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

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

of the ingot difficult, causing the origination of a porous zone. As the location of this central porous zone coincides with the lamination in the rolled product it can be assumed that lamination is caused by the porosity of the metal. In the places of lamination considerable amounts of non-metallic impurities were found impeding the scalding of the lamination even at greater reductions. Based on the tests two methods were found to prevent lamination: 1) reducing the porosity of the central part of the ingot and 2) reducing the quantity of non-metallic impurities. 1) In order to reduce the central porosity, the process of feeding the central area of the ingot had to be improved. Measures were taken to increase the time during which the metal is liquid in the hood of the riser. It was found, however, that neither the application of "lunkerite" with an aluminum content of 28% instead of 14%, added in quantities of 3 - 4 kg/ton instead of 1.5 - 2 kg/ton, nor the use of lunkerite containing 35 - 50 % magnesium powder (1.5 - 2.0 kg/ton) yielded a considerable improvement of the macrostructure. Thus it was not possible to improve the feeding of the ingot with liquid metal by increased heating of the top. Better results were obtained in this respect when the riser hood was insulated by asbestos sheets (10mm thick) between its casing and lining and by winding

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

asbestos cores, 22 mm thick, or asbestos sheets around the ingot molds, at a distance of 500 mm from the top, fixed with sheet iron. The riser hoods were also mounted on asbestos disks. The longitudinal templates taken from ingots melted in insulated ingot molds showed a satisfactory density and the axial porosity found in conventional ingots was absent. The products rolled from ingots produced with the insulation method (140 x 140 mm section) were also free from lamination. 2) The second method to prevent lamination, i.e., the reduction of non-metallic impurities was tested with 3 kinds of deoxidizing agents: a) Silicomanganese in the furnace and 45% solution of ferro-silicium in the ladle (conventional method); b) 15 - 17 kg/ton AMS alloy in the furnace and 45% solution of ferrosilicium in the ladle; c) manganese silicate in the furnace and calcium-silicon in the ladle. The best results were obtained with method b) (3.05% rejects due to lamination and 0.06% rejects due to macrostructure, while the corresponding figures for method a) are 5.05% and 0.5% and for method c) 17.0%) (see table). To improve the steel quality, further tests were carried out in 1958 - 1959 to study preliminary oxidation with silicochromium, instead of AMS, the use of titanium-containing scrap instead of ferro-titanium for alloying and the optimum metal temperature prior to deoxidation, ensuring a satisfactory macrostructure and metal surface. By employing titanium-containing scrap the temperature drop in the ladle decreased

and the toughness of steel was reduced. Rejects due to surface defects were 0.13% instead of 0.24% in the conventional melts. There are 2 figures, 1 table and 1 Soviet reference.

ASSOCIATIONS: Nauchno-issledovatel'skiy institut metallurgii, Chelyabinskiy metallurgicheskiy zavod (Scientific Research Institute of Metallurgy, Chelyabinsk Metallurgical Plant)

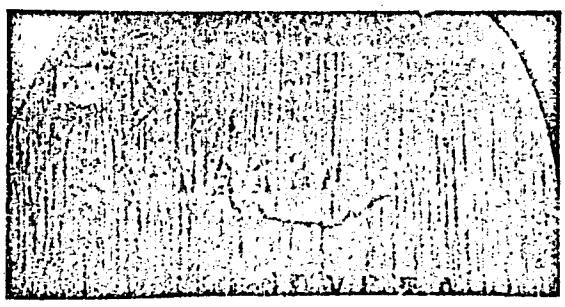

Figure 1: "Tongue" defect in 18KhGT steel ingot

KOLOSOV, M.I., kand.tekhn.nauk; STROGANOV, A.I., kand.tekhn.nauk; KEYS, N.V., inzh.; BOGATENKOV, V.F., kand.tekhn.nauk; VAYNSHTEYN, O.Ya., inzh.; DANILOV, A.M., inzh.; ZVEREV, B.F., inzh.; ANTROPOVA, N.G., inzh.; KHRYUKINA, V.A., inzh.

Use of silicon-chromium in open-hearth smelting of steel. Stal' 20 no.7:607-608 Jl '61. (MIRA 14:5)

1. Chelyabinskiy nauchno-issledovatel'skiy institut metallurgii; Chelyabinskiy i Zlatoustovskiy metallurgicheskiye zavody.
(Steel—Metallurgy) (Silicon-chromium alloys)

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

Research being carried out by the Chelyabinsk Metallurgical Plant. Stal' 21 no.8:706,702-703,707,745 Ag '61. (MIRA 14:9)
(Chelyabinsk--Metallurgical plants)

34979
S/133/62/000/003/004/008
A054/A127

18.7520

AUTHORS: Gol'dshteyn, Ya. Ye., Candidate of Technical Sciences, Zel'dovich, V. I., Keys, N. V., Kossovskiy, L. D., Vaynshteyn, O. Ya., Shmatko, K. S., Engineers

TITLE: The effect of treating liquid chrome-nickel steel with cerium on its crystallization

PERIODICAL: Stal', no. 3, 1962, 258 - 261

TEXT: Tests were carried out to study the effect of adding ferrocerium to chrome-nickel structural steel on the flake formation and crystallization. The tests were based on the chemical affinity of cerium to hydrogen, which increases when the temperature is raised. As rare-earth metals mostly tend to adsorb hydrogen in the 200 - 600°C range, where the hydrogen separation from the metal is particularly intensive, this phenomenon can be used to reduce flaking. Four 40 Kh (40KhN) steel ingots of the same melt were tested: one, checking specimen, without ferrocerium, the others containing 0.1, 0.25 and 0.6% ferrocerium, respectively. Lumps of ferrocerium, containing 94% rare-earth metal (primarily cerium) were used. The ingots were top-cast and weighed 2.65 ton. Lateral macrotemplates,

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The effect of treating...

cut from blooms rolled from the test ingots, (air-dried after rolling, non-annealed) were analyzed after 1 and 6 months. Flakes were not found in templates from steel to which at least 0.6% ferrocerium was added. The analysis also showed that the effect of cerium (lanthanum, etc.) actually does not manifest itself in the adsorption of hydrogen, but rather in bonding it in the form of stable hydrides. In steel, containing as much as 3.7 cm^3 hydrogen/100 g, there was no flaking, due to the addition of 0.6% ferrocerium, while flakes were found in steel containing not more than 0.56 cm^3/100 g hydrogen, if not treated with cerium. When ferrocerium is added to the liquid steel in amounts above 0.25%, the pattern of dendritic crystallization changes and sulfur will be re-distributed in the microareas of the metal. High-smelting cerium-sulfides pass from the interaxial areas into the dendritic axes. When ferrocerium is added in amounts of up to 0.6%, dendritic crystallization disappears, and, under the effect of cerium, the steel is cleaned from sulfur, antimony, stannum, bismuth, lead, etc. 0.6% ferrocerium reduces the sulfur-content of the metal 5 times. However, when ferrocerium is added in the ingot mold, the cerium-sulfides (oxy-sulfides) cannot entirely be removed into the slag and the feeding head. This results in a nonhomogeneity of the boundary zone. The high-temperature cerium-sulfides (oxy-sulfides of intricate composition) are forming already in the period prior to crystallization

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S/133/62/000/006/004/0
A054/A127

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

TITLE: At the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant)

PERIODICAL: Stal', no. 6, 1962, 525

TEXT: 1) The corrosion resistance of the 1X18H9T (1Kh18N9T) grade steel containing 0.09 - 0.11% carbon increases if its titanium content exceeds the fivefold amount of carbon by more than 0.02%. The tendency towards intergranular corrosion also depends on the degree of reduction of the metal and slag during refining. This is indicated by the increased silicon content in the refining process of heats with high corrosion resistance. At a Ti : C = 5 ratio they pass the corrosion test and have an average silicon content of 0.41% as compared to heats which have to be re-tested and whose silicon content is not more than 0.29%. The use of titanium increases upon applying on the bath surface a meniscus of easily smelting fluorite slag prior to adding ferrotitanium. The accumulation of titanium nitrides and titanium oxides in the ingot top can be reduced by increas-

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ing the section of the lower riser dozzle opening. 2) When carbon, transformer, ball bearing and structural steels are smelted in the new electric furnaces, 4 - 7% ferrous ores and 3 - 5% lime are added to the charge, to accelerate the oxidation of phosphorus, chromium and manganese. Upon charging up to 50% liquid pigiron in the smelting of ball bearing steel, the quality of the steel was equivalent to that smelted in smaller furnaces. 3) To reduce the metal scrap requirement of new, large-size electric furnaces operated on solid charge, tests were made with liquid pig iron. For smelting У7А (U7A), У13А (U13A), У8ГА (U8GA), ШХ15 (ShKh15) and 45 grade steels, the best results were obtained by adding 40 - 43% liquid pig iron. Addition of more than this amount increased the smelting time. The carbon content was reduced during smelting most intensively if the quantity of ore added was not more than 300 - 320 kg/ton liquid pig iron. The smelting time was the shortest and the electric power consumption the lowest if the charge was heated prior to pouring pig iron for 50 - 60 minutes at about 12,000 - 14,000 kw-hour. To heat the metal during smelting at least 28,000 - 29,000 kw-hour is required at the highest voltage. The use of liquid pig iron reduced smelting time by 8 - 10%, electric power consumption by 18 - 20%; the liquid steel output increased by 2% owing to the reduction of iron from the ore. The use of liquid

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pig iron does not impair the quality of the steel. However, no saving can be realised, owing to the higher price of liquid pig iron as compared to that of scrap. 4) Tests were carried out to reduce the riser part of 500-kg ingots (with 5.7-% conicity to one side, an H/D ratio of 3.7 and an ingot-body volume of 57.85 cm) of ЭИ435 (EI435), Х15Н60 (Kh15N60), Х20Н80 (Kh20N80), Х13Ю4 (Kh13Yu4), Р18 (R18), Р9 (R9), 3Х2В8 (3Kh2V8), 1Х18Н9Т (1Kh18N9T) steel grades. With a (liquid) riser volume of 17.4% and a dozzle with a 355-mm opening no shrinkage cavities were observed in the 54 ingot bodies tested. 5) The technology of smelting 20Х15Н3МА (20Kh15N3MA) [ДИ-1 (DI-1)] steel grade in small electric furnaces was established. The steel contained (in %): 0.15 - 0.2! C, ≤ 0.60 Mn, ≤ 0.60 Si, ≤ 0.030 S, ≤ 0.035 P, 14.5 - 16.5 Cr, 2.5 - 3.0 Ni, 0.30 - 0.50 Mo, ≤ 0.40 W. The amount of non-metallic inclusions and rejects during production and utilization can be reduced considerably if the charge contains 5 - 9% chromium and if the metal temperature at the beginning of refining is 1,590 - 1,620°C, before tapping: 1,580 - 1,610°C and in the ladle: 1,570 - 1,590°C. Refining under white slag should take 1 - 1 1/2 hours.

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S/133/62/000/006/015/015
A054/A127

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

TITLE: At the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant)

PERIODICAL: Stal', no. 6, 1962, 572

TEXT: 1) The overall automation of the heating control in open-hearth furnaces has been developed in co-operation with the Chelyabinskiy nauchno-issledovatel'skiy institut metallurgii (Chelyabinsk Scientific Research Institute of Metallurgy). Combustion is controlled by the parameter of excess air in the outlets by means of alpha-indicator type pickups. The automatic heat control increased the furnace output by 5.2%, mainly by shortening the smelting process, and reduced the fuel consumption by 10.7%. 2) It is necessary to do only one intervening repair in the no. 1 open-hearth workshop, by increasing the volume of the slag chamber, removing slag from it completely after repair, removing slag partly and levelling it out with bulldozers during the furnace run, etc.). 3) The quantities of oxygen required for open-hearth furnaces, depending on the

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furnace volume and during the various phases of the smelting process have been determined (in m^3/hour):

	Small	Medium	Large
	f u r n a c e		
Charging	700	1,200	1,500
Beginning of heating	700	1,200	1,500
Pouring of pig iron and smelting	1,200	1,800	2,500
Finishing	-	1,000	1,200

The heating conditions of open-hearth furnaces are improved if the oxygen is fed mainly in the lower part of the torch. For this purpose the angle of inclination of oxygen tuyeres should be increased from 8° to 14 - 15°, their height above the caisson bottom should be reduced from 300 to 150 - 180 mm and the intersection angle of the tuyeres increased from 8° to 12°, while their rear part is extended. It is expedient to feed oxygen and air simultaneously. 4) Pericalse-spinel bricks used for lining open-hearth furnace crowns wear by 10 - 18% less than magnesite-chromite bricks, but heat losses with the former type are about 8 - 10% higher. 5) New refractory materials were tested. Dense magnesite bricks in the checkerwork of medium-capacity open-hearth furnaces proved satisfactory for 221

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smeltings. The high heat conductivity of these bricks improved the heating conditions of the furnace and decreased specific fuel consumption. The best material for checkerwork lining was found to be calcined periclase-forsterite brick, produced under elevated pressure. 6) The "Magnezit" Plant produced a test-batch of non-calcined periclase-spinel bricks, fixed in metal frames and reinforced inside. The test bricks were used for a medium-capacity open-hearth furnace crown and lasted for 311 smeltings. The rapid wear of the test bricks right at the beginning of the furnace run is caused by the 1.5-mm thick reinforcement plates, which oxidize and smelt and reduce the refractory properties of the adjoining zones of the brick.

S/133/62/000/007/004/014
A054/A127

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

TITLE: At the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant)

PERIODICAL: Stal', no. 7, 1962, 618 - 619

TEXT: 1) In 1961, the standstills during repair of the bottom of large-capacity furnaces were reduced from 4.3 to 2.94% and those of small furnaces from 4.27 to 2.62%, as compared with the preceding year. This was the result of using mainly small-grained magnesite powder and improved methods of lining and slag removal. Tests were carried out with magnesite-chromite concrete for the furnace bottom. This concrete contains 47 - 52% magnesium, instead of 80 - 85% as in the standard material and 80 - 85% of the 2-0 mm fraction. The concrete layer was coated with magnesite powder. The use of concrete cut the time of bottom repairs by 1 - 1 ½ h, reduced standstills to 2.5% and the consumption of magnesite powder by 3 - 3.5 kg/ton steel. 2) In cooperation with the Chelyabinskiy nauchno-issledovatel'skiy institut metallurgii (Chelyabinsk Scientific Re-

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search Institute of Metallurgy) tests were carried out to blow oxygen in large-capacity open-hearth furnaces through two tuyeres in the crown, at a rate of 1,200 m3/h. The head of the tuyeres was kept at a 150 - 300 mm distance from the bath level. Oxygen consumption of the torch decreased to 1,000 - 1,200 m^3/h from 2,500 m^3/h. Feeding oxygen at a rate of 5.8 - 7.4 m^3/ton and an intensity of 1,100 - 1,200 m^3/h reduced the casting time by 45 - 59 min. The specific fuel consumption decreased by 4.7 - 9.2%, the total specific oxygen consumption by 1.2 - 4.5 m^3/ton, the average hourly yield of the furnace increased by 6.2 - 9.0%. The new method does not affect the service life of the furnace. 3) The macrostructure of 1 ХНТ (1KhNT) steel, from which the steering wheel spokes of cars are made, can be improved by using АМС (AMS) alloy for reduction. The waste decreases by a factor of 3 as compared to the steel reduced by silico-chrome. The metal temperature prior to reduction should be 1,610 - 1,625°C. The pouring rate must ensure lifting of the metal level with uniform skin from 1/3 of the ingot mold height. 4) Pouring rimming steel in 7.3-ton ingots (instead of 5.7 ton) on six-position ingot mold stools through a ladle spout 50 mm in diameter, reduced the casting time by 20 - 30 min. The prescribed pouring rate (220 - 280 mm/min) was not affected. 5) In open-hearth furnaces working by

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the scrap-ore method, 45 - 70% ore was replaced by an agglomerate with a basicity of 0.75 - 1.14 and containing 48.7 - 58.3% Fe; 20 - 24.6% FeO; 54.3 - 59.0% Fe_2O_3; 0.055 - 0.085% S; 10.7 - 12.0% SiO_2; and 5.6 - 13.8% CaO. Due to its lower oxidizing capacity the consumption of the agglomerate exceeded that of the ore by 12%. During smelting the basicity of the agglomerate increased by 0.1 - 0.3. If all the ore is replaced by agglomerate (of a 0.8 - 1.0 basicity) the amount of limestone should be reduced by 1%. The P and S content of the cast iron remained unchanged, the P- content of the metal decreased during smelting by 0.007 - 0.016%, the smelting time was shortened by 4%. The new method does not affect the metal quality. 6) In the last 3 years the annual production of steel increased by 27.5, 22.4 and 12.8% in large, medium and small furnaces. The smelting time in medium and large furnaces increased due to the high silicon content of the pig iron, the considerable fluctuations in the silicon and sulfur content, the high slag residue. 7) In cooperation with the Chelyabinsk Scientific Research Institute of Metallurgy tests were made to produce semi-killed steel. The chemical capping was carried out by adding 45-% or 75-% ferrosilicon in amounts yielding a 120 - 300 g/ton silicon content in the steel for various intervals after the ingot mold was filled. Head-crop was 4 - 5%. Upon adding

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400 g/ton 75-% ferrosilicon, the steel corresponded to ГОСТ 380-60 (GOST 380--60). As,however, cavities were found in the macrostructure, the steel grade cannot replace those coming under GOST 1050-60. Mechanical capping was effected by pouring into bottle-shaped molds. The steel obtained was more homogeneous than rimming steel, only increased sulfur liquation was observed at a level corresponding to 18 - 25% from the top. 8) The effect of ferrous oxides in the slag before reduction on the quality of 12ХН3А (12KhN3A), 12Х2Н4А (12Kh2N4A) and 20Х2Н4А (20Kh2N4A) grades was studied in cooperation with the Chelyabinskiy politekhnicheskiy institut (Chelyabinsk Polytechnic Institute). A ferrous oxide content of 12 - 18% did not affect the mechanical properties of steel, nor the oxygen content in the ladle, proving that oxidation of the metal by the slag during tapping is inconsiderable. An increased ferrous oxide content in the slag prior to reduction had some effect on the burning of silicon, manganese and chrome. To simplify the smelting process of the above-mentioned steels, the iron content in the slag prior to reduction can be increased from 12 to 14%. 9) In the 08КП (08kp) steel grade smelted in large furnaces the S-content increased considerably. To reduce it, the pig iron used should not contain more S than 0.04%; during charging about 10% ferromanganese should be added to promote

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desulfurization; the pig iron feeding ladles must be cleaned carefully from slag and caked mass, the capacity of the slag removing ladle should be increased to 16 m^3; for large furnaces double chutes should be used for slag removal. If the S-content of pig iron exceeds 0.04%, the 08kp grade should be smelted in medium-size furnaces.

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S/133/62/000/007/010/014
A054/A127

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

TITLE: At the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant)

PERIODICAL: Stal', no. 7, 1962, 636 - 637

TEXT: 1) ЭИ 437Б (EI437B) grade steel, (200 mm square section) was tested for its mechanical properties and heat resistance. The specimens used for this purpose were partly drawn and partly upset, but subjected to the same heat treatment. The microstructure of the upset specimens was uniform over the whole section and corresponded to an index of 2 - 3 in accordance with the table issued by the Zavod "Elektrostal'" ("Elektrostal'" Plant). The drawn specimens had a nonuniform macrostructure, with grains varying between indices 0.5 - 6 of the table mentioned. The strength limit, relative elongation and compression values were higher for the upset than for the drawn specimens. 2) Contrary to standard practice, 1-ton round section ingots of 20Х15Н3МА (20Kh15N3MA).[ДИ-1 (DI-1)] grade steel were placed into the pusher-type furnace when hot, next they were cooled and finished on grinding machines without having been tempered beforehand. No cracks were observed on

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these ingots, whereas surface defects occur on those which, according to the conventional technology, are first roughed before being placed into the pusher-type furnace and tempered prior to being processed on the grinding machine. The new method involving charging in hot condition cuts the technological cycle of the production by 8 days and increases the serviceable output by 5%. 3) To increase the productivity of the 1,100 blooming mill fewer passes are applied, the steel grades have been re-classified in four classes instead of three according to their deformation resistance and this permitted a decrease in the number of passes by two for soft grades; the main drive of the blooming mill was converted to ionic drive control. The new method, omitting two passes, increased the productivity by 9.8%, the current value (when passing in the second grocve), by 0.4 - 0.6 ka, the geometric mean current for various profiles by 3 - 10%. 4) 40Х (40Kh), 45Х (45Kh), 45Г2 (45G2), 20ХГТР (20KhGTR), 40ХГТР (40KhGTR), 30ХГСА (30KhGSA), 65Г (65G), and 0Х12Ф (0KhN2F) steel grades were flame-scarfed when cold. After 10 days' storage, cracks on the flame-scarfed surface were only found for the 20KhGTR and 40 KhGTR grades. Flame-scarfing at 300°C deteriorated the surface quality of products made of 55С2 (55S2) and ШХ 15 (ShKh15) steel. 5) A study was made of the accuracy of the rolled product (in 16 sizes) on the 300-1, 350 and 300-2 stands.

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On the two first stands the vertical diameter of the rolled section showed an increase at its end, while on the 300-2 stand this was the case for both ends. Rejects and second grade output for the three stands amounted to 2.4, 1.9 and 1.3% respectively. 6) 2Kh13-4Kh13 (2Kh13-4Kh13) 200 - 300 mm blooms were tempered at 700°C instead of being annealed at 800°C. The d_B hardness of the steel was 4.0 - 4.5 mm when applying the new method which eliminated hot cracks. Moreover, the servicing of the heating furnace became easier and the productivity was raised by 1.5%. 7) To increase the capacity of the 800-mm stand, the rolling of ingots weighing 1.4 ton (upper section: 420 x 420 mm, bottom section: 336 x 336 mm, height of the ingot body: 1210 mm, conicity 3.8%, riser volume: 19.5% of the ingot volume) was introduced. The quality of the metals tested was satisfactory with the exception of the Sh Kh 15 (ShKh15) grade. In the 1.4-ton ingots of this grade a higher axial porosity was observed than in the 1.115 ton ingots, therefore the conicity increased to 4.7%. By rolling larger ingots, the productivity was raised by 7%. 8) Tests were carried out to find the causes of coarse-grained structure formation in the 40KhN (40KhN), 40KhNMA (40KhNMA), 20KhN3A (20KhN3A) and 30KhGSA (30KhGSA) steel grades. Cracks due to this structure in hardened specimens of 40KhN and 40KhNMA grades are caused by cooling the blooms in air prior to heat treatment. The notch toughness of transverse specimens decreases by a factor of 2. The cracks

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in the 20KhN3A grade are caused by overheating the ingots before rolling. This can be rectified by subsequent normalization at 900°C. 9) A study was made of the effect of cerium-modification on macrostructure, microstructure, mechanical properties and ductility at the temperature of hot mechanical treatment, of the 18ХНВА (18KhNVA), 30ХГСА (30KhGSA), 12Х2Н4А (12Kh2N4A), Х17Н2 (Kh17N2) and 1Х18Н12М2Т (1Kh18N12M2T) steel grades. Cerium was added to the various grades in different ways. After cerium modification, the strength limit and elongation values increased for the 18KhNVA grade, whereas its notch toughness was reduced. The strength limit, yield point and notch toughness increased in the 30KhGSA grade and its relative compression decreased; in the 12Kh2N4A and Kh17N2 grades cerium caused a deterioration of the mechanical properties, whereas it ensured a dense macrostructure and good corrosion resistance in the 1Kh18N12M2T grade. 10) To eliminate blister formation in 500-kg ingots (with a 5.7% conicity) of Х15Н60 (Kh15N60) and Х20Н80 (Kh20N80) chrome-nickel steels (sometimes 25% of the ingots proved defective), the oxidized skin must penetrate into the riser, it was found. For this purpose the ingot diameter under the riser was increased from 335 to 355 mm, while its upper opening was reduced from 230 to 190 mm. In 83-mm rods produced by this method, no blisters were found. 11) The causes of low ductility of ЭИ 437 Б (EI437B) steel shown in transverse cracks at the begin-

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ning of forging were studied. As these cracks are absent immediately after casting, they are evidently caused by slow cooling from the forging temperature. The mechanical properties and long-term strength of low-ductility specimens conform to the prescriptions (σ_B = 90.8 ÷ 110.6 kg/mm^2, δ = 14 ÷ 24%, ψ = 16.7 ÷ 27.3%, a_k = 3.0 ÷ 6.5 kgm/cm^2, long-term strength 106 - 197 hours).

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KEYS, N.V.; GOLIKOV, Ye.S.; TULIN, N.A.; KOKAREV, N.I.; ZHUKOV, D.G.

"Manufacture of steel in electric furnaces" by A.D. Kramarov.
Stal' 22 no.1:42 Ja '62. (MIRA 14:12)

1. Chelyabinskiy metallurgicheskiy zavod i Ural'skiy institut chernykh metallov.
(Steel--Electrometallurgy)

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

Research carried out at the Chelyabinsk metallurgical plant.
Stal' 22 no.6:525,572 Je '62. (MIRA 16:7)

(Steel--Electrometallurgy)
(Open-hearth process)

GOL'DSHTEYN, Ya.Ye., kand.tekhn.nauk; ZEL'DOVICH, V.I., inzh.; KEYS, N.V., inzh.; KOSSOVSKIY, L.D., inzh.; VAINSHTEYN, O.Ya., inzh.; SHMATKO, K.S., inzh.

Effect of treating liquid chromium-nickel steel by cerium on the characteristics of its crystallization. Stal' 22 no.3:256-261 Mr '62. (MIRA 15:3)

1. Chelyabinskiy nauchno-issledovatel'skiy institut metallurgii i Chelyabinskiy metallurgicheskiy zavod.
(Chromium-nickel steel--Metallography) (Cerium)

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

Increasing the importance of plant laboratories by the introduction of scientific anc technological innovations. Zav.lab. 28 no.1:117-118 '62. (MIRA 15:2)

1. Nachal'nik TSentral'noy zavodskoy laboratorii Chelyabinskogo metallurgicheskogo zavoda (for Keys). 2. Zamestitel' nachal'nika TSentral'noy zavodskoy laboratorii Chelyabinskogo metallurgicheskogo zavoda (for Komissarov).
(Chelyabinsk--Metallurgical laboratories)

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

Research by the Chelyabinsk Metallurgical Plant. Stal' 22 no.7:604-605,618-619,636-637,651 Jl '62. (MIRA 15:7)
(Metallurgical research)

KEYS, N.V.; VAYNSHTEYN, O.Ya.; KHRYUKINA, V.A.; KAMKINA, L.A.; KORABLEV, Ye.I.

Use of nickel-bearing emery dust in open hearth furnaces.
Metallurg 7 no.2:20-21 F '62. (MIRA 15:3)

1. Chelyabinskiy metallurgicheskiy zavod.
(Open-hearth furnaces--Equipment and supplies)
(Metallurgical plants--By-products)

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

At the Chelyabinsk Metallurgical Plant. Stal' 22 no.10:916 O'62
(MIRA 15:10)

(Ingot molds)

S/130/63/000/001/001/008
A006/A101

AUTHORS: Galyan, V. S., Zhukov, D. G., Keys, N. V., Ushakov, S. T., Khayrutdinov, R. M., Shatalov, M. I.

TITLE: Improving the transformer steel melting techniques

PERIODICAL: Metallurg, no. 1, 1963, 13 - 14

TEXT: Previous transformer steel melting techniques were based on the combined oxidizing of carbon with iron ore and oxygen, and diffusion deoxidation of the metal with ferrosilicon admixture. The cold rolled steel produced by this technique showed unsatisfactory magnetic properties. During 1959 and 1960 some improvements were made at the KMK including the use of an increased amount of iron ore for oxidation of Cr, Mg and P; reduction of the carbon and manganese content; decreased oxidation of the metal during melting, more complete deoxidation of the steel during the reduction period. A more accurate correlation of iron-ore and admixtures in the metallic portion of the charge, increased slag amount, strict observation of temperature conditions during oxygen blast, and an increased amount of silico-calcium, were the improvements achieved. On the basis

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Improving the transformer steel melting techniques

of the new techniques transformer steel was melted in a high capacity electric furnace in 1961. To reduce metal oxidation at the beginning of the oxidation period, 10% cast iron was added to the charge; the optimum metal temperatures were established at the end of oxygen blast (1,590 - 1,620°C) and in the ladle (1,570 - 1,590°C). The content of ferric oxide in the slag decreased at the end of melting to 28 - 33% and at the end of the oxidation period to 38 - 41%. The carbon content after oxygen blast exceeded 0.03% in 80% of heats, and the manganese content was not below 0.05 - 0.06%. As a result the magnetic properties of 0.35 mm thick sheets were improved. There is 1 table.

Card 2/2

ALYM, L.A., inzh.; VAYNSHTEYN, O.Ya., inzh.; KEYS, N.V., inzh.; LUBENETS, I.A., inzh.; SMIRNOV, Yu.D., inzh.; FIRSOV, S.G., inzh.

Production of St. 5ps semikilled steel for concrete reinforcements. (MIRA 16:4)
Stal' 23 no.4:320-321 Ap '63.
(Steel, Structural--Metallurgy) (Concrete reinforcements)

S/133/63/000/004/003/011
A054/A126

AUTHORS: Zhukov, D. G., Keys, N. V., Malinovskaya, T. I., Golikov, Ye. S., Engineers

TITLE: Improving the melting technology of 18 XHBA (18KhNVA) steel

PERIODICAL: Stal', no. 4, 1963, 328 - 330

TEXT: The melting technology mostly used for the 18KhNVA grade does not ensure a dense macrostructure. Tests with a 30 - 40 min shorter reduction period did not improve the metal structure. According to the theory of Kholin the metal will contain less non-metallic inclusions if there is a greater amount of globular crystals in the central part of the ingot and the diverging forces towards the periphery will be distributed on a larger area, hereby preventing the intergranular cracking. Based on this theory, a new technology with two variants was tested, one of them ensuring complete oxidation and the other being carried out with the remelting of wastes. In the first variant the oxidizing slag was tapped and fresh slag (lime + fluor), amounting to 1.5% of the charge was added when the C-content of the metal reached 0.25 - 0.20%. Next the slag was melted

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Improving the melting technology of...

and mixed, the bath was blown through with oxygen (through a 1" or 3/4" pipe) until the C-content decreased to 0.09 - 0.11%. Then slag was tapped, ferrochrome and ferrotungsten were added and the slag (which must be kept in liquid condition) was mixed with 80 - 100 kg crushed coke. The reduction with coke lasted 25 minutes. The temperature of the metal prior to tapping the first slag was 1,600 - 1,620°C, after O_2-blowing: 1,640 - 1,660°C. In the second variant the charge was composed to attain 0.35 - 0.45% C during smelting. Slag was tapped at a C-content of 0.25 - 0.20%, fresh slag was added and oxygen was blown into the bath until a 0.09 - 0.10% C content was obtained. The metal temperature was 1,580 - 1,600°C prior to blowing while after it was 1,600 - 1,620°C. Otherwise the standard technology was maintained. The tests showed that blowing oxygen in the bath lowered the hydrogen concentration in the metal by 0.9 $cm^3/100$ g metal and it amounted to about 3.57 - 4.63 $cm^3/100$ g metal during the refining period and to 4.4 $cm^3/100$ g of the finished metal. Transcrystallization developed weakly and intercrystalline cracks did not form. Comparison of 40 test heats and 76 conventional ones showed that of the former 0.84% had to be rejected due to lamination, against 2.55% of the conventional heats, while the corresponding values for cracking were 0.64 and 2.20%, and for blisters 0.98 and 1.47% re-

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spectively. The mechanical properties are represented by the following values (numerators: test steel, denominators: conventional steel):

σ_B, kg/mm^2	σ_s, kg/mm^2	δ, %	ψ, %	a_k, kgm/cm^2	d_B, mm
130 / 125	121 / 115	13.6 / 14.0	61.8 / 60.8	42.2 / 14.1	3.15 / 3.10

The tests were carried out in co-operation with Novozhilov and Cherepannikova. There are 2 figures.

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S/133/63/000/004/004/011
A054/A126

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

TITLE: At the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant)

PERIODICAL: Stal', no. 4, 1963, 336 - 337

TEXT: 1. To improve ductility and corrosion resistance of the X18H10T (Kh18N10T) stainless steel, the metal temperature prior to blowing oxygen was raised to 1,600 - 1,620°C, titanium was added after feeding lime-containing slag. This made it possible to reduce the cindering of nickel after O_2-blowing and stabilize the degree of titanium adsorption. Still better results were expected of the use of a slag with a higher lime content. The first slag was tapped after the first reduction with silicon and coke (2 kg/ton), next fresh slag, containing 1% lime and 0.25% fluor (of the charge weight) was added. Reduction after O_2-blowing was carried out with a smaller amount of silicon and lumps of ferrosilicon and ferrochrome, calculating a 13 - 14% Cr content in the melt. The waste due to corrosion in the test heats was 8.5 and 3.6% (as against 13% in the

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At the Chelyabinskiy metallurgicheskiy zavod...

conventional ones), on account of a more thorough reduction of the metal prior to adding ferrotitanium. At a 0.1% C content the optimum amount of titanium should be 0.5 - 0.6%. The corrosion resistance of the X18H9T (Kh18N9T) and X17H13M2T (Kh17N13M2T) grades was improved by the addition of rare earth elements (0.06 - 0.12%), and the ductility of the metal, its casting properties and surface became also better. 2. Tests were carried out in co-operation with the Chelyabinskiy nauchno-issledovatel'skiy institute metallurgii (Chelyabinsk Scientific Research Institute of Metallurgy) to improve the 38XM0A (38KhMYuA) grade. The steel was melted in large electric furnaces either with a fresh charge or with the oxygen-remelting of alloy scrap. Prior to tapping the oxidizing slag, the bath was reduced by 5 kg/ton cast iron, and after deslagging by calcium silicate, ferrosilicon and aluminum (4,1 and 0.3 kg/ton respectively). The 2.65 ton ingots were cast with carbon tetrachloride. 2 - 3% lime in the charge reduced the sulphur content of the metal by 0.001% and the phosphor content by 0.003%. The pouring of the metal was prolonged to 140 - 170 sec at a metal temperature in the ladle of 1,575 - 1,580°C and to 160 - 190 sec at 1,585 - 1,590°C. As compared to 1961, the waste was reduced from 13.9 to 3.8% in the metallurgical plant and at the user's plant from 5,8 to 2.9%. 3. In co-opera-

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tion with the Chelyabinsk Scientific Research Institute of Metallurgy, tests were made to reduce the non-metallic inclusions in the 30 ХГСА (30KhGSA) grade. The best results were obtained with a rapid and intense oxidation at 1,620 - 1,640°C, with preliminary reduction by cast iron, manganese silicate, aluminum, coke (1 - 1.5 kg/ton during 15 minutes) and ferrosilicon powder (5 kg/ton) in three batches, mixing 1 kg/ton aluminum in the 2nd and 3rd batch. The test metal contained hardly any globules; the amount and the size of oxide inclusions was somewhat higher than usual, but still below the standard limit. 4. 2.65-ton ingots of the ШХ 15 (ShKh15), 38ХМЮА, (30KhGSA), 18 ХНВА (18KhNVA), etc. grades were cast in uniformly walled molds. Their durability decreased from 26 to 21 castings without, however, increasing the cast iron consumption (60 kg/ton). The macrostructure of the test steels was about the same as when using conventional molds, only the axial porosity was found to have slightly increased. 5. In co-operation with the Chelyabinsk Scientific Research Institute of Metallurgy, tests were made to melt electrosteel with cast iron previously refined in a converter. For this purpose a discarded 200-ton ladle was used, over which a smoke canopy was mounted. A water-cooling tuyere with a 45-mm outlet was set in the opening of the canopy. Oxygen consumption was 15 - 30 m^3/min., steam con-

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sumption 30 - 50 m^3/hour; blowing took 50 - 70 minutes. To protect the lining and to dilute slag, maximum amounts of 2.5% lime and 1% iron ore were added during melting. The content of various additives before (numerator) and after (denominator) oxygen blowing was:

C	Si	Mn	S	P
4.18 / 3.42	0.99 / 0.30	1.19 / 0.45	0.054 / 0.045	0.162 / 0.127

Previously refined cast iron amounting to 50% of the metal-charge weight was used for U7A - U12A (U7A-U12A) and ShKh15 grades. The smelting time was shortened by 39 minutes or 10%; electric power consumption decreased by 20%.

6. A technology was established for melting stainless steel in large-capacity arc furnaces. After several failures the cooling of the bath (by adding ferrochrome), the addition of alloying elements, the reoution of the slag were under control. The operating period at increased power was shortened. After blowing, silicomanganese was added to the slag. Metal cinder amounted to an average of 8.5% of the charge weight; the adsorption of chrome attained 82%. In dependence of the C-content and O_2-pressure, blowing lasted 50 - 80 minutes. The macro-

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structure of steel was satisfactory. The heats with a higher index for the alpha-phase had a chrome-nickel ratio between 1.78 and 1.95. 7. The technology for C608X20H10Г6 (Sb08Kh20N10G6) grade (with an increased ductility) has been established. The steel was melted in small arc furnaces with the remelting of stainless steel scrap, oxygen blowing in the bath and refining under white slag. The welding rods made from the steel at the Beloretskiy metallurgicheskiy kombinat (Beloretsk Metallurgical Plant) displayed low ductility, both during production and in use. Ductility was found to depend on the final metal temperature, the chrome content of the bath during blowing and the content of P, Cr, Ni and C in the steel. In the low-ductility heats the ladle temperature, the P and C content and the amount of the alpha-phase were too high, the Cr:Ni ratio was too low. The highest ductility was obtained when modifying with ferrocerium after the final reduction by aluminum (0.5 kg/ton). 8. The slags obtained in melting highly heat-resistant alloys and master alloys contain very little FeO, Cr_2O_3, SiO_2 reducing oxides and a relatively large amount of calcium oxides and calcium fluorite, therefore they can be used in slag forming prior to the addition of ferrotitanium in melting stainless steels, hereby increasing the titanium adsorption from 44.6 to 50.3%. This kind of slag contains 17 - 20% nickel re-

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At the Chelyabinskiy metallurgicheskiy zavod...

sidue after the melting of nickel alloys and saves nickel (4 kg/t), 18-% ferro-titanium (6.5 kg/t), Xp000 (Khr000) ferrochrome (0.6 kg/t), fluor (1.3 kg/t) and lime (10 kg/t) when used in melting Cr-Ni steels. 9. A new composition was established (in co-operation with the Vostochniyy nauchno-issledovatel'skiy institut ogneuporov/Eastern Scientific Research Institute of Refractory Materials) for induction furnace crucibles, ensuring a longer service life, containing fused magnesite with the following granulometric distribution: 4 - 2 mm: 25%, 2 - 1 mm: 35%, 1 - 0.09 mm: 20%, 0.09 - 0 mm: 20%. Crucibles of this material have a durability of 26 melts and a lower tendency to coking with other materials. The macrostructure of metals melted in such crucibles improved. 10. In co-operation with the Institut elektrosvarki im. Ye. O. Patona (Institute of Electrowelding imeni Ye. O. Paton) the technology for the ДИ-1 (DI-1) (20Х15Н3МА/20Kh15N3MA) grade was established, using electroslag remelting, in a 300-mm diameter crystallizer. For ingots of 600 - 630 kg the АНФ-6 (ANF-6) fluxing agent was used in an amount of 20 - 28 kg/ingot. The ingots had a smooth surface. The silicon content of the steel was reduced by 0.04 - 0.18%, that of sulphur from 8 - 6 to 6 - 4 . 10^{-3}%, the macrostructure of the metal was flawless; the values for strength and ductility were nearly identical in longitudinal and

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transverse specimens. The index for oxide inclusions decreased from 3 - 5 to 0.5 - 1, that of sulfides from 2.5 - 3.5 to 0.5. 11. Tests were made to study the annealing, decarburization and red-hot stability of the P18 (R18) grade. The test metal was annealed in a compartment furnace by heating to 860°C at a 100°/h rate, with holding for 0.5 h/ton, cooling to 700°C at a 30°/h rate, followed by air cooling. To shorten the time of increased temperatures, when decarburization takes place more intensely, the charge weight was limited to 10 t, but lateron increased to 20 t. The furnace output was raised from 0.48 to 0.65 t/h, the decarburized layer changed only slightly by 0.15 - 0.2 mm. Red-hot stability was tested on 90 - 100 mm diameter forged rods that were heated to 840 - 860°C, oil-hardened at 1,280°C, next annealed three times at 560°C with one-hour holding and then air-cooled. The hardness of the specimens was between 62 and 64 R_C. Subsequently they were again annealed at 620°C with a holding time of 4 h and then air-cooled.

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S/133/63/000/004/006/011
A054/A126

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

TITLE: At the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant)

PERIODICAL: Stal', no. 4, 1963, 353

TEXT: 1. To reduce the surface to be processed by grinding wheels, ingots were given a semi-circular shape and their weight was increased from 1,115 to 1,290 kg. The semi-spherical shape is machine-planed, the flat parts are finished with grinding wheels. The new, heavier ingots increased the productivity by 8.5%, reduced the labor required for surface finishing by a factor of 2 and reduced the number of grinding wheels used to 4,300 per 1,000 ton casting. 2. The ductility of 1Х18Н9Т (1Kh18N9T) grade decreased when the composition was modified by the ГОСТ 5632-61 (GOST 5632-61), reducing the nickel content. To improve this, heats with an α-phase indexed by 2.5 or more were subjected to a stepped heat treatment, lasting 12 hours, during which the ingots were kept for 5 hours at a lower (1,180 - 1,200°C) temperature. The ingots should be heated

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in cell-type soaking pits of a high heat capacity. 4. To reduce the carbide inhomogeneity in 160 - 180 mm X12M (Kh12M) forged pieces, forging is carried out via intermediate strips according to the following pattern: 280 x 220 → 240 x x 280 → 240 x 180 → 180 x 180 mm and with homogenization of the slabs. As compared to oval slabs those forged according to the above pattern have a carbide inhomogeneity index reduced by one. Homogenization at 1,180°C for 50 hours with a subsequent surface machining decreased this index for 140 mm circular sections by 2. 5. Chrome-aluminum alloy ingots (X13Yu4/Kh14Yu4, OX23Yu5/OKh23Yu5, OX27Yu5A/OKh27Yu5A) usually finished on lathes and subsequently by pneumatic hammers are successfully surface-treated with grinding wheels. The ingots must be thoroughly heated to 550°C with grinding taking place in the 550 - 230°C range. 6. The X13Yu4 (Kh13Yu4) ingots which were hitherto fed in a pusher type furnace while hot were tested to be cooled in unheated soaking pits to 50°C in 90 hours. After surface finishing they were fed into the furnace with a temperature of 350°C at the rear part and heated for 20 hours, but these ingots displayed inner concentrical cracks during forging. Better results were obtained with ingots that were fed into the furnace at 700°C, held for 10 - 12 hours, after which they were furnace-cooled to 50°C in 48 - 72 hours. The 90-mm and 130 - 160 mm square sections forged from these ingots had a satisfactory ductility and did not crack, hereby increasing the flawless output by 10 - 15%.

Card 2/2

KEYS, N.V., inzh.; KOMISSAROV, A.I., inzh.; MYSINA, G.Ye., inzh.; DONETS, R.N., inzh.

Studying the hardenability of bearing steel produced by the Chelyabinsk Metallurgical Plant. Stal' 23 no.4:360-362 Ap '63. (MIRA 16:4)

1. Chelyabinskiy metallurgicheskiy zavod.
(Bearing metals—Hardening)

S/133/63/000/004/009/011
A054/A126

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

TITLE: At the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant)

PERIODICAL: Stal', no. 4, 1963, 364

TEXT: 1) Tests were carried out to shorten the cooling time of X17H2 (Kh17N2) grade ingots. After casting and stripping the ingots were laid out ouside for 1 hour. They were set in the furnace at 50°C for 24 - 72 hours and annealed at 670°C for 48 hours. No cracks were found in the ingots after this treatment. Accelerated cooling was also applied to forgings with double annealing. The first takes place in the soaking pits of the forging workshop, the second in the heat treatment department. To shorten the holding time during annealing for 120 mm square sections, the incubation period of crack formation and the hardness of the metal was studied after 10, 15 and 20 hours holding time at 670°C; in each case the hardness was nearly identical and according to standards. No cracks were observed in 120 mm square and 170 mm circular sections during 45

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days and 6 months periods. The annealing time of the 120 mm squares in the forging shop was shortened by applying a 12-hour holding time. The new measures reduced the total production cycle by 1 1/2 days and greatly relived the soaking pits that formed the bottle necks in the production process. 2) According to a new technology, the ШХ15 (ShKh15) grade rolled sections are heated at a maximum possible rate to 790°C, held for 1 h/t, cooled at a 20°C/h rate to 680°C, next held for 6 hours, then cooled in 2 hours under the hood and in air. Over-annealing in respect of the pearlite phase could be reduced from 2.15 to 0.48%.

ACCESSION NR: AR4014140 S/0137/63/000/012/V038/V038

SOURCE: RZh. Metallurgiya, Abs. 12V284

AUTHOR: Galyan, V. S.; Keys, N. V.; Khayrutdinov, R. M.; Ushakov, S. T.

TITLE: Melting electric steel with the use of molten pig iron in the charge

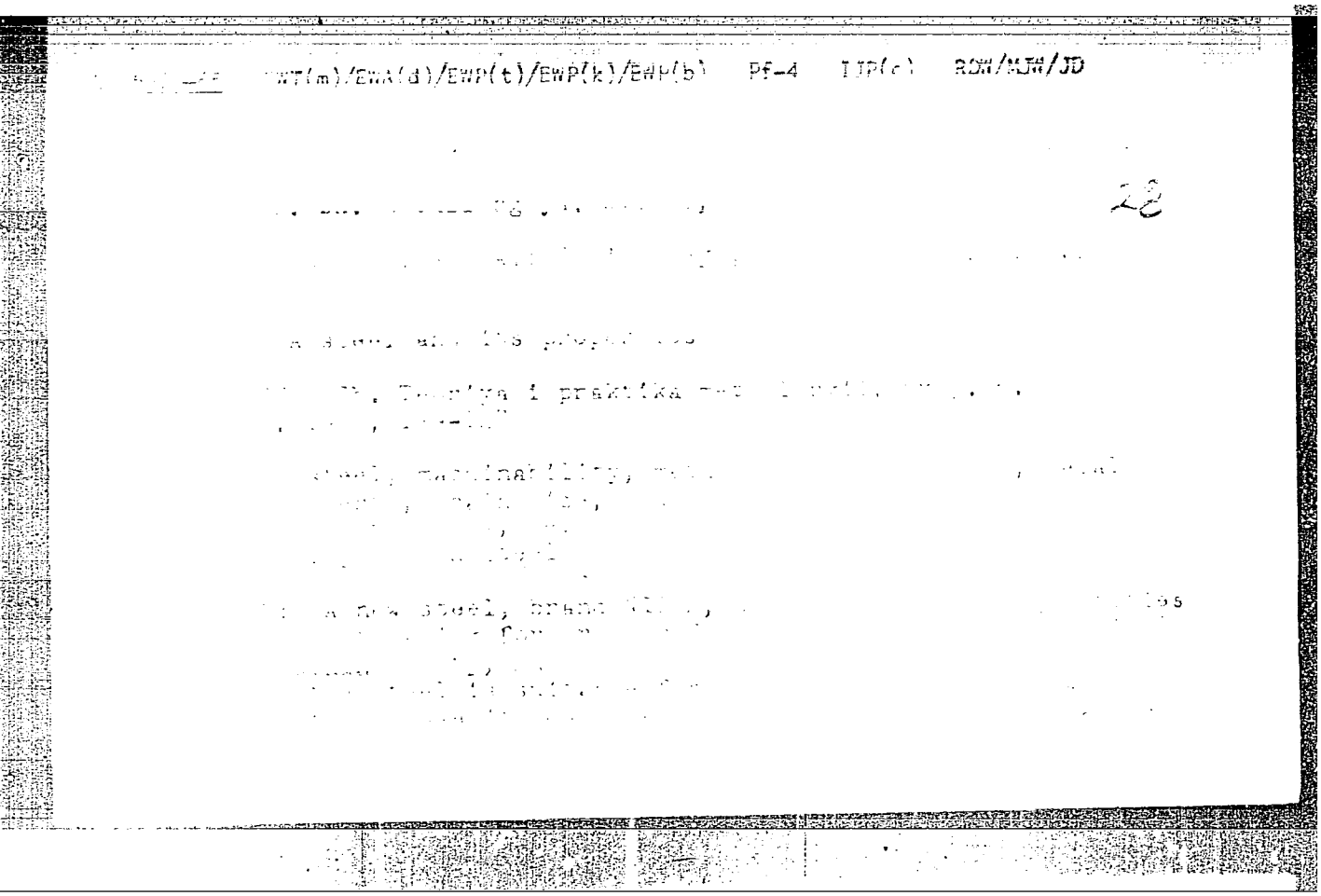
CITED SOURCE: Sb. Teoriya i praktika metallurgii. Chelyabinsk, vy*p. 5, 1963, 63-69

TOPIC TAGS: Electric steel melting, pig iron, high carbon steel melting, electric furnace

TRANSLATION: Experimental meltings with molten pig iron were carried out in a 90-t arc furnace. The feasibility of melting high-carbon steels in this electric furnace, using 30-40% of molten pig iron, was established. When such a charge is used, the duration of the melting is reduced by 8-10%, and the consumption of electrical energy is decreased by 15-20%. D. Kashayeva.

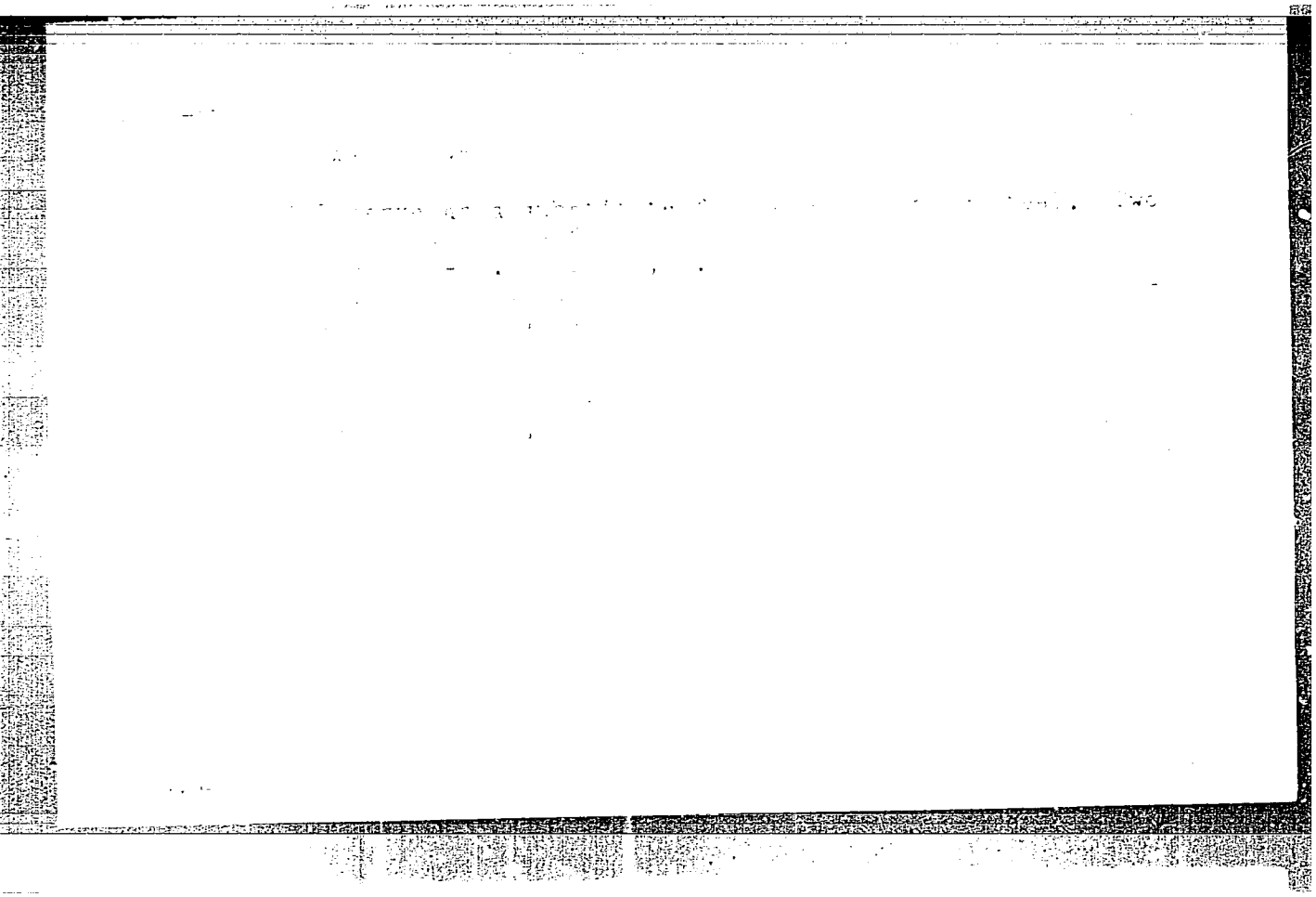
DATE ACQ: 09Jan64 SUB CODE: ML ENCL: 00

Card 1/1



EWT(m)/EWA(d)/EWP(t)/EWP(k)/EWP(b) Pf-4 IJP(c) RDW/WJW/JD

22



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L 17461-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG

ACCESSION NR: AP3004785 S/0129/63/000/008/0019/0023

66
65

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

TITLE: Use of cerium for modification of construction and stainless steels and cast iron

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 8, 1963, 19-23

TOPIC TAGS: stainless steel, machinery construction steel, Ce, cerium, cast iron, ferro cerium

ABSTRACT: Authors were part of a group which carried out tests devoted to the employment of cerium as a steel modifier. Purpose of these tests was to reduce the hydrogen content in 40 KhN steel, which is susceptible to flaking, and to remove the bright spots which were encountered in the fractures of OSV axle steel samples. The effect of ferrocerium admixtures upon the properties of construction steels and an increasing the strength of cast iron ingot molds. The tests showed that an admixture of ferrocerium to the 40 KhN and OSV steels brings about a reduction in the sulfur content, lowering of the critical points and increase in strength. Tests on 18KhNBA, 30KhGSA, 12Kh2N4A, Kh17N2 and 1Kh18N12M2T steels corroborated the possibility of using rare earth metals as modifiers for improv-

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L 17461-63

ACCESSION NR: AP3004783

ing the steel's quality. Ferrocerium admixtures lower the steel's susceptibility to flaking. The resistance of ingot molds from cerium cast iron is 1-5 times greater than those from raw cast iron. The amount of complex modifier depends upon the sulfur content. The advantage of the cerium modifier is that it can be introduced into ordinary ladles without the erection of autoclaves and special chambers because a violent reaction of the modifier with the cast iron does not take place. Orig. art. has: 3 figures and 4 tables.

ASSOCIATION: Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk metallurgical works)

SUBMITTED: 00 DATE ACQ: 06Sep63 ENCL: 00

SUB CODE: ML NO REF SOV: 000 OTHER: 000

Card 2/2

L 14956-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG

ACCESSION NR: AP3004786 S/0129/63/000/008/0033/0038

AUTHOR: Savitskiy, Ye. M.; Keys, N. V.; Popov, V. F.; Lyubimov, V. N.; Zhukov, D. G.

TITLE: Properties of Kh18N12M2T stainless steel containing oxides of rare-earth metals

SOURCE: Metallovedeniye i termicheskaya obrabotka metallov, no. 8, 1963, 33-38

TOPIC TAGS: Kh18N12M2T stainless steel, AISI 316T steel, rare-earth metal oxide addition, optimum amount, steel tensile strength, room-temperature ductility, hot ductility, formability microstructure

ABSTRACT: The effect of 0.08 and 0.12% additions of rare-earth metal (REM) oxides on properties of Kh18N12M2T [AISI 316T] stainless steel has been investigated in three production-scale heats. The oxides were put in a 40-ton preheated ladle 5—8 min before tapping the furnace and casting the steel into 4.5-ton ingots. Test specimens were cut from the top, middle, and bottom sections of the ingots. Ductility characteristics of rolled metal were measured both along and across the direction of rolling. Steel ingots with REM oxides were found to have a

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L 14956-63
ACCESSION NR: AP3004786

dense flawless surface requiring only slight surface conditioning and a fine dense macrostructure without traces of segregation. Rolled blooms also had no surface defects. The amount of ferrite in REM-oxide-treated steel was 50 to 75% smaller than in untreated steel, and its distribution along the ingot height was more uniform. Addition of REM oxides improved steel formability and resistance to intercrystalline corrosion and increased the yield by about 0.5%. An addition of 0.08% REM oxides increased the room-temperature tensile strength by 11.5% and the yield strength by 15.4%; no further improvement was observed when the REM oxide content was raised to 0.12%. While the hot ductility of the steel without REM oxides gradually improved as the test temperature increased to 1000 and 1200C, it increased by 1.5—2 times with an addition of 0.08% of REM oxides. In hot ductility torsion tests, steel specimens with 0.08% REM oxides withstood 18 and 28 turns at 1000 and 1200C, respectively, while specimens of untreated steel failed after 8—10 and 12—15 turns. The REM-oxide-treated steel also had a finer austenite grain, lower anisotropy of the mechanical properties, and higher ductility, particularly across the direction of rolling. In general, addition of REM oxides is especially effective in casting large ingots and shaped castings. Orig. art. has: 5 tables.

ASSOCIATION: Inst. of Metallurgy (Chelyabinsk Metallurgical Plant)

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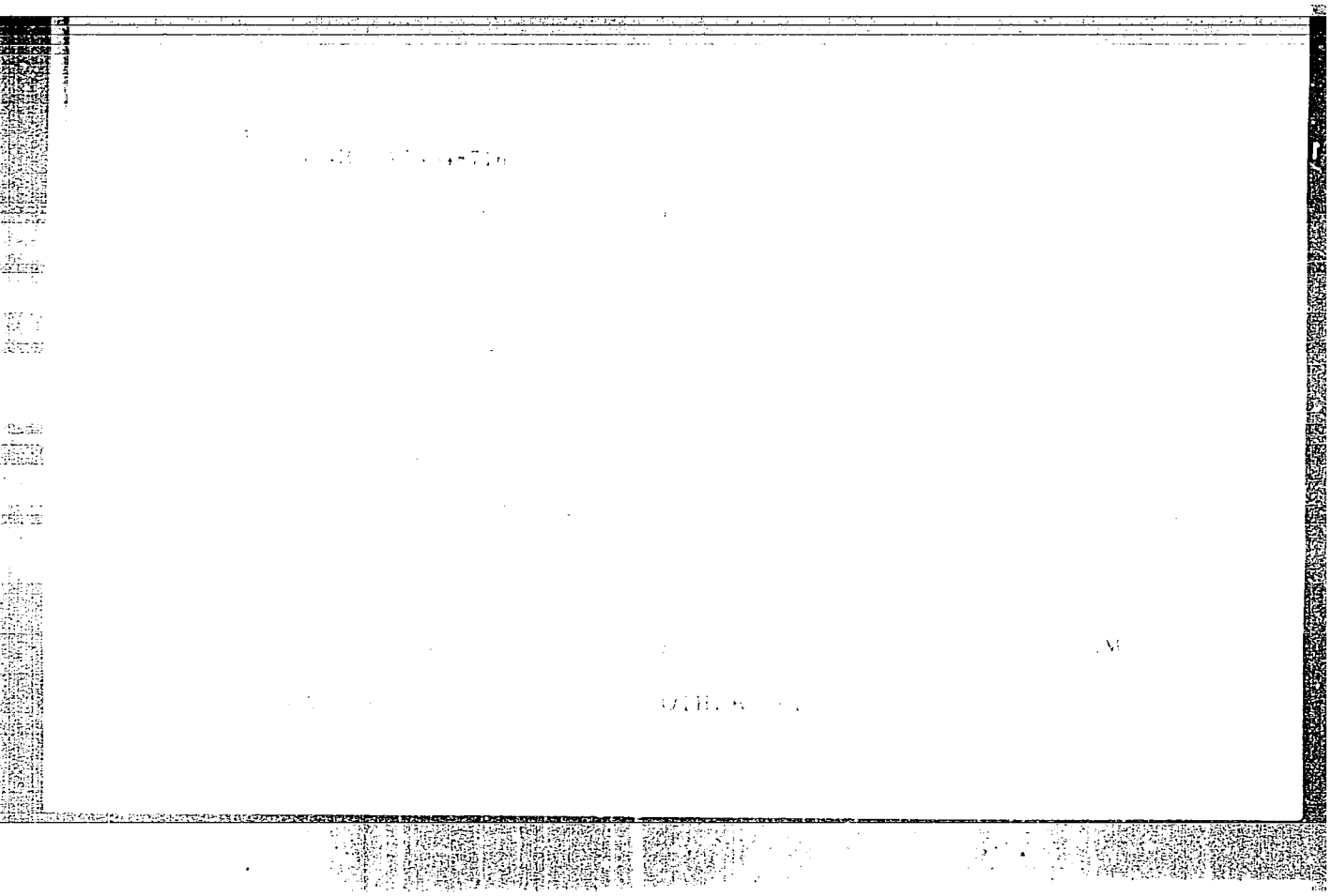
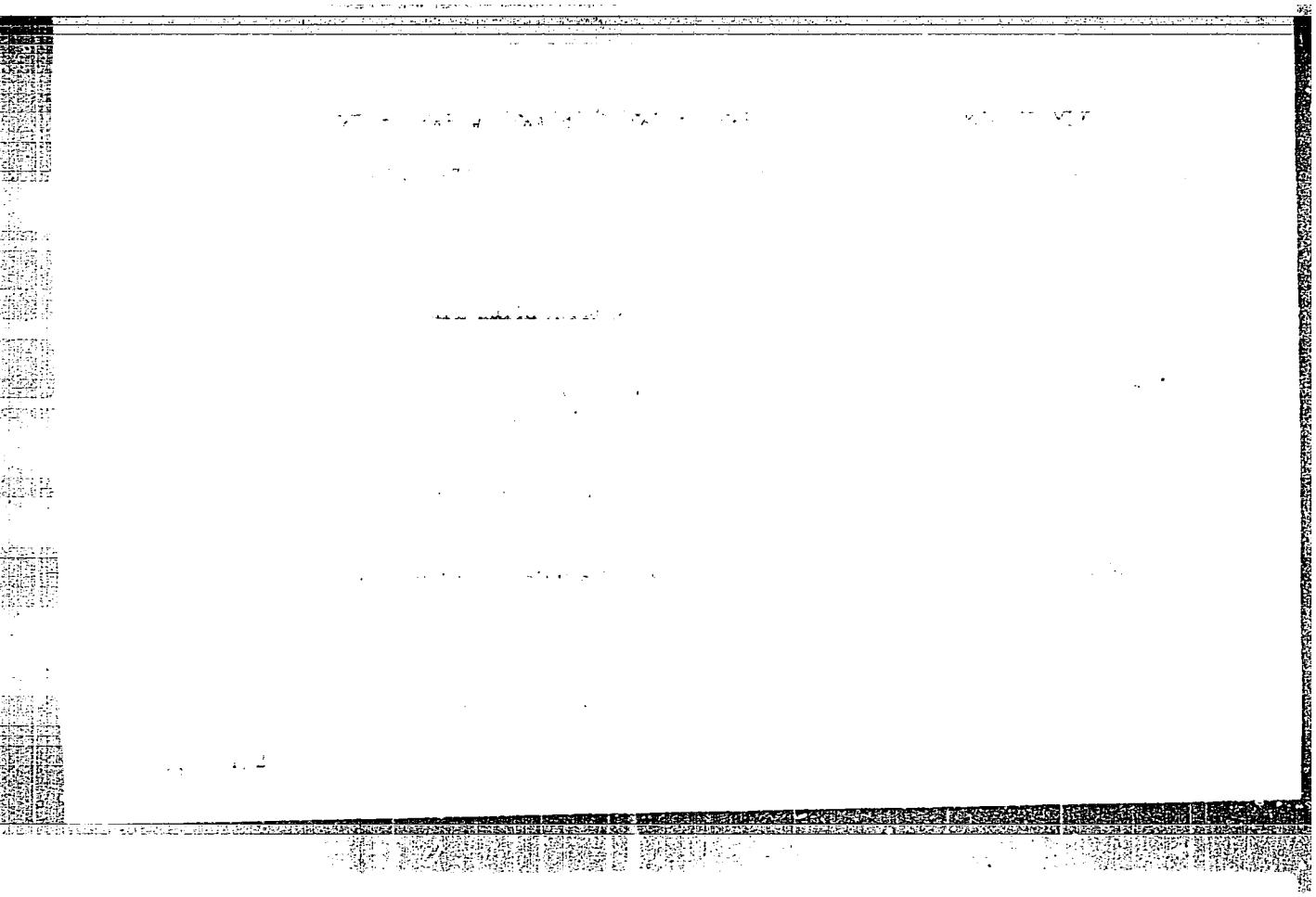
KEYS, N.V.; SINITSYN, A.A.; POZDNYSHEV, V.M.; SAMARIN, A.P.; YARTSEVA, T.M.; Prinimali uchastiye: BENDOVSKIY, B.M.; CHUTCHEV, I.I.; KOMPANIYETS, N.V.; OTRISHCHENKO, N.I.; KHARITONOVA, V.V.; TOROPOV, F.S.

Making ingot molds and other castings of cast iron with spheroidal graphite at the Chelyabinsk Metallurgical Plant. Stal' 23 no.4:381-383 Ap '63. (MIRA 16:4)

(Iron founding) (Ingot molds)

ABSTRACT: Improvement of the stainless steels Kh18N12M2T and [illegible] whose [illegible] rare earth metals (REM) or 0.08-0.12% REM oxides (polyrite) under manu-





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NR: AT1048718

under manufacturing conditions

ASSOCIATION: None

SUBMITTED: 13Jun64 ENCL: 00 SUB CODE: MM

NO REF SOV: 004 OTHER: 000

Card 2/2

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

New developments in research. Stal' 24 no.7:61[illegible].633 Jl '64.
(MIRA 18:1)

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

New developments in research. Stal' 24 no.8:753 Ag '64.
(MIRA 17:9)

L 35031-65 EWT(m)/EWP(b)/EWP(t) JD

ACCESSION NR: AP5008155 S/0286/65/000/005/0034/0034

AUTHOR: Paton, B. Ye.; Dudko, D. A.; Medovar, B. I.; Latash, Yu. V.; Maksimovich, B. I.; Shevchenko, A. I.; Stupak, L. M.; Goncharenko, V. P.; Grigor'yev, L. Y.; Petukhov, G. K.; Chudin, N. I.; Lubenets, I. A.; Yartsev, M. A.; Keys, N. V.; Tulin, N. A.; Kapel'nitskiy, V. G.; Privalov, N. T.; Pis'mennov, V. S.; Kholodov, Yu. A.; Bystrov, S. N.; Bastrakov, N. F.; Donets, I. D.; Silayev, A. Ya.

TITLE: Method of electroslag casting of ingots. Class 18, No. 168743

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 5, 1965, 34

TOPIC TAGS: ingot casting, ingot electroslag casting, electroslag melting, steel melting, alloy melting, metal melting

ABSTRACT: This Author Certificate introduces a method of electroslag casting of ingots in an open or protective atmosphere or in vacuum, in which slag is first melted in a mold with a nonconsumable or consumable electrode arc or plasma jet. To improve the metal quality and the ingot surface and to raise the yield, the molten metal or, if needed, the slag is poured into the mold through a hollow consumable or nonconsumable electrode (see Fig. 1 of the Enclosure). Orig. art. has: 1 figure. [ND]

Card 1/3

L 35031-65

ACCESSION NR: AP5008155

ASSOCIATION: Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant)

SUBMITTED: 06Feb63	ENCL: 01	SUB CODE: MM, IE
NO REF SOV: 000	OTHER: 000	ATD PRESS: 3215

Card 2/2

L 01517-66 EWT(m)/EWA(d)/EWP(t)/EWP(z)/EWP(b) IJP(c) MJW/JD

ACCESSION NR: AP5014375 UR/0383/65/000/001/0061/0065
669.187.6—8

AUTHOR: Zhukov, D. G.; Keys, N. V.; Men'shenin, Ye. B.; Pegov, V. G.; Molchanova, A. A.

TITLE: Treatment of electric steel with liquid synthetic slag

SOURCE: Metallurgicheskaya i gornorudnaya promyshlennost', no. 1, 1965, 61-65

TOPIC TAGS: electric steel, synthetic slag

ABSTRACT: The treatment of electric steel with liquid synthetic slag was adopted on a mass-production scale at the Chelyabinsk metallurgical plant for the first time in the history of Soviet metallurgy in July, 1964. The chemical composition of the materials and the procedure employed in the preparation of the lime-alumina slag are described. ShKh15 steel was treated with the slag obtained. The slag treatment was found to reduce considerably the contamination of the steel with non-metallic impurities, to decrease the sulfur content, and to raise the output of the electric furnaces by 12 to 15%. The macrostructure of slag-treated ShKh15 steel shows virtually no differences from that of steel of standard batches. "The

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L 01517-66
ACCESSION NR: AP5014375

18

work was carried out in collaboration with TsNIIChM under the supervision of Doctor of Technical Sciences S. G. Voinova. In addition to the authors, engineers N. V. Keys, Ye. S. Golikov, I. A. Lubenets, V. G. Pegov, N. V. Ridenik, A. A. Molchanova, M. Ye. Anisimova and others participated in the study." Orig. art. has: 2 figures and 6 tables.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 000 OTHER: 000

Card 2/2 DP

LUBENETS, I.A.; ZHUKOV, D.G.; VOINOV, S.G.; SHALIMOV, A.G.; KOSOY, L.F.; KALINNIKOV, Ye.S.; CHERNYAKOV, V.A.; YAFTSEV, M.A.; GOLIKOV, Ye.S.; MYSINA, G.Ye.; Prinimali uchastiye: KEYS, N.V.; PEGOV, V.G.; MEN'SHENIN, Ye.B.; BARNOVALOV, M.A.; SHIRER, G.B.; SHATALOV, M.I.; MOLCHANOVA, A.A.; ANISIMOVA, M.Ye.

Refining steel with synthetic slag from large-capacity arc furnaces. Stal' 25 no.3:232-235 Mr '65. (MIRA 18:4)

KEYS, N.V.; KOMISSAROV, A.I.; ISUPOV, V.F., inzh.; FAIEYEV, I.G., inzh.; NOSOV, V.A., inzh.

New developments in research. Stal' 25 no.7:614-615 Jl '65. (MIRA 18:7)

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

New developments in research. Stal' 25 no.7:618 Jl '65.

New developments in research. Ibid.:654-655

New developments in research. Ibid.:660

New developments in research. Ibid.:669 (MIRA 18:7)

NOVIKOV, V.; MATVEYEV, Yu.M.; ROZHINSKIY, M.B.; BATIST, A.I.; ICKSEL', G.; KOROLEV, M.; IVANTSOV, V.; ARONOV, I.; SVETLAKOV, V.; ZAYONCHIK, L.Z.; RASPOPOV, I.V.; SERDYUKOV, G.V.; GRISHKOV, A.I.; MAKEYEV, I.F.; DELLO, A.A.; SHUMNAYA, V.A., inzh.; SPIRYAGIN, L.P., inzh.; GRISHKOV, A.I.; KARDONOV, B.A.; BURDIN, V.M., kand. tekhn. nauk; MOLGACHEV, D.A., inzh.; MUZALEVSKIY, O.G.; RIVKIN, A.A.; KEYS, N.V.; KOMISSAROV, A.I.

New developments in research. Stal' 25 no.8:842-845 S '65. (MIRA 18:9)

ACC NR: AP6012948 SOURCE CODE: UR/0133/65/000/007/0618/0618

AUTHOR: Keys, N. V.; Komissarov, A. I.

ORG: none

TITLE: Improvement of the quality of 18Kh2N4VA steel by electroslag and vacuum arc melting

SOURCE: Stal', no. 7, 1965, 618

TOPIC TAGS: vacuum arc, electroslag melting, steel, vacuum melting, carbon monoxide, silicon, sulfur, manganese, nonmetallic inclusion, steel structure, high quality steel/ 18Kh2N4VA steel

ABSTRACT: Electroslag melting of 18Kh2N4VA steel was performed in a 420 mm diameter crystallizer using ANF-6 and AN-291 flux—with vacuum arc melting in a 380 mm diameter crystallizer at a current strength of 6 ka. During electroslag melting, 20-30% of the silicon was contaminated by carbon-monoxide and the sulfur content was reduced to 0.006-0.007%. During vacuum arc melting, 25-35% of the manganese was contaminated. The electroslag and vacuum arc ingots were poured off to a 175-250 mm and 140 mm squares. The macrostructure of the electroslag parts (140-250 mm) was homogeneous with no inconsistencies. There were no large inclusions: there were only individual point inclusions. Thanks to the directed crystallization, dense macrostructure and purity as concerns nonmetallic inclusions, the melted metal was more isotropic than

Card 1/2 UDC: 669.187.26.001.5

L 22567-66

ACC NR: AP6012948 O

open-melted metal. These new metallurgical processes will provide high quality steel for large shapes. [JPRS]

SUB CODE: 13, 09 / SUBM DATE: none

Card 2/2 BK

L 27426-66 EWT(m)/EWA(d)/EWP(t)/ETI IJP(c) JD
ACC NR: AP6017779 SOURCE CODE: UR/0133/65/000/009/0845/0845

29
B

AUTHOR: Keys, N. V.; Komissarov, A. I.

ORG: Chelyabinsk Metallurgical Plant (Chelyabinskiy metallurgicheskiy zavod)

TITLE: Production technology of clad steel 3sp-Kh18N10T

SOURCE: Stal', no. 9, 1965, 845 18 18

TOPIC TAGS: steel, sheet metal, weldability, metallurgic furnace/3spKh18N10T steel

ABSTRACT: A rational design of the pack was selected. An unsymmetric four-layer pack with a 1.08:1.10 ratio of the thickness of the upper part to the lower part and strips 35-40 mm wide provided for the preparation of sheets of identical thickness. The finished output depends on the width of the strips. Strips 20-25 mm wide do not guarantee a pack seal. The increase in pack width from 700 to 800 mm reduces the consumption factor from 2.26 to 1.83. The effect of heating conditions on the weldability of layers in sheets was studied. When packs are heated in continuous four-zone furnaces, with bottom preheating, a special heating condition is established in the soaking zones (1300-1320°C, 3 hours). The consumption factor was reduced to 1.9-2.0 at peak operation. This work was done jointly with the Central Scientific Research Institute of Ferrous Metallurgy (TsNIIChM) and the Chelyabinsk Scientific Research Institute of Metallurgy. [JPRS]

SUB CODE: 11, 13 / SUBM DATE: none

Card 1/1 UDC: 621.771.23.001.5

L 04902-67 EWT(m)/EWP(t)/ETI/EWP(k) IJP(c) JD

ACC NR: AP6031224 (A) SOURCE CODE: UR/0133/66/000/009/0837/0841

AUTHOR: Gol'dshteyn, Ya. Ye. (Candidate of technical sciences); Bakhovskaya, M. V. (Engineer); Kapel'nitskiy, V. G. (Engineer); Keys, N. V. (Engineer)

ORG: Chelyabinsk Institute of Metallurgy (Chelyabinskiy n.-i. institut metallurgii); Chelyabinsk Metallurgical Plant (Chelyabinskiy metallurgicheskiy zavod)

TITLE: Structure and properties of variously melted structural steel 18

SOURCE: Stal', no. 9, 1966, 837-841

steel structure, metal property, vacuum melting, induction melting

TOPIC TAGS: structural steel, structural steel melting, structural steel property, electroslag melting, vacuum arc melting, vacuum induction melting/18Kh2N4VA structural steel, 40KhNMA structural steel, 35Kh2GSMA structural steel

ABSTRACT: A comparative study has been conducted of the structure and properties of 18Kh2N4VA (A), 40KhNMA (B), and 35Kh2GSMA (C) structural steels melted by the following processes (weight of ingots in kg is shown in brackets): electroslag [500 and 1000], vacuum arc [800], vacuum induction [500], electroslag + vacuum arc [450], and vacuum induction + vacuum arc [450]. It was found that although none of the melting processes used affected significantly the strength of steels, all of them more or less improved the notch toughness at room temperature, reduced the susceptibility to temper brittleness (see Fig. 1), and lowered the temperature of transition to brittle behavior. For instance, the latter temperature of A, B and C steels melted by one of the combined processes dropped from 30—35, 90 and 30C (conventional

Card 1/3 UDC: 669.15-194

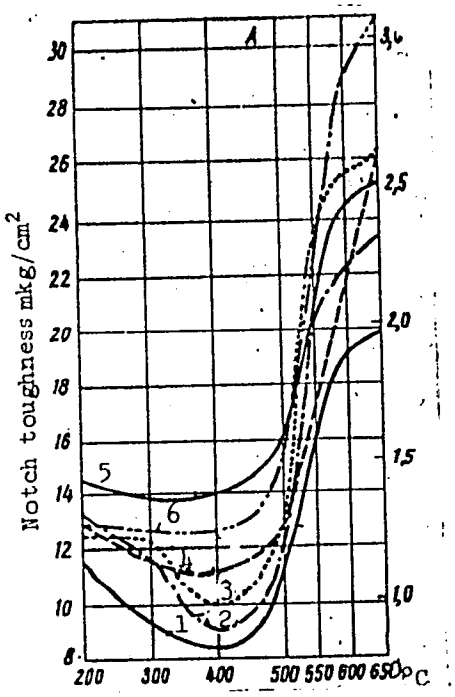

Fig. 1. Notch toughness of 18Kh2N4VA steel versus tempering temperature

1 - Conventional arc; 2 - electroslag; 3 - electroslag + vacuum arc; 4 - vacuum arc; 5 - vacuum induction; 6 - vacuum induction + vacuum arc.

APPROVED FOR RELEASE: 09/17/2001 CIA-RDP86-00513R000721620007-6"

L 04982-67
ACC NR: AP6031224

arc melting) to 70—75, 115—120 and 60—70C, respectively. The combined melting processes also reduce the anisatropy of mechanical properties. However, the degree of effect depends on the final heat treatment and the carbon content of the steels. Orig. art. has: 6 figures and 2 tables. [TD]

SUB CODE: 11, 13/ SUBM DATE: none

Electroslag melting

Card 3/3

L 09135-67 EWT(m)/EWP(t)/ETI/EWP(k) IJP(c) JD/JG

ACC NR: AP6031841 (A,N) SOURCE CODE: UR/0133/66/000/007/0619/0620

41
37

AUTHOR: Keys, N. V.; Kominarov, A. I.

ORG: None

TITLE: Research at the Chelyabinsk Metallurgical Plant

SOURCE: Stal', no. 7, 1966, 619-620

TOPIC TAGS: titanium steel, slag, alloy steel, metal recrystallization

ABSTRACT: The paper contains the following brief reports. *Improving the Technological Conditions for Production of EI481 Steel:* A maximum increase in permanent strength was achieved by melting with oxygen and alloying the metal with ferrocerium in quantities up to 0.5 kg/t in the furnace before removal and 0.7 kg/t in the ladle. This results in a considerable increase in the ductility at temperatures of 950-1150°C as well as a sharp reduction in oxygen concentration. Use of an 1170 kg ingot increases the usable yield by 3-5%. *Casting Stainless Titanium-Containing Steel Under a Slag of Exothermal Briquets:* The charge for preparing the briquets consists of ground calcium-silicon alloy, manganese ore, fluorite, coarse silicate, sodium nitrate, aluminum powder and fluorite concentrate. Consumption of emery wheels for dressing is reduced to 0.8 kg/t as compared with 3.5 kg/t consumed when casting is done with petrolatum; consumption of metal in emery dust is reduced from 12 to 2.6 kg/t which results in an economy of about 5 rubles per ton of steel. *Improving the Quality of Electric Steel by Using Dried Oxygen:* After starting a silicagel dryer, two forty-ton arc furnaces were supplied with extremely dry oxygen. The moisture content in the oxygen was reduced

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L 09135-67

ACC NR: AP6031841 6

from 0.6-1.1 to 0.02-0.04 g/m^3. This resulted in a reduction in the hydrogen content by 0.43 cm^3 per 100 g of metal in high-carbon steel (ShKh15), 1.02 cm^3 per 100 g in medium-carbon steel (38KhMYuA and others) and 1.69 cm^3 per 100 g in low-carbon steel (18Kh2N4VA). Rejected output for individual grades of steel is reduced by 20-30%. *Electroslag Remelting of Steel in Crystallizers with Square Cross Section:* Square crystallizers with an upper cross section of 300×300 mm and a lower cross section of 350×350 mm may be used in electroslag remelting to produce ingots weighing 1.3 tons which are suitable for rolling on an 800 mill. The crystallizer has a smaller cross section than the circular type which reduces flux consumption by 15 kg/t for a slag bath of the same height. The elongated shape of the ingot means that the quota per ton of steel may be reduced by approximately 2% at the previous cutting height. *Improving the Quality of Kh18N10T Steel Made in Large Electric Furnaces:* Kh18N10T steel was melted in 100 ton electric furnaces with partial titanium alloying during extraction. Half of the required quantity of titanium was introduced in the form of 30% ferrotitanium before extraction of the melt and the rest was added in the form of titanium sponge briquets on the bottom of the ladle. The assimilation of titanium was somewhat reduced (from 47 to 46%) although melts containing less than 0.45% titanium were reduced from 20.4 to 11%. The proportion of melts with a silicon concentration of more than 0.60% was reduced from 19 to 6.5%. No melts contained more than 0.70% silicon. The lower silicon concentration made it possible to increase the consumption of ferrosilicon for deoxidation by 100-200 kg/t which increased chromium reduction from 0.65 to 1.01% while the consumption of ferrochromium was reduced by 4 kg/t of usable metal.

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L 09135-67
ACC NR: AP6031841

There was no change in metal quality. *Teeming Steel from Electric Furnaces Using Exothermal Slag Briquets:* Steel from arc furnaces with a capacity of 40 and 100 tons was teemed with exothermal slag briquets of the following composition with respect to dry mass: 5% aluminum powder, 17% each manganese ore and calcium-silicon alloy, 16% nepheline, 32% fluorite, 7.5% sodium silicate, 25% coarse silicate and 3% graphite. Briquets measuring 420×210×30 mm (8.0-8.5 kg mass) were prepared on water glass (6-7% above 100%). Briquet consumption was 3.0-3.5 kg/t. The surface quality of stainless steel ingots was improved by a factor of 3-4. Labor in dressing was considerably reduced by the absence of "collars" and surface defects. The quality of structural steel was improved: ordinarily the fraction of rolled products in the first and second classes of defectiveness with minimum dressing was about 15%, while the fraction in the experimental melts was 80%. *Improving the Durability of Kh15N60 and Kh20N80 Alloys:* Small ingots (150 and 200 kg) were used for improving the uniformity of distribution of rare earth elements within the metal and increasing its ductility. Ferrocerium was added to the ingot mold in quantities of 0.7-1.5 kg/t. The metal in experimental ingots cast at the Beloretsk Metallurgical Combine showed satisfactory ductility during forging and reduction. Addition of ferrocerium increased the durability of the wire from 62 to 91 hours with a further increase to 97 hours with the use of a more improved process developed at the Chelyabinsk Scientific Research Institute of Metallurgy.
[Translation of first seven reports]

SUB CODE: 11, 13/ SUBM DATE: None

Card 3/3 nst

ACC NR: AP7002779 SOURCE CODE: UR/0133/66/000/007/0625/0625

REVIEWER: Keys, N. V.; Komissarov, A. I.

ORG: Chelyabinsk Metallurgical Combine (Chelyabinskiy metallurgicheskiy kombinat)

TITLE: Replacement of high-alloy Kh12N13 steel with steels having lower nickel content

SOURCE: Stal', no. 7, 1966, 625

TOPIC TAGS: high alloy steel, metal casting / Kh12N13 high alloy steel

ABSTRACT: Steel Kh23N6SL does not differ essentially in its properties from Kh23N13 and it is recommended that it be used for casting of heat-resisting and scale-resisting parts instead of the latter; for castings operating in corrosive media, Kh18N9TL steel should be used. [JPRS: 37,758]

SUB CODE: 11, 12 / SUBM DATE: none

Card 1/1

UDC: 669.15-194.001.5

0925 1659

L 09121-67 EWP(e)/EWT(m)/EWP(t)/ETI/EWP(k) IJP(c) JD/WW/WH

ACC NR: AP6031842 (A,N) SOURCE CODE: UR/0133/66/000/007/0642/0643

38
32

AUTHOR: Keys, N. V.; Komissarov, A. I.

ORG: None

TITLE: Research at the Chelyabinsk Metallurgical Plant

SOURCE: Stal', no. 7, 1966, 642-643

TOPIC TAGS: metallurgy, bimetal, metal forging

ABSTRACT: The paper contains the following brief reports. *Improving the Quality of EI617 Alloy:* Cracks in a bar 32 mm in diameter made from EI617 alloy are caused by rolling overheated and undercooled metal. This phenomenon is eliminated by reducing the prerolling temperature in the continuous furnace from 1160-1180 to 1140-1150°C. This treatment resulted in a reduction of rejects for cracks and made it possible to reduce the diametric margin for grinding. *Reducing Decarbonization of R18 Steel by Using a Protective Coating:* A freshly prepared protective coating of water glass (65%), fire clay (20%), Carborundum (6%), graphite (6%) and commercial borax (3%) was applied by brush in an even layer up to 1 mm thick on the high speed steel before heating of square bars measuring 160-190, 110 and 85 mm. The specimens were then dried at room temperature for at least ten hours. All types of products made from the coated blanks satisfied the requirements on decarbonizing standards, while 27.3% of the specimens

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forged from uncoated blanks showed a decarbonized layer deeper than the permissible standard. The reduction in waste metal increased the usable yield by 3-4%. *Forging Vacuum-Arc Remelted Ingots of ShKh15 Steel Without Roughing:* It is conventional practice to rough vacuum-arc remelted ingots until all traces of the so-called "corona" are removed. Hard steel ingots, in particular those made from ShKh15, must be slowly cooled and annealed before roughing. In order to reduce the technological cycle, forging of the ingots without roughing was introduced after slow cooling in the pits. The ductility of the unroughed ingots and the surface finish of intermediate blanks 130 mm square were satisfactory. The yield of usable metal was raised by 2-3%. *Effect of Technological Factors on Forging of Specimens for Testing Long-Term Strength and Mechanical Properties:* It was found on the basis of an evaluation of the macrostructure of specimens and tests which were conducted that variations in the temperature to which specimens of EI437BU-VD alloy were heated before upsetting in the 950-1060°C range had no significant effect on macrostructure although an optimum is observed at 1020-1040°C. The fine-grain macrostructure of upset specimens is due to underheating during quenching, and in some individual melts--to high carbon concentration (0.07%). The coarse-grained macrostructure of individual melts is due to low carbon concentration (below 0.04%) in EI437BU-VD alloy and is a consequence of increased sensitivity of low-carbon metal to overheating before quenching and forging. *Development of Technology for Production of Bimetal Sheet:* The breaking point of bimetal sheets of St. 3+1Kh18N10T 8-10 mm thick was 46-57 kg/mm^2 (451-559 MN/m^2); yield point 29-33 kg/mm^2 (284-324 MN/m^2); relative elongation δ_5=30-38%; shearing strength

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ACC NR: AP6031842

18-30 kg/mm^2 (177-294 MN/mm^2). However, about 5% of the sheets 10 mm thick and 3% of the sheets 8 mm thick did not satisfy requirements for strength of adhesion between layers--shearing strength was below 15 kg/mm^2 (147 MN/mm^2). The packets should be rolled with a negative deflection to produce sheets of identical thickness. Nearly all sheets meet the required standards if the thickness ratio of the upper sheet to the lower is kept within 1.09-1.11 with optimum flattening thickness. In order to produce an 8-mm sheet of a given thickness, the length of the stainless plate should be at least 150 mm greater than the width, while the length should be at least 200 mm greater than the width for a 10-mm sheet. [Translation of reports 1, 2, 3, 4 and 7]

SUB CODE: 11/ SUBM DATE: None

Card 3/3 nst

KEYSAR, A.P. (Yaroslavl')

Labor and the postnatal period in thrombocytopenia (Werlhof's disease) requiring urgent splenectomy. Kaz.med.zhur. no.5:72-73 S-O '60.
(MIRA 13:11)

(PURPURA (PATHOLOGY))
(SPLEEN--SURGERY)
(LABOR, COMPLICATED)

KEYSAR, A.P.; DAVIDSON, B.S.

Protracted pregnancy. Kaz. med. zhur. no. 2:51-53 Mr-Ap '61.
(MIRA 14:4)

1. Akushersko-ginekologicheskoye otdeleniye Yaroslavskoy dorozhnoy bol'nitsy Severnoy zheleznoy dorogi (nachal'nik otdeleniya - A.P. Keysar).

(PREGNANCY, PROTRACTED)

KEYSAR, A.P.; BELYAKOVA, E.V.

Acute toxic dystrophy of the liver in a pregnant woman. Akush. i gin. 37 no.2:99-100 F '61. (MIRA 14:3)

1. Iz akushersko-ginekologicheskogo otdeleniya (nach. A.P. Keysar) Yaroslavskoy dorozhnoy bol'nitsy Severnoy zheleznoy dorogi.
(PREGNANCY, COMPLICATIONS OF) (LIVER—DISEASES)

KEYSAR, A.P.

Birth of twins in a woman with a uterus bicornis. Kaz. med. zhur. no.1:65-66 Ja-F '62. (MIRA 15:3)

1. Akushersko-ginekologicheskoye otdeleniya (nachal'nik otdeleniya - A.P. Keysar) Yaroslavskoy dorozhnoy bol'nitsy Severnoy zheleznoy dorogi.
(UTERUS—ABNORMITIES AND DEFORMITIES)
(BIRTH, MULTIPLE)

BARASHENKOV, V. S.; KEYSER, G. Y.; OGREBA, A. A.

"Compton Effect on Nucleon, Nucleon Polarizability"

report presented at the Intl. Conference on High Energy Physics, Geneva, 4-11 July 1962

Joint Institute for Nuclear Research, Laboratory of Theoretical Physics

COUNTRY : USSR
CATEGORY : Farm Animals. General Problems.
ABS. JOUR. : RZhBiol., No. 3, 1959, No. 11974.

AUTHOR : Koyser, I. A.
INST. : Uzbek Scientific Research Institute of Animal*
TITLE : Improving Desert Pastures by Supplementary Sowing and planting of Forage Plants.

ORIG. PUB. : Tr. Uzb. n-i. in-ta zhivotnovodstva, 1957, vyp. 2, 19-31

ABSTRACT : The desert pastures of Uzbekestan are characterized by very small and unstable crops of fodder plants. In order to improve them, the best fodder crops to be used among shrubs are Arthrophy persicum, Haloxylon aphyllum,* and among semi-shrubs, wormwood (Artemesia). They represent valuable forage plants and are well consumed by sheep. -- K. V. Tatariyskaya

* and the Russianthistle (Salsola rigida)

CARD: 1/1

*Husbandry.

14

KEYSER, Ya. S., inzh.-mekhanik (Stantsiya Khmel'nitskaya, Yugo-Zapadnoy dorogi).

Improving an acceleration device. Put' i put. khoz. no. 7:44 Jl '58. (MIRA 11:7)

(Railroads--Tools and implements)

KEYSERMAN, G.L., inzh.

Shipbuilders of Leningrad preparing to greet the 22nd Congress of the CPSU. Sudostroenie 27 no.10:4-6 O '61. (MIRA 14:12)

1. Glavnyy spetsialist Upravleniya sudostroitel'noy promyshlennosti Leningradskogo sovnarkhoza.
(Leningrad--Shipbuilding)

L 40142-66 EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP6025826 SOURCE CODE: UR/0316/66/000/001/0112/0115

AUTHOR: Karayev, Z. Sh.; Keyserukhskaya, L. G.; Aliyeva, Sh. A.; Gadymov, A. M. 44 B

ORG: Institute of Inorganic and Physical Chemistry, Academy of Sciences AzerbSSR (In-m neorgan. i fiz. khimii AN AzerbSSR)

TITLE: Synthesis and study of yttrium sulfogallate, $YGaS_3$, and yttrium sulfoindate, $YInS_3$

SOURCE: Azerbaydzhanskiy khimicheskiy zhurnal, no. 1, 1966, 112-115

TOPIC TAGS: yttrium, indium, gallium compound, sulfur compound

ABSTRACT: Yttrium sulfogallate, $YGaS_3$, and yttrium sulfoindate, $YInS_3$, were synthesized and their crystallographic structures, elemental composition, stabilities, and electrical conductivities were examined. The work is part of an extensive program, presently being carried out at the Institute of Inorganic and Physical Chemistry, Academy of Sciences AzerbSSR, aimed at finding new types of semiconductors. The $YGaS_3$ and $YInS_3$ were prepared by fusing mixtures of the elements in stoichiometric ratios in sealed quartz ampoules evacuated to $1 \cdot 10^{-3}$ mm Hg. Initially, half of an ampoule was slowly heated in a furnace to 1000°C while the other half, outside the furnace, was cooled with water. Then, the whole ampoule was placed inside the furnace and held there for 2 hrs at 1250°C. It was found that $YGaS_3$ has a hexagonal crystal lattice.

Card 1/2

IGNATOV, V.A.; KEYSERUKHSKIY, M.G.

Colorado beetle control in Kaliningrad Province. Zashch. rast. ot vred. i bol. 5 no. 8:46-47 Ag '60. (MIRA 13:12)

1. Nachal'nik Kaliningradskoy kompleksnoy ekspeditsii (for Ignatov). 2. Zaveduyushchiy opornym punktom Vsesoyuznogo nauchno-issledovatel'skogo instituta zashchity rasteniy (for Keyserukhskiy).

(Kaliningrad Province--Potato beetle)

KEYSERUKHSKIY, M.G.

Efficient preparations against the Colorado beetle. Zashch. rast. ot vred. i bol. 6 no.3:52 Mr '61. (MIRA 15:6)

1. Zaveduyushchiy Kaliningradskim punktom Vsesoyuznogo instituta zashchity rasteniy (for Keyserukhskiy).
(Potato beetle)
(Insecticides)

KEYSERUKHSKIY, M.G.

Effectiveness of DDT and hexachlorotcyclohexane against the Colorado beetle as related to the form and method of their use. Zashch.rast. ot vred. i bol. 4 no.4 51-[illegible] Ag '59.

(MIRA 16:5)

(Potato beetle-Extermination) (Insecticides)

KEYSERUKHSKIY, M.G.

Insectary of the Kaliningrad Branch Station of the All-Union Institute of Plant Protection. Zashch.rast.ot vred.i bol. 7 no.4:53 Ap '62. (MIRA 15:12)

1. Zaveduyushchiy Kalinigradskim opornym punktom Vsesoyuznogo instituta zashchity rasteniy.
(Kaliningrad—Entomological research)

KEYSERUKHSKIY, M. G.; SOKOLOVA, G. S., mladshiy nauchnyy sotrudnik

Elimination of focuses of the Colorado bettle. Zashch. rast. ot vred. i bol. 5 no.6:48 Je '60. (MIRA 16:1)

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