekhnicheskikh nauk; FRIDMAN, Ya.B., doktor tekhnicheskikh nauk; KHIMYSHIN, F.F., kandidat tekhnicheskikh nauk; KHRUSHCHEV, M.M., doktor tekhnicheskikh nauk; CHERNASHKIN, V.G., kandidat tekhnicheskikh nauk; SHAPIRO, M.M., inzhener; SHKOL'NIK, L.M., kandidat tekhnicheskikh nauk; SHRAYBER, D.S., kandidat tekhnicheskikh nauk; SHCHAPOV, N.P., doktor tekhnicheskikh nauk; GUDTSOV , N.T., akademik, redaktor; GORODIN, A.M. redaktor izdatel'stva; VAYNSHTEYN, Ye.B., tekhnicheskiy redaktor

[Physical metallurgy and the heat treatment of steel and iron; a reference book] Metallovedenie i termicheskaia obrabotka stali i chuguna; spravochnik. Pod red. N.T.Dudtsova, M.L.Bernshteina, A.G. Rakhshtadta. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1956. 1204 p. (MLRA 9:9)

1. Chlen -korrespondent Akademii nauk USSR (for Bunin)
(Steel--Heat treatment) (Iron--Heat treatment)
(Physical metallurgy)

GELLER, YU. A.

Category : USSR/Solid State Physics - Phase Transformation in Solid Bodies E-5

Abs Jour : Ref Zhur - Fizika, No 2, 1957 No 3803

Author : Geller, Yu.A.
Title : Magnetic Method of Determining the Amount of Residual Austenite

Orig Pub : Sovrem. metody ispytaniy materialov v mashinostroyenii M., Mashgiz, 1956, 211-228

Abstract : Methods are proposed for calculating the amount of residual austenite using magnetic-measurement data, taking into account the alloyability of the α-solid solution. Limits are indicated for the possible application of the magnetic analysis to determine the amount of residual austenite, and the steels and phase states for which this method can be used are indicated. Bibliography, 12 titles.

Card : 1/1

APAYEV, B.A.; GELLER, Yu.A.

Determining the amount of austenite by the magnetic method. Zav. lab. 22 no.6:752-755 '56. (MLRA 9:8)

1. Gor'kovskiy issledovatel'skiy fiziko-tekhnicheskiy institut.
(Steel--Analysis)

GELLER, YU. A.

129-11-3/7

AUTHOR: Geller, Yu. A., Doctor of Technical Sciences.

TITLE: Main Trends in Developing Tool Steels. (Osnovnyye napravleniya v razvitii instrumental'nykh staley).

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1957, No.11, pp.43-56 (USSR)

ABSTRACT: The chairs of the technical colleges and particularly the Leningrad Industrial Institute (Leningradskiy Industrial'niy Institut) (the school of N. D. Gudtsov), the Moscow Steel Institute (Moskovskiy Institut Stali) (the school of N. A. Minkevich), the Ural Industrial Institute (Ural'skiy Industrial'niy Institut) (the school of S. S. Shteynberg) were mainly responsible for the investigations relating to tool steels during the first years of industrialisation of the Soviet Union. Later on investigations of tool steels began in the scientific research establishments, particularly TsNIITMASh (the school of A. P. Gulyayev). Between 1930 and 1940 considerable work in developing new tool steels and heat treatment regimes was carried out by works' laboratories particularly those of "Elektrostal", "Frezer", "Kalibr" and the Moscow Automobile Works (Moskovskiy Avtozavod) and the Gorky Automobile Works (Gor'kiy Avtozavod). The trends of Soviet pre-war research can be gauged from the compositions

Card 1/4

129-11-3/7

Main Trends in Developing Tool Steels.

of the steels developed and introduced between 1935 and 1940 given in Table 1, p.45, which lists three high chromium steels, one medium tungsten steel (8.5 to 10% W) and three multi-alloy steels. The merits of the individual steels enumerated in this table are discussed in some detail and also their influence on post-war development trends. In the post-war years research in the field of tool steels is carried out mainly by the All Union Tool Institute (Vsesoyuznyy Instrumental'nyy Institut) and the Central Ferrous Metallurgy Institute (Tsentral'nyy Institut Chernoy Metallurgii). The author points out that the interest in development of tool steels has diminished considerably in post-war years and so has the scale of research in this field in works' laboratories and university chairs. He also points out that the development of the tool industry during the post-war years has enabled satisfying fully the tool requirements of the engineering works. For instance, the rated capacity of the "Frezer Works", which is one of the largest Soviet tool manufacturing works, has increased 4.5 fold. There has been a marked increase in the number of grades of steel and also in the diversity of their chemical compositions. The requirements to be

Card 2/4

129-11-3/7

Main Trends in Developing Tool Steels.

met by tool steels for various applications are discussed and also the necessary trends of development for satisfying these requirements. The author deals separately with the characteristic features of the individual types of steel, i.e. carbon steel, alloy steel, high chromium steel, high speed steel, steel to be used for hot stamping dies and, finally, with heat treatment techniques. In the case of high speed steels the increase in vanadium content is a promising trend and low alloy steels showed considerably improved cutting properties if the vanadium content was increased to 3.3%. The chemical composition of recently developed high vanadium and high cobalt containing high speed steels and also that of standard cobalt steels are entered in Table 2, p.52. The author himself has made considerable contributions to the development of certain grades of tool steels and also to developing heat treatment regimes. In the field of heat treatment considerable progress has been made in utilising very low temperature heat treatment; the work of Gulyayev, A.P., Vorob'yev, V.G. and of some other authors has shown that it is possible to establish reliably the range of application of heat treat-

Card 3/4 ment by sub-zero temperatures, which is particularly

Main Trends in Developing Tool Steels.

favourable for steels with 12 to 18% Cr of which it is required that after hardening they should have a high hardness and a high corrosion stability. Under certain conditions sub-zero heat treatment is also favourable for high chromium steels intended for stamping dies and subjected to low temperature tempering for the purpose of obtaining a high hardness. According to the results of various authors, including the author of this paper, it is advisable, from the point of view of austenite stabilisation, to carry out the tempering of high speed and high chromium steel immediately after hardening so as to obtain as complete transformation of the residual austenite as possible. Results of various authors also brought about changes in views relating to the desirable temperature of heating during the hardening process. The features of isothermal hardening are also discussed. The heat treatment of high speed steel is discussed in a separate paragraph, dealing particularly with the influence of the structure and phase composition. There are 2 figures and 2 tables.

ASSOCIATION: Moscow Machine-Tool Tool Industry. (Moskovskiy Stankoinstrumental'nyy Institut).

GELLER, Yu. A.

PHASE I BOOK EXPLOITATION SOV/1598

Moscow. Dom nauchno-tekhnicheskoy propagandy im. F.E. Dzerzhinskogo

Sovremennyye splavy i ikh termicheskaya obrabotka (Contemporary Alloys and Their Heat Treatment) Moscow, Mashgiz, 1958. 389 p. 12,000 copies printed.

Additional Sponsoring Agency: Obshchestvo po rasprostraneniyu politicheskikh i nauchnykh znaniy RSFSR.

Ed. (Title page): Yu. A. Geller, Doctor of Technical Sciences; Ed. (Inside book): V.V. Zaborinskiy, Engineer; Tech. Ed.: B.I. Model'; Managing Ed. for Literature on Metal Working and Tool Making: R.D. Beyzel'man, Engineer.

PURPOSE: The book is intended for engineering and technical personnel of heat-treatment shops and test laboratories of machine-building plants.

COVERAGE: This collection of 18 articles, compiled by 33 authors, aims to acquaint the reader with modern practice in the heat treatment of steels. The authors are primarily concerned with the development of various types of structural, tool, and heat-resistant steels and with the use of their alloying elements. Materials-handling equipment is described at some length. The treatment of alloys, particularly those of titanium, also comes within the scope of the collection. The book is thoroughly diagrammed, and a good deal of the material is shown in graphical form. Among the problems dealt with are the minimization of deformations, the introduction of the automatic control of heat-treating equipment, together with fully mechanized tool manufacture, and the optimum proportions of different alloying elements. There are numerous tables and drawings. Bibliographic listings placed at the end of chapters are predominantly Soviet. The articles comprising this collection are reports delivered at a conference held in the Scientific and Technical Propaganda House imeni F.E. Dzerzhinskiy in Moscow.

Contemporary Alloys and Their Heat Treatment SOV/1598

Card 4/6

SOV/137-58-10-21622

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 10, p 167 (USSR)

AUTHORS: Geller, Yu.A., Mel'nichenko, Ye.V., Onishchik, Ye.I.

TITLE: The Role of Carbide Transformations in High-speed Steel Heated Into the A_1 Temperature Range (O roli karbidnykh prevrashcheniy v bystrorezhushchey stali pri nagreve vblizi oblasti A_1)

PERIODICAL: Metallovedeniye i term. obrabotka. Moscow, Metallurgizdat, 1958, pp 132-148

ABSTRACT: The effect of annealing time and temperature on properties of steel was studied on four separate smeltings of high-speed steel with different compositions (smelting 1 included the carbides Fe_2W_2C, $Cr_{23}C_6$, and VC; smelting 2 the carbides Fe_2W_2C and VC; smelting 3 the carbide Fe_2W_2C; and smelting 4 the carbide Fe_2W_2C with some positions in the lattice being replaced by Cr). It was established that an increase in anneal time produces transformations in the carbide phase and impairs the properties of the steel. The unstable carbide Fe_2W_2C is transformed into stable carbides WC and Fe_3C. During heating

Card 1/3

SOV/137-58-10-21622

The Role of Carbide Transformations in High-speed Steel (cont.)

of steel for hardening purposes the WC does not dissolve and the solid solution contains insufficient amounts of W, as a result, the hardness and red-shortness stability of the steel are impaired. The process of transformation of the metastable carbides Fe_2W_2C and WC is not reversible. Cr and small quantities of V tend to replace W atoms in the complex carbide Fe_2W_2C thus increasing its stability and inhibiting the formation of WC, which, in turn, increases the resistance of steel to red-shortness, this latter property is not directly affected by Cr or V. Introduction of Cr improves the hardenability of the steel. Cr-free steel exhibits a somewhat lower hardness after tempering (55-57 R_C instead of 63). Increasing the annealing time of a steel containing Cr and V, or V only, has no effect on its hardness nor on its resistance to red-shortness; in the case of a steel containing no Cr or V, the R_C value is reduced from 55-57 to 50. Increasing the anneal time to 100 hours increases the hardness of a steel which contains neither Cr nor V to an R_C of 65-66, and the hardness of steel containing V only to an R_C of 60. The authors explain this fact by the decomposition of the Fe_2W_2C into WC and Fe_3C and by the dissolution of the latter in a solid solution. Increasing the temperature and the time of anneal reduces the hardness (by two units) and impairs the cutting properties of steel that had been heated repeatedly to

Card 2/3

SOV/137-58-10-21622

The Role of Carbide Transformations in High-speed Steel (cont.)

600°C. It is recommended that the temperature of anneal be lowered to 820-850° and that the soaking time, as well as the number of intermediate and prolonged heatings into the A_1 region, be reduced in order to increase the red-shortness stability of the steel.

F.U.

1. Tool steel--Transformations 2. Tool steel--Temperature factors 3. Tool steel --Mechanical properties

Card 3/3

S/123/60/000/009/001/017
A004/A001

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1960, No. 9, p. 20, # 43232

AUTHOR: Geller, Yu.A.

TITLE: Low-Alloy Tool Steels

PERIODICAL: V sb.: Konstruktsii rezhushchikh instrumentov i tekhnol. ikh izgotovleniya No. 4, Moscow, 1958, pp. 6 - 11

TEXT: The author investigates the properties, heat-treatment conditions and fields of application of the new low-alloy tool steel grades У7Х (U7Kh), У11Х (U11Kh) and У13Х (U13Kh) (0.4 - 0.7% Cr), and the low-alloy chrome steel grades of low tempering ability ШХ6 (ShKh6), ЭИ603 (EI603) and Х05 (Kh05). It was found that the new groups of tool steels preserve the advantages of carbon steel grades (low hardness and good machinability in the annealed state) while possessing a better hardenability and higher tempering ability in comparison with carbon steel.

Translator's note: This is the full translation of the original Russian abstract.

Card 1/1

80838

18.7100

SOV/123-60-1-841

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1960, No 1, p 108 (USSR)

AUTHORS: Geller, Yu.A., Mel'nichenko, Ye.V.

TITLE: The Effect of Annealing[18] on the Red Hardness[18] of High-Speed Steel[18]

PERIODICAL: V sb.: Konstruktsii rezhushchikh instrumentov i tekhnol. ikh. izgotovleniya, No 4, Moscow, 1958, pp 36 - 46

ABSTRACT: The authors investigate technological factors which are causing the spoiling of the red hardness of high-speed steel and analyze the principal measures which have to be taken in order to avoid this defect. A deterioration of the red hardness and a lowering of the cutting properties is caused by an excessively long holding during annealing and high-temperature tempering. This process is intensified with an increase of the annealing temperature from 820°C to 880 - 900°C and with long tempering of preliminarily hardened steel. A deterioration of the red hardness is caused by the transformation of the composite W-carbide,[18] taking place

Card 1/2

80838

SOV/123-60-1-841

The Effect of Annealing on the Red Hardness of High-Speed Steel

during long heating, and the formation of stable WC and W_2C carbides which are hardly soluble in austenite. In order to obtain a high-grade high-speed steel it is necessary to carry out annealing at lower temperatures, to cut down the holding time, and to reduce the number of intermediate and long temperings in the range of 700 - 900°C. 7 figures, 11 references.

I.N.N.

Card 2/2

SOV/28-58-6-20/34

AUTHORS: Geller, Yu.A., Professor, Doctor of Technical Sciences, Malinkina, Ye.I., Candidate of Technical Sciences, Lomakin, V.N.

TITLE: Supplementing the State Standard GOST 5950-51 With the Method for Controlling Steel by Its Annealing Property (Dopolnit' GOST 5950-51 metodikoy kontrolya stali na prokalivayemost')

PERIODICAL: Standartizatsiya, 1958, Nr 6, pp 65-69 (USSR)

ABSTRACT: The annealing property of instrumental steel is defined as the property to obtain a martensite structure and high hardness after tempering. The annealing capacity is determined by the methos of butt tempering as specified by GOST 5657-51. If the samples are kept up to 30-35 sec/mm in the salt tank, the annealing property increases (Figure 1). A longer period does not increase the annealing property beyond the value reached at 35 sec/mm. Changes in this

Card 1/3

SOV/28-58-6-20/34

Supplementing the State Standard GOST 5950-51 With the Method for Controlling Steel by Its Annealing Property

property among the different smeltings are not due to the chemical composition, because only slight changes are correlated with a 2-3 times higher annealing property (Tables 1 and 2, Figure 2). Metallurgical factors, like smelting, rolling, are the causes of the changes. The comparison of the curves of distribution of hardness over the length of the sample is the basis for the nomograms showing the distribution of the annealing property of alloyed instrumental steels (Figures 4 and 5). These nomograms may be applied to steel to types KhVG, 9KhS, Kh, and similar types. During grinding, the layer of annealed steel in an instrument may be reduced. In the samples, the obtained values may be reduced therefore by 2 mm. The results of these calculations are shown in Table 6.

Card 2/3

SOV/28-58-6-20/34

Supplementing the State Standard GOST 5950-51 With the Method for Controlling Steel by Its Annealing Property

There are 6 tables and 6 graphs.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy instrumental'nyy institut (All-Union Scientific Research Instrument Institute)

Card 3/3

SOV/129-58-11-2/13

AUTHORS: Geller, Yu. A., Doctor of Technical Sciences, Professor, and Kachanov, V. S., Engineer

TITLE: Structure, Properties and Heat Treatment of New High Speed Steels (Struktura, svoystva i termicheskaya obrabotka novykh bystrorezhushchikh staley)

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1958, Nr 11, pp 6-19 (USSR)

ABSTRACT: A considerable improvement in the cutting properties of high speed steels can be achieved by adding cobalt or up to 4-5% vanadium. During recent years numerous such high speed steels have been developed and in Table 1 the analyses are given of the main grades of such steels in the U.S.S.R. and the U.S.A. Numerous such new steels have passed laboratory and industrial tests but so far are not being used on a large enough scale; the best and optimum conditions have so far not been determined and it has not been established for which tools the individual steels are most suitable. To some extent this is explained by the fact that the new high speed steels are more difficult to grind and machine than ordinary high speed steels. High vanadium content steels contain a greater quantity of VC which have a hardness of about 1900 H_V as compared to about 1400 H_V for complex carbides of tungsten. This increases

Card 1/7

the resistance to wear but reduces grindability. Furthermore, an increase in the V content is effective only in the case of simultaneously increasing the carbon content and, therefore, steels containing 4 to 5% vanadium should contain 1.3 to 1.5% carbon which brings about a lowering in the malleability and the mechanical properties. Introduction of cobalt improves the heat resistance proportionately with the increase in the cobalt content up to 18-20%. However, it also lowers the mechanical properties the more the higher the Co content of the steel. For these reasons these new steels have to be thoroughly investigated and heat treatment regimes have to be worked out which ensure a better combination of the heat resistance and of the mechanical properties. It is of great importance to verify the properties of industrial heats and not of laboratory heats. Therefore, the authors selected for investigation four steels from melts produced by Elektrostal' which were supplied in the form of rolled strips of 15 x 35 mm; the chemical compositions of these steels are:

R18 - 0.72% C, 18.30% W, 4.12% Cr, 1.27% V;

 RK10 - 0.81% C, 18.68% W, 4.19% Cr, 1.28% V, 9.71% Co, 0.19% Mo;

RK15 - 0.77% C, 18.44% W, 4.09% Cr, 1.30% V, 14.65% Co, 0.60% Mo;

R10F5K5 (EI931) - 1.45% C, 10.82% W, 4.01% Cr, 4.46% V, 5.05% Co.

One of these was the stainless steel R18 which was investigated for the purpose of comparison. The steel RK15 was investigated for the purpose of determining whether it is advisable to improve the heat resistance by increasing the cobalt content above the limits which are usually applicable to cobalt steels. The hardness and the strength of the investigated steels in the as-delivered state are entered in Table 3. The subject matter is dealt with under the following paragraph headings: influence of hardening conditions on the properties of the steel; residual austenite; influence of tempering conditions on the properties of the steel. The obtained results are described and discussed in some detail and are also entered in graphs. In the conclusions the author summarises his results thus:

1. The fundamental properties were investigated of the following main types of characteristic new high performance

high speed steels: RK10, RK15 and R10F5K5; furthermore, the heat treatment regimes were determined which permit obtaining a better combination of properties.

2. Cobalt and high vanadium high speed steels have a considerably higher (1.5 to 2 times) heat resistance than the standard Soviet high speed steels R18 and R9. However, their mechanical properties are less favourable than those of the standard steels. Therefore, cobalt and high vanadium steels (over 3% V) are unsuitable for cutting processes involving dynamic regimes and for shaped tools with a thin cutting edge. Steels of this type can be used for machining materials which are difficult to machine (including austenitic alloys); however, the cutting tools must be of relatively simple shape.

3. An increase in the Co content, particularly above 10%, reduces appreciably the strength and increases brittleness due to separating out of inter-metallic compounds during the tempering. In spite of the fact that the heat resistance is higher than for other steels, steel with 15% Co is not recommended for practical use or for extensive workshop tests due to the very low mechanical

properties of such steels.

4. Alloying of high speed steels with Co does not change the conditions of dissolution of carbides in the case of high temperature heating, since the cobalt is present mainly in the solid solution and not in the carbides. The cobalt increases the quantity of the residual austenite in the hardened steel but does not increase its stability against tempering. For cobalt steels it is advisable to apply the same number of tempering operations as for similar cobalt-free steels.

5. It was shown in earlier work of the author (Refs 4 and 5) that the steels with a high vanadium content differ as regards the conditions of dissolution of carbides during heating from other high speed steels. For adequate saturation of the solid solution of high vanadium steels it is necessary to ensure during heating dissolution not only of a part of the complex tungsten carbides (which is the case for other steels) but to also dissolve a part of the vanadium carbides. Passing into solution of these more stable carbides is not completed during the heating time usually applied for hardening high speed steels and proceeds

SOV/129-58-11-2/13

Structure, Properties and Heat Treatment of New High Speed Steels

for a longer time. Increase of the heating time to double (to 20 secs per 1 mm dia.) for steels containing 4 to 5% V ensures a higher heat resistance, see Fig.11.

6. In contrast to cobalt and standard high speed steels, high vanadium steels have a more stable residual austenite due to a larger concentration in it of carbon. This involves an additional tempering operation, a fourth, at 560 to 570°C.

7. If the conditions enumerated in 5 and 6 are fulfilled, high vanadium steels with 5% Co will have a heat resistance equal to the higher alloyed steel with 18% W and 10% Co and will have somewhat better mechanical properties than the latter. Furthermore, high vanadium steels are superior to steels containing 10 and 15% Co as regards hardness and machineability in the annealed state.

8. Use of the hardening temperature 1285-1295°C is recommended with a heating time of 6 to 7 sec/mm for the steel RK10 and 1260°C with a heating time of 20 sec/mm for the steel R10F5K5.

9. Tempering of cobalt and high vanadium steels at 560 to 570°C brings about an increase in the hardness to 67-68 R_C;

Card 6/7

Structure, Properties and Heat Treatment of New High Speed Steels

the hardness will be only 63-64 R_C is the tempering temperature is 600°C. However, an increase of the tempering temperature to 600°C does not improve the strength although it intensifies the separating out of finely dispersed particles. For the steel R10F5K5 it is more advisable to apply tempering four times at 570-580°C for maintaining an increased hardness.

The final selection of the tempering regime and of the most favourable hardness should be made on the basis of extensive industrial scale tests.

There are 14 figures, 3 tables and 11 references, 7 of which are Soviet, 2 English, 2 German.

1. Tool steel--Properties 2. Tool steel--Heat treatment
3. Tool steel--Structural analysis

PHASE I BOOK EXPLOITATION SOV/3457

Nauchno-tekhnicheskoye obshchestvo mashinostroitel'noy promyshlennosti. Sektsiya metallovedeniya i termicheskoy obrabotki metallov.

Metallovedeniye i termicheskaya obrabotka metallov; trudy Sektsii metallovedeniya i termicheskoy obrabotki metallov (Physical Metallurgy and Heat Treatment of Metals; Transactions of the Section of Physical Metallurgy and Heat Treatment of Metals) no. 2. Moscow, Mashgiz, 1960. 242 p. 6,000 copies printed.

Sponsoring Agency: Nauchno-tekhnicheskoye obshchestvo mashinostroitel'noy promyshlennosti. Tsentral'noye pravleniye.

Editorial Board: G. I. Pogodin-Alekseyev, Yu. A. Geller, A. G. Rakhshtadt, and G. K. Shreyber; Ed. of Publishing House: I. I. Lesnichenko; Tech. Ed.: B. I. Model'; Managing Ed. for Literature on Metalworking and Machine-Tool Making: V. I. Mitin.

PURPOSE: This collection of articles is intended for metallurgists, mechanical engineers, and scientific research workers.

COVERAGE: The collection contains articles describing results of research conducted by members of NTO (Scientific Technical Society) of the machine-building industry in the field of physical metallurgy, and in the heat treatment of steel, cast iron, and nonferrous metals and alloys. No personalities are mentioned. Most of articles are accompanied by Soviet and non-Soviet references and contain conclusions drawn from investigations.

TABLE OF CONTENTS:

17

Physical Metallurgy and Heat Treatment (Cont.) SOV/5457

AVAILABLE: Library of Congress (TN672.M34)

ENTIN, Ruvim Iosifovich; GELLER, Yu.A., prof., red.; GORDON, L.M., red.izd-va; KARASEV, A.I., tekhn.red.

[Austenite transformations in steel] Prevrashcheniia austenita v stali. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1960. 252 p. (MIRA 13:6)
(Steel--Metallography) (Phase rule and equilibrium)

S/123/61/000/012/011/042
A004/A101

AUTHORS: Geller, Yu. A.; Malinkina, Ye. I.; Lomakin, V. N.

TITLE: Hardenability of alloyed tool steels

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 12, 1961, 80-81, abstract 12B575 (V sb. "Metallovedeniye i term. obrabotka metallov". [Tr. Sektsii metalloved. i term. obrabotki metallov. Tsentr. pravl. Nauchno-tekhn. o-va mashinostroit. prom-sti, no. 2]. Moscow, 1960, 197-219)

TEXT: The authors studied the hardenability of industrial melts of the steel grades 9XC (9KhS) (18 melts), XBГ (KhVG) (16 melts) and X (Kh) (5 melts). It is expedient to determine and check the hardenability of these steel grades by the face end hardening method according to ГОСТ (GOST) 5657-51. The authors established a dependence between the distribution of hardness over the length of the face end specimen and over the cross section of cylindrical specimens of alloyed hyper-eutectoid steels. The data of face end hardening according to the suggested nomogram being available it is possible to determine the hardenability of cylindrical specimens up to 100 mm in diameter. In order to obtain more homo-

Card 1/2

S/123/61/000/012/011/042
A004/A101

Hardenability of alloyed tool steels

geneous and higher properties of cutting tools and dies of large profile it is necessary to rate the mentioned alloyed hyper-eutectoid steels according to their hardenability by the face end hardening method taking into account the nomogram of the critical diameter and the distribution of hardness over the cross section. There are 17 figures and 10 references.

N. Il'ina

[Abstracter's note: Complete translation]

Card 2/2

18.3200

SOV/129-60-3-8/16

AUTHORS: Geller, Yu. A. (Doctor of Technical Sciences, Professor), Lebedeva, Ye. A. (Engineer)

TITLE: Tool Steels. The Effect of Alloying on Properties of Hypereutectoid Tool Steel

PERIODICAL: Metallovedeniye i termicheskaya obrabotka metallov, 1960, Nr 3, pp 31-40 (USSR)

ABSTRACT: This is a report concerning steels investigated in the present work. They were selected to characterize: (a) the effect of carbon (0.98-1.4%); (b) the effect of alloying elements; (c) a joint effect of these elements in steels of more complex mposition. These steels were smelted in the high frequency furnace, poured into 35 kg ingots, and forged into round rods 20 to 30 mm diameter, and also into 10 × 10 mm square rods. The forging was begun at 1,050-1,100°C (1,100-1,150°C for steel KhZS and 1,000-1,050°C for steel 9Kh2F)

78129
SOV/129-60-3-8/16

Tool Steels. The Effect of Alloying on Properties of Hypereutectoid Tool Steel

and finished at 850°C. The structure and properties of deformed and annealed steel, structure after annealing, the sensitivity to the formation of carbide lattice; the structure and properties of hardened steel. temperatures of hardening, hardness of cooled steel; the amount of residual austenite, strength, hardenability, hardness after hardening, properties of annealed steel, stability against tempering, strength of tempered steel, and selection of optimum composition of alloyed steel were all studied and described. The investigation showed that the beneficial effect of alloying elements in hypereutectoid steel has its maximum when their content is 0.8 to 1.1%, or at complex alloying. With higher content, the negative effect of some elements on many properties of steel becomes more pronounced. Chromium (at 0.3-0.8% content) somewhat increases hardenability and hardness after hardening to a larger degree than other elements and assures a uniform distribution of carbides. However, the increase in chromium over 0.8-1% does not improve hardenability but increases the carbide

Card 3/4

Tool Steels. The Effect of Alloying on Properties of Hypereutectoid Tool Steel

78189
SOV/129-60-3-8/16

heterogeneity, hardness after annealing, the amount of residual austenite, and elevates hardening temperature. Manganese decreases the temperature of hardening, increases hardenability but, when its content is over 1%, greatly increases the amount of residual austenite, which lowers the hardness of steel. Silicon is the only element which, at comparatively small content (0.7-1.5%), retards the second stage of martensite disintegration and increases thermal stability. But when its content is over 1%, silicon increases the hardness after annealing and the sensitivity to decarbonization. It is stated that by rational complex alloying it is possible (at decreased chromium, manganese, and silicon content) to increase the solubility of elements (tungsten and vanadium) which form stable carbides, and by these means to increase the hardenability and hardness. Besides, tungsten and vanadium retard the growth of grain. Vanadium (0.1-0.2%) is the only element which effectively prevents the formation of carbide network. There are

Card 3/4

S/121/60/000/007/008/011

AUTHORS: Geller, Yu.A., Karavanov, Yu.I.

TITLE: Improving the Structure and Properties of High-Speed Cast Steel by Annealing

PERIODICAL: Stanki i Instrument, 1960, No. 7, pp. 29-31

TEXT: The problem of the investigations described in the article consisted in determining the possibilities of improving the structure and properties of high-speed cast steel by way of annealing and in developing the right annealing conditions. Annealing at comparatively low heating temperatures does not dissolve the primary carbides, but, causing coagulation, can improve the structure. Cast steel undergoing annealing obtains, after hardening and annealing, a higher strength. The authors, investigating the properties of hardened steel and of annealed steel (particularly heat-resistance and strength), draw, as a result of the investigations carried out, the following conclusions: The annealing of cast steel, while not eliminating the lattice of ledeburite eutectic segregating at the grain boundaries, promotes its refining and makes it possible to obtain a more homogeneous structure of the metallic base. Owing to this the strength of steel after hardening and annealing, i.e. in the state in which it is used in

Card 1/2

S/121/60/000/007/008/011

Improving the Structure and Properties of High-Speed Cast Steel by Annealing

ready-made tools, increases by 10-15%. It is recommended to anneal cast steel at higher temperatures (900-950°C) than rolled steel. Holding time at heating temperatures should amount to 4-6 hours. A longer holding time is not to be recommended, since it might lower the heat-resistance. The authors emphasize the necessity of carrying out further investigations of the heat treatment of high-speed cast steel with the aim of a further improvement of its structure. There are 2 photos, 2 graphs and 3 Soviet references.

Card 2/2

23427
S/121/60/000/008/014/014/XX
D040/D113

11710 1045, 1454,

AUTHORS: Geller, Yu.A., and Vays, S.D.

TITLE: The effect of the composition of quenching media on the hardenability and strength of carbon steel

PERIODICAL: Stanki i instrument, no. 8, 1960, 27-29

TEXT: Experiments were conducted to find the effect of quenching in aqueous solutions of salts and alkalis on the hardenability and strength of carbon steel and also to find the solution which brings out the best properties of the steel. Aqueous solutions of 10% NaOH, 10% Na_2CO_3, 5% $KMnO_4$ and 5-6% NaCl were used as quenching media. For experimental purposes, У12А (U12A) steel with initial structure of grainy pearlite with uniformly distributed secondary cementite was used. The hardenability was determined on cylindrical specimens, 24 mm in diameter and 75 mm long. They were preheated to 600°C and then heated to 800 and 820°C in molten salt (72% $BaCl_2$ and 28% NaCl). The temperature of all the quenching fluids was 18-20°C. The thickness of the hardened layer was measured by three methods: (a) by hardness

Card 1/5

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R000514630001-1"

23427

S/121/60/000/008/014/014/XX
D040/D113

The effect of the composition ....

from the surface to the layer where the metal had a hardness of not less than RC 60; (b) by microstructure - i.e. by the martensite layer thickness to the first troostite spots; (c) by macroanalysis - i.e. the thickness of the outer light layer seen after etching. All methods indicated approximately the same thickness. The data obtained are presented graphically (Figs. 1, 2, 3). It can be seen from figure 3 that faster cooling due to salts and alkalis raised the metal strength after quenching, and that the highest strength was obtained through using a $KMnO_4$ quenching solution. The following conclusions were drawn: (1) Quenching in aqueous salt and alkali solutions has the following advantages over quenching in water: (a) It improves the hardenability of steel and raises the surface hardness by 1-2 units; (b) It increases the hardenability and thickness of the extremely hard surface metal; (c) It decreases the quenching temperature required for deeper hardening, and so reduces overheating; (d) It gives increased strength in quenched state and after low tempering; (2) The use of aqueous salt and alkali solutions decreases the deformation of the steel and its tendency to quenching cracks; (3) Best results are achieved using NaCl (5-6%), NaOH (10%) and $KMnO_4$ (4-5%) solutions. $KMnO_4$ ensures higher strength

Card 2/5

23427
S/121/60/000/008/014/014/XX
D040/D113

The effect of the composition ....

and a hardened layer of slightly less thickness. Exhaust fans are required for protective purposes. NaCl solution is more convenient in operation, and although it gives slightly lower strength, it also gives a thicker hardened layer. There are 3 tables, 3 figures and 9 references: 8 Soviet and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: B.F. Russell, The Australasian Engineer, 7, I, 1958.

X

Card 3/5

GELLER, Yu.A.; FADYUSHINA, M.N.

Microscopic method of determining decarbonization in tool steels.
Zav.lab. 26 no.3:307-310 '60. (MIRA 13:6)

1. Vsesoyuznyy nauchno-issledovatel'skiy instrumental'nyy institut.
(Steel alloys--metallography)
(Carbon)

PHASE I BOOK EXPLOITATION SOV/5874

Geller, Yuliy Aleksandrovich

Instrumental'nyye stali (Tool Steels). 2d ed., rev. Moscow, Metallurgizdat, 1961. 510 p. Errata slip inserted. 9300 copies printed.

Ed. of Publishing House: S.L. Zinger; Tech. Ed.: M.K. Attopovich.

PURPOSE: This book is intended for technical personnel and may also be useful to students at schools of higher technical education.

COVERAGE: The book reviews the basic principles of alloying tool steels and discusses their composition, structure, and heat treatment. Carbon and alloy tool steels, high-speed steels, cold- and hot-work die steels, and measuring-tool steels are considered. Conditions of hot working and thermochemical treatment for improving tool-steel properties are discussed, and methods for determining the structure and properties of these steels are reviewed. No personalities are mentioned. There are 470 references, mostly Soviet.

[redacted]

S/137/61/000/010/032/056
A006/A101

AUTHOR: Geller, Yu.A.

TITLE: High-speed steels of raised efficiency

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 10, 1961, 13, abstract 10I95 (V sb. "Vysokoproizvodit. rezhushchiy instrument", Moscow, Mashgiz, 1961, 7 - 21)

TEXT: This is a review. The most effective means of improving the properties of high-speed steels is the alloying with Co and a higher V content. The author describes Co and high-V steels used in the USA and the Federal German Republic. GOST 5952-59 contains 3 groups of high-speed steel: 1) on 18% W base-grade P18Φ2 (R18F2) and P18Φ2K5 (R18F2K5); 2) on 9 - 10% W base - grades P9Φ5 (R9F5), P9Φ2K5 (R9F2K5), P9Φ2K10 (R9F2K10) and P10Φ5K5 (R10F5K5); 3) on 14% W base- grade P14Φ4 (R14F4). The chemical composition and heat treating conditions of these steels are given, their technological and operational properties are described and recommendations are given as to their use. There are 14 references.

T. Fedorova

[Abstracter's note: Complete translation]

Card 1/1

S/137/62/000/002/088/144
A060/A101

AUTHORS: Geller, Yu. A., Fadyushina, M. N.

TITLE: Determination of residual austenite by the magneto-metallographic method

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 2, 1962, 70, abstract 2I471 (V sb. "Metodika i praktika metallogr. issled. instrum. stali", Moscow, Mashgiz, 1961, 44-50)

TEXT: The magneto-metallographic method proposed by the authors makes it possible to establish the presence of residual austenite by examination of specimens under a microscope and to determine the distribution of residual austenite in the structure. The magneto-metallographic method was checked by testing the steels ХВГ, 9ХС, Р9, and Р18 (KhVG, 9KhS, R9, and R18). It is shown that the results of the magneto-metallographic method coincide with the data obtained by the magnetic X-ray structure analyses. The magneto-metallographic method possesses a high sensitivity and is very expedient for determining the residual austenite in a multiphase alloy, and is also convenient for controlling the tempering of high-speed steel.

I. Nikitina

[Abstracter's note: Complete translation]

Card 1/1

S/137/62/000/002/090/144
A060/A101

AUTHOR: Geller, Yu. A.

TITLE: Metallographic methods of determining the decarbonized layer

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 2, 1962, 70, abstract 2I473 (V sb. "Metodika i praktika metallogr. issled. instrum. stali". Moscow, Mashgiz, 1961, 51-53)

TEXT: To determine the decarbonization of hypereutectoid ledeburite tool steels three metallographic methods are recommended, based upon differing principles. These methods of determining the decarbonization are based upon the difference in the duration and the temperature of transformation of supercooled austenite as a function of the carbon content. Thus, for high-speed steels a method is proposed, based upon the difference in the temperatures of the beginning of the martensitic transformation of the supercooled austenite in the decarbonized layer and the core. The method recommended for hypereutectoid alloy steels is based upon the difference in the stability of the supercooled austenite in the intermediate region. It is the simplest one for this group of steels. The third method is applicable to many tool steels and is based upon the determination

Card 1/2

of the decarbonization from the difference of the stability of the supercooled austenite in the pearlite region as a function of the C content. The three methods indicated for determining the decarbonization cannot be applied to carbon tool-steel on account of the lowered stability of the supercooled austenite in them. For those steels the decarbonization is determined at the present time from the reduced number of excess carbides in the structure of annealed steels which is not precise.

M. Rabinovich

[Abstracter's note: Complete translation]

S/137/62/000/002/095/14
A060/A101

AUTHOR: Geller, Yu. A.

TITLE: Determining decarbonization in high-speed steel from the temperature of martensitic transformation

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 2, 1962, 71, abstract 2I478 (V sb. "Metodika i praktika metallogr. issled. instrum. stali". Moscow, Mashgiz, 1961, 54-55)

TEXT: The article cites treatment schedules for determining the decartonized layer in high-speed steel and high-chrome steel by the method of V. D. Sadovskiy. (See "Zavodskaya laboratoriya", 1934, no. 6).

M. Rabinovich

[Abstracter's note: Complete translation]

Card 1/1

S/137/62/000/002/09./..
A060/A101

AUTHORS: Geller, Yu. A., Fadyushina, M. N.

TITLE: Determining decarbonization in alloy steel from intermediate transformation

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 2, 1962, 71, abstract 21474 (V sb. "Metodika i praktika metallogr. issled. instrum. stali". Moscow, Mashgiz, 1961, 60-65)

TEXT: A description is given of the comparative determination of the thickness of the decarbonized layer using three methods - the method of chemical analysis, the method of V. D. Sadovskiy, and the method of A. A. Popov and M. S. Mikhalev, carried out in order to estimate the precision of the last mentioned method and the feasibility of its application to tool steels. The steel grades У12, У11ХВ, Х, 9ХС, ХВГ, 95ХГСВ, and 8СВМ (U12, U11KhV, Kh, 9KhS, KhVG, 95KhGSV, and 8SVM) were investigated. The specimens had a cross-section 8 x 8mm. All the steels to be decarbonized were soaked in a hydrogen stream at 900°C in order to obtain the initial structure the specimens were annealed at 780°C for 4 hours. Then the specimens were heated up in a reducing vat and cooled to

Card 1/2

d

[Abs

Card 2/2

S/123/62/000/014/007/020
A004/A101

AUTHORS: Malinkina, Ye. I., Geller, Yu. A., Lomakin, V. N.

TITLE: Hardenability of alloyed steel

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 14, 1962, 27, abstract 14B151 (In collection: "Metodika i praktika metallogr. issled. instrum. stali". Moscow, Mashgiz, 1961, 94 - 108)

TEXT: The authors present the results of investigating the possibility of using the face hardening method to determine the hardenability of alloyed tool steel, and also nomograms for the conversion of the hardenability obtained on face samples into the hardenability of cylindrical specimens subjected to volumetric hardening with oil-quenching at 20°C and in hot media. The steel grades 9 XC (9KhS), XBГ (KhVG) and X (Kh) were investigated. It was found that the face hardening method is fully applicable for determining the hardenability of alloyed tool steel. The nomograms for determining the hardenability, plotted for the case of quenching in oil and in molten salts, make it possible according to the given face test, to determine the hardness in the center and in any spot

Card 1/2

Hardenability of alloyed steel

S/123/62/000/014/007/020
A004/A101

of the specimen cross section of any diameter, the magnitude of the critical diameter and thickness of the hardened layer on specimens of any diameter, and also the necessary hardenability depth according to the face test, in order to obtain the required depth of the hardened layer and the required core hardness on components of a given diameter. There are 12 figures.

E. Spivak

[Abstracter's note: Complete translation]

Card 2/2

GELLER, Yu. A.; KREMNEV, L.S.; OLESOVA, TS.L.

Rapid steel with reduced carbide heterogeneity. Metalloved. i term. obr. met. no.6:25-35 Je '61. (MIRA 14:6)

1. Vsesoyuznyy nauchno-issledovatel'skiy instrumental'nyy institut.
(Tool steel--Metallography)

S/148/61/000/009/010/012
E193/E383

AUTHORS: Kremnev, L.S. and Geller, Yu.A.

TITLE: The effect of small additions of titanium and nitrogen on the properties of high-speed cutting steel

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, no. 9, 1961, 129 - 137

TEXT: The main problem in producing the standard P18 (R18) and P9 (R9) high-speed cutting steels is to attain uniform distribution of carbides on which the uniformity of the grain size depends. Satisfactory distribution of carbides can be ensured by reducing the tungsten and chromium content so as to reduce the proportion of free carbides without decreasing the quantity of these elements in the solid solution. Steels of this type, however, show a tendency to excessive grain growth. This effect can be prevented by increasing the V content to 2 - 2.5%; in this case, however, steel becomes difficult to grind, which causes considerable difficulties in the fabrication of tools of complex shape. The object of the present investigation was to study the possibility of overcoming these

Card 1/4

S/148/61/000/009/010/012
E193/E383

difficulties by the addition of elements which would inhibit grain growth of steel during pre-hardening heating without increasing the free-carbide content. Ti (a carbide-forming element) and N, which forms stable nitrides, were used for this purpose. The chemical analysis of the experimental alloys is given in a table. The maximum quantity of N was 0.01 - 0.02 - 0.03%. Several conclusions were reached.

1) Addition of 0.1 - 0.2% Ti or 0.02 - 0.03% N with 0.1 - 0.2% Al inhibits grain growth of medium-tungsten content, high-speed cutting steel, decreases its sensitivity to overheating and increases its strength.

2) The effect of Ti as a grain refining and strengthening addition is more pronounced that that of nitrogen. In Fig. 3, constructed for specimens quenched from various temperatures and tempered (three times) for 1 hour at 550 °C, the bending strength (σ, kg/mm^2) is plotted against the quenghing temperature (°C), Curves 2 and 1 relating, respectively, to steel without Ti and with 0.26% Ti. In fig. 7 (constructed for similarly heat-treated specimens) σ is plotted against the quenching

temperature (°C), Curves 1 and 2 relating, respectively, to steel containing Ti and N additions.

3) The proportion of residual austenite unaffected by addition of N is decreased by the addition of Ti to an extent, illustrated in Fig. 4a, where the proportion of residual austenite (A, %) is plotted against the hardness temperature (°C) for steel containing 3% Cr and no Ti (top curve), steel with 3% Cr and 0.26% Ti (dotted curve with an inflection point), steel with 2.68% Cr and no Ti (horizontal dotted curve) and steel with 2.67% Cr and 0.16% Ti (bottom curve).

4) The quantity of residual austenite in a hardened steel depends not only on the composition of austenite but also on its grain size attained during heating prior to hardening. With increasing grain size the stability of austenite increases and so does the quantity of residual austenite. It is for this reason that the proportion of residual austenite is reduced in the presence of Ti but is not affected by additions of N.

S/148/61/000/009/010/012
E193/E383

The effect of ....

There are 11 figures, 1 table and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The English-language reference is: Ref. 4 - A. Carter, Journal Iron and Steel Inst., 83, 11, 1955.

ASSOCIATION: Moskovskiy stankoinstrumental'nyy institut (Moscow Machine and Instrument Institute)

SUBMITTED: February 3, 1961

Card 4/4

LEASE: 08/23/2000 CIA-RDP86-00513R000514630001-1

S/148/61/000/011/018
E111/E480

AUTHORS: Geller, Yu.A., Kremnev, L.S.

TITLE: The effect of chromium on the properties of high-speed cutting steel

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no.11, 1961, 129-136

TEXT: There is evidence that chromium has an appreciable effect on the working and properties of high-speed steel. The chromium content of such steels is fixed within the same range (4 to 4.5%) in the USSR and abroad for all grades, irrespective of wide variations in tungsten, molybdenum and vanadium concentrations. Work reported on the effect of chromium on the cutting properties (Ref.2: H. Peltzgutter. Stahl u. Eisen, H. 12, 1924) and hardenability (Ref.4: E. Gudremon. Special steels. v.11, Metallurgizdat, 1959) or on the phase composition (Ref.6: N.T.Chebotarev, Izv. AN SSSR, Seriya fizicheskaya, no.1, 1951; Ref.8: F.Kaiser, M.Cohen, Metal Progress, no.6, 1952) does not fully represent the influence of this element. Nor does it enable the optimum chromium content to be found for various contents of other elements, especially tungsten. To study this problem, the

Card 1/4

S/148/61/000/011/010/018
E111/E480

The effect of chromium ...

authors investigated steels with 3.63 to 18% W, up to 4.2% Cr, 0.72 to 0.88% C and 1.0 to 1.7% V. These were induction melted, cast into 12 kg ingots and forged into 12 x 12 mm bars. After various heat treatments, phase analysis, solid-solution analysis, hardness measurements and determination of cutting properties and carbide distribution were carried out. The authors draw the following conclusions. In high-speed steel, chromium affects various transformations taking place during hardening and heat treatment, its influence is therefore very complex. Its main effect is on high-temperature transformations preceding quenching. As it is present in the form of a complex tungsten carbide, it lowers the solubility of this carbide in the austenite; the higher the chromium content in the carbide (and therefore in the steel), the greater the effect. Steels with less than 8 to 10% tungsten, in which grain growth begins at lower temperatures, require more chromium to obtain saturation of the solid solution with tungsten while keeping the grain small. The tungsten carbides precipitated on tempering form in larger quantities at lower temperatures and also coagulate at a somewhat reduced heating temperature if they contain more chromium. It is for

Card 2/4

this reason that, in steels with up to 8 - 10% W, the secondary hardness is raised but red hardness is reduced by chromium. Chromium hinders the transformation of the complex tungsten carbide into the simpler one insoluble in austenite. However, it increases carbide heterogeneity in steel with a higher carbide content (more tungsten) and this impairs strength. At the same time, chromium improves hardenability because it promotes a fuller solution of tungsten carbides and the formation of chromium carbides which go into solid solution on heating to 1100 - 1150°C. For improving the properties of high-speed cutting steel, the chromium content should be fixed in relation to that of tungsten. With up to 10% W, about 4% Cr is required to saturate the solid solution at lower temperatures, thus keeping the grains small, and to obtain a high secondary hardness. In steels containing over 10 to 12% W, the chromium content should be reduced to 3% in order to retain a fine grain size on high-temperature heating and to reduce carbide heterogeneity, increase strength and red hardness. There are 8 figures, 2 tables and 11 references: 8 Soviet-bloc and 3 non-Soviet-bloc. The two references to English language publications read as follows: Ref.1: P. Malkiewiez. Journ. Iron

The effect of chromium ... S/148/61/000/011/010/018
E111/E480

and Steel Inst., v.193, 1959, 1; Ref.8: as quoted in text.

ASSOCIATION: Moskovskiy stanko-instrumental'nyy institut (Moscow Institute of Machine Tools and Instruments)

SUBMITTED: April 4, 1961

Card 4/4