SOV/163-58-2-[illegible]

Desulfurization of Cast Iron by Means of Lime

sulfurization process. This way cast iron with a sulfur content of 0,02-0,22% was obtained. There are 5 figures, [illegible] tables, and 5 references, 2 of which are Soviet.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: November 20, 1957

Card 2/2

Ойкс, Г. Н.

130-3-8/21

AUTHORS: Sokolov, G. A., Engineer and Oyks, G. N., Professor Doctor of Technical Sciences.

TITLE: New installation for the vacuum treatment of liquid steel. (Novaya ustanovka dlya vakuumirovaniya zhidkoy stali).

PERIODICAL: Metallurg, 1958, No.3, pp.16-21 (USSR).

ABSTRACT: In this article a new vacuum installation in the electric steel-melting shop of the "Krasnyy Oktyabr'" Works in Stalingrad is described. The installation was designed at the works under the direction of the Moscow Steel Institute (Moskovskiy Institut Stali). V. M. Severtsov, V. S. Kiryukhin, M. V. Podskrebov, G. I. Kozlitin are named as works-staff members who participated in the design work with institute-staff members. The installation is intended for degassing liquid steel in a ladle or during pouring from one ladle to another; it also enables steel to be top- or bottom-poured in neutral or protective atmospheres. The weight of steel treated is 1 - [illegible] tons. The chamber for ladle degassing (Fig.1) consists of a steel cylindrical (diameter 3300 mm and height 2200 mm) chamber with a flat lid. The lid is provided with a bunker to hold additions, an inspection window and an [illegible] through which steel from another teeming ladle can be

Card 1/3

130-3-8/21

New installation for the vacuum treatment of liquid steel.

poured into the ladle standing in the evacuated chamber. The lid-raising mechanism is a modification of that designed by the "Dneprospetsstal'" Works. The vacuum chamber for bottom pouring consists of a base and top part 800 and 2100 mm high, respectively, with a 20 mm thick rubber ring seal. The chamber is for a three-ingot arrangement and is provided with three bunkers for exothermic mixture, an inspection window and a stoppered funnel vessel in which a layer of metal is maintained as a seal. The top part of the chamber is handled by the pouring crane. The arrangement for top pouring is that a funnel is welded to the hot top, a bunker being provided for adding exothermic mixture, a side-arm for evacuating the system and a signalling device for the metal level. The central pumping station (Fig.4), is equipped with two PBH-60 pumps each rated at 2900 m^3/hour at 90% vacuum. The pumps can be used in series or parallel and the article describes the valve system. For improving on the 15-20 mm Hg produced by the pumps ejectors are provided and the article deals with the theory and characteristics of these and tabulates test results with steam pressures of 1 - 6.5 atm gauge.

Card 2/3 The valves used are of an original design (Fig.7) and have

133-4-8/21

New installation for the vacuum treatment of liquid steel.

sealing rings of paranite, this being selected after many unsuccessful attempts to use other materials. The manufacture of the rings is described, and the cooler with a cooling surface of [illegible].3 m^2. The article concludes with an account of the inertial dust-catcher for protecting the pumps. These are followed by an oil filter. The whole installation is said to have worked satisfactorily since its commissioning in November, 1957, producing residual pressures of 12 - 14 mm Hg even with vigorously boiling steels.

There are 3 figures and 1 table.

ASSOCIATION: Moscow Steel Institute. (Moskovskiy Institut Stali).

AVAILABLE: Library of Congress.

Card 3/3

OYKS, G.N., doktor tekhn. nauk, prof.; ZHAN'-YAO-VEN' [Han-Yao-wen], inzh.

[redacted]

Desulfurizing liquid iron in vacuum. Izv. vys. ucheb. zav.; chern. met. no.4:37-45 Ap '58. (MIRA 11:6)

1. Moskovskiy institut stali.
(Desulfuration) (Vacuum metallurgy) (Iron--Metallurgy)

TRET'YAKOV, Ye.V., inzh.; OYKS, G.N., prof., doktor tekhn.nauk

Conditions for accelerating slag formation and dephosphorization.
Izv.vys.ucheb.zav.; chern.met. no.8:21-30 Ag '58.
(MIRA 11:11)

1. Moskovskiy institut stali.
(Smelting) (Chemistry, Metallurgic)

SOV/130-58-10-5/18

AUTHORS: Sokolov, G.A., Oyks, G.N. and Ansheles, I.I.

TITLE: Vacuum Treatment of Alloy Steel (Vakuumnaya obrabotka legirovannoy stali).

PERIODICAL: Metallurg, 1958, Nr.10, pp.10-14 (USSR)

ABSTRACT: In November 1957 an installation (described in "Metallurg", 1958, Nr.3) for the vacuum treatment of liquid steel was commissioned at the "Krasnyy Oktyabr'" works. The authors describe results obtained with vacuum treatment of type 30KhGSA steel in the ladle and also during pouring. Ladle treatment of 12-ton heats was effected in 20-ton ladles to allow for the "boiling" of the metal. Observations were made continuously on the slag surface and the stopper. Initially all heats behaved rather similarly, but later some continued to boil violently while others became quieter. Because of possible damage to stopper-rod sleeves and cooling of the metal the treatment was stopped 5-7 minutes after the attainment of a vacuum of 15-20 mm Hg. Vacuum fusion of samples showed that the hydrogen and nitrogen contents decrease by 0.3-2.0 cm^3/100 g and 0.0007-0.003%

Card 1/3

SOV/130-58-10-5/18

Vacuum Treatment of Alloy Steel.

respectively, through vacuum treatment. The metal oxygen decrease was irregular, but analyses of the gases evolved during treatment (Table 1) showed that generally 12-37% CO and CO_2 were present; interpretation of results is complicated by the presence of refractory-derived non-metallic inclusions and the determination of non-metallic inclusions is now being carried out in the finished steel. Frequency curves were constructed (Fig.2) from tests on the strength and plasticity characteristics of vacuum-treated and ordinary steels; both were better in the treated metal; the macrostructures were almost the same. In another method of treatment the vacuum was treated directly in the ingot mould (4.1 tons) during its filling from a tundish. The nozzle to the mould is initially closed with a thin steel plate, which enables evacuation to a residual pressure of 10-12 mm to be effected. The plate melts when the metal is poured on and the ingot mould is filled at a pressure of about 5-7 mm Hg in 2.5-3.0 minutes. The metal jet was seen to be irregular and bubble-evolution was observed in the metal filling the mould, especially at the walls.

Card 2/3

SOV/130-58-10-5/18

Vacuum Treatment of Alloy Steel.

The surface of ingots top-poured in this way differed little from that of ordinary bottom-poured ones. The slight blemishes on the edges of the vacuum poured ingots disappeared during heating in the soaking pits and there was rather less segregation. Comparison of the mechanical properties of rolled vacuum-treated and ordinary steel (Table 2) showed that the former was generally superior. The author urges that further improvements be made in the vacuum pouring process. There are 3 figures and 2 tables

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute).

Card 3/3

SOBOLEV, S.K., inzh.; OYKS, G.N., prof., doktor tekhn.nauk

Desulfuration of cast iron in the ladle by means of a lime and
aluminum suspension in gas. Izv.vys.ucheb.zav.; chern.met. no.11:3-8
N '58. (MIRA 12:1)

1. Moskovskiy institut stali.
(Desulfuration) (Cast iron--Metallurgy)

OYKS, G.N., doktor tekhn. nauk, prof.; USHAKOV, Ye.N., inzh.; KOZLOV, V.I., inzh.

Using molten iron-calcium slag for converting high-phosphorous pig iron. Izv. vys. ucheb. zav.; chern. met. no.12:3-8 D '58. (MIRA 12:3)

1. Moskovskiy institut stali.

(Slag)
(Cast iron--Metallurgy)

Translation from Referativnyy zhurnal Metallurgiya 1958 Nr [illegible] (USSR) SOV [illegible]

AUTHORS Turkebayev Y A, Ovks, G N.

TITLE Intensification of Decarburization in the Melting Period During Conversion of High-phosphorus Iron (Intensifikatsiya obezuglerozhivaniya v period plavleniya pri peredele chuguna s vysokim soderzhaniyem fosfora)

PERIODICAL Sb Mosk in-t stali 1958 Vol 38 pp 88 [illegible]

ABSTRACT 130 heats with high-phosphorus iron and 13 with conversion pig iron employing oxygen blow of the bath (OBB) during the melting period (M) are investigated 200 heats with phosphorus and conversion pig iron without blow are analyzed statistically It is observed that as the amount of O_2 introduced increases the M time diminishes and oxidation loss grows In OBB heats there is earlier formation of slag with higher (P_2O_5) than in heats without O_2 blow A calculation of the amount of slag formed in M is provided Calculation of the possible increase in temperature due to direct oxidation of impurities by gaseous O_2 is performed Bath blow with O_2 makes for a significant overheating of the Me thereby affording a possible reduction in the next

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Intensification of Decarburization in the Melting Period During the Co[illegible] SOV [illegible]

period of the heat, viz., finishing. In OBB heats of rimmed steel (St) the metal (Me) temperature is somewhat lower than in heats without OBB, while the opposite picture holds in melts of rail St. This is explained by the endothermic [illegible] of the reaction between [C] and the ore occurring in an early stage of M and by the differences in the quantities of ore introduced for these grades. An early [illegible] of O_2 blow of the bath makes for reduction in M, formation of slags with higher [P_2O_5], longer Fe-lance life, and reduced carry off of flue dust than when blow is begun later. The rate of C and P oxidation rises with increase in OBB intensity. Increase in OBB intensity does not interfere with attainment of the desired [P] at the close of M since it accelerates slag formation and the basicity of the slag rises. To verify the influence of initial [C] and [P] upon M duration, 2 100% molten pig-iron and 7 85% molten-pig iron heats were run. It is found that an increase [illegible] initial [C] and [P] in the charge upon OBB heats with corresponding change [illegible] ore and limestone consumption does not increase the duration of a heat.

Card 2/2

PEROV, A.P. [translator]; OYKS, G.N., doktor tekhn.nauk, red.;
PETRUSHA, L.F., red.izd-va; MIKHAYLOVA, V.V., tekhn.red.

[Efficiency of various methods of riser head heating] Effektivnost' razlichnykh metodov utepleniia pribyli. Moskva, Gos.nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1959. 56 p.
Translated from the English. (MIRA 14:1)
(Steel ingots)

18(3) SOV/148-59-1-6/19

AUTHORS: Sokolov, G.A., Engineer and Oyks, G.N., Professor, Doctor of Technical Sciences

TITLE: Kinetics of Vacuum-Flow Steel Degassing in a Ladle (Kinetika protsessa degazatsii pri vakuumirovanii zhidkoy stali v kovshe)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy - Chernaya metallurgiya, 1959, Nr 1, pp 47-58 (USSR)

ABSTRACT: Information is given on experiments carried out in order to investigate processes of liquid steel degassing under vacuum. Smelts of "ShKh9", "ShKh15", and "30KhGSNA" grades of electric steel were investigated according to a new technology developed by I.I. Ansheles, Candidate of Technical Sciences from MIS, V.I.Danilin, and B.Z. Kononov, Engineers from the "Krasnyy Oktyabr'" Plant. Desulfurization by slag deoxidation was used to obtain steel containing only chromium, carbon, and manganese. The subsequent deoxidation of this steel under vacuum was carried out by carbon dissolving and by degassing. The quantitative evaluation of degassing kinetics was performed by a new indicator method with the use of an indicator gas containing 96 to 98% methane and 1.5 to 3.0% higher hydrocar-

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SOV/148-59-9-[illegible]

AUTHORS: Kosterev, L. B. (Engineer), Oyks, G. N. (Professor)

TITLE: Liberation of Gas During Solidification of 18-Ton Ingots

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, 1959, Nr 9, pp 61-72 (USSR)

ABSTRACT: This is a study of gas liberation during solidification of 18-ton ingots at various degrees of oxidation and various compositions of steel; also an investigation of the part played by atmospheric oxygen which oxidizes the surface of ingot metal during the rimming action in molds in the process of gas formation. The metal was produced by the scrap-ore process in basic 220-ton open hearth furnaces with magnesite-chromite roof and a special arrangement for the oxygen blowing of the bath. The reduction of rimmed steel by ferromanganese was performed in the furnace and in the ladle. The installation for investigation is shown on Fig. 1. The liberated (during the ingot solidification)

Card 1/8

Liberation of Gas During Solidification of 18-Ton Ingots

77136
SOV/148-59-9-6

gas was collected by means of an iron welded hood, which was lowered by a hoist into the liquid metal to about 50 mm depth.

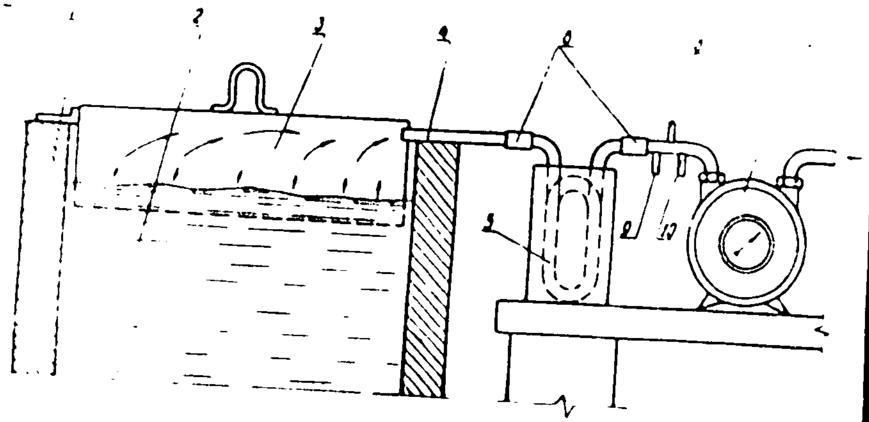

Fig. 1. An installation for collection of gas liberated during the solidification of an ingot: (1) mold; (2) liquid metal; (3) gas-collecting hood 1320 x 570 x 400 mm; (4) 3/4"-diameter outgoing pipe; (5) cooler; (6) connecting pipe; (7) gas meter GK-6; (8) mercury thermometer; (9) U-shape manometer; (10) outlet for taking gas samples.

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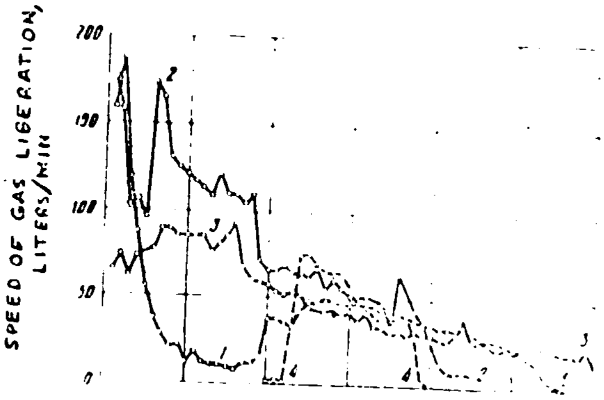
Liberation of Gas During Solidification of 18-Ton Ingots

77136
SOV/[illegible]

Fig. 2. The amount and speed of gas liberation during solidification of the ingot: (1) steel 08kp ingot (experiment 1); (2) steel 0.8kp ingot (experiment 2), a stream of metal was blown by oxygen; (3) steel 08 ingot (experiment 3); (4) semi-killed steel 08ps ingot (experiment 4); (5) killed steel 08 10 ingot (experiment 5).



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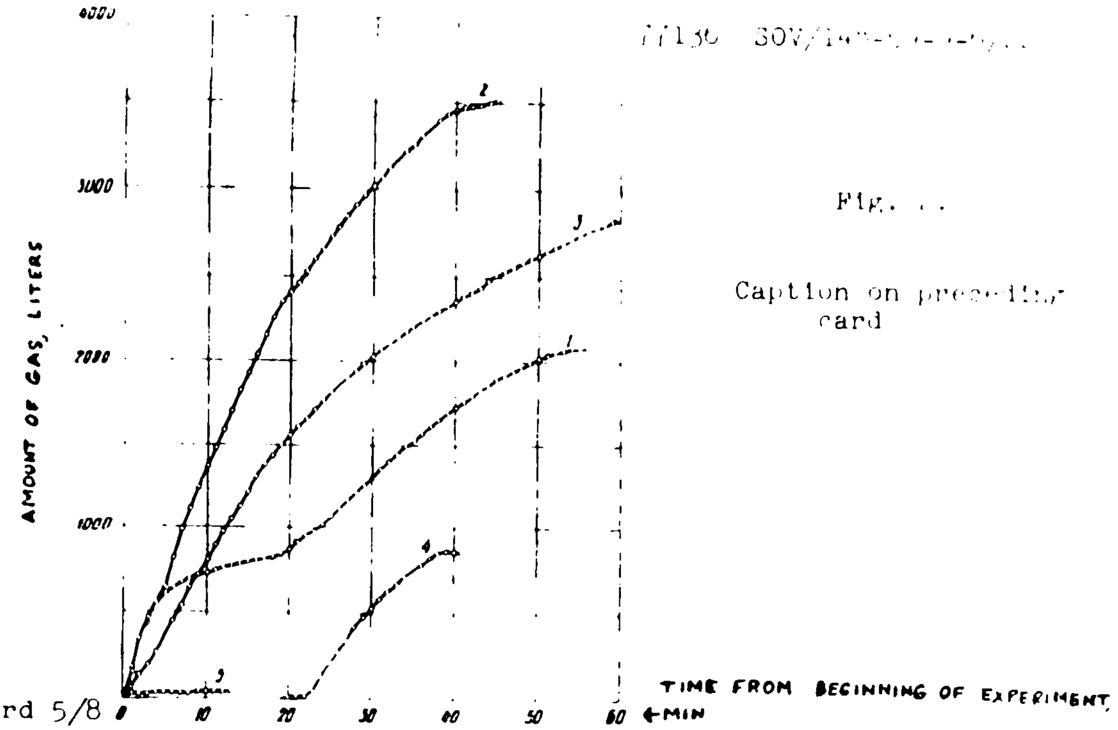

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Liberation of Gas During Solidification of 18-Ton Ingots

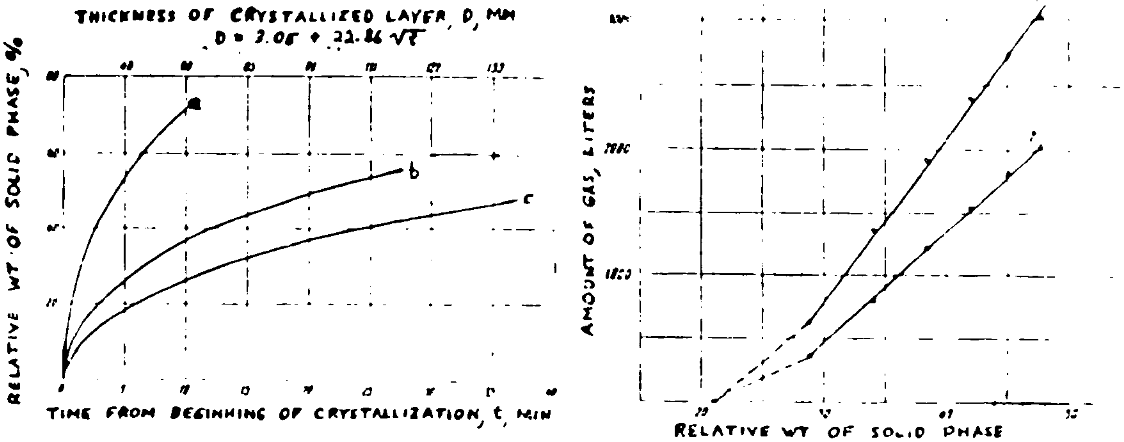

Fig. 3. The relationship between the amount of crys[illegible] and the amount of liberated gas: (1) steel [illegible] ingot (experi-ment 2); ([illegible]) steel 3kp ingot (experiment [illegible]); (a) [illegible] 0.8 ton, 300 x 300 mm; (b) steel ingot about [illegible] ton, [illegible]; (c) steel ingot about 18 ton, 740 x 1540 mm.

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Liberation of Gas During Solidification [illegible]
of 1[illegible]-Ton Ingots

[illegible]
SOV/[illegible]

of the amount of liberated gas and the speed of gas liberation; the increase in concentration of manganese and carbon in steel results in diminishing intensity of gas liberation. (2) The amount of gas liberated during the solidification of [illegible]-ton rimmed steel [illegible] varied from [illegible] to [illegible] m³/ton. The amount of gas

liberated per ton of steel does not depend on the weight of the ingot. (3) The composition of gas liberated during the solidification of ingots depends on oxygen content in steel. The crystallization of rimmed steel is accompanied mainly by the liberation of carbon monoxide ([illegible]%); the gas, liberated from the semi-killed steel, together with carbon monoxide, contains a considerable amount of hydrogen; the killed steel liberates mainly hydrogen. (4) The increased oxidation of rimmed steel has a small effect on the composition of liberated gas; it results in a small decrease of hydrogen content and a small increase of carbon dioxide content. ([illegible]) The rimming action in the molds proceeds at the expense of oxygen dissolved in steel, as well as the oxygen [illegible]

Card [illegible]

Liberation of Gas During Solidification [illegible]
of 1?-Ton Ingots SOV/[illegible]

air, which oxidizes the surface of the metal [illegible] rimming action. Over [illegible]% of admixtures, during the rimming action in the moulds, burns out at the expense of oxygen of the air. There are [illegible] figures; [illegible] tables; and [illegible] Soviet references.

ASSOCIATION: Moscow Steel Institute (Moskovskiy institut stali)

SUBMITTED: July 23, 19[illegible]

Card [illegible]

PHASE I BOOK EXPLOITATION SOV/39

Oyks, Grigoriy Naumovich, Professor, Doctor of Technical Sciences, und Khaya Mendelevna Ioffe

Proizvodstvo stali; raschety (The Making of Steel; Calculations) Moscow, Metallurgizdat, 1960. 319 p. Errata slip inserted. 7,250 copies printed.

Scientific Ed.: Grigoriy Naumovich Oyks, Professor, Doctor of Technical Sciences; Ed. of Publishing House: S.I. Venetskiy; Tech. Ed.: L.V. Dobuzhinskaya.

PURPOSE: This textbook is intended for students of industrial and metallurgical tekhnikums and may also be of use to engineers and technicians of metallurgical plants and planning organizations, as well as to students of metallurgical schools for higher technical education.

COVERAGE: The book reviews calculations for the charge of basic and acid, single or double slag, open-hearth furnaces operating with or without oxygen. Thermal calculations of open-hearth furnace performance, the simplified design of regenerators (including the draft check) and methods of compiling material and

Card 1/6

Oyks, G. N.

PHASE I BOOK EXPLOITATION SOV/4544

Soveshchaniye po teorii liteynykh protsessov, 4th

Kristallizatsiya metallov; trudy soveshchaniya (Crystallization of Metals; Transactions of the Fourth Conference on the Theory of Casting Processes) Moscow, Izd-vo AN SSSR, 1960. 325 p. 3,200 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut mashinovedeniya. Komissiya po tekhnologii mashinostroyeniya.

Resp. Ed.: B. B. Gulyayev, Doctor of Technical Sciences, Professor; Ed. of Publishing House: V. S. Rzhevnikov; Tech. Ed.: S. G. Tikhomirova.

PURPOSE: This book is intended for metallurgists and scientific workers. It may also be useful to technical personnel at foundries.

COVERAGE: The book contains the transactions of the Fourth Conference (1958) on the Theory of Casting Processes. [The previous 3 conferences dealt with hydrodynamics of molten metals (1955), solidification of metals (1956), and shrinkage processes in castings (1957)]. General problems in the crystallization of metals, including the crystallization of constructional steels, alloy steels with special properties, cast iron, and of nonferrous alloys, are discussed. Recognition is given to D. K. Chernov and N. T. Gudtsov and their students, B. B. Gulyayev and A. G. Spasskiy, for their contributions to the understanding of the basic problems involved in the theory of crystallization of ferrous and nonferrous metals and alloys. Academician A. V. Shubnikov is also mentioned in connection with his work on the planning of research on crystal formation. References accompany several of the articles.

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Oyks, G.N.

PHASE I BOOK EXPLOITATION SOV/4548

Akademiya nauk SSSR. Komissiya po fiziko-khimicheskim osnovam proizvodstva stali

Primeneniye vakuuma v metallurgii (Use of Vacuum in Metallurgy) Moscow, Izd-vo AN SSSR, 1960. 334 p. Errata slip inserted. 4,500 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A.A. Baykova Komissiya po fiziko-khimicheskim osnovam proizvodstva stali.

Resp. Ed.: A.M. Samarin, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: G.M. Makovskiy; Tech. Ed.: S.G. Markovich.

PURPOSE: This collection of articles is intended for technical personnel interested in recent studies and developments of vacuum steelmaking practice and equipment.

COVERAGE: The book contains information on steel melting in vacuum induction furnaces, and vacuum arc furnaces, reduction processes in vacuum, and degassing of steel and alloys. The functioning of apparatus and equipment, especially vacuum furnaces and vacuum booster pumps is also analysed. Personalities are mentioned in connection with some of the articles and will appear in the Table of Contents. Three articles have been translated from English. Some of the

PART IV. DEGASSING OF STEEL AND ALLOYS

Oyks, G.

PHASE I BOOK EXPLOITATION SOV/4782

Moscow. Institut stali

Proizvodstvo i obrabotka stali i splavov (Production and Treatment of Steel and Alloys) Moscow, Metallurgizdat, 1960. 462 p. (Series: Its: Sbornik, 39) 2,100 copies printed.

Ed.: Ye. A. Borko; Ed. of Publishing House: S. L. Zinger; Tech. Ed.: M. R. Kleynman; Editorial Council of the Institute: M. A. Glinkov, Professor, Doctor of Technical Sciences; R. N. Grigorash, Docent, Candidate of Technical Sciences; V. P. Yelyutin, Professor, Doctor of Technical Sciences; A. A. Zhukhovitskiy, Professor, Doctor of Chemical Sciences; I. N. Kidin, Professor, Doctor of Technical Sciences; B. G. Livshits, Professor, Doctor of Technical Sciences; A. P. Lyubimov, Professor, Doctor of Technical Sciences; I. M. Pavlov, Corresponding Member, Academy of Sciences USSR; and A. N. Pokhvisnev, Professor, Doctor of Technical Sciences.

PURPOSE: This book is intended for technical personnel in industry, scientific institutions and schools of higher education, dealing with open-hearth and electric-furnace steelmaking, metal rolling, physical metallurgy, metallography, and heat-treatment. It may

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of the articles.

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Card 1/10

Production and Treatment (Cont.) SOV/4782

TABLE OF CONTENTS:

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S/[illegible]/[illegible]
AO54/AO[illegible]

AUTHORS: Oyks, G.N., Professor; Matevosyan, P.F., Engineer; [illegible] G.A., Engineer; Ansheles, I.I., Docent; Danilin, [illegible] Engineer; Koncnov, B.Z., Engineer

TITLE: New Process for Melting Ball-Bearing Steel

PERIODICAL: Stal, 1960, No. 4, pp 308 - [illegible]

TEXT: The melting of the metal in vacuum furnaces [illegible] an adequate degree of degasification and deoxidation is not [illegible] mass production, because the capacity of these furnaces is small [illegible] ment complicated and expensive It was considered more effective [illegible] the metal in a conventional furnace and apply vacuum treatment [illegible] in the ladle. However, this method did not yield satisfactory [illegible] tests were carried out to incorporate the vacuum treatment in the [illegible] of steel production. In the tests a unit was employed as that used in [illegible] steel foundries including the two PBH 60 (RVN-60) type [illegible] pumps connected in series with a capacity of 60 - 48 m /min, [illegible] 70 - [illegible]% and a maximum vacuum of [illegible] mm Hg. In the range of [illegible]

Card 1/4

S[illegible]

New Process for Melting Ball-bearing Steel A0[illegible]A[illegible]

sures of [illegible] - [illegible]0 mm the pump capacity was [illegible] - 40 m^3/min. In [illegible] the output of the pump system, steam jet ejectors were mounted at [illegible] let producing a vacuum of 350 - 400 mm Hg. During the tests the [illegible] treatment in the ladle was carried out: a) partly in a variant [illegible] conventional technology, and b) partly according to a modified [illegible] the conventional melting process vacuum treatment in the ladle had [illegible] tle effect on deoxidation and in order to obtain a satisfactory [illegible] of the metal it was necessary that the oxygen contained in [illegible] the vacuum treatment be present in the form of a solution or in the [illegible] ture of inclusions easily reduceable. This, however, was [illegible] effective deoxidizing agents, such as silicon and aluminum [illegible] sent from the solution. Therefore the reduction was carried [illegible] silicon and aluminum which were only added to the ladle in the [illegible] of the vacuum treatment, mainly for the purpose of alloying. A[illegible] the new technology the ball-bearing steel was melted in a [illegible] furnace with at least [illegible] C in the metal when fusing [illegible] ture was maintained at 1,[illegible]0 - [illegible]0°C before skimming [illegible] slag, i.e., somewhat higher than the usual temperature allowing [illegible] reserve for the subsequent vacuum treatment. After removing [illegible]

S/133/60/000/0
A054/A02

New Process for Melting Ball-Bearing Steel

ro-chrome was added in a quantity corresponding to the type of steel. With a slag mixture containing lime, fluorite, some chippings of fire-clay and dinas, amounting to 5% of the weight of the metal (a little less than the amount thus far used). Then 25 kg forge-coke was added and the furnace was hermetically closed for 20 - 25 min. Evidently at a higher temperature of reduction a thoroughly oxidized slag could be obtained also without the addition of ferrosilicon. As in the new technology one of the most important purposes of the reduction was the desulfurization of the bath, the duration was determined by the initial sulfur content of the metal and the rate of desulfurization which could be somewhat lower than in the conventional process, where slag was additionally deoxidized by ferrosilicon. The analysis showed that for identical amounts of sulfur the rate of desulfurization was even higher in the new process due to the higher temperature during reduction. The ladle was put in the vacuum chamber when the sulfur content of the metal was about 0.15 - 0.18%. The vacuum treatment of the steel containing in the solution only carbon, chrome and manganese was accompanied by violent boiling, indicating the intensity of the deoxidation under the influence of the carbon absorbed. After 5 - 6 min the boiling intensity decreased, and, while vacuum was maintained, 75%-ferrosilicon [illegible]

Card 3/4

S/1[illegible]

New Process for Melting Ball-Bearing Steel A054/A0[illegible]

corresponding to the average silicon content of the steel produced and aluminum (160 g/t) were added. Then the metal was boiled for a second time for 1.5 - 2 min. The complete vacuum treatment took only 8 - 10 min. The oxidizing agents added into the ladle were assimilated to a higher degree in the new than in the conventional process (ferrosilicon to 90% as compared to 65% and aluminum to [illegible]6% instead of 50.4%). The non-metallic contaminations were analysed quantitatively according to ГОСТ 801-47 (GOST [illegible]) and the globular inclusions according to the scale of TsNIIPP. The chemical and metallographical tests on non-metallic inclusions also proved the greater purity of the steel. The new method is economical: melting was shortened, reduction took 20 min less, the consumption of deoxidizing agents and the quantity of waste products decreased. The saving was [illegible] roubles per ton. There are 4 figures, 5 tables and [illegible] Soviet references.

Card 4/4

S/148/60/000/009/003/025
A161/A030

AUTHORS: Oyks, G.N., Khan' Yao-ven', and Litvintsev, A.I.

TITLE: Desulfurization of iron and steel in vacuum

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no.9, 1960, 18-28

TEXT: The Moscow Steel Institute has carried out an investigation in laboratory and in foundry conditions. The observations are discussed with references to four previous Soviet works (Ref. 1-4). The desulfurization degree and rate was different in acid and basic crucibles in vacuum (Fig.1). As had been proven previously (Ref.1) desulfurization in basic crucibles in vacuum is always higher than in acid crucibles. This phenomenon shows that magnesium oxide of the crucible is decomposed by carbon in vacuum. Magnesium raises the degree of desulfurization through the reaction calculated by Chapman and Ta-Li (Ref.3) (V.I.Lakomskiy, "Liteynoye proizvodstvo", 1957, No.1)

$$Mg_{пар} + [FeS]_{\%Fe} = Fe_{ж} + (MgS)_{тв} \; ; \; \Delta F_{1973} = -83930 + 35.85T ,$$

Card 1/4

S/148/60/000/009/003/025
A161/A030

Desulfurization of iron and steel ...

and hence the conditions were favorable in basic crucibles, but the process did not develop intensely at the residual pressures that were achieved in experiments. Apparently, magnesium only plays a limited part in desulfurization of iron in basic crucibles on account of raising the oxygen content, as has been revealed by R.S.Belyakov (Dissertation for the degree of Candidate of Technical Sciences, Moscow Steel Institute, 1957). Desulfurization increased with raising the temperature of iron, the depth of vacuum, and the higher temperature and longer holding time in the vacuum. The effect of manganese content in iron on desulfurization is known - it raises with dropping temperature of liquid iron. Dzhozef (Ref.4) (Dzhozef and Gol'bruk, Domez, 1934, No.11-12) discovered that in the equilibrium reaction of manganese with sulphur the product of their contents in metal is constant at a given temperature. In temperatures above 1450°C (Fig.4) even an high manganese content (3%) does not reduce sulphur content below 0.1%, and at 1350° only 2% Mn bring the sulphur content to 0.07%. V.G.Burtsev and R.A.Karasev stated the considerable effect of Mn in the content range 1.06-2.36% in vacuum desulfurization (reported at a conference on physico-chemical processes in steelmaking, in 1957). In the subject investigation manganese content

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was 1.47 and 1.83. It was stated in experiments at the im. Dzerzhinskogo (im. Dzerzhinskiy) plant that manganese is a strong desulfurizer but it has no effect at all if the initial sulphur content in iron is below 0 05% (Fig.7 and 8); Mn content higher than 1.47% has no strong effect. In experiments with ball bearing steel ШХ15 (ShKh15) in laboratory, in alundum crucible, no desulfurization could be obtained, which may only be explained by low content of silicon, sulphur and other impurities in metal. The mechanizm of desulfurization in a vacuum was studied with X-ray diffraction. No SO_2 gas was found in separating fumes behind the vacuum pump. Condensed powder on a filter placed in front of the vacuum hoses was investigated with standard X-ray cameras, but some highly dispersed powders produced no diffraction lines. These powders were investigated by electron diffraction, with an ЭМ-4 (EM-4) electronograph. The results lead to conclusion that the structure was a solid solution of FeS in FeO, in heterogeneous compound, of FeO, FeS, or Fe(O, S) type. The FeS phase was revealed by electron diffraction only. The following general conclusions have been made. 1) The degree of desulfuration increases with longer time in vacuum, and it becomes slower with the time. 2) The speed of desulfuration drops with decreasing initial sulphur content. The desulfurization rate is different in graphite,

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basic and acid crucibles in similar conditions; it drops in respective order. 3) The degree of desulfurization of iron in a vacuum is higher in basic and graphite crucibles than in acid crucibles. 4) Increased manganese content is favorable only when the initial sulphur content in metal is high, but some desulfurization is possible in a vacuum even with a low initial concentration of sulphur. 5) It appears that desulfurization of iron in vacuum is the result of evaporation of sulphur with subsequent compounds formation with iron and manganese vapours in vacuum furnace, up to FeS and Fe, Mn (S), or the low-melting components are evaporating. No elementary sulphur was revealed by X-ray diffraction analysis of the condensate. 6) The sulphur content does not decrease in ball bearing steel in shallow vacuum in foundry conditions. 7) In laboratory conditions with vacuum of 10^{-1} to 10^{-3} mm mercury column, no perceptible sulphur content decrease was revealed also when the sulphur content in steel was low (0.008%). There are 9 figures and 4 Soviet-bloc references.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: 16 May 1960

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S/[illegible]
A[illegible]/A[illegible]

N

AUTHORS: Kosterev, L. B., Dyks, G. B

TITLE: Impurities segregation in solidifying [illegible] rimming steel ingots

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya no. [illegible] 1960 [illegible]

TEXT: The behavior of carbon and oxygen was studied during the crystallization of 18-ton 08[illegible] (08kp, and [illegible] 08kp) steel before the formation of the crust on the top in open ingot molds with a [illegible] m² cross section area and bottle ingot molds with an 0.[illegible] m² opening. Steel was melted in basic open hearth [illegible] ton furnaces and bottom-poured into the 2400 mm high ingot molds. An enclosed sampler with an aluminum spiral was used for sampling; the alumina content in samples was determined by S. N. Shkotova's method (Ref. [illegible] "Zavodskaya laboratoriya" [illegible]). In 08kp steel the C content in the liquid ingot portion dropped at the end of the first crystallization stage and in 08kp it rose. The maximum [illegible] content (above 0.[illegible] %) in 08kp exceeded the concentration determined the

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[illegible]

A [illegible] A [illegible]

Imp[illegible] [illegible]

exceeds the [illegible] rate [illegible] the [illegible] surface, and the oxygen [illegible] in the metal [illegible]. A [illegible] line, [illegible] [illegible] A [illegible] S. M[illegible] Chipman, Trans. Amer. [illegible] Jernkontorets Annaler, [illegible] atmosphere. CO pressure [illegible] [illegible] metal [illegible] [illegible] pressure that [illegible] N.N. [illegible]

[illegible]

The maximum %C [illegible] CO liberation pressure [illegible] pressure [illegible] means [illegible] [illegible] and [illegible]

Card [illegible]

[illegible]

with a [illegible]

the [illegible]

solid and liquid phase [illegible]

formation [illegible]

presented a [illegible]

and V. M. [illegible]

[illegible]

tes in the [illegible]

the parent metal. [illegible]

[illegible]

ASSOCIATION: [illegible]

SUBMITTED: [illegible]

Card [illegible]

SOBOLEV, S.K., inzh.; KUDRIN, V.A., kand.tekhn.nauk; OYKS, G.N., doktor tekhn.nauk; TRUBIN, K.G., doktor tekhn.nauk. V rabote prinimali uchastiye: BLIZNYUKOV, S.A.; ROZHKOV, I.M.; MALYSHEV, V.S.

Desulfuration of pig iron outside the blast furnace by lime with the addition of aluminum powder. Sbor.Inst.stali no.39:5-15 '60. (MIRA 13:7)

1. Kafedra metallurgii stali Moskovskogo ordena Trudovogo Krasnogo Znameni instituta stali im. I.V.Stalina.
(Cast iron—Metallurgy) (Desulfuration)

OYKS, G.N., doktor tekhn.nauk; BARBASHIN, O.A., inzh.; KALTYGIN, V.P., inzh.

Changes in steel composition in the process of pouring. Sbor. Inst.stali no.39:40-46 '60. (MIRA 13:7)

1. Kafedra metallurgii stali Moskovskogo ordena Trudovogo Krasnogo Znameni instituta stali im. I.V.Stalina.
(Steel--Metallurgy)

OYKS, G N

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PHASE I BOOK EXPLOITATION SOV/5556

Moscow. Institut stali.

Novoye v teorii i praktike proizvodstva martenovskoy stali (New [Developments] in the Theory and Practice of Open-Hearth Steelmaking) Moscow, Metallurgizdat, 1961. 439 p. (Series: Trudy Mezhvuzovskogo nauchnogo soveshchaniya) 2,150 copies printed.

Sponsoring Agency: Ministerstvo vysshego i srednego spetsial'nogo obrazovaniya RSFSR. Moskovskiy institut stali imeni I. V. Stalina.

Eds.: M. A. Glinkov, Professor, Doctor of Technical Sciences, V. V. Kondakov, Professor, Doctor of Technical Sciences, V. A. Kudrin, Docent, Candidate of Technical Sciences, G. N. Oyks, Professor, Doctor of Technical Sciences, and V. I. Yavoyskiy, Professor, Doctor of Technical Sciences; Ed.: Ye. A. Borko; Ed. of Publishing House: N. D. Gromov; Tech. Ed.: A. I. Karasev.

PURPOSE: This collection of articles is intended for members of scientific institutions, faculty members of schools of higher education, engineers concerned with metallurgical processes and physical chemistry, and students specializing in these fields.

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New [Developments] in the Theory (Cont.) SOV/5556

COVERAGE: The collection contains papers reviewing the development of open-hearth steelmaking theory and practice. The papers, written by staff members of schools of higher education, scientific research institutes, and main laboratories of metallurgical plants, were presented and discussed at the Scientific Conference of Schools of Higher Education. The following topics are considered: the kinetics and mechanism of carbon oxidation; the process of slag formation in open-hearth furnaces using in the charge either ore-lime briquets or composite flux (the product of calcining the mixture of lime with bauxite); the behavior of hydrogen in the open-hearth bath; metal desulfurization processes; the control of the open-hearth thermal melting regime and its automation; heat-engineering problems in large-capacity furnaces; aerodynamic properties of fuel gases and their flow in the furnace combustion chamber; and the improvement of high-alloy steel quality through the utilization of vacuum and natural gases. The following persons took part in the discussion of the papers at the Conference: S.I. Filippov, V.A. Kudrin, M.A. Glinkov, B.P. Nam, V.I. Yavoyskiy, G.N. Oyks and Ye. V. Chelishchev (Moscow Steel Institute); Ye. A. Kazachkov and A. S. Kharitonov (Zhdanov Metallurgical Institute); N.S. Mikhaylets (Institute of Chemical Metallurgy of the Siberian Branch of the Academy of Sciences USSR); A.I. Stroganov and D. Ya. Povolotskiy (Chelyabinsk Polytechnic Institute); P.V. Umrikhin (Ural Polytechnic Institute); I.I. Fomin (the Moscow "Serp i molot" Metallurgical Plant); V.A. Fuklev (Central Asian Polytechnic Institute)

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New [Developments] in the Theory (Cont.) SOV/5556

and M.I. Beylinov (Night School of the Dneprodzerzhinsk Metallurgical Institute). References follow some of the articles. There are 268 references, mostly Soviet.

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TRUBIN, Konstantin Georgiyevich; OYKS, Grigoriy Naumovich, prof., doktor tekhn. nauk; CHERNENKO, Mikhail Avksent'yevich; LUR'YE, Il'ya Naumovich; TRUBETSKOV, Mikhail Mikhaylovich [deceased]; VESELKOV, N.G., red.; VAGIN, A.A., red. izd-va; MIKHAYLOVA, V.V., tekhn. red.

[Metallurgy of steel: the open-hearth process; design and equipment of open-hearth furnaces and plants] Metallurgiia stali: martenovskii protsess; konstruktsii i oborudovanie martenovskikh pechei i tsekhov. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1961. 448 p. (MIRA 14:8)

(Open-hearth furnaces—Design and construction)

AFANAS'YEV, S.G., kand.tekhn.nauk; **BARSKIY**, B.S., dotsent; **YEFROYMOVICH**, Yu.Ye., kand.tekhn.nauk; **KAGANOV**, V.Yu., kand.tekhn.nauk; **KATOMIN**, B.N., inzh.; **LEYKIN**, V.Ye., inzh.; **LUR'YE**, I.N., inzh.; **MIKHAYLOV**, O.A., kand.tekhn.nauk; **NETESIN**, A.Ye., inzh.; **ORMAN**, M.Ye., inzh.; **RUTES**, V.S., kand.tekhn.nauk; **SHNEYEROV**, Ya.A., kand.tekhn.nauk; **OYKS**, G.N., prof., doktor tekhn.nauk, nauchnyy red.; **GOL'DIN**, Ya.A., glavnyy red.; **PTITSYNA**, V.I., red.izd-va; **ISLENT'YEVA**, P.G., tekhn.red.

[Technological progress in Soviet ferrous metallurgy; steelmaking] Tekhnicheskii progress v chernoi metallurgii SSSR; staleplavil'noe proizvodstvo. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi i tsvetnoi metallurgii, 1961. 493 p.

(MIRA 14:4)

(Steel--Metallurgy)

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PHASE I BOOK EXPLOITATION SOV/5411

Konferentsiya po fiziko-khimicheskim osnovam proizvodstva stali. 5th, Moscow, 1959.

Fiziko-khimicheskiye osnovy proizvodstva stali, trudy konferentsii (Physicochemical Bases of Steel Making; Transactions of the Fifth Conference on the Physicochemical Bases of Steelmaking) Moscow, Metallurgizdat, 1961. 512 p. Errata slip inserted. 3,700 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A. A. Baykova.

Responsible Ed.: A. M. Samarin, Corresponding Member, Academy of Sciences USSR; Ed. of Publishing House: Ya. D. Rozentsveyg. Tech. Ed.: V. V. Mikhaylova.

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Physicochemical Bases of (Cont.) SOV/5411

PURPOSE: This collection of articles is intended for engineers and technicians of metallurgical and machine-building plants, senior students of schools of higher education, staff members of design bureaus and planning institutes, and scientific research workers.

COVERAGE: The collection contains reports presented at the fifth annual convention devoted to the review of the physicochemical bases of the steelmaking process. These reports deal with problems of the mechanism and kinetics of reactions taking place in the molten metal in steelmaking furnaces. The following are also discussed: problems involved in the production of alloyed steel, the structure of the ingot, the mechanism of solidification, and the converter steelmaking process. The articles contain conclusions drawn from the results of experimental studies and are accompanied by references of which most are Soviet.

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PART IV. THE APPLICATION OF VACUUM AND THE GAS CONTENT IN STEEL

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4-

S/137/61/000/011/021/123
A060/A101

AUTHORS: Kudrin, V. A., Oyks, G. N., Petrenko, O. D., Yudson, A. A., Nechkin, Yu. M., Nam, V. P., Ansheles, I. I., Ivanov, R. M., Adrianova, V. P.

TITLE: Characteristic features of the smelting technology for high-quality steel with heating of open hearth furnaces by natural gas

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 11, 1961, 30, abstract 11V192 (V sb.: "Novoye v teorii i praktike proiz-va martenovsk. stali". Moscow, Metallurgizdat, 1961, 280 - 289. Discuss. 332 - 334)

TEXT: An investigation carried out upon 140-ton open hearth furnaces operating on the scrap process and heated by a mixture of natural gas and mazut, has shown that in operating with the gas-mazut mixture the smelting duration is increased on account of the reduction in the heat-transfer as result of slag frothing, which occurs with greatest intensity at the end of the smelting period. The frothy slag hinders the active transfer of O_2 from the gas atmosphere leading to a lowering in V_c and the accumulation of Fe_2O_3 at the upper levels of the slag. Thus, the Fe_2O_3 content in the surface layer of the slag turned out to be greater by a factor of 1.5 than in heats fueled by mazut only. Simultaneously

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AUTHORS: Oyks, G. N., Danilin, V. I., Ansheles, I. I., Sokolov, O. A., Kononov, B. Z.

TITLE: Production of ball-bearing steel with the use of ladle vacuuming of the unreduced metal

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 11, 1961, 59, abstract 11V346 (V sb. "Novoye v teorii i praktike proizv-va martenovsk. stali" Moscow, Metallurgizdat, 1961, 335-342. Discuss. 428-434)

TEXT: According to the new technique the smelting of ball-bearing steel in basic furnaces is carried out with complete oxidation and resmelting. The oxidation period is carried out forcedly with the use of ore. The vat temperature before the elimination of the oxidizing slag is 1,590-1,620°C. After drawing off the oxidizing slag and correcting the metal with respect to its C content, Cr and Mn content, one adds in a single dose a slag mixture (3% of the weight of the metal) consisting of lime, spar, chamotte and Dinas block. Then a portion of ground coke is put on top of the slag, the furnace is hermetically closed and soaking proceeds for 20-25 min. After attaining an S content of 0.015-0.018% the smelt is

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Production of ball-bearing steel ...

led out into a ladle together with the slag. In the course of vacuum treating the unreduced metal in the ladle a vigorous bubbling proceeds and takes 5 [illegible] min. Thereupon 75% Fe-Si and Al are introduced from a special bunker under vacuum. At the end of the vacuuming the metal is cast into 4.1 ton ingots. The quality of the steel was determined by the statistical method from a large number of heats smelted according to the experimental and the usual techniques. The quality of the metal obtained was better. The nonmetallic impurity content constituted 0.00264% as compared to 0.00410%. The dimensions of the globules in the metal of the ordinary heats is 16-18 μ, and in the experimental heats up to 10 μ. The task of the reducing period of the heat according to the new technique is the application of active desulfurating slag and the correction of the chemical composition. The mean duration of that period is 1.32 hrs as compared to 1.70 hrs of ordinary heats, the total heat duration was shortened by 20 min, and the reducer expenditure was decreased considerably, as result of which the production cost of steel was decreased by 1[illegible] rub per ton.

Yu. Ne[illegible]

[Abstracter's note: Complete translation]

Card 2/2

NAM, B.P.; OYKS, G.N.; KUDRIN, V.A.; MECHKIN, Yu.M.

Hydrogen behavior in open-hearth furnace baths fired with natural gas. Izv. vys. ucheb. zav.; chern. met. no.1:56-64 '61. (MIRA 14:2)

1. Moskovskiy institut stali.
(Open-hearth furnaces—Combustion)
(Steel—Hydrogen content)

S/148/61/000/003/003/015
A161/A133

AUTHORS: Oyks, G. N., Sokolov, G. A.

TITLE: The possibility of producing ingots with weldable shrinkage cavities

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no. 3, 1961, 37 - 39

TEXT: A method is suggested for the vacuum treating of steel in intermediate ladle and ingot molds, with deoxidation and alloying in this vacuum. The new technology requires a special pouring arrangement shown in a drawing. The ingot mold has a precision-machined annular protrusion on the top portion. Ring pipes with inlets and outlets for water are cast into the ingot mold wall and serve for chilling the top of the ingot. The intermediate ladle having a slightly larger volume than the ingot to be produced is installed on the mold protrusion on a rubber seal. The intermediate ladle is lined, heat-installed and has a stopper. It is closed with a rubber sealed lid. The bottom and lid of the intermediate ladle are screened for radiation protection. The lid bears a funnel, a mechanism for lowering and lifting the stopper, a hopper for "lunkerite" or heating mixes, and a hopper for ferroalloys and alloy additives. The additives are

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supplied by a feed screw driven from outside. The lids of both hoppers are vacuum-tight. A sight hole is provided, and a TV camera may be used on the ladle. The intermediate ladle is heated to 900°C, and the arrangement connected to vacuum pumps and evacuated to a residual pressure of 1-2 mm Hg. The inlet for metal in the funnel is closed with a thin piece of steel or aluminum sheet and sealed. Steel is poured from the furnace in the semi-killed state, with a low addition of ferro-manganese (or chromium), with slight excess of carbon (0.02 - 0.03%) over the mean required by the specification, and with 50 - 60°C overheat in comparison with the usual pouring temperature. The short time needed to melt the closing metal plate in the funnel is sufficient for the formation of a liquid metal plug, and the metal flows into the evacuated space in the intermediate ladle where it is rapidly degassed and deoxidized by the dissolved carbon. Crushed alloy additives are added to the metal jet by the feed screw after the intermediate ladle is filled to 3/4. Burning of the alloy additives and ferroalloys and the formation of non-metallic inclusions will be insignificant. After the intermediate ladle is filled, lunkerite or another heating mixture from the hopper is spilled on the top, then the stopper is lifted, and metal flows through the outlet and a short guide pipe into the ingot mold where the residual air pressure is also low. Secondary degassing takes place in the ingot mold, with possible interruption of the jet and

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splash on the mold walls that cannot spoil the ingot surface for no oxide films can form on the metal. The vacuum is maintained in the ingot mold up to the formation of a solid top. Then the vacuum is removed, and crystallization continued. The shrinkage cavity will be free from oxide films and it must weld up in subsequent hot rolling or forging. The metal economy will be very considerable, particularly in the production of 40 -150 ton ingots for forging from which up to 40% has usually to be cut off with shrinkage cavities. Inert gas may be used instead of a vacuum in the intermediate ladle and the ingot mold, but the final inert gas pressure must slightly exceed that of the atmospheric air. The suggested method eliminates the necessity of using large and expensive vacuum chambers for vacuum treatment. The Author's Certificate claim for it had been filed on November 2[illegible], 1956, under no. 560989/22. There is 1 figure. (Essentially full translation)

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute)

SUBMITTED: September 1, 1960

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22312

S/133/61/000/004/001/015
A054/A127

18 3200

AUTHORS: Oyks, G. N., Doctor of Technical Sciences, Professor; Sharadzenidze, S. A., Engineer; Svetlitskiy, Ye. A., Engineer; Malyshev, S. I., Engineer; Lolua, K. K., Engineer, and Mindlin, B. I., Engineer

TITLE: Production of tubes from semi-killed steel with a double-layer crystalline structure

PERIODICAL: Stal', no. 4, 1961, 304 - 307

TEXT: Tests were carried out on automated manufacture of seamless tubes from semi-killed steel, instead of from killed steel as in the conventional process. A metal was required, incorporating the advantages of both killed and rimming steels. For this pupose rimming steel smelted in openhearth furnaces was cast in ingot molds with widened bases, into 5.5 - 6.3 ton ingots. Without interrupting the metal flow, aluminum granules (250 - 100 gr/ton of steel) were introduced during pouring in the central zone of the casting (the carbon-content varied correspondingly between 0. and 0.23%). Aluminum was added. Upon adding aluminum, the outer layers of

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Production of tubes from semi-killed steel...

the metal which were in contact with the mold wall, were already crystallizing and formed a low-carbon, sulfur- and phosphorus-free rimming skin, while, at the same time the core of the ingot was still liquid. Aluminum kills the rimming metal of the core, while the rate of oxidation can be controlled by the amount of aluminum added. Provided deoxidation was carried out in the correct way, the ingot consists of a) a soft, blister-free rimming skin, on an average 12 - 20 mm thick and b) a semi-killed core with uniform liquation of carbon, sulfur and phosphor, (not exceeding 10%), in vertical and transversal direction. The average rate of the rising of the metal in the mold was 0.28 - 0.32 m/min. The 250 x 310 mm and 290 x 310 mm blooms made of the test steel were put into the pusher-type furnace of the tube-rolling mill. The surface of the blooms is remarkably clean, not displaying any of the usual flaws of killed steel. The blooms were rolled on 400 mm stands, with the working rolls having the following angles of inclination: 8 - 9° for 168 x 6 mm tubes, 8 - 9° for 219 x 7 - 8 mm and 7 - 9° for 325 x 8 mm tubes. The piercing tests showed that the test metal was more strongly affected by the changes in temperature than billets made of killed steel. The test billets could not be pierced at 1190°C, whereas in

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the conventional process piercing can easily be performed at 1150 - 1180°C.
However, even when the temperatures were sufficiently high (1230 - 1260°C),
the rejects amounted to 8%, as a result of incorrect adjustment of the first
piercing stand. The hardness of the billet is not uniform in its cross-
section (Fig. 2). The core is harder, than the external layers. The fail-
ure of the piercing tests could be eliminated by modifying some of the rol-
ling parameters. The inclination of the rolls in the first stand was re-
duced by 1°, reduction at the neck of the rolls was increased by 2.7 - 2.9%
and drawing out the nosepiece of the mandrel by 22 - 25%. By decreasing
the inclination angle of the working rolls, friction and pulling forces in-
creased whereas axial slip decreased. As a result of the increased reduc-
tion, the central parts were processed more thoroughly and piercing was
promoted. The above mentioned changes in rolling parameters decreased the
amount of non-piercable billets from 8% to 1.7%. Non-piercing of the bil-
lets can be entirely eliminated by raising the cropping of the top to 2 -
3%. A further cropping (3 - 4%) should be carried out for the 900 mm stand.
The quality of the tube surface with double-layer structure is satisfactory. X
The rate of flawless products increased to 95 - 98%. The mechanical proper-
ties of the tubes made of the test steel complies with ГОСТ (GOST) 8731-58

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Production of tubes from semi-killed steel...

for killed steel (Ст.2, Ст.3 etc. Ст = St). There are 4 figures and 3 Soviet references.

ASSOCIATION: Moskovskiy institut stali (Moscow Steel Institute) and Zakavkazskiy metallurgicheskiy zavod (Zakavkaz Metallurgical Plant)

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18 3200

23988
S/148/61/000/005/001/015
E071/E135

AUTHORS: Baranov I.A., Oyks G.N., and Ansheles, I.I

TITLE: Improvement in the technology of production of ball bearing steel

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya 1961, No.5, pp 50-57

TEXT: The influence of changes in the technology of smelting ball bearing steel (in electric furnaces) as well as of some parameters of vacuum treatment on the quality of steel was investigated by statistical methods. Data collected during metallographic control of the quality of production were used for the investigation. Changes in the technology of smelting consisted of a decrease in the reducing period of smelting and the transfer of the deoxidizing treatment to the ladle under vacuum (G.A. Sokolov, G.N. Oyks present journal 1959 No.1, Ref.1; G.N. Oyks P.P. Matevosyan et al., Stal', 1960 No 4, Ref.2). The influence of the height of metal column in the ladle during vacuum treatment was studied by comparing the degree of contamination of the metal by inclusions for charges of 12 and 16 t

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Improvement in the technology of production of ball bearing steel

(equivalent to an increase in the height of metal of 250-300 mm). The increase in the height of the metal resulted in a significant increase of oxides and globular inclusions but there was no significant change in the degree of contamination by sulphide inclusions (Table 1). It is assumed that the adverse influence of an increased height of metal in the ladle is due to an increase in the loss of deoxidants (due to oxidation) particularly of silicon, added under vacuum. The influence of the residual pressure, mm Hg, was studied by comparing the degree of contamination of the steel by oxides and globular inclusions, Fig.1 (degree of contamination relative units vs residual pressure, mm Hg. o - oxide inclusions ● - globular inclusions, numbers at points designate the number of specimens, the degree of oxidation of silicon, Fig.2 (residual Si in the steel vs. residual pressure, mm Hg; numbers designate the number of heats). With increasing residual pressure the degree of contamination somewhat decreases. The summary influence of the duration of pure boiling during the addition of deoxidants under vacuum (τ) and the depth of vacuum

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($P_{res.}$ - residual pressure) on the degree of contamination was expressed by the factor (100 %/$P_{res.}$). A statistical correlation of this factor with the degree of contamination by oxide or globular inclusions indicates that with increasing depth of vacuum and increasing duration of the degassing period the degree of contamination decreases, Fig 3 (numbers at points designate the number of specimens - - - oxides ——— globular inclusions). This relationship was statistically significant. A comparison of mean values and standard deviations of the degree of contamination of steel produced by the old and modified smelting technology (Table 2) indicates that the latter gave steel less contaminated by oxide and globular inclusions but more contaminated by sulphide inclusions. Therefore further modification of smelting technology was directed towards improving the degree of desulphurisation of the metal, durability of the ladle lining and a more uniform distribution of silicon throughout the volume of the metal. Experimental heats in a 16 ton electric furnace in which deoxidizing mixtures of powdered lime and spar were blown in during the

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oxidizing period were not satisfactory (Table 3). A noticeable desulphurisation was obtained only in the case when nitrogen was used as a carrier. The installation used for the injection is shown in Fig.4 (1 and 2 - valves for compressed air or nitrogen 3 - nozzle for blast supply, 4 - nozzle for the supply of powdered desulphuriser in air or nitrogen 5 - fixing of top cover 6 - fixing of bottom cover 7 - pressure gauge). A change in the slag practice was more successful. Usually the refining slag in a proportion of 2.5-3% of the weight of metal was made from a mixture containing 70-72% lime 10-12% spar 8-10% chamotte and 8-10% crushed Dinas refractory. In the new practice Dinas refractory was replaced by spar and the weight of slag was increased to 3.5% of the weight of metal. A comparison of the sulphur content in the finished metal from 200 heats made with the usual and 186 heats made with modified slag showed that the average sulphur content of steel produced by the latter practice was 0.002% lower than in that produced by the former. Moreover rejects of metal due to high sulphur practically ceased. The influence of

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ladle refractories on the behaviour of sulphur during vacuo treatment was also studied. It was observed that during vacuo treatment the content of alumina and silica in slag increases, decreasing its basicity by an average of 30%. As a result, the coefficient of sulphur distribution decreases and the occurrences of the reversion of sulphur in the vacuo treated steel were more frequent than in the usual steel (28% as against 7%). To preserve the desulphurising ability of slag and to increase the durability of the ladle lining a series of experimental heats was made in which the vacuo treatment of the steel was done in ladles fitted with a ring 460 mm high (at the level of slag-metal boundary), made from basic (magnesite and chromemagnesite) and neutral (high alumina) refractories. Under these conditions (50 heats) the basicity of the slag during the treatment decreased by only 9.5% against the previous 30% and the sulphur content of metal decreased by an average of 0.002-0.003% while in heats treated in ladles with the ordinary lining (85 heats) it remained practically unchanged. The durability of the ladles fitted with such a ring

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also increased (from [illegible] heats to 11-19 heats) despite some spoiling of basic bricks on cooling. Ball bearing steel deoxidized by carbon in the furnace is usually very pure as regards inclusions ([illegible]-0.0011%). On tapping of such steel the amount of stable endogenic inclusions remains practically unchanged which confirms the assumption that the influence of secondary oxidation of steel not containing strong deoxidizers is insignificant. An increase in the amount of inclusions (0.0020-0.0040%) takes place during vacuo treatment and addition of deoxidants in the ladle. In vacuo treatment of steel secondary oxidation during teeming is much more dangerous than during tapping from the furnace of non-deoxidized steel, since during teeming it already contains some amounts of silicon and aluminium. For the protection of the stream of metal during teeming from secondary oxidation, tube rings with holes were used, through which a neutral gas (nitrogen or argon) was supplied. In these experiments no satisfactory results were obtained. By blowing a neutral gas (phy[illegible] [illegible] [illegible]cuo. the concentration of oxygen in the immediate ne[illegible] [illegible] of the metal stream could not be

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reduced below 10%. In the second series of experiments natural gas was used which reduced the concentration of oxygen below 1% (physical and chemical protection). The increase in the hydrogen content in the metal was insignificant (about 0.5 cm3/100 g) and a most careful control of the microstructure of the metal indicated that the presence of a small amount of hydrogen inside the protecting ring has no negative effects on the metal quality. As a result of the protection of the metal stream by natural gas, the degree of contamination of the metal decreased by 0.2-0.4 units. An increased viscosity of slag during tapping of the heat and subsequent vacuum treatment caused difficulties in the deoxidation of the metal with 75% ferrosilicon. In individual cases, the metal was rejected due to incorrect analysis for silicon. The use of a 45% ferrosilicon proved to be more reliable. A comparison of data on the distribution of silicon along the height of the metal in the ladle deoxidized with a 45% ferrosilicon indicated that this was more uniform than that deoxidized with a 75% ferrosilicon. The coefficient of variation was 23.3%

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and 31.6% respectively (statistical treatment of 120 heats of each type). A statistical analysis of the results of metallographic control of each type of heat showed that with the use of a 45% ferrosilicon the degree of contamination by globular inclusions decreases on the average from 1.24 ± 0.039 to 0.98 ± 0.034 units (statistically significant). The degree of contamination by oxides and sulphide inclusions remained practically unchanged. It appears from thermodynamic considerations that under vacuum silicon should not act as a deoxidant, nevertheless it forms inclusions since during the immersion of ferrosilicon into the metal some localised zones of a very high concentration of silicon are formed where, in accordance with the law of mass action, its oxidation takes place. In view of the above, the use of ferrosilicon as a deoxidant is inadvisable. To confirm this supposition, an experimental heat of ШХ 9 (ShKh9) steel was made. The duration of the vacuo treatment under a residual pressure of 7 mm was 8 minutes. The removal of the residual oxygen was done by aluminium added uniformly in small portions during teeming (50-60 g/ton). The metal stream was protected with natural gas.

S/148/61/000/009/003/012
E071/E135

AUTHORS: Kosterev, L.B., and Oyks, G.N.

TITLE: The mechanism of segregation of admixtures in 18 ton ingots of rimming and semikilled steel

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, no.9, 1961, 59-70

TEXT: An investigation of the chemical non-uniformity was carried out on: four 18 ton ingots of low carbon steel; two ingots of rimming steel one of which crystallised under free boiling conditions (it was covered with the cast iron top after 26 min), the second ingot was solidified under the cover which was lowered into the metal immediately after the end of filling; one ingot of semikilled steel (150 g/t of aluminium was added to the metal stream during teeming); and one ingot of killed steel (aluminium rod 1 kg/ton suspended in the mould). The structure of the ingots and their chemical non-uniformity were determined on longitudinal axial templets, sulphur prints and samples of metal taken on the levels 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 40, 50, 60, 70, 80, 83, 86, 89, 92, 95 and 98% of the height counting

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from the top of the ingots. Eight samples of metal (50 mm apart) were taken at each level and on the level 24% every 5 mm. The distribution of sulphur was found to be similar to that in small and medium ingots of rimming steel; the concentration of sulphur in the metal increases from the surface to the centre and from the bottom to the head of the ingot. A specific feature of the distribution of sulphur in large ingots of rimming steel is Λ-shaped segregation which is also characteristic for killed steel. A V-shaped distribution of sulphur was observed in the bottom part of the ingots, i.e. shrinkage takes place there at the end of the solidification similar to that in ingots of killed steel. The distribution of carbon was basically similar to that of sulphur, but was less pronounced. The segregation of phosphorous was even less pronounced. It was established that the oxidation of manganese takes place during the boiling of the metal in moulds. To check the existing views on the role of boiling on the development of segregation of admixtures, samples of the metal were taken during the process of boiling with closed sampling tubes immersed 200 and 2000 mm into the moulds. During the boiling, the two samples, which were taken nearly simultaneously, differed little in the concentration of the segregating elements. Thus it can be concluded that the accumulation of admixtures in the top part of the ingots takes place at the last stage of the crystallisation of the middle part of the ingots, and not during the formation of the boiling zone. A comparison of the influence of the duration of boiling on the maximum degree of segregation showed that segregation decreases with increasing duration of the boiling period. However, this method cannot be used for reducing the degree of segregation since simultaneously the structure of the top of the ingot deteriorates, which leads to larger metal losses. In semikilled steel chemical non-uniformity is considerably smaller and the structure of the head of the ingot without a clearly defined shrinkage cavity is superior to that of rimming steel. A thickness of a good quality skin of 10-12 mm is sufficient for the production of sheets. The average yield of slabs from this steel was 89%. It is considered that the production of semikilled steel instead of rimming steel would be an efficient method of improving the quality and the yield of large ingots.

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S/148/61/000/011/003/018
E071/E180

AUTHORS: Kosterev, L.B., and Oyks, G.N.

TITLE: Non-metallic inclusions in 18-ton ingots of rimming steel

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, no.11, 1961, 45-56

TEXT: Results of an investigation on the nature and distribution of non-metallic inclusions in bottom poured 18-ton ingots (730 x 1550/780 x 1590 mm, 2400 mm high) of rimming steel melted in 220-ton basic open hearth furnaces are described. Altogether 3 ingots were used for the investigation: 2 ingots from one cast (0.08% C, 0.42% Mn, 0.022% S, 0.030% O) teemed on a common stand, whereupon the second ingot was capped immediately after filling and a third ingot from another cast (0.08% C, 0.30% Mn, 0.028% S and 0.045% O) which was rather cold on teeming 370-380 specimens (40 x 50 mm) were cut out from longitudinal sections and used for a metallographic study of non-metallic inclusions. The nature of non-metallic inclusions was determined

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majority of cases they contained also the oxide phase

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forming two-phase inclusions with an excess of the oxide phase forming grains or dendrites. The silicate phase is not homogeneous, but consists of a fine grain eutectic containing small grains of the oxide phase. Size of these inclusions varied from 2-40μ to 100-200μ, occasionally 300μ. Mean hardness of silicates 721 kg/mm^2. Silicates formed the second largest group of inclusions. Oxysulphides: these two-phase inclusions form the largest group. They consist of a eutectic (MnFe)O - (MnFe)S and an excess oxide or sulphide phase. In the centre of the upper part of the ingots oxysulphide inclusions surround the boundaries of the primary grains of the metal. A majority of these inclusions are 20-50μ with an occasional 5-10μ in size. Inclusions consisting of oxides - sulphides - silicates: these inclusions were encountered for the first time in large ingots of rimming steel; their formation is probably promoted by prolonged presence of the liquid metal. The inclusions can contain separated individual oxides, sulphides and a eutectic oxide-sulphide silicate. The silicate phase separates in the form of plates, oxide in dendritic formations. The size of these

BARANOV, I.A.; OYKS, G.N.; ANSHELES, I.I.

Improving the technology of ball-bearing steel production. Izv.vys. ucheb.zav.; chern.met. 4 no.5:50-57 '61. (MIRA 14:6)

1. Moskovskiy institut stali.
(Steel—Metallurgy) (Bearing metals)

NAM, B.P.; OYKS, G.N.; KUDRIN, V.A.; NECHKIN, Yu.M.

Effect of hydrogen concentration in final open-hearth furnace slag on changes in hydrogen content of the metal during its tapping and pouring. Izv.vys.ucheb.zav.; chern.met. 4 no.9: 54-58 '61. (MIRA 14:10)

1. Moskovskiyinstitut stali.
(Steel—Hydrogen content) (Slag—Analysis)

KOSTEREV, L.B.; OYKS, G.N.

Mechanism of impurity segregation in 18-ton rimmed and capped steel ingots. Izv.vys.ucheb.zav.; chern.met. 4 no.9:59-70 '61. (MIRA 14:10)

1. Moskovskiy institut stali.
(Steel—Metallography) (Steel ingots—Defects)

OYKS, G.N., doktor tekhn.nauk, prof.; SHARADZENIDZE, S.A., inzh.; SVETLITSKIY, Ye.A., inzh.; MALYSHEV, S.I., inzh.; LOLUA, K.K., inzh.; MINDLIN, B.I.,inzh.

Production of tube made of capped-type steel with a two-layer crystal structure. Stal' 21 no. 4:304-307 Ap '61. (MIRA 14:4)

1. Moskovskiy institut stali i Zakavkazskiy metallurgicheskiy zavod.
(Pipe, Steel) (Rolling (Metalwork))

[illegible] G. V. [illegible]

[illegible]

is 20 to 25 [illegible]

[illegible] rate [illegible] factor [illegible]

An approximate calculation [illegible]

of the reaction [illegible] total [illegible]

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The [illegible]

[illegible] Th[illegible]
solution [illegible]

[illegible]

Th[illegible]
[illegible] [c] · [c] [illegible]
r = 0.1 cm [illegible]
[illegible]
Five [illegible]
[illegible]

Card [illegible]

[illegible]

the [illegible] -v [illegible]
crystal [illegible]
central zone was [illegible]
to a single vacuum [illegible]
In billets rolled [illegible] double vacuum [illegible]
without silicon [illegible]
found: their density was equivalent to that [illegible]
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[illegible]

[illegible]

equilibrium with [illegible]
vacuum treated [illegible]
after [illegible] vacuum [illegible] 0.0 [illegible]
distribution. [illegible]
flotation [illegible] evolution during vacuum [illegible]
There are [illegible] figures.

ASSOCIATION: [illegible]

SUBMITTED: [illegible]

Card [illegible]

OYKS, G.N., doktor tekhn. nauk, BORODIN, D.I., TSYKIN, L.V.; KAPUSTIN, [illegible], SOROKIN, A.A.; KUTSENKO, A.I. ZAGREBA, A.V., TRUSEYEV, A.A., REKHLIS, G.N.

Effect of the condition of the slag on the intensity of ejections during the Bessemer production of steel. Met. i gornorud. prom. no.1:24-28 Ja-F '65. (MIRA 18:[illegible]

OYKS, G.N., doktor tekhn. nauk; BORODIN, I.I.; TSYKIN, L.V.; KAPUSTIN, I.V.; SOROKIN, A.A.; KUTSENKO, A.D.; ZAGREBA, A.V.; REKHLIS, [illegible]; TRUSEYEV, A.I.; Prinimali uchastiye: GUBENKO, [illegible]; FOMIN, [illegible]; KUBLITSKIY, A.M.; SAF'YANOV, V.P.; VOLYNKIN, V.M.

Some problems in the hydrodynamics of a converter bath. Met. i gornorud. prom. no.3:29-31 My-Je '65. (MIRA 18:[illegible])

FATKULLIN, O.Kh.; [illegible], V.I.; [illegible], G.N.; [illegible]
[illegible], A.T.; [illegible], V.I.; [illegible], V.I.

Deoxidizing ball-bearing steel with vacuum [illegible] by [illegible].
Metallurg 10 no.12:20-22 D '65.

1. Zavod "Krasnyy Oktyabr'" i Moskovskiy institut [illegible]

GLADYSHEV, N.G.; CYKS, G.N.; DRUZHININ, V.P.; FEICECHUK, Ye.V.;
GORLOV, S.M.

Mechanism of the formation of internal hot cracks in a continuous rectangular ingot. Izv. vys. ucheb. zav.; chern. met. 8 no.5:40-44 '65. (MIRA 18:5

1. Novotul'skiy metallurgicheskiy zavod.

YAVOYSKIY, V.I., otv. red.; [illegible], A.M., red.; [illegible], Ye.A., red.; GLINKOV, M.A., red.; ZA[illegible], Ye.Ya., red.; KAPUSTIN, Ye.A., red.; KOCHO, V.S., red.; KUDRIN, V.A., red.; LAPITSKIY, V.I., red.; LEVIN, S.L., red.; OYKS, G.N., red.; ROMENETS, V.A., red.; UMRIKHIN, P.V., red.; FILIPPOV, S.I., red.

[Theory and practice of the intensification of processes in converters and open-hearth furnaces; transactions] Teoriia i praktika intensifikatsii protsessov v konverterakh i martenovskikh pechakh; trudy. Moskva, Metallurgiia, 1965. 552p. (MIRA 18:10)

1. Mezhvuzovskoye nauchnoye soveshchaniye po teorii i praktike intensifikatsii protsessov v konverterakh i martenovskikh pechakh. 2. Moskovskiy institut stali i splavov (for Filippov). 3. Zhdanovskiy metallurgicheskiy institut (for Kapustin). 4. Ural'skiy politekhnicheskiy institut (for Umrikhin).

OYKS, G.N.; MATEVOSYAN, P.A.; ANSHELES, I.I.; FATKULLIN, O.Kh.; [illegible]
[illegible], [illegible]; SIVKOV, S.S.; [illegible], A.T.; Prinimali uchastiye: PETROV,
[illegible]; [illegible]KOVA, [illegible]; [illegible], Ye.[illegible]; [illegible]
F[illegible]OV, V.I.; [illegible]LYAKOVA, K.V.

Results of vacuuming ball-bearing steel by various methods. [illegible]
[illegible] no.9:[illegible]-[illegible] S '64. [illegible]

TSYKIN, L.V.; OYKS, G.N.

Mechanism of the oxidation of impurities in a converter bath.
Izv. vys. ucheb. zav.; chern. met. 8 no.9:63-68 '65.
(MIRA 18:9)

1. Moskovskiy institut stali i splavov.

OYKS, G.N.; SOKOLOV, G.A.; ZUYEV, I.M.; PETROV, V.K.; ZUBAREV, A.G.;
KLIMASHIN, P.S.

Treatment of liquid transformer steel in the ladle. Stal'
25 no.8:711-715 Ag '65. (MIRA 18:8)

OYKS, G.N., kand. tekhn. nauk; SOROKIN, A.A.; KAPUSTIN, I.V.; TSYKIN, L.V.;
BORODIN, I.I.; KUTSENKO, A.D.; RUKHITS, G.N.; ZAGREBA, A.V.;
UL'YANOV, L.P.; TRUSEYEV, A.I.

Trends in the reorganization of the Bessemer furnace department at the Dzerzhinskii Plant. Met. i gornorud. prom. no.3:28-30 My-Je '64. (MIRA 17:10)

BORODIN, D.I.; OYKS, G.N.; TSYKIN, L.V., KAPUSTIN, I.V.

Measuring the temperature of flue gases in a bessemer converter.
Izv. vys. ucheb. zav.; chern. met. 7 no.11:71-74 '64.
(MIRA 17:12)

1. Moskovskiy institut stali i splavov.

OYKS, G.N.; LOOZE, K.

Sulfur oxidation in an oxygen-blown converter process. Izv. vys. ucheb. zav.; chern. met. 7 no.7:58-62 '64 (MIRA 17:8)

1. Moskovskiy institut stali i splavov.

BORODIN, D.I.; OYKS, G.N.; KAPUSTIN, I.V.; TSYKIN, L.V.

Ejection, fly ash and "explosions" during the bottom blowing of metal in converters. Izv. vys. ucheb. zav.; chern. met. 7 no.9:56-62 '64. (MIRA 17:6)

1. Moskovskiy institut stali i splavov.

[illegible]

Determining the [illegible] conditions for the [illegible] of manganese cast iron. Izv. vys. ucheb. zav.; chern. met. [illegible] no.3:48-54 [illegible]. (MIRA [illegible])

1. Moskovskiy [illegible] institut stali i splavov.

FATKULLIN, G. Kh.; OYKS, G. N.; ANSHELES, I. I.

Testing on a test stand the method of circulating vacuuming of liquid steel. Izv. vys.ucheb.zav.; chern.met.7 no. 5:[illegible] '64. (MIFA 17:[illegible]

1. Moskovskiy institut stali i splavov.

GANKIN, V.B.; SLIVCHANSKAYA, V.V.; ITSKOVICH, G.M.; OYKS, G.N.

Primary structure of a continuous ingot of rimmed steel. Izv. vys. ucheb. zav.; chern. met. 6 no.9:62-67 '63. (MIRA 16:11)

1. TSentral'nyy nauchno-issledovatel'skiy institut chernoy metallurgii i Moskovskiy institut stali i splavov.

LOOZE, K.; OYKS, G.N.

Sulfur oxidation in the acid converter process. Izv. vys. ucheb. zav.; chern. met. 6 no.7:70-75 '63. (MIRA 16:9)

1. Moskovskiy institut stali i splavov.
(Bessemer process) (Desulfuration)

TRUBIN, Konstantin Georgiyevich, prof., doktor tekhn. nauk;
OYKS, Grigoriy Naumovich, prof., doktor tekhn. nauk

[Metallurgy of steel; the open-hearth process, technological part]Metallurgiia stali; martenovskii protsess, chast' tekhnologicheskaia. Izd.3., perer. i dop. Moskva, Izd-vo Metallurgiia, 1964. 770 p. (MIRA 17:6)