1. KEYMAKH, L.I., Eng.

2. USSR (600)

4. Foundations

7. Introduction of new technical processes in the Trust for Heavy-Construction Foundations. Stroi. prom. 30, no. 11, 1952.

9. Monthly List of Russian Accessions, Library of Congress, February 1953. Unclassified.

KEYMAKH, L.I., inzhener.

Overall mechanization of road and pipe-line construction. Sbor.mat. o nov. tekh. v stroi. 15 no.7:9-12 Jl '53. (MLRA 6:7)
(Road machinery) (Pipe lines)

KEYMAKH, L.I., inzhener; KONYUSHKOV, A.M., kandidat tekhnicheskikh nauk; nauchnyy redaktor; GOLUBENKOVA, L.A., redaktor; SMOL'YAKOVA, M.V., tekhnicheskiy redaktor.

[Rapid assembly-line method of laying steel pipelines] Potochno-skorostnoe stroitel'stvo stal'nykh truboprovodov. Moskva, Gos. izd-vo lit-ry po stroitel'stvu i arkhitekture, 1954. 170 p.(MLRA 7:11)
(Pipelines)

KEYMAKH, L.I., inzhener.

Erecting reinforced concrete silo-type structures using standard metal adjustable (hoistable) formwork under winter conditions. Sbor.mat. o nov.tekh. v stroi. 16 no.10: 15-17 '54. (MIRA 8:2)
(Concrete construction--Formwork)

KEYMAKH, L.I., inzhener.

Use of electric heating in wintertime construction of reinforced concrete conical smokestacks. Stroi.prom. 32 no.10:8-10 O '54.
(MLRA 7:11)
(Concrete construction--Cold weather conditions) (Chimneys)

KEYMAKH, L.I., inzhener.

Building small silo towers with standard metal adjustable forms. Sbor.mat. o nov.tekh. v stroi. 17 no.2:14-17 '55. (MLRA 8:2)
(Silos) (Concrete Construction --Formwork)

KEYMAKH, L.I.

Methods of erecting silos made of reinforced concrete. Stroi.prom. 33 no.3:16-20 Mr '55. (MLRA 8:5)

1. Glavnyy inzhener tresta Zhelezobetonstroy.
(Reinforced concrete construction) (Silos)

KEYMAKH, L.I., inzhener

Construction of reinforced concrete hyperholic water-cooling towers.
Stroi. prom. 33 no.8:18-22 Ag'55. (MLRA 8:11)
(Cooling towers)

GOYKOLOV, Ye.F.; KANTOROVICH, I.G., inzh.; PETROV, P.V.; RAYTSESS, A.Ya.; CHERNOV, A.V., inzh.; SHASHKOV, V.F.; SHISHKOV, I.A.; SHMIDT, Kh.M.; KEYMAKH, L.I., retsenzent; KUDRYAVTSEV, A.V., retsenzent; V redaktirovanii prinimali uchastiye: ZOTOV, A.V.; TELYANER, D.M.. SHIROKOVA, G.M., red.izd-va; STEPANOVA, E.S., tekhn.red.; RUDAKOVA, N.I., tekhn.red.

[Handbook for builders of reinforced concrete industrial chimneys and silos] Spravochnik stroitelia zhelezobetonnykh zavodskikh trub i silosov. Pod red. A.V.Chernova. Moskva, Gos.izd-vo lit-ry po stroit., arkhit. i stroit.materialam, 1959. 300 p.
(MIRA 13:1)

(Silos) (Chimneys)

KEYMAKH, L.I., inzh.; VOLYNTSEV, V.A.; LARIONOV, V.A., retsenzent; SHELKOVNIKOV, S.G., retsenzent; KRYLOV, B.A., kand. tekhn. nauk, nauchnyy red.; SHIROKOVA, G.M., red.izd-va; BOROVNEV, N.K., tekhn. red.

[Construction of high reinforced concrete structures]Stroitel'stvo vysotnykh zhelezobetonnykh sooruzhenii. Moskva, Gosstroizdat, 1962. 278 p. (MIRA 15:12)
(Reinforced concrete construction)

06291
SOV/119-59-11-5/13

24 (2), 28 (1)
AUTHORS: Keymakh, R. Ya., Engineer, Kudryavtsev, V. I., Engineer

TITLE: A Method for the Objective Measurement of the Angle of Rotation of the Polarization Plane of Light Waves

PERIODICAL: Priborostroyeniye, 1959, Nr 11, pp 10-14 (USSR)

ABSTRACT: The usual method of determining the polarization plane of polarized light waves in a polarimeter is known to be employed by rotating the analyzer by 90° relative to the polarization plane. This position is visually determined by adjusting the analyzer to complete darkness. In the case of the method described here, the polarizer performs a rotary oscillation round the optical axis with the cyclic frequency ω. As long as the analyzer is not in the position which causes complete darkness in the case of the usual method being employed, an oscillation of the light current with the cyclic frequency ω may be observed in the analyzer. If, however, the analyzer is in this position, an oscillation of the light current with the cyclic frequency of 2ω occurs. Modulation of the light current may be attained mechanically or by means of the piezoelectric effect or the Faraday effect. For the latter

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method a system is described, and in table 1 the Verdet constants of quartz and flint (-glass) are given for some wavelengths. The fact that the direction of rotation of the polarization plane is independent of the direction of light propagation in quartz is here advantageously utilized. A comparison of the usual method with that described here shows that at small δ (δ = unbalance angle of the optical system) the latter method is more accurate. In the second part practical applications of the method described are dealt with, and it is found to be suited for the construction of automatic recording polarimeters, automatic saccharimeters, as well as for automatic regulation of the concentration of optically active substances. As an example, a spectropolarimeter (Fig 7) is described. It consists of a quartz monochromator, a polarizer, a container for the liquid to be investigated, a modulator, an analyzer, and a photoelectric cell. The electronically amplified photoelectric feeds one of the coils of a reversing engine, whereas the second coil of the reversing engine is fed by the same current source as the modulator. The axle of the engine is coupled with the polarizer and with the

A Method for the Objective Measurement of the Angle of Rotation of the Polarization Plane of Light Waves

recording pen of a recording device by way of a reduction gear. The functioning of this device and its advantages, especially of its photoelectric system, are described in detail. Finally, an automatic saccharimeter (Fig 8), an automatic balance (Fig 9) and an automatic recording device for magnetoelectric instruments (Fig 10) are discussed. There are 10 figures, 2 tables, and 1 Soviet reference.

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BR

ACCESSION NR: Ap4038885 S/0119/64/000/005/0003/0005

AUTHOR: Keymakh, R. Ya.; Kudryavtsev, V. I.

TITLE: Automatic spectropolarimeter

SOURCE: Priborostroyeniye, no. 5, 1964, 3-5

TOPIC TAGS: polarimeter, spectropolarimeter, optically active substance, dispersion of rotation

ABSTRACT: The instrument is intended for measuring and recording the dispersion of rotation of optically active substances in a wide range of visible and ultraviolet radiation. It is based on an automatic polarization servo system with the light modulation depending on the plane of polarization; the system permits the precision measurement of the angle of rotation of the vibration plane. The principal parts of the polarimeter are shown in Enclosure 1. Experience with the instrument has shown that: (1) The dispersion of rotation can be measured in the

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ACCESSION NR: AP4038885

range of 230-700 millimicrons with an angular error of ±0.0025°; (2) Weakening the luminous flux by 99.5% does not affect the accuracy of measurement; (3) The selected zero point is stable to the extent that its drift remained within the normal error of the instrument during 8 hrs of work; (4) The servo rate of response is 0.03 degree/sec; (5) Readings within 2° can be recorded; (6) Measurements of the dispersion of rotation of diluted tartaric acid, camphor in hexane, etc., exhibited good agreement with data published elsewhere. Orig. art. has: 4 figures and 6 formulas.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 05Jun64 ENCL: 01

SUB CODE: OP NO REF SOV: 004 OTHER: 000

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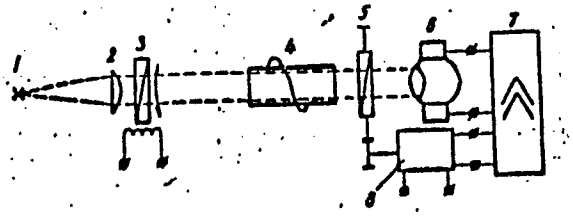
ACCESSION NR: AP4038885

ENCLOSURE: 01



A simplified diagram of the automatic polarimeter with polarization-plane modulated light

1 - monochromatic-light source; 2 - condensor;
3 - polarizer-modulator; 4 - measuring cell;
5 - analyzer; 6 - photoreceiver; 7 - amplifier;
8 - reversible motor driving the analyzer

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~~9(6), 7(6)~~

67360

SOV/119-59-12-5/18

AUTHORS: Keymakh, R. Ya., Engineer, Kudryavtsev, V. I., Engineer

TITLE: An Automatic Polarization Colorimeter

PERIODICAL: Priborostroyeniye, 1959, Nr 12, pp 12-13 (USSR)

ABSTRACT: The first part of this paper deals with the physical fundamentals of light polarization in crystals and with the rotation of the polarization plane on the passage of polarized light through optically active media. The second part describes an automatic polarization colorimeter with which a paper published in Priborostroyeniye, 1959, Nr 11 has already dealt. In this instrument the polarization plane of a linearly polarized beam is set into a sinusoidal rotary oscillation of 50 cycles by a magneto-optical modulator. With proper position of the analyzer, an alternating voltage of 100 cycles is induced in the circuit of a photocell. A particular angular position of the analyzer with which a voltage of 100 cycles is induced in the photocell circuit, corresponds to each ratio of the monochromatic components of light. A glass vessel is contained in the path of rays of the instrument, through which the liquid to be measured flows. Because of the absorptive power of this solution it is necessary to readjust the position of the analyzer with which 100 cycles are induced in the photocell

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An Automatic Polarization Colorimeter SOV/119-59-12-5/18

circuit if the composition of the solution changes. The analyzer is readjusted with the help of a reversible two-phase motor. In the last part the author describes an automatic recording colorimeter based on the afore-mentioned colorimeter. Contrary to orthodox designing, the polarizer of this instrument is automatically adjusted. The positions of the stylus and of the polarizer are simultaneously controlled on a diagram, and thus, the state of the passing liquid is recorded. The instrument is illustrated in figure 4. A circuit diagram is given in figure 5. It was developed by the refinery imeni Mantulin for the determination of sugar in condensates. There are 5 figures and 3 Soviet references.

Card 2/2

KEYMAKH, R.Ya., inzh.; KUDRYAVTSEV, V.I., inzh.

Instruments and devices designed by the All-Union Research and Experimental Institute of Control and Measuring Instruments for the Food Industry. Mekh.i avtom.proizv. 16 no.4:35-38 Ap '62. (MIRA 15:4)

(Instruments)

KUDRYAVTSEV, V.I., inzh.; KEYMAKH, R.Ya., inzh.; KATSENELENBOGEN, E.V., inzh.; FROLOV, A.K., inzh.

Automatic devices used in the measuring line for determining sugar content in beets. Mekh.i avtom.proizv. 18 no.3:35-37 Mr '64. (MIRA 17:4)

L 31491-66

ACC NR: AP6023197 SOURCE CODE: UR/0243/66/000/001/0041/0044

AUTHOR: Baulina, E. A.; Keymakh, R. Ya.; Kudryavtsev, V. I.; Portnov, M. A. 43 B

ORG: All-Union Scientific Research Chemicopharmaceutical Institute im. S. Ordzhonikidze, Moscow (Vsesoyuznyy nauchno-issledovatel'skiy khimiko-farmatsevticheskiy intitut); All-Union Scientific Research Experimental Design Institute of Food Machine-Building, Moscow (Vsesoyuznyy nauchno-issledovatel'skiy eksperimental'no-konstruktorskiy institut prodovol'stvennogo mashinostroyeniya)

TITLE: Physicochemical and automatic methods of analysis and control in the production of medicinal preparations. Report nine. Method of control of the division of racemates into optically active isomers

SOURCE: Meditsinskaya promyshlennost' SSSR, no. 1, 1966, 41-44

TOPIC TAGS: isomer, optic activity, crystallization, amine, filtration, temperature control, pharmacology, polarimeter, chemical reaction kinetics, automatic control equipment

ABSTRACT: An automatic method for the control of the division of racemic D, L-threo-1-(p-nitrophenyl)-2-amino-1,3-propanediol, an intermediate product in the production of levomycetin, has been developed. The division of the racemate into optically active isomers is carried out by the method of their successive crystallization from the reaction mass containing an aqueous solution of the racemate. The formation of a solid phase during the crystallization process

Card 1/2 UDC: 615.4-073.55

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L 31491-66
ACC NR: AP6023197

made the control of the racemic amine division difficult. The new method makes it possible by means of a series of filtrations and temperature regulation to control the division of racemates into optically active isomers despite the continuously developing solid phase. The solid phase is separated from the mother solution by filtration in a vacuum and the return of the filtrate for refiltration. Crystallization of the obtained filtrate is prevented by heating the filtrate to a temperature of 70° or higher, a temperature 7° higher than crystallization temperature. The automatic control of the division is accomplished by means of an automatic polarimeter of a measuring vessel into which the mother solution filtrate is drawn under the effect of a vacuum. Orig. art. has: 3 figures. [JPRS]

SUB CODE: 07, 06, 13 / SUBM DATE: 29Jul65 / ORIG REF: 002 / OTH REF: 001

Card 2/2 mc

[redacted], Ya. I

O sovetskom usovershenstvovanii rez'b profilia Vitworta. (Vestn. Mash., 1948, no. 11, p. 64-65)

The Soviet improvement of Witworth thread.

DLC: TN4.V4

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

SOV/115-59-10-6/20

12 (2, 3), 28 (2)

AUTHOR: Keymakh, Ya. I.

TITLE: Truck for Checking 10-Ton Balances

PERIODICAL: Izmeritel'naya tekhnika, 1959, Nr 10, pp 13-16 (USSR)

ABSTRACT: The VNIIgroup of the Komitet standartov, mer i izmeritel'nykh priborov (Committee of Standards, Measures and Measuring Equipment) has developed a new load-lifting equipment for checking 10-ton balances, ie. the ZIL-151 truck. This truck has fully mechanized, automated and remote controlled operations of loading and unloading standard weights totaling 0.5 tons. The hull of the truck (Fig 2) is made of Nr 10, 8 and 6.5 welded girders. Two monorails are mounted on the upper part of the hull carrying two electric TEP-0.5 hoists. These hoists are set in motion by a AOL-22-4 0.4-kw engine developing 1,440 rpm. The drive gear is composed of a BMZ-4.5/4 electric generator (Fig 4) mounted under the floor of the truck and connected with the truck engine through a single-step KOM-1

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Truck for Checking 10-Ton Balances

power take-off, a cardan shaft and a mechanism controlling the KOM-1 power take-off installed in the driver's cabin. The 220-v generator has 1,500 rpm. The truck of which a detailed description is given in the article, is undergoing operational tests. A truck which can check balances of 20 ton useful loading was also developed in Bratislava from the "Tatra IIIR" truck, but it was not fully mechanized and the electric gear was installed in the trailer. The VNII is preparing plans for a balance-checking truck with a higher loading capacity. There are 5 diagrams and 1 photograph.

KEYNER, Yu.M. (Moskva)

Rivers of Ustyurt. Priroda 53 no. 12:101-102 '64. (MIRA 18:1)

SILKINA, Ye.Z.; MISYURA, K.R.; KEYNO, N.K.; TYNYANKINA, Ye.V.; SIRIDOVA, A.G.; ZUDINA, A.A.; MISYURENKO, A.T.; YATCHENKO, M.G., red.;

[Economy of the Khabarovsk Territory; a statistical manual] Narodnoe khoziaistvo Khabarovskogo kraia; statisticheskii sbornik. [Khabarovsk] Khabarovskoe knizhnoe izd-vo, 1957. 127 p. (MIRA 11:3)

1. Khabarovskiy kray. Statisticheskoye upravleniye. 2. Statisticheskoye upravleniye Khabarovskogo kraya (for all, except Yachenko). 3. Nachal'nik Statisticheskogo upravleniya Khabarovskogo kraya (for Yatchenko)
(Khabarovsk Territory--Statistics)

KEYNYANEN, L.I.

Increase in the number of runs made on the electrified sections between repairs. Elek. i tepl. tiaga 2 no.1:19-21 Ja '58. (MIRA 11:3)

1.Starshiy mashinist elektrodepo Leningrad-Finlyandskoy Oktyabr'skoy dorogi.

(Leningrad Province--Electric railroads)

KEYNYANEN, V.I.

Operating conditions of brushes can be made easier. Elek.i tepl.tiaga 3 no.11:45 N '59. (MIRA 13:3)

1. Nachal'nik planovo-tekhniki-ekonomicheskogo otdela Murmanskogo otdeleniya Oktyabr'skoy dorogi.
(Electric railway motors)

JOCHWEDS, Beniamin, prof. dr. med.; NAPIORKOWSKA, Wanda; KEYOANA-JEDRZEJEWSKA, Barbara

Use of phenylbutazone derivatives in the early postoperative period following thyroidectomy. Pol. tyg. lek. 20 no.1: 12-13 4 Ja '65

1. Z Kliniki Chorob Wewnetrznych Instytutu Gruzlicy (Kierownik: prof. dr. med. B. Jochweds).

S/035/61/000/011/023/028
A001/A101

AUTHOR: Kuiper, G. (Keyper, Dzh.)

TITLE: The lunar surface in early stages of solar system evolution

PERIODICAL: Referativnyy zhurnal. Astronomiya i Geodeziya, no. 11, 1961, 77 - 78, abstract 11A562 (V sb. "Vopr. kosmogonii", v. 7, Moscow, AN SSSR, 89 - 90, Engl. summary)

TEXT: The author discusses peculiarities of the lunar seas testifying on their formation prior to the epoch of maximum melting of lunar interior, during the maximum and after it. So, for instance the Mare Crisium and Mare Humorum were formed from impacts of bodies having fallen on the Moon even prior to the epoch of maximum lava eruptions to the surface. Mare Imbrium was formed soon after the maximum melting. Maria like Mare Nubium are not of impact origin but flooded ones. Large bodies which fell on the lunar surface and formed sea depressions constituted, in the author's opinion, once a ring of small satellites around the Earth, which the Moon crossed receding from the latter due to tidal interaction. The subsequent phase in development of the lunar surface was characterized by

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S/035/61/000/011/023/028
A001/A101

The lunar surface in early stages of...

fissuring of the lava crust and formation of cracks (troughs) of tension and ridges of compression, dike-like eruptions near the north pole, and local volcanic activity.

Ye. Ruskol

[Abstracter's note: Complete translation]

Card 2/2

S/169/63/000/001/025/062
D263/D307

AUTHORS: Keyrimov, Sh.B., Kisin, I.M. and Afayev, Sh.M.

TITLE: Particulars of the distribution of atmospheric deposits in the basin of River Kishchay, according to precipitation-meter data

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 1, 1963, 45, abstract 1B241 (Uch. zap. Azerb. Un-t. Geol.-geogr. ser., 1962, no. 1, 71-78 (Azerb.: summary in Rus.))

TEXT: To study the snow cover and atmospheric precipitation, snow-measuring traverses were undertaken in 1958 in the River Kishchay basin, situated on the southern slope of the Main Caucasian Ridge. Six precipitation meters were also established, and the amounts of deposits falling in the lower part of the basin were determined at rainfall-measuring points between Nukha and Station Damarchik. From these investigations it appears that the change from increasing precipitation with altitude of the locality to decreasing precipitation occurs, in this region, at a height of 2500 - 2600 m.

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S/169/63/000/001/025/062
D263/D307

Particulars of the distribution ...

The zone of maximum precipitation during all seasons and taken annually is between altitudes of 2500 and 2600 m. ,The most intense increase in the precipitation occurs mainly in the summer and autumn (mean gradient of the increase of precipitation with height reaches 3 - 4 mm per 100 m). In winter and spring the gradients are less pronounced, being 1 - 2 mm per 100 m. Above 2600 m, the gradients of decreasing precipitation are 3 - 5 mm per 100 m during the summer and autumn months. The mean annual gradient of increasing precipitation was 15 - 18 mm for 1959-1960, while for individual mountain zones this value varied from 0 to 40 mm per 100 m. At heights between 2800 and 3000 m, above the height at which the increase-to-decrease change occurred, the decrease of precipitation was 5 mm for every 100 m of altitude. (Author's summary).
[Abstracter's note: Complete translation]

Card 2/2

KEYROVICH, Ye.N.; ZHURAVLEV, V.P., kand. tekh. nauk; RYZHIKH, L.I., gornyy inzh.

Dust control in the Kostenko "A" Mine. Ugol' 38 no.8:50 Ag '63. (MIRA 17:11)

1. Glavnyy inzh. shakhty "A" im. Kostenko (for Keyrovich).
2. Karagandinskiy nauchno-issledovatel'skiy ugol'nyy institut (for Zhuravlev, Ryzhikh).

KEYS, F.G., prof; KINAN, Dzh.G.[Kinan, G.G.], prof.; SEYDZH, B.G.[Seigo, B.G.], prof. (Soyedinennyye Shtaty Ameriki)

Results of the first conference of the International Steam Coordination Committee in Moscow on June 21-22, 1958. Teploenergetika 5 no.11:61-64 N '58. (MIRA 11:11)

(Steam--Congresses)

KEYS, I. [Keis, I.]

Two solutions to a problem describing the motion of a gyrostat with a fixed point. Izv. AN Est. SSR. Ser. fiz.-mat. i tekh. nauk 14 no. 4:552-554 '65 (MIRA 19:2)

Some necessary conditions for the existence of single-valued integrals in equations describing the motion of a heavy gyrostat about a fixed point. Ibid.:555-558.

1. Institut kibernetiki AN Estonskoy SSR. Submitted May 7, 1965.

ACC NR: AP7003552 SOURCE CODE: UR/0023/66/000/004/0540/0554

AUTHOR: Keys, I. (Keis, I)

ORG: Institute of Cybernetics, Academy of Sciences, Estonian SSR (Institut kibernetiki Akademii nauk Estonskoy SSR,

TITLE: Concerning one problem of energy optimization of motion of the relative center of inertia of a gyrostatic system with variable mass

SOURCE: AN EstSSR. Izvestiya. Seriya fiziko-matematicheskikh i tekhnicheskikh nauk, no. 4, 1966, 540-554

TOPIC TAGS: gyrostat, optimal control, optimum trajectory, integral equation, Poisson equation, gyroscope

ABSTRACT: The article deals with a gyrostat provided with gas-filled baloons, suitably disposed, having a control system such that when gas escapes from three nozzles lying in the principal inertial planes relative to the center, whose ends are perpendicular to their radius vectors, the inertia tensor of the gyrostat remains similar to the initial tensor, and the center of inertia of the compound body remains the same as before. The problem is to minimize the energy lost during the flight of the gyrostat as the latter maneuvers. The solution is obtained in two parts by Pontryagin's method. In the first part, dealing with the positioning of the gyrostat at the prescribed point during the maneuver, reduces the problem of existence of solutions for certain integral equations. The second problem, that of

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ACC NR: AP7003552

the pure maneuver, is solved completely. In the latter case the resultant system of equations is reducible to a Poisson system of equations which can be solved by the method of Lagrange multipliers. Orig. art. has: 57 formulas.

SUB CODE: 12/ SUBM DATE: 17Dec65/ ORIG REF: 005

Card 2/2

KEYS, I.A.

Existence of certain integrals of equations describing the motion of a gyrostat fixed at one point. Vest. Mosk. un. Ser. 1: Mat., mekh. 18 no.6:55-63 N-D'63. (MIRA 17:2)

1. Kafedra teoreticheskoy mekhaniki Moskovskogo universiteta.

KEYS, I.A.

Some motions of a heavy gyrostat set in fast rotation about a fixed point. Vest. Mosk. un. Ser. 1: Mat., mekh. 20 no.1:61-75 Ja-F '65. (MIRA 18:4)

1. Kafedra teoreticheskoy mekhaniki Moskovskogo universiteta.

KEYS, T.A. (Moskva)

Algebraic integrals in the problem involving the motion of a heavy gyrostat around a fixed point. Prikl. mat. i mekh. 28 no.3:516-520 My-Je'64

ACCESSION NR: AP4011723 S/0055/64/000/001/0076/0079

AUTHOR: Keys, I. A.

TITLE: Motion of a gyrostat supported on one fixed point

SOURCE: Moscow. Universitet. Vestnik. Seriya 1. Matematika, mekhanika, no. 1, 1964, 76-79

TOPIC TAGS: gyrostat, gyrostat motion, regular precession, Euler angle, instantaneous angular velocity, tensor of inertia, Newtonian force field, center of mass

ABSTRACT: A gyrostat supported at one point achieves regular precession if its motion can be represented as uniform rolling of a circular cone fixed within the gyrostat along the surface of a circular cone fixed in space. The vertices of the cones coincide with the support point of the gyrostat, O. The Oz axis of the Oxyz coordinate system, fixed in the gyrostat, is directed along the axis of symmetry of the first cone (axis of self-rotation). Let ψ, φ and θ be Euler angles, $-E$ be the 1-3 component of the tensor of inertia, M be the mass of the gyrostat, δ_0 a constant, x_0 and y_0 the coordinates of the radius vector, and m_1, m_2, m_3 the

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ACCESSION NR: AP4011723

projections on the Oxyz axis of the moment of quantitative relative motion. For existence of regular precession and a nonsymmetric heavy gyrostat the necessary and sufficient conditions are: 1) the axis of self-rotation must be perpendicular to the circular section of the ellipsoid of inertia of the gyrostat, and the center of mass of the gyrostat must be on this axis; 2) the moment of the relative quantity of motion must be directed along the axis; 3) the axes of precession and self-rotation must be mutually orthogonal and the value of the angular velocity of the self-rotation be given by

$$\dot{\varphi}^2 = \frac{Mgz_0}{E}\delta_0.$$

It can be shown analogously that for a symmetric heavy gyrostat the necessary and sufficient conditions for existence of regular precession are: $x_0 = y_0 = 0$, $m_1 = m_2 = 0$, the axis of self-rotation must coincide with the axis of dynamic symmetry, and the axis of precession--with the direction of the force of gravity. If the case $m_1 = m_1(t)$, $m_2 = m_2(t)$, $m_3 = m_3(t)$ is considered, then by a suitable choice of functions one can attain a given motion $\psi = \psi(t)$, $\varphi = \varphi(t)$, $\theta = \theta(t)$. Orig. art. has: 10 formulas.

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ACCESSION NR: AP 4011723

ASSOCIATION: Kafedra teoreticheskoy mekhaniki (Department of Theoretical Mechanics)

SUBMITTED: 30Nov63 DATE ACQ: 14Feb64 ENCL: 00

SUB CODE: MM NO REF SOV: 001 OTHER: 002

Card 3/3

ACCESSION NR: AP4040577 S/0040/64/028/003/0516/0520

AUTHOR: Keys, I. A. (Moscow)

TITLE: Algebraic integrals in the problem of motion of a heavy gyrostat supported at one point

SOURCE: Prikladnaya matematika i mekhanika, v. 28, no. 3, 1964, 516-520

TOPIC TAGS: algebraic integral, gyrostat, Jacobian multiplier, quadrature, ellipsoid

ABSTRACT:

$$A\frac{dp}{dt}+(C-B)qr+m_3r-m_1r=y_0'\gamma_3-z_0'\gamma_2,\quad \frac{d\gamma_1}{dt}=r\gamma_2-q\gamma_3 \qquad (x_0'=Mgx_0) \quad (1)$$

$$B\frac{dq}{dt}+(A-C)pr+m_1r-m_3p=z_0'\gamma_1-x_1'\gamma_3,\qquad \frac{d\gamma_2}{dt}=p\gamma_3-r\gamma_1$$

$$C\frac{dr}{dt}+(B-A)pq+m_3p-m_1q=x_0'\gamma_2-y_0'\gamma_1,\qquad \frac{d\gamma_3}{dt}=q\gamma_1-p\gamma_2$$

describes the motion of a heavy gyrostat supported at one point. This system does not involve time explicitly and has a last Jacobian multiplier, equal to unity.

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ACCESSION NR: AP4040577

It allows the algebraic integrals

$$\begin{cases} Ap^2 + Bq^2 + Cr^2 - 2(x_0'\gamma_1 + y_0'\gamma_2 + z_0'\gamma_3) = h_1 \\ (Ap + m_1)\gamma_1 + (Bq + m_2)\gamma_2 + (Cr + m_3)\gamma_3 = h_2, \quad \gamma_1^2 + \gamma_2^2 + \gamma_3^2 = 1 \end{cases} \quad (2)$$

This system can be reduced to quadratures for $x_0' = y_0' = z_0' = 0$, when it allows the fourth algebraic integral

$$(Ap + m_1)^2 + (Bq + m_2)^2 + (Cr + m_3)^2 = L^2 \quad (3)$$

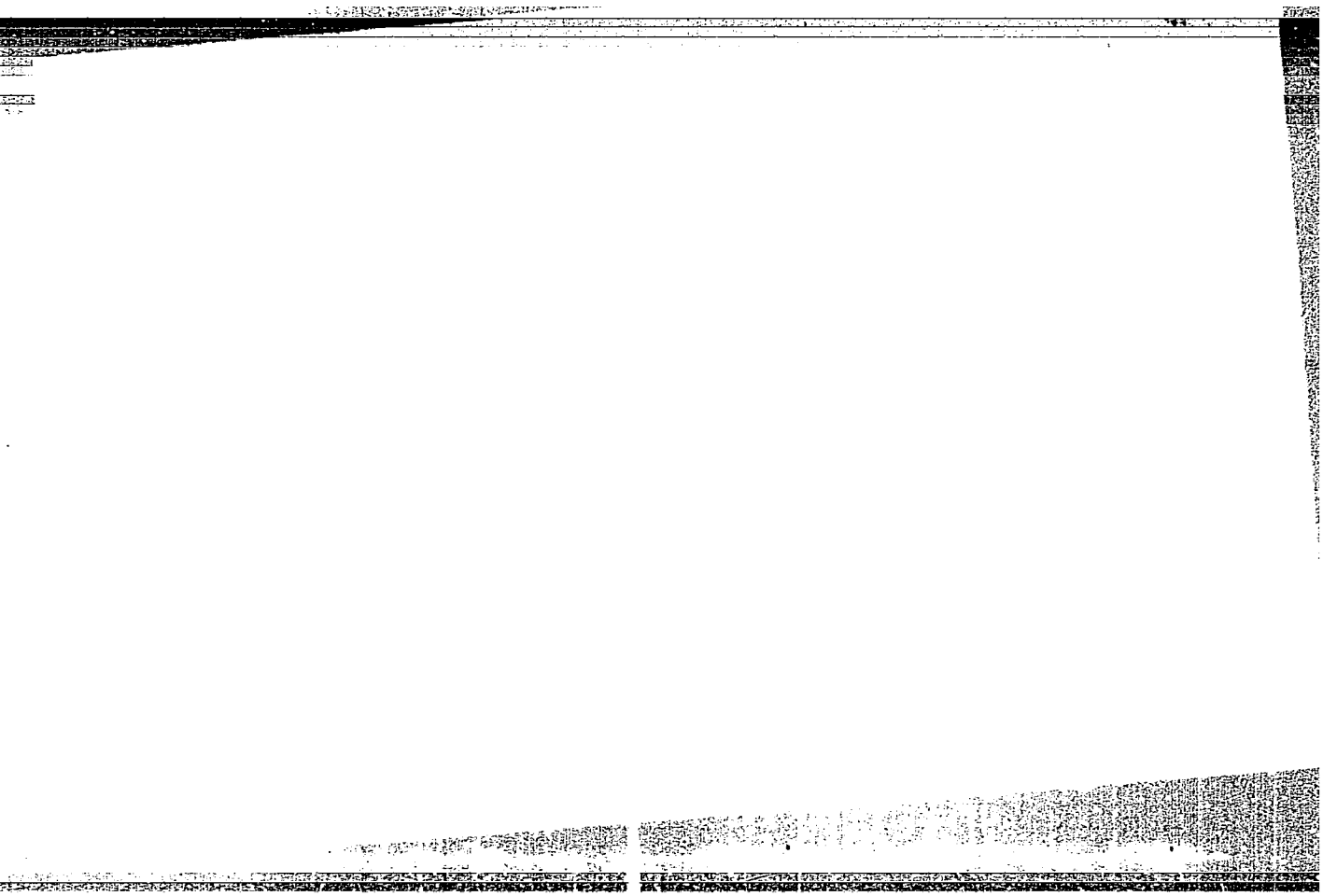
and in the case A = B, $x_0' = y_0' = 0$, $m_1 = m_2 = 0$, when it has the integral $r = r_0$.

The author studies the problem of finding general conditions for existence of new algebraic integrals for system (1) which do not depend on the classical integrals (2). "The author extends his gratitude to Yu. A. Arkhangel'skiy and P. V. Myasnikov for their valuable remarks." Orig. art. has: 25 formulas.

ASSOCIATION: none

SUBMITTED: 02Nov63	DATE ACQ: 19Jun64	ENCL: 00
SUB CODE: MA	NO REF SOV: 003	OTHER: 003

Card 2/2



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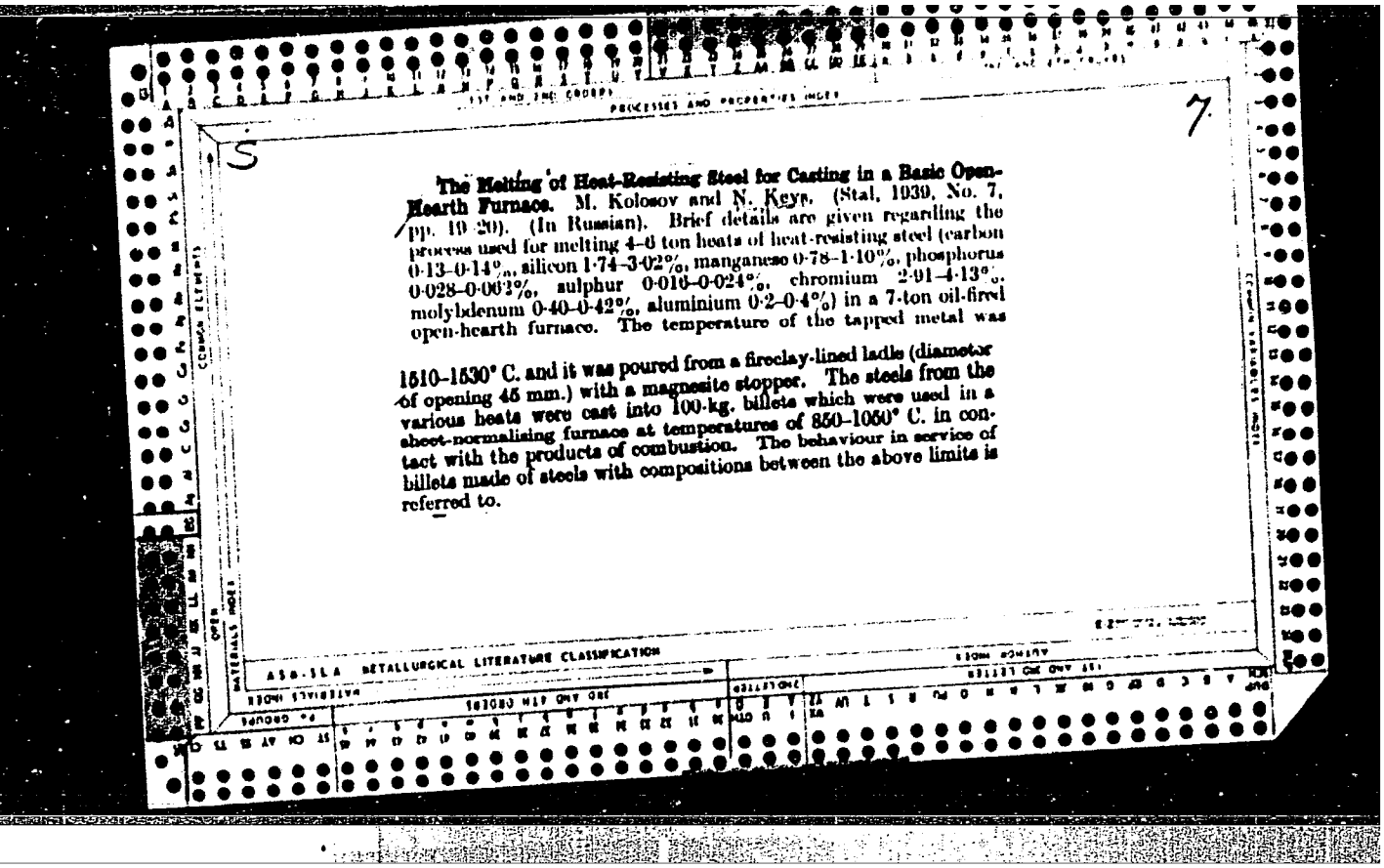


The Melting of Heat-Resisting Steel for Casting in a Basic Open-Hearth Furnace. M. Kolosov and N. Keyn. (Stal, 1939, No. 7, pp. 19–20). (In Russian). Brief details are given regarding the process used for melting 4–6 ton heats of heat-resisting steel (carbon 0·13–0·14%, silicon 1·74–3·02%, manganese 0·78–1·10%, phosphorus 0·028–0·062%, sulphur 0·016–0·024%, chromium 2·91–4·13%, molybdenum 0·40–0·42%, aluminium 0·2–0·4%) in a 7-ton oil-fired open-hearth furnace. The temperature of the tapped metal was 1510–1530° C. and it was poured from a fireclay-lined ladle (diameter of opening 45 mm.) with a magnesite stopper. The steels from the various heats were cast into 100-kg. billets which were used in a sheet-normalising furnace at temperatures of 850–1050° C. in contact with the products of combustion. The behaviour in service of billets made of steels with compositions between the above limits is referred to.

CA

9

Blowing air into the metal during open-hearth melting. I. S. Semenenko and N. V. Kel[illegible]. *Teoriya Prakt. Met.* 12, No. 9, 13-14(1940). The object of the expts. was to det. the velocity of combustion of C, the possibility of removing the other impurities and the relation between the oxidation of the impurities and the rise of the temp. of the metal. The compn. of the charge was such as to produce a final metal contg. approx. 2.0% of C. Within 1-5 min. after melting air was passed continuously with a pressure of 2.5-4.5 atm. in one or in two stages for 14-16 min. The av. velocity of combustion of C during blowing was 0.034%/min. In the ordinary process the av. velocity is 0.018%/min. No disproportion between the process of the oxidation of C and heating the metal was observed. In all exptl. meltings the oxidation of Mn and P during the process was normal. The Mn content in the bath after blowing was 0.37-0.47% (in 1 case the Mn content reached 0.21%). The P content in the bath after blowing was 0.018%. Almost no oxidation of S was observed. The furnace life was shortened by blowing. W. R. Henn

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

[illegible], N. V.

Jun 47

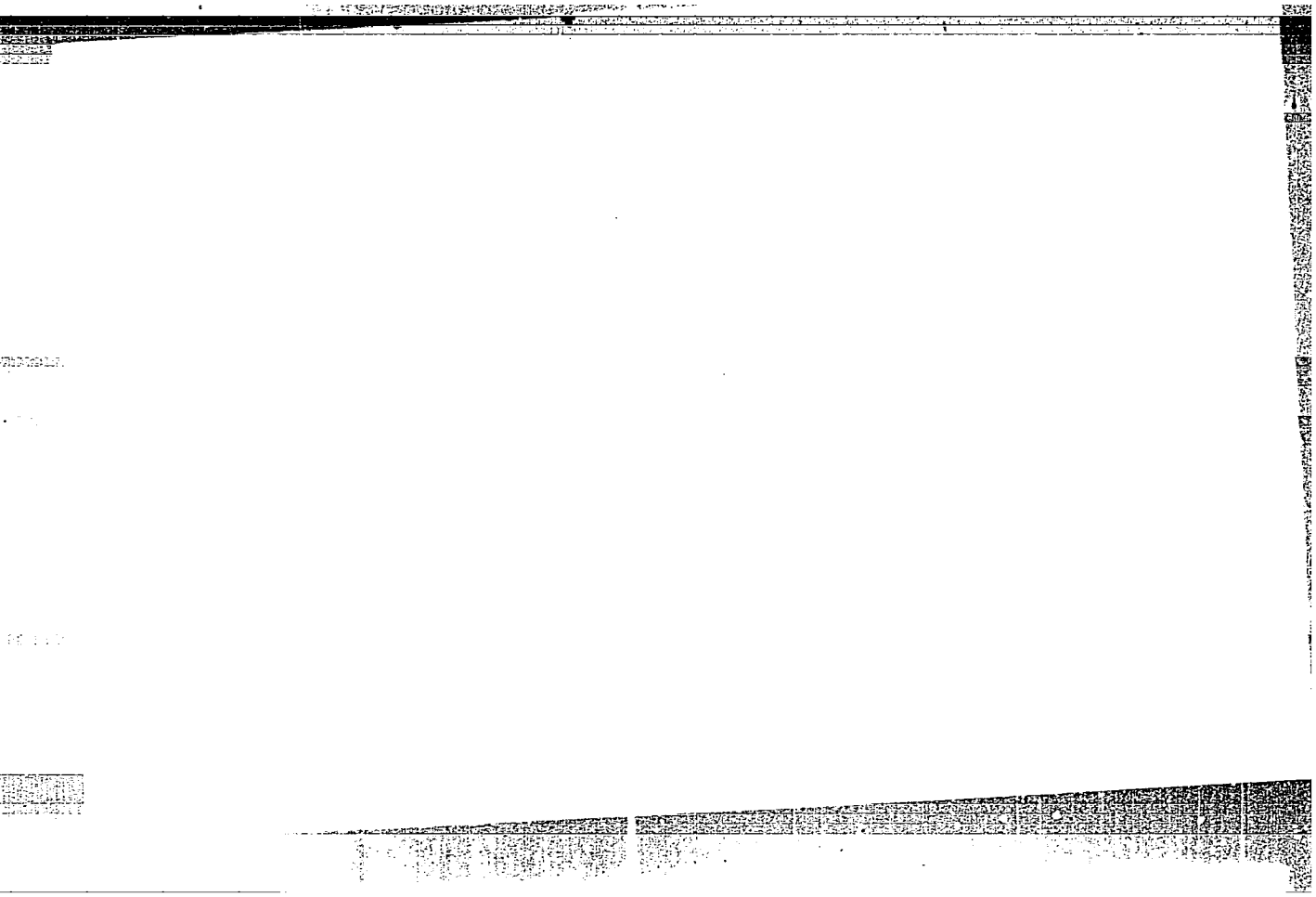
USSR/Engineering
Metallurgy, Ferrous
Ball Bearings

"Test of Optimum Technology for Smelting Ball Bearing Steel," M. I. Kolosov, I. Ya. Ayzenshtok, N. V. Keys, Engineers, Chelyabinsk Metallurgical Works, 2½ pp

"Stal'" No 6

Series of tests determined that best method consists of terminal oxidation of steel with calcium silicate and introduction of ferrous chromate at beginning of refining process. This greatly increased quality, decreased cost and increased productivity of equipment.

PA 1/49T15



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KEYZS, N.V., KOLOSOV, M.I., MOROZOV, A.M., STROGANOV, A.I., VAYNSHTEYN, O.IA., AYZENSHTOK, I.Ya.

Influence of Blast Humidity on the Cast-Iron Hydrogen Content and the Quality of Steel,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

SOV/137-58-8-16552

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 46 (USSR)

AUTHORS: Kolosov, M.I., Morozov, A.N., Stroganov, A.I., Isayev, V.F., Keys, N.V., Vaynshteyn, O.Ya.

TITLE: The Rate and Sequence of Crystallization in Ingots of Killed Steel (Skorost' i posledovatel'nost' kristallizatsii slitkov spokoynoy stali)

PERIODICAL: V sb.: Primeneniye radioaktivn. izotopov v chernoy metallurgii. Chelyabinsk, Knigoizdat, 1957, pp 95-105

ABSTRACT: Radioactive Fe^{59} (introduced in the form of Fe oxide) was employed in conjunction with the method of overturning of molds in order to investigate crystallization processes in ingots of steel ShKh15SG (2.65 t) and of steels 10 and 45 (6.2-t ingots). The radioactivity of various zones of the ingot was determined from the radiation intensity of 3.5-g specimens of metal drilled out on different levels of a longitudinal templet of the ingot. As the crystallization progresses, the two-phase region on the sides of the ingot amounts to 30-50 mm. After the formation of a zone of columnar crystals, a two-phase region fed with liquid metal from the central part is formed in the lower part

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SOV/137-58-8-16552

The Rate and Sequence of Crystallization in Ingots of Killed Steel

of the ingot. In a 6.2-ton ingot, the height of this zone extends to 850 mm. Up to a certain time (approximately 80 min in the case of the 6.2-t ingot) the thickness of the crystallized layer (including the two-phase region) taken in a horizontal section of the ingot is proportional to the square root of the crystallization time. Deviations from this relationship, which occur toward the end of the crystallization period, are attributable to a more rapid formation of a two-phase region at the center of the ingot. Extension risers, employed in production of high-quality steel ingots, may be removed only after the crystallization of the ingot has been completed. Bibliography: 19 references.

Ya.L.

1. Steel--Crystallization 2. Iron isotopes (Radioactive)--Applications

Card 2/2

SOV/137-59-1-333

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 1, p 11 (USSR)

AUTHORS: Morozov, A. N., Povolotskiy, D. Ya., Keys, N. V.

TITLE: A Study of the Kinetics of the Process of Desulfurization of Steel in Electric Arc Furnaces (Izucheniye kinetiki protsessa obesserivaniya stali v elektricheskikh dugovykh pechakh)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 112-123. Diskuss., pp 160-187

ABSTRACT: Experimental smeltings of ball-bearing steel were conducted in electric arc furnaces with capacities of 30-40 tons; the radioactive isotope (RI) S^{35} in the form of an iron sulfide was introduced into the metal after the charge had melted, as well as in the beginning of the reduction period. It was established that in the course of the oxidation period the RI is distributed throughout the volume of the metal and the slag within 15 minutes, whereas the ratio (1%S):[1%S] attained a constant value in 10 - 20 minutes. The constancy of relative concentration of the RI in the metal [1/%S] was preserved during the oxidation period only when the content of the S amounted to 0.022 - 0.032%; at a lower S content it was reduced owing to the fact

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SOV/137-58-9-18676

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 9, p 75 (USSR)

AUTHORS: Morozov, A.N., Kolosov, M.I., Stroganov, A.I., Isayev, V.F., Keys, N.V., Vaynshteyn, O.Ya.

TITLE: A Nucleonic Study of the Rate and Sequence of Steel-ingot Crystallization (Izucheniye skorosti i posledovatel'nosti kristallizatsii stal'nykh slitkov pri pomoshchi radioaktivnykh indikatorov)

PERIODICAL: V sb.: Staleplavil'n. proiz-vo. Moscow, Metallurgizdat, 1958, pp 203-217

ABSTRACT: Radioactive tracers were used to investigate the crystallization of 2.65-t ingots of ShKh15SG and 6.2-t ingots of Nrs-10 and 45 steels, bottom poured. 3-5 batches of Fe^{59} (4.5-14.5 millicuries per t steel) were introduced as Fe_2O_3 mixed with Al powder. The tops of the ingots were held in the liquid state by periodic additions of lunkerite pipe eliminator. At the same time, crystallization of Nr-10 steel was also studied by overturning three ingots on single stool at different time intervals after pouring. The isotope was introduced at the moments when the residual liquid metal from each of these ingots was poured

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SOV/137-58-9-18676

A Nucleonic Study of the Rate and Sequence of Steel-ingot Crystallization

into a fourth on the same stool. The thickness of the frozen layer as determined by radiography was greater than when determined by pouring out the liquid residue of the metal. This is explained by the fact that the zones of isotope distribution describe the region of the ingot occupied by liquid metal, whereas the thickness of the crystallized layer determined by pouring out defines the region of solid metal phase alone. The difference between them is the magnitude of the region in which two phases exist. The length of that region along the sides of the ingot in the course of crystallization does not exceed 30-40 mm. At the conclusion of the formation of the zone of columnar crystals in the bottom of the 6.2-t ingot there arises a two-phase region attaining 850 mm in height. This region comes into being as the result of the accumulation of equiaxed crystals that have torn away after formation on the interface between the solid and liquid phases. The crystallization of the two-phase region is intermittent in nature. The development of V-segregation and axial porosity are dependent upon the taper of the ingot and the conditions under which the two-phase zone is fed liquid metal from the upper portion of the ingot. In the making of high-quality steel, the hot top should be removed only after the body of the ingot has completely hardened. Within given time limits, the thickness of the crystallized layer is proportional to the square root of the crystallization time; the proportionality factor therein,

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KEYS, N. V.

133-1-7/24

AUTHORS: Kolosov, M.I., Engineer, Morozov, A.N., Doctor of Technical Sciences, Stroganov, A.I., Candidate of Technical Sciences, Popov, Yu.A., Engineer, Vaynshteyn, O.Ya., and Keys, N.V.

TITLE: The Quality of Steel from Pig Iron Produced with a Constant Moisture Blast (Kachestvo stali iz chuguna, vyplavlennogo na dut'ye postoyannoy vlazhnosti)

PERIODICAL: Stal', 1958, No.1, pp. 24 - 27 (USSR).

ABSTRACT: The influence of moisture content of blast on the hydrogen content in pig iron and the influence of hydrogen content of pig iron on the hydrogen content of steel as well as flake sensitivity of steel on the hydrogen content in the liquid metal were investigated. Nos. 1 and 3 blast furnaces on the above works were transferred to operation with a constant moisture blast (15-20 g/m^3). This resulted in the smoother operation, higher blast temperatures 750 - 800 °C (against previous 450 - 500 °C), increase in output (No.1 - 3%; No.3 - 1.3%) and a decrease in the coke rate (No.1 - 6.5%; No.3 - 1.3%). As the works produce quality steel it was considered necessary to check the possible effect of higher moisture in blast on the steel quality. It was found that with increasing moisture content in blast, the hydrogen content of pig iron increases but not proportionally. However, the mean content of hydrogen in the

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Chelyabinsk Metallurgical Plant.

The Quality of Steel from Pig Iron Produced with a Constant Moisture Blast

open-hearth bath after melting and on teeming was found to be practically independent of the hydrogen content of pig or moisture content in the blast (Fig.1), The final hydrogen content of steel on teeming was not correlated to its content in the corresponding pig (Table 1, Fig.2). The comparison of hydrogen content in pig, steel and rolled products of various levels of moisture content in blast is shown in Table 2; the comparison of the degree of flaking in semis and their hydrogen content and the mechanical properties of finished steel at various levels of moisture in blast - Tables 3 and 4, respectively. It is concluded that the hydrogen content of pig iron has no influence on the hydrogen content of quality steel after melting and on teeming. The direct relationship between the flake sensitivity and hydrogen content of liquid metal was not established. The methods of heating and cooling flake-sensitive steels used on the works secure the absence of flakes in finished products at any level of moisture in the blast. The macro-structure of rolled semis is independent from the moisture content of the blast. There are 4 tables, 2 figures and 6 Russian references.

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At the Chelyabinsk Metallurgical Works results obtained were as follows:

Furnace capacity, t.	100	185	200	370
Decrease in the duration of heats, %	6-9	22	17	13-18
Increase of output in t/m^2 day	0.8	0.8	1.0	1.2

A decrease in the consumption of conventional fuel of 13 to 37 kg/t of steel was obtained. Mean thermal loads remained unchanged. In 1958 the introduction of oxygen pretreatment of pig iron is planned.

An improvement in the quality of steel for axles.

An investigation indicated that defects on rolled semis for the manufacture of axles were caused by defects in ingots which in turn were due to unsatisfactory internal surface of the ingot moulds. By maintaining an established practise for filling of the bottom part of ingot moulds and applying

At the Chelyabinsk Metallurgical Works

2.5% bottom crop improved the quality of the metal. "Bright points" were easily noticed in tensile specimens of the metal. It was established that "bright points" are not metal defects but appear in tensile specimens during testing due to non-uniformity stresses in the metal caused by "points" non-uniformity. The latter appears in ingots in the form of whiskers and is formed due to liquation and gas evolution during the crystallisation process. Thermal treatment at 680°C for 120 hours decreases the development of "bright points" in specimens and thus also "points" non-uniformity in semis. The results of corresponding investigation carried out by TsNIIChM confirmed the above findings.

Deoxidation of open hearth steel with aluminium in tubes. In order to decrease oxidation of aluminium during final deoxidation its introduction into steel in metallic tubes was tested. It was found that: 1) on deoxidation in tubes the content of oxide inclusions is higher than on ordinary introduction of aluminium; 2) the content of aluminium oxide in the oxide inclusions with the experimental and usual methods of introducing aluminium in an amount of 700 g/t is the same (about 86%); on introduction of 300 g/t of aluminium in tubes the alumina content in oxide inclusions

At the Chelyabinsk Metallurgical Works

decreases by 50% but the amount of silica sharply increases; 3) with the usual and experimental modifications of deoxidation, ingots from the second bottom teeming set up were more contaminated by alumina inclusions than in ingots of the fourth set, in which the proportion of silica increases.

The use of siliconchromium during smelting chromium steels in open hearth furnaces.

During studies of the possibility of a complete or partial replacement of ferrochromium (types 1 and 0) with silicochromium (type 18) when smelting low-carbon chromium steels, the latter have been introduced into the bath in the heated to red heat state in the proportion of 15-20 kg/ton of steel. The final adjustment of chromium content was done 10-15 minutes later with ferrochromium. The heat was kept for a further 20-40 minutes depending on the content of chromium. In all heats on the addition of silicochromium boiling of the bath ceased. The following advantages of the method were observed:

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At the Chelyabinsk Metallurgical Works

a) the period of preliminary deoxidation coincides with the alloying process which leads to an economy in ferro-alloys (exclusion of blast furnace ferrosilicon) and shortening of the heat by 10 minutes; b) chromium losses (due to oxidation) from silicochromium are 5-6% lower than from ferrochromium. The quality of metal remains the same as an alloying with ferrochromium. For smelting steel containing not more than 0.17% of carbon, the carbon content of silicochromium should not exceed 2%.

An increase in the yield of good metal from an ingot. On investigating the problem of increasing the yield of good metal from 6.2, 4.5, 2.65 and 1.18 ton ingots the following methods were tested: a) Addition to the top of the ingot of an exothermic mixture containing 70% of ferrosilicon (75%), 10% of silicocalcium and 20% of sodium nitrate; b)The use of frothed chamotte (s.gr. 0.4-0.8 g/cm^3) and coal briquettes for lining of tops (coal briquettes contained 50% of coke breeze, 25% of charcoal waste, 20% of sawdust and 5% of sodium nitrate); c) Increasing the conicity of the top from 18 to 35%. The use of tops from frothed chamotte decreased the crop top to 12%, however, their durability was very low.

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At the Chelyabinsk Metallurgical Works

The lining from coal briquettes also decreased the crop top to 12-13%, but due to difficulties in making briquettes and the lining the method cannot be recommended for mass production. Tops of 35% conicity did not give any improvement. The work is being continued. There are no figures or references.

Card 6/6

Sov/133/58-9-11/29

AUTHOR: Keys, N. V.

TITLE: At the Chelyabinsk Metallurgical Works (Na Chelyabinskom metallurgicheskom zavode)

PERIODICAL: Stal', 1958, Nr 9, pp 806-807 (USSR)

ABSTRACT: Introduction of platinum rhodium-platinum thermocouples for measuring the temperature of liquid steel.
Replacement of tungsten-molybdenum thermocouples with platinum rhodium-platinum thermocouples improved the accuracy of the temperature measurements of liquid steel. Optimum temperatures in the course of smelting and in the ladle for steels 38KhMYuA, 18KhNVA, transformer and 1Kh18N9T were established (given in the text). By maintaining optimum temperatures the quality of metal was improved.
A decrease in the degree of contamination of ball bearing steel with non-metallic inclusions (in cooperation with TsNIIChM and KMK).
Some modifications in the technology of production of ShKh15 steel were introduced: a) a decrease in the metal temperature during smelting and tapping (the temperature in the ladle was decreased from 1560-1590°C to 1530-1550°C);
b) a moderate deoxidation of the bath with a carbonaceous reagent so as to obtain no more than 0.4% of calcium carbide

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At the Chelyabinsk Metallurgical Works

in slag before tapping, and c) replacement of a prolonged diffusion deoxidation by a deep deoxidation which shortened the duration of the heat by 60-90 minutes. The decrease in the metal temperature caused some deterioration in the surface quality of ingots.

Vacuo-treatment of liquid steel.

Vacuo treatment of transformer steel in a ladle and in a stream during the pouring of steel from one ladle into another was introduced. The final pressure 30-50 mm Hg. Some decrease in hydrogen content in 50% of heats was observed but no improvement in specific losses was obtained. An additional pumping installation to decrease the final pressure is being planned.

An improvement in the technology of production of 38KhMYuA steel.

A decrease in the production of defective metal by a factor of 2-2.5 was obtained by the following modifications in the smelting technology: a) preliminary deoxidation with pig iron (6 kg/ton) before the removal of oxidising slag, followed by

At the Chelyabinsk Metallurgical Works

additions of silico-manganese (3.5 kg/ton) and 75% ferro-silicon (1.3 kg/ton) at the beginning of the reducing period; b) addition of ferrochromium immediately after preliminary deoxidation; c) diffusion deoxidation with coke and ferro-silicon during 20 minutes, and d) a decrease of the deoxid-ising period to 80 minutes.

Testing of carburised bricks for steel ladles.

Chamotte bricks were carburised by treatment with tar pitch for 36 hours at 250-300°C followed by a thermal treatment at 600-700°C for 8 hours. The use of these bricks in 185 ton ladles for open hearth ladles did not give any positive results but the life of 40 ton ladles for electric steel was increased by 100%.

Operation of open hearth furnaces with various refractories in regenerators.

On testing various refractories in regenerators of 100 ton open hearth furnaces the best results were obtained with high-alumina (Al_2O_3 - 60%) and forsterite bricks.

Card 3/3

Sov/133/58-9-19/29

AUTHOR: Keys, N. V.

TITLE: At the Chelyabinsk Metallurgical Works (Na Chelyabinskom metallurgicheskom zavode)

PERIODICAL: Stal', 1958, Nr 9, p 827 (USSR)

ABSTRACT: The removal of liquid slag from recuperative soaking pits of the blooming mill.
In order to obtain a slag with a melting temperature of 1100° the pit bottoms were treated with a mixture of 68% coke breeze, 29.2% quartz sand and 2.8% of lime after every 14 charges. The slag formed was flowing out through the slag notch in which a burner was fixed to prevent the solidification of slag in it. The above practice had no negative influence on the pit lining, while the output of the soaking pits increased by 15% and the consumption of fuel decreased by 10%.

Card 1/1

Sov/133/58-9-22/29

AUTHOR: Keys, N. V.

TITLE: At the Chelyabinsk Metallurgical Works (Na Chelyabinskom metallurgicheskom zavode)

PERIODICAL: Stal', 1958, Nr 9, p 838 (USSR)

ABSTRACT: An improvement in practice of thermal treatment of quality rolled products.

A method of heat treating blooms so that after rerolling or forging the products obtained could be cooled in air without any danger of flake formation, was investigated. For this purpose blooms (250-300 mm) from pearlitic, semimartensite and martensite steels were heat treated for periods of 100-120 hrs instead of 48 hours as previously. Blooms so treated after forging on rolling were cooled in air. Tests carried out three months later indicated the absence of flakes. The work is being continued.

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At the Chelyabinsk Metallurgical Works

The operation of furnaces for heat treatment with elevated roofs.

In order to increase charge, roofs on 5 furnaces were elevated for 500 mm and their operation investigated. It was found that some increase in the supply of gas was necessary. The throughput of furnaces increased by 18%.

AUTHOR: Keys, N.V. SOV/133-58-11-12/25

TITLE: At the Chelyabinsk Metallurgical Works (Na Chelyabinskom metallurgicheskom zavode)

PERIODICAL: Stal', 1958, Nr 11, p. 998 (USSR)

ABSTRACT: 1) An increase in the durability of ingot moulds. Ingot moulds for electric steels (ingots weighing 1 180 kg) with reinforced tops were tested; the life of moulds increased by 22%. Similar moulds cast from nodular iron were also tested. The life of the latter moulds increased to 76-98 heats as against 35 heats for moulds from ordinary iron. The production of ingot moulds from nodular iron for ingots weighing 6 200 kg is planned.
2) Mastering of the technique of producing steel casting refractories by the method of semi-dry pessing.
The production of stopper tubes by semi-dry pressing improved the quality of the refractories.

Card 1/1

SOV/133-59-2-6/26

AUTHORS: Dubrov, N.F., Gorlach, I.A., Keys, N.V. and Zhukov, D.G.

TITLE: An Investigation of the Heterogeneity of a Transformer Steel Ingot (Issledovaniye neodnorodnosti slitka transformatornoy stali)

PERIODICAL: Stal', 1959, Nr 2, pp 117-122 (USSR)

ABSTRACT: The chemical and structural non-uniformity of a 6.2 ton ingot of transformer steel was studied. The method of smelting steel in a 40 ton arc furnace is described in some detail. The chemical composition of the metal in the ladle was %: C 0.04; Si 3.20; Mn 0.10; Ni 0.12; Cu 0.12; S 0.007; P 0.009 and Cr 0.04. The metal was bottom poured into 6.2 ton ingots. The shape and dimensions of the ingot are shown in Fig.1. A longitudinal plate, 20 mm thick was cut out from the middle part of the ingot, from which 60 samples were collected by drilling for chemical analysis as shown in Fig.1. The segregation of longitudinal and transverse cross-sections of carbon, sulphur, phosphorus, aluminium and nitrogen is shown in table 1 and Fig.2. The degree of segregation was as follows:

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An Investigation of the Heterogeneity of a Transformer Steel Ingot

Deviation from mean %	C	S	P	Al	N_2
positive	30	30	20	25	10
negative	5	15	10	5	10

Mean silicon content was 3.10%, maximum 3.23% and minimum 2.95%. No regularity in the distribution of silicon was observed. Mean manganese content was 0.095%, a number of samples taken from the upper part of the ingot contained 0.110% and from the bottom part 0.092%. On the basis of mean values it is concluded that the non-uniformity in the distribution of manganese was insignificant. Mean chromium content was 0.030%; in the upper part of the ingot - 0.035% was the predominant concentration and in the bottom part - 0.025%; maximum 0.041% and minimum 0.041%. Thus the distribution of chromium was found to be very non-uniform. The contents of copper and nickel in all samples was stable, for copper it varied from between 0.10 to 0.11% and for nickel from 0.11 to 0.12%. The quantities and composition of non-metallic inclusions which varied from 0.0172 - 0.0066% are shown in table 2,

An Investigation of the Heterogeneity of a Transformer Steel Ingot

their appearance in Fig.3. The predominant component of non-metallic inclusions was alumina but considerable quantities of TiO_2, SiO_2 and FeO were also found. The size of the individual inclusions was comparatively small, mainly 5μ only a small proportion was of about 50μ. The macro and microstructure of sections taken from various parts of the ingot is shown in Fig 4, 5 and 6 respectively. It is concluded that a considerable improvement in the heterogenity of transformer steel can be obtained if the contents of carbon, sulphur and aluminium are decreased to 0.02%, 0.003% and traces respectively. The introduction of electromagnetic stirring will also improve

An Investigation of the Heterogeneity of a Transformer Steel Ingot

the uniformity of steel. There are 2 tables, 6 figures and 5 references of which 4 are Soviet and 1 English.

ASSOCIATION: Ural'skiy Institut Chernykh Metallov i Chelyabinskiy Metallurgicheskiy Zavod (Ural Ferrous Metals Institute and Chelyabinsk Metallurgical Works)

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000721620006-7"

AUTHORS: Keys, N.V., Zhukov, D.G and Khizhnichenko, A.M.

TITLE: Mastering of the Production of Transformer Steel (Osvoyeniye vyplavki transformatornogo metalla)

PERIODICAL: Stal', 1959, Nr 2, pp 130-131 (USSR)

ABSTRACT: The development of the smelting practice of transformer steel in 40 ton arc furnaces with subsequent teeming in 6.2 ton ingots is briefly outlined. The main points of established practice: Oxidation of carbon to 0.10 - 0.15% with iron ore and further 0.03% carbon with dried oxygen, (250 - 450 m^3/heat). At the beginning of the reducing period the metal is preliminarily deoxidised with silicocalcium in lumps (1.5 kg/t) and then during 15 - 20 min with powdered ferrosilicon (10 kg/t) and aluminium powder (1 kg/t). 20 - 25 minutes before tapping the metal is alloyed with 75% ferrosilicon. The metal temperature before tapping should be 1620-1635°C and in the ladle 1570-1590°C. Depending on the temperature the metal is retained in ladle for 10-20 minutes and then treated with a desulphurising mixture containing lime fluorospar and calcined soda. The metal in the ladle is vacuo treated for 8-10 minutes at a residual pressure of

SOV/133-59-6-7/41

AUTHOR: Keys, N.V.

TITLE: At the Chelyabinsk Metallurgical Works (Na Chelyabinskom metallurgicheskom zavode)

PERIODICAL: Stal', 1959, Nr 6, p 502 (USSR)

ABSTRACT: 1. Smelting of ferrosilicon and foundry iron with oxygen enriched blast. Oxygen enriched blast (up to 25.1%) is being used on a furnace of 930 m^3 working capacity, producing mainly ferrosilicon. When the furnace operated on normal blast a systematic formation of ring-shaped scaffolds was observed. With oxygen enriched blast the output of the furnace increased and the coke rate decreased (at 25.1% O_2 by 16.7% and 2.3% respectively). The temperature in the hearth at a distance of 750 mm from the tuyere nozzle reaches a maximum of 1980 - 2080°C. The content of CO_2 reaches the highest value (12%) at the point of maximum temperature and decreases to zero at a distance of 1250 mm from the tuyere nozzle. The content of CO in the flame 0.5% increasing to the centre of the hearth to 38-48%. Analysis of samples of metal and slag

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At the Chelyabinsk Metallurgical Works

withdrawn through a tuyere indicated that: a) silicon is reduced mainly above the tuyere level from liquid slag; b) the degree of reduction of silicon in the bosh and in the upper part of the hearth is determined by the temperature and concentration of silica in the primary slag; c) a partial oxidation of silicon takes place on the tuyere level: from 10 - 13% in the centre to 6 - 9% in the oxidation zone. Smelting of foundry iron with oxygen enriched blast (23.5 - 24%) and addition of steam 40 - 47 g/m^3 increased the furnace output by 9%. Smelting of foundry iron with oxygen enriched blast was found to be uneconomical.

2. A study of the wear of the blast furnace hearth bottom. After a furnace campaign of 14 years 4 months, temperature measurements in the foundation, at two levels and the temperature of iron in the bear were carried out prior to blowing out for relining (no details). Iron from the bear, which was in direct contact with the chromemagnesite layer, contained less carbon, silicon and manganese than the iron usually

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produced. It is thought that the layer of this low carbon iron at a temperature in the region of 1130 - 1150° (solidification temperature) acted as a protective layer. The depth of bottom wear after 14 years was the same as that of another furnace without a chromemagnesite layer after a campaign of five years.

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SOV/133-59-6-15/41

AUTHOR: Keys, N.V.

TITLE: At the Chelyabinsk Metallurgical Works
(Na Chelyabinskom metallurgicheskom zavode)

PERIODICAL: Stal', 1959, Nr 6, pp 523-524 (USSR)

ABSTRACT: 1) The use of oxygen for smelting steel in open hearth furnaces. Oxygen enrichment of air to 25% by supplying oxygen to the flame increased the output of the furnaces as follows:

furnace capacity, tons	100	185	370
increase in output, %	14.0	15.7	19.0

On operation with oxygen the cost of the steel decreased by 3.67 - 4.27 roubles/ton on the large furnace and remained unchanged on 100 ton furnaces.
2) Pretreatment of pig iron before charging into open hearth furnaces. Two methods of pretreatment of pig iron in ladles were tried: blowing with oxygen and additions of 2-4% of ore to the ladle before it was filled with iron. In the first case the process of desiliconisation was found to be too cumbersome: in the second case the process of desiliconisation was

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accompanied with a considerable temperature drop e.g. after standing of 3 hours the content of silicon dropped from 0.83 to 0.49% and the iron temperature from 1450 to 1320°C. No comments as to the applicability of the latter method are given.
3) A decrease in the consumption of ferromanganese. On changing the deoxidation practice for killed and rimming steel, i.e. adding ferromanganese into the ladle instead of into the furnace (10-20 minutes before tapping) a considerable saving of manganese without deterioration in the steel quality was obtained.
4) Alloying of steel with titanium-containing scrap. For the replacement of ferrotitanium for alloying steels 30T, 18KhGT - 40KhGT smelted in 100 ton furnaces, titanium filings and scrap containing 99% of titanium was used. After ignition to 350-400°C for the removal of oil, the scrap was placed on the bottom of the ladle to which steel was tapped. Titanium losses in oxidation amounted to 57.5 to 63.5%.

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5) The use of graphite as a substitute for coating materials for ingot moulds. Additions of graphite (800 g/t) to ingot moulds during bottom pouring of metal were tried. No changes in the surface quality and macrostructure of carbon steels were observed but the surface of rolled products from chromium and silicon steels deteriorated. No carburisation of metal during teeming was observed.
6) The use of unfired magnesite teeming nozzles (in co-operation with the Works "Magnezit"). 500 Heats of killed and rimmed steels were experimentally teemed using unfired magnesite nozzles in 100 and 185 ton ladles with satisfactory results.
7) An improvement in the operation of regenerators. In order to widen the regenerators and slag pockets, the thickness of the insulation of the walls was reduced from 230 to 115 mm, which increased the durability of the checker work by 6.2%. In order to decrease heat losses through the lining of the bottom part of the furnace structure it is advantageous to replace the usual chamotte bricks by low weight bricks

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of bulk density 0.8 - 0.6 g/cm^3.
8) Cleaning of the regenerators from flue dust. Washing of regenerators with water at a pressure of 5 - 7 atm was found to be successful but the mechanical strength of the forsterite bricks decreased and the temperature of the checker work decreased by 80-90°C and is recovered only after 2-3 heats. It is planned to increase the pressure of the cleaning water to 10-12 atm and to mix it with compressed air.
9) The use of unfired magnesite-chromite bricks in open hearth roofs. Unfired magnesite-chromite roofs in 100 and 185 ton furnaces were tried. The number of furnace repairs increased from 1.74 to 2.66 per year. Despite the lower cost of unfired bricks, their use in roofs of a length higher than 6 m is not advantageous.
10) Automation of the operation of the intermediate draught valve. Reverses on 185 and 370 ton open hearth furnaces are carried out according to "meeting gas" which leads to a sharp increase in the pressure in the

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working space of the furnace in the moment of reverse. In order to decrease the pressure, an automatic opening of the intermediate valve in the moment of passing of gas from both ports and its lowering after the reverse was introduced.

SOV/133-59-6-19/41

AUTHOR: Keys, N.V.

TITLE: At the Chelyabinsk Metallurgical Works (Na Chelyabinskom metallurgicheskom zavode)

PERIODICAL: Stal', 1959, Nr 6, p 531 (USSR)

ABSTRACT: 1. An improvement in the microstructure of ingots of 18KhNVA steel.
In order to counteract the appearance of intercrystalline cracks in the axial part of the ingots of 18KhNVA steel, "oxygen boiling" was introduced for the maximum removal of gases from the liquid metal during the electro-smelting of the steel. In the last moment of the oxidation period the bath is energetically blown with oxygen and refining is started without the removal of slag. The content of hydrogen decreased from 5.25 - 7.76 to 3.57 - 4.33 $cm^3/100$ g and a satisfactory macrostructure of rolled products of a cross section of 160 x 160 mm was obtained.
2. Vacuum treatment of liquid metal in the ladle.
In order to study the influence of vacuum treatment of transformer steel on its electromagnetic properties, the metal was treated in the ladle for 10 to 15 minutes

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at a residual pressure of 30 - 40 mm Hg. The content of hydrogen decreased by 1 $cm^3/100$ g, of nitrogen by 20% and non-metallic inclusions from 0.0145 to 0.0112%; magnetic induction increased by 300 Gauss with a decrease in watt losses by 0.05 - 0.10 W/kg.

SOV/133-59-6-26/41

AUTHOR: Keys, N.V.

TITLE: At the Chelyabinsk Metallurgical Works (Na Chelyabinskom metallurgicheskom zavode)

PERIODICAL: Stal', 1959, Nr 6, p 551 (USSR)

ABSTRACT: Flame dressing of blooms from rolling heating. Flame dressing of blooms at a temperature 300 - 400°C (the heat after rolling) was successfully introduced into normal practice. Previously flame dressing of blooms of steels ShKh15, U10-U13, 5582 etc, which have a tendency to the formation of cracks, was done at 150-300° after thermal treatment usually applied for the prevention of flake formation.

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SOV/133-59-9-13/31

AUTHORS: Keys, N.V., Ayzenshtok, I.Ya., Komissarov, A.I. and Royak, D.B., engineers

TITLE: The Production of Steel 38KhMYuA for Internal Combustion Engines

PERIODICAL: Stal', 1959, Nr 9, pp 808-811 (USSR)

ABSTRACT: Changes in the technology of smelting 38KhMYuA steel since the start of its production in 1952, are outlined. The main points in the smelting technology used at present: a) a preliminary deoxidation of the bath with pig iron after the end of the oxidising period; at the beginning of refining, the bath is deoxidised with a mixture of silicomanganese and 75% ferrosilicon in lumps; b) addition of ferrochromium at the beginning of refining; c) diffusion deoxidation with coke and ferrosilicon during 20 minutes; d) shortening of the reducing period to 80 minutes (instead of 120 to 150 minutes in the previous technology) metal temperature before casting 1600 to 1620°C in the ladle 1575 to 1590°C. Despite improvements in the smelting technology, the proportion of defective metal is still high (in 1957 - 145%). Due to the appearance of spot segregation, head crops were

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The Production of Steel 38KhMYuA for Internal Combustion Engines

increased to 25%. Most common defects encountered in this type of steel are described: 1) Spot segregation consisting of localised enrichment of metal in carbon, sulphur and phosphorus; the appearance of the defect is associated with the evolution of gas during crystallization. 2) "Bubbles" - in the axial zone of macrotemplets discontinuities in the metal called "coarse bubbles" (Fig 1). A fracture along the zone of the "bubbles" appears as lamination in the form of dark thread. No changes in structure in the zone of the defect was noticed, non-metallic inclusions are absent. Studies of longitudinal cross sections of ingots (Fig 2) indicated that the defect is associated with insufficient feeding of the ingot during its solidification. 3) Cracks - usually situated in the central part of macrotemplets (Fig 3). The defect was found to be caused by too early transportation of ingot bogies after teeming (40 minutes) by retaining the bogies in the casting pit for 2 hours 20 minutes this type of defect disappeared. An investigation of the defects in the finished parts - blisters (Fig 5, 6 and 7) indicated that some improvements

The Production of Steel 38KhMYuA for Internal Combustion Engines

in the forging of semis and stamping of parts are necessary as at present, the central part of the ingot is pushed towards the internal working surface of the stamped parts. The necessity of establishing well founded standards for defects which at present are considered as unavoidable is stressed. There are 7 figures and 6 Soviet references.

ASSOCIATION: Chelyabinskiy metallurgicheskiy zavod
(Chelyabinsk Metallurgical Works)

KEYS, N.V.; VAYNSHTEYN, O.Ya.; KHRYUKINA, V.A.

Making axle steel in high-capacity open-hearth furnaces.
Metallurg 5 no.8:16-18 Ag '60. (MIRA 13:7)

1. Chelyabinskiy metallurgicheskiy zavod.
(Open-hearth furnaces) (Steel—Metallurgy)

S/130/60/000/006/007/011

AUTHORS: Gnuchev, S. M., Zhukov, D. G., Keye, N. V., Klochkova, Z. V., Danilov, P. M., Konovalov, K. N.

TITLE: On the Problem of Transformer Steel Melting

PERIODICAL: Metallurg, 1960, No. 6, pp. 18-22

TEXT: Information is given on peculiarities in the technology of transformer steel melting at the "Dneprospetsstal'" Plant, the Kuznetskiy metallurgicheskiy kombinat (Kuznetsk Metallurgical Combine) and the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant). A special feature adapted by the Dneprospetsstal' plant is that a relatively high content of C and S is obtained in the molten charge (0.30-0.40 C and 0.030-0.035% S). The carbon is oxidized by the ore and then by gaseous oxygen. The reduction time depends on the sulfur obtained in the finished metal (not over 0.005%). After teeming the metal is subjected to vacuum treatment in the ladle. At the Kuznetsk plant the melting process is conducted in a highly organized manner. The necessary amount of ore and lime is added to the charge so that the oxidizing and the melting stage are combined. After repeated slag formation the pool is subjected to oxygen blast; during the blast the carbon content is reduced to

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On the Problem of Transformer Steel Melting S/130/60/000/006/007/011

0.02-0.03%. Until 1960, oxidizing at the Chelyabinsk Metallurgical Plant was brought about with iron ore and subsequent elimination of carbon by blowing the pool with oxygen. Presently, the oxidation and the melting stage have been combined; simultaneously with the charge 2.5 t iron ore and 1.0 t lime are introduced. It was stated that the amount of rejects was relatively low at all the plants. The dependence of surface defects in slabs on the metal temperature in the ladle is given and shows that the minimum percentage of rejects is obtained at a temperature of 1570-1590°C. The content of impurities in metals produced by the enumerated plants is represented by graphs. The metal produced at the Chelyabinsk plant contained the highest amounts of carbon, sulfur, manganese and nickel. The metal from Dneprospetsstal' contained the lowest amounts of carbon, sulfur and chromium (to 0.005%). The metal from the Kuznetsk Combine contained more carbon and about 40% of the melts contained 0.006-0.008% S. Thousandths of a per cent of Ti were revealed in all the metals. Data on the output of high-grade rolled sheets made of metal which was produced by the aforementioned plants do not indicate the advantages of one or the other technology, since an effect of the used technology on the output was not established. There are 2 sets of graphs and 3 tables.

ASSOCIATIONS: TsNIIChM, Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant) Kuznetskiy metallurgicheskiy kombinat (Kuznetsk Metallurgical Combine)

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The Use of Silicochrome When Smelting Steel in Open Hearth Furnaces

Cr	49 - 56	29 - 39
Si	15 - 19	40 - 54
C	2.75 - 4.50	0.12 - 0.20

When using 12 - 20 type silicochrome 7 - 20 kg/t were added, whereas of the 40 - 50 type silicochrome about 4.5 kg/t (in the ChMZ) and about 2.3 kg/t (in the ZMZ) and for 30 - 35 KhGSA 6.5 kg/t were added. When applying silicochrome, steels of the required composition could be produced without any difficulty and the duration of the preliminary deoxidation could be reduced by 5 - 9 min in both plants, (i.e., by 0.3 - 1.5% of the melting time). The amount of chrome, manganese and silicon scale is practically the same as for the conventional method (in Zlatoustovsk: Cr 18%, Mn 20%, Si 32%, in Chelyabinsk: Cr 19%, Mn 25%, Si 38%). The lower amount of chrome scale in the ZMZ can be explained by the higher residual chrome content of the metal before deoxidation: 0.13 - 0.31% as compared to the values obtained in the ChMZ : 0.06 - 0.13%. In order to obtain an optimum economical effect, when melting medium-carbon chrome steel, the amount of 20 type silicochrome should be 11 - 13 kg/t in the ChMZ and 8.5 - 9.5 kg/t in the ZMZ and the silicon used in conventional melting be replaced by blast-furnace ferrosilicon. When

KEYS, N.V.; KOMISSAROV, A.I.

Studying conditions for the acceleration of the sintering process and preparing a high-basicity fluxed sinter.
Stal' 20 no.8:698 Ag '60. (MIRA 13:7)
(Sintering)

KEYS, N.V.; KOMISSAROV, A.I.

Laboratory research at the Chelyabinsk Metallurgical Plant.
Stal' 20 no.8:715 Ag '60. (MIRA 13:7)
(Open-hearth process)

S/133/60/000/008/005/013

AUTHORS: Keys, N. V. and Komissarov, A. I.

TITLE: News in Brief

PERIODICAL: Stal', 1960, No. 8, p. 721

TEXT: 1. In the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant) tests were carried out in order to improve the electromagnetic properties of transformer steel. Mainly the oxidizing period of melting, the temperature conditions and various deoxidizing agents for removing the non-metallic inclusions from the metal were examined. The blowing of oxygen into the metal was started when the carbon content in the bath was 0.20-0.25% and ended when the maximum carbon content was 0.03-0.035%. Optimum metal temperature in the ladle was 1,570°-1,590°C. During pouring, wooden frames were placed into the ingot molds. The electromagnetic properties of the sheets of 0.5 mm in thickness were improved by 30-35% in the Novosibirskiy metallurgicheskiy zavod (Novosibirsk Metallurgical Plant) compared to the 1958 products and by 52-63% in the MMK. The quantity of waste matter, due to surface defects, decreased from 3.2% to 1.4%. In order to remove the non-metallic inclusions

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S/133/60/000/008/005/013

News in Brief

from the metal completely, in seven meltings magnesium silicate (25% Mg, 58% Si, 1.38% Al and 16.9% Fe) and in one melting ferrocerium (50% Ce and 35% La) were added. For 0.5 mm sheets, rolled from the test ingots, no change in the electromagnetic properties was observed. 2. Tests were carried out in order to improve the quality of 18ХНВА (18KhNVA) grade steel by boiling with oxygen without removing subsequently the slag and by refining under this slag layer. The metal was poured into molds for 1.115 and 2.65 t and then the steel was rolled into squares of 160 and 175-200 mm. The macrostructure and the longitudinal quench crack of the specimens were satisfactory. It was found that hydrogen considerably affects the formation of intercrystallite cracks and their shape. The new technology made it possible to reduce the hydrogen content of the finished metal to 0.90-1.58 $cm^3/100$ g. The total amount of waste products from the test metal was 2% against 5.3% for the conventional type. 3. Tests were carried out in order to improve the technology of melting and the surface of the 1Х18Н9Т (1Kh18N9T) type stainless steel ingots. By a more intensive deoxidation of the low-carbon steels and by adding more chrome silicate it was possible to decrease the ferrochrome consumption from 140 to 124 kg/t. As a result of the lubrication applied earlier to ingot molds when smelting steel with

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S/133/60/000/008/010/013

AUTHORS: Keys, N. V. and Komissarov, A. I.

TITLE: News in Brief

PERIODICAL: Stal', 1960, No. 8, p. 740

TEXT: At the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant) the output of rolled products from the 1Kh18N9T (1Kh18N9T) type stainless steel was raised considerably, and consequently the demands made on the 800 and 1100 type adjusting machines also increased. In order to raise the capacity of the adjusting process, two equipments for flame scarfing the stainless steel were installed. An aluminum-magnesium powder is applied in this process. It was found that it is economical to use flame scarfing only for metals with rough surface defects.

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S/133/60/000/008/012/013

AUTHORS: Keys, N. V. and Komissarov, A. I.

TITLE: News in Brief

PERIODICAL: Stal', 1960, No. 8, p. 757

TEXT: 1. The new melting technology applied at the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant) in order to improve the quality of ball-bearing steel differs from the conventional method in several aspects: the boiling period is made more intensive, pig iron is added at the end of the oxidation phase, the metal temperature is reduced during melting and pouring (1,530°-1,550°C); the steel and slag are tapped through an opening of 250-300 mm. This new method decreases the quantity of non-metallic inclusions, oxides, etc. in the metal (the amount of specimens with inadmissible contents of oxides decreased from 14.9-16.0% to 7.7-6.0% and the amount of globular enclosures from 5.7-7.5% to 0.55-2%). 2. The causes of the low notch toughness of the 30KhGSNA (30ХГСНА) type steel were investigated. The conditions of the heat treatment for this type of steel are prescribed by a standard for an average chemical composition of the metal with 0.27-0.32% C and maximum content

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S/133/61/000/001/005/016
A054/A033

AUTHORS: Keys, N.V.; Zhukov, D.G.; Malinovskaya, T.I.; Vikharev, A.M.

TITLE: Using Wooden Frames in Electric Steel Pouring

PERIODICAL: Stal', 1961, No. 1, pp. 38 - 39

TEXT: At the end of 1957, the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant), in cooperation with the TsNIIChM introduced a new technology for producing ШХ15 (ShKh15) grade ball bearing steel, applying lower temperatures for the liquid metal (before pouring 1,530 - 1,550°C instead of 1,560 - 1,590°C). This improved the quality of the metal as regards non-metallic inclusions. Pouring was carried out with skin-formation at the metal surface when the lower third of the ingot mold was filled. However, the new method increased the surface defects of the new metal producing distortions on the ingot, flaking and cracking in the rolled product. The rate of rejects due to surface defects in the metal poured at 1,530 - 1,550°C was 1.47% as compared to 0.21% of the conventional metal. When the causes of these surface defects were investigated it was found that the distortions occurred mainly in that part of the ingot which corresponded to the reduction of the metal flow speed during pouring for the pur-

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Using Wooden Frames in Electric Steel Pouring

pose of skin formation. To eliminate these surface defects it was decided to put wooden frames in the ingot molds and to fill the lower part of the ingot mold rapidly, then slowing down the pouring speed and increasing it again when filling the upper third of the ingot mold. The use of wooden frames reduced the percentage of rejects due to surface defects to 0.08% as compared to 1.47% in metal poured without wooden frames. The new method has been applied also for transformer steel and it was possible to reduce the percentage of surface defects in this steel from 2.5 to 0.5% using wooden frames in the ingot molds.

ASSOCIATION: Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant)

S/133/61/000/001/002/016
A054/A033

AUTHORS: Kolosov, M.I., Candidate of Technical Sciences; Stroganov, A.I., Candidate of Technical Sciences; Vaynshteyn, O.Ya., Engineer; Keys, N.V., Engineer; Khryukina, V.A., Engineer

TITLE: Crystallization and Quality Improvement of 18-30XГТ (18-30KhGT) Grade Steel

PERIODICAL: Stal', 21 1961, No. 1, pp. 25 - 28

TEXT: In the 18KhGT grade steel defects in the form of blisters and twists were found, mainly in the top part of the ingot, resulting in 7% rejects. The defects in the ingot body were most probably due to pouring in such a way that in the ingot mold top a skin was formed at the walls. When 5-ton ingots were cast the defects decreased due to the shorter pouring time resulting in a smaller temperature difference between the beginning and the end of the casting process. An efficient measure to prevent these defects was topping the ingots at 19% of their height instead of 17%. Another type of defect is the "tongue" observed on the face of the ingot when cutting the hot metal. In the 5-ton and 6.2-ton ingots this type of defect increased to 25%. When investigating these "tongues" on

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Crystallization and Quality Improvement of 18-30ХГТ (18-30KhGT) Grade Steel

etched longitudinal and lateral macrosections and on the longitudinal hardened fracture, it was found that they were actually laminations of the central zone of the ingot. Macrostructural tests revealed at the place of laminations an accumulation of non-metallic impurities, extending along the axis of lamination. Moreover, investigations of the longitudinal hardened fracture showed that this lamination is an internal defect of the metal connected with the crystallization of the ingot. Therefore, tests were made to determine the character of crystallization and the structure of 18-30KhGT grade steel ingots. The crystallization process was studied in 6.2-ton ingots by the tilting method, radiometry and temperature tests. In the radiometric method (Ref. 1, M.I. Kolosov, A.N. Morozov, et al.: "Rate and Sequence of the Crystallization of Killed Steel Ingots". In the collection: "The Application of Radioactive Isotopes in Ferrous Metallurgy", Chelyabinsk, 1957), the Fe^{59} radioactive isotope was applied. The metal temperature during crystallization was recorded at distances 665, 1,125 and 1,425 mm from the riser, with platino-rhodium-platinum thermocouples, protected by double-wall quartz tubes between which graphite rings were fitted at each level. During crystallization a double-phase zone formed along the axis of the ingot. The considerable toughness of the 18-30KhGT steels makes the feeding of the central part