18(5) SOV/128-59-3-8/31

AUTHOR: Pikunov, M.V., and Kurdyumov, A.V., Candidates of Technical Sciences

TITLE: Castings from Brittle Materials

PERIODICAL: Liteynoye Proizvodstvo, 1959, Nr 3, pp 16-18 (USSR)

ABSTRACT: For the various branches of the industry it has become necessary to use materials resistant to high temperaturea and chemical influences. Such materials but are difficult to cut and machine and are not possible to form by pressure as they do not have any elasticity. The best method of workability for such materials is casting. But the main obstacle for the latter method are the appearance of cracks caused by shrinkage and inner heat pressure of the casting. This dependance between temperature and pressure of the core material is represented in one drawing and is well known for die casting and pressure die casting. It is necessary that the core material has a greater coefficient of heat expansion than the material of the casting.

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. Castings from Brittle Materials SOV/128-59-3-8/31

Graphite, carbon, coke, etc., or an other melting material are suited as a core material, where the core material had been previously cast in aluminum. In all cases preheating of the core material to 200° or up to 500° Celsius is necessary. When casting complicated shapes, like e.g. pistons, pouring of the complete shape is not possible. In such cases the core consists of several parts. Cracks caused by the pressure originating from the cooling-off of the material are a disadvantage too when casting brittle materials, like e.g. cast iron with a high percentage of chromium, silicium, diabase, etc. A table is offered listing the deformations of the materials when cooling-off. Such cooling-off shall be done slowly and uniformly, and the casting should not betaken from the mold too early. The final solution of the experiments made revealed that employment of the centrifugal casting method (700 rpm) with graphite cores preheated from 800° to 850°C will yield the best results. After pouring the mold was deposited for 5 to 6 hrs. at a temperature of 800°C, afterwards was cooled down to room temperature

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within 20 to 24 hrs. There are 3 graphs, 1 diagram, and 4 references, 3 of which are Soviet and 1 English.

18(7)

SOV/128-59-5-15/35

AUTHOR: Kurdyumov, A.V. and Akimova, K.I., Candidates of Technical Sciences

TITLE: Effect of Minor Vanadium, Tungsten, and Boron Additions on the Structure and Mechanical Properties of NAMz 12-9-2 Bronze

PERIODICAL: Liteynoye Proizvodstvo 1959, Nr 5, pp 26-28 (USSR)

ABSTRACT: The authors investigate the change of the mechanical properties (resistance, yield point and elasticity) by minor vanadium-, tungsten and boron additions to bronze alloy type NAMz 12-9-2 with iron contents of 0,5%. Fig (1) shows a micrometal section with various contents of vanadium. Thus, it can be established that by increasing the contents of vanadium 0,1 - 0,15%, (see Fig. 1 v,g) the formation of ß-phase increases. Fig. (2 a) illustrates an addition of 0,04% boron, Fig. (2 b) an addition of 0,1% boron, and Fig. (2 v,g) an addition of 0,05 - 0,08% vanadium. The results obtained are summarized in a table, giving also those values

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Effect of Minor Vanadium, Tungsten and Boron Additions on the Structure and Mechanical Properties of NAMz 12-9-2 Bronze

obtained after thermical treatment. (See also Fig. 3, 4, 5). It becomes obvious that vanadium may be added only up to a contents of 0,15 - 0,17%. Tungsten and boron additions have nearly the same effect on the mechanical properties of NAMz 12-9-2 bronze. There are 5 diagrams and 5 references, 4 of which are Soviet and 1 English.

ORLOV, Nikolay Dmitriyevich, kand.tekhn.nauk; MIRONOV, Vladimir Mikhaylovich; SPASSKIY, A.G., doktor tekhn.nauk, retsenzent; KURDYUMOV, A.V., kand.tekhn.nauk, retsenzent; PIKUNOV, M.V., kand.tekhn.nauk, retsenzent; CHURSIN, V.M., kand.tekhn.nauk, retsenzent; POZDNYAK, N.Z., inzh., retsenzent; ZASLAVSKIY, D.M., inzh., retsenzent; RUBTSOV, N.N., prof., doktor tekhn.nauk, red.; POMERANTSEV, S.N., inzh., red.; RYBAKOVA, V.I., inzh., red.izd-va; MODEL', B.I., tekhn.red.

[Founding handbook; shaped castings of heavy nonferrous metals] Spravochnik liteishchika; fasonnoe lit'e iz splavov tiazhelykh tsvetnykh metallov. Pod red. N.N.Rubtsova. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1960. 402 p.

(MIRA 13:11)

(Nonferrous metals--Founding)
(Founding--Handbooks, manuals, etc.)

KURDYUMOV, A.V.; ROTERSHTEYN, A.A.

Possibility of reducing the loss of cadmium in the production of cadmium bronze. Izv. vys. ucheb. zav.; tsvet. met. 3 no.5:132-136 '60. (MIRA 13:11)

1. Krasnoyarskiy institut tsvetnykh metallov. Kafedra liteynogo proizvodstva.

(Copper-cadmium alloys—Metallurgy)

S/137/62/000/005/053/150
A006/A101

AUTHORS: Kurdyumov, A. V., Pikunov, M. V.

TITLE: Some peculiarities in the technology of melting and casting calcium and magnesium fluoride alloys

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 31 - 32, abstract 5G205 ("Sb. nauchn. tr. In-t tsvetn. met. im. M. I. Kalinina", 1960, v. 33, 277 - 284)

TEXT: Pure CaF_3 and MgF_2 were used as initial materials for the manufacture of the alloys. The fluorides were melted in crucibles made of electrode graphite. Gas and electric furnaces assuring heating up to 1,300°C were employed as melting units. The alloy was prepared by previous mixing of powderlike salts, taken in a given ratio, and subsequent melting of the mixture. Graphite or graphite-chamotte were the most suitable materials for the manufacture of molds in fluoride casting. In all cases the alloy temperature was 1,060 - 1,120°C and the temperature of the mold prior to casting was 750 - 850°C. Prior to casting the mold was dried and roasted at 800 - 850°C. The filled molds were

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Some peculiarities in the...

cooled with the furnace at a rate of 30 - 50 degrees/hour. An eutectic alloy containing (in %) 48 MgF_2 and 52 CaF_2 was investigated. The addition of 2 - 5% Ni fluoride to the alloy considerably reduces the danger of breakdown of the castings owing to thermal stresses.

G. Svodtseva

[Abstracter's note: Complete translation]

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18.1245 2508, 1416, 1454

S/149/61/000/003/004/004
A006/A106

AUTHORS: Kurdyumov, A. V., Shestyrev, I. A.

TITLE: On the use of pressure crystallization in casting magnesium alloys

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, no. 3, 1961, 125 - 128

TEXT: Pressure crystallization was proposed by Academician A.A. Bochvar and Professor A. G. Spasskiy as an effective means of eliminating porosity in aluminum alloy castings. This method was as yet not employed in magnesium alloy castings due to the opinion that these alloys in liquid state were inflammable under high air pressure. The present study was made to reveal the possibility of using pressure crystallization for casting magnesium alloys and to determine the effect of pressure on the porosity of the castings. The experiments were made with МЛ 4 (ML4) and МЛ 5 (ML5) alloys. The shape and dimension of castings were selected in such a manner that in one case shrinkage porosity was located in the upper portion of the casting (Figure 1, a and b) and in the other case over its whole height (Figure 1,c). The castings were placed in the bottom of the mold, the riser and the pouring gate were at the top. In all cases the metal was top-poured. The

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On the use of pressure crystallization ...

S/149/61/000/003/004/004
A006/A106

foundry mold was made of a standard mixture of 5% moisture and with fluorine admixture. For pressure crystallization the mold was placed in an autoclave. After pouring, the autoclave cover was closed and compressed air was supplied. To prevent ignition, sulfur powder was placed around the air gate and the riser. The mold was held in the autoclave for 10 - 15 minutes, then specimens were cut out and their porosity was determined from the density by double weighing in air and glycerin, and by weighing and measuring. Castings were manufactured by crystallization under conventional conditions and under pressure of 1.5, 3, 4 and 5 atg. The alloy temperature was 760°C. It was found that the density of the specimens increased with higher pressure. The distribution of porosity over the height was studied on specimens shown in figure 1c, cast into two molds. In one mold crystallization proceeded under conventional conditions, in the other one under 1.5, 3 and 5 atg pressure. ML5 alloys were cast at 690 and 800°C. It was found that in all cases but one a higher density was observed in pressure crystallized castings. The dense portion of a conventionally crystallized casting was about 15% of its total height, that of a pressure crystallized casting 30 - 40%. The experiments performed lead to the following conclusions: Pressure crystallization, employed in aluminum alloy casting, can also be recommended for magnesium alloy casting. For this purpose risers having a sufficient volume should be placed above the compact parts

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On the use of pressure crystallization

of the casting. Casting should be performed in an autoclave by crystallization under 3 - 5 atg. pressure. The alloys must be heated to 760 - 800°C, to maintain one portion of the alloy in prolonged liquid state so that the shrinkage pores be fully soaked under the effect of high pressure. Magnesium alloys in liquid state are not inflammable under high pressure. To prevent accidental ignition it is sufficient to pour some sulfur powder around the riser and the air gate. This article was recommended for publication by the kafedra liteynogo proizvodstva Krasnoyarskogo instituta tsvetnykh metallov (Department of Foundry Practice at the Krasnoyarsk Institute of Non-Ferrous Metals). There are 3 figures.

ASSOCIATION: Krasnoyarskiy institut tsvetnykh metallov (Krasnoyarsk Institute of Non-Ferrous Metals) Kolomenskiy teplovozostroitel'nyy zavod (Kolomna Locomotive Building Plant)

SUBMITTED: August 19, 1960.

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KURDYUMOV, A.V.; ROTERSHTEYN, A.A.

Reducing the loss of cadmium in the manufacture of cadmium bronze. Lit.proizv. no.7:44-45 Jl '61. (MIRA 14:7)
(Cadmium) (Bronze)

15.2240
18.1200

28052 S/128/61/000/009/008/009
A054/A127

AUTHORS: Kurdyumov, A.V.; Pikunov, M.V.

TITLE: The technological pecularities of melting and casting calcium and magnesium fluoride alloys

PERIODICAL: Liteynoye proizvodstvo, no. 9, 1961, 39 - 41

TEXT: Corrosion-resistant alloys containing calcium fluoride and magnesium fluoride have a low ductility. They are difficult to machine and more suitable for casting. However, their pecularities in melting and casting require measures which differ from the conventional conditions. The usual refractory materials containing various oxides cannot be used for alloys containing calcium and magnesium fluoride, because these dissolve and adsorb the oxides which makes their castability deteriorate. The use of metallic crucibles is also limited due to the high temperatures involved. The best results were obtained when these alloys were melted in electrode-graphite crucibles in gas or electric furnaces at temperatures up to 1,300°C. After crystallization gas porosity similar to the honeycomb porosity in steel and copper can often be observed in these alloys which can be reduced by remelting. This shows that porosity is the result

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of gas saturation of the salts and not of chemical reactions. By blowing dry air (oxygen) through the melt the dissolved gas (mainly hydrogen) can also be removed and the alloy becomes denser. The rate of cooling also affects the porosity of this alloy. When remelting to eliminate the porosity, dried and hardened crucibles must be used, carefully avoiding any contact with moisture. For the above-mentioned reasons the conventional mold and core materials cannot be used either. The best material for the above purpose is graphite or graphite chamotte (consisting of crushed chamotte crucibles, + 8 - 10% water, + 3 - 5% refractory clay). Prior to use the mold has to be dried, then hardened at 800 - 850°C. The mixture must be poured into a hot (750 - 800°C) mold, owing to the low heat-conductivity and plasticity of fluorides. To prevent thermal stresses causing cracks, cooling to room temperature has to be effected slowly and at a uniform rate (for castings 0.5 - 20 kg in weight 30 - 50°C/h). This is attained best by pouring the alloy of 1,050 - 1,100°C into molds heated to 800 - 850°C, with subsequent slow cooling in the furnace. Eutectic alloys were found more suitable than hypo-eutectoid and hyper-eutectoid ones. Therefore, to obtain more exact data of their mechanical and casting properties, tests were carried out with eutectic alloys adding 2 - 5% nickel fluoride. This greatly reduced fracturing by thermal stresses. Another condition which perceptibly affects the quality of

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The technological pecularities of melting and....

the alloy is the purity of constituents. For some properties of fluoride alloys the following values were obtained:

Eutectic alloy (52% CaF_2, 48% MgF_2)	Parameters
Specific gravity, g/cm^3	
at 20°C	3.07
at 1,050°C	2.75
Coefficient of heat expansion	
at 0 - 100°C	10.3×10^{-6}
at 0 - 800°C	14.9×10^{-6}

Eutectic alloy (52% CaF_2, 48% MgF_2)	Parameters
Heat-conductivity as compared with that of copper	
at 40°C	1/180
at 225°C	1/63

There are 2 figures, 2 tables and 3 references: 2 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: G. Fuseya and oth., Journal Soc. Chemical Industry. Japan, no. 4, v. 36, 1933.

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S/128/61/000/012/003/004
A004/A127

AUTHORS: Spasskiy, A.G.; Pikunov, M.V.; Kurdyumov, A.V.; Lebedev, Ye.A.

TITLE: Removing films from metals by filtration

PERIODICAL: Liteynoye proizvodstvo, no. 12, 1961, 22 - 24

TEXT: The authors point out that quite a number of alloys during melting and pouring are considerably contaminated with oxide films which reduce their technological and mechanical properties and the quality of components. They enumerate a number of metal purification processes and report on tests which were carried out to remove films from aluminum alloys by filtration. These tests were carried out during the semi-continuous casting of ingots of the Д16 (D16) and АК6 (AK6) alloys by A.G. Spasskiy, M.V. Pikunov and A.V. Kurdyumov. Prior to the casting process, filtration was studied by simulating metal filtration with water with pieces of paper representing the films. Lumps of crushed magnesite bricks were used as filtering agent. The filtration results showed that a lump filter of 50 mm thickness holds back 50 - 70% of particles 1 x 1 mm in size, while a filter of 100 mm thickness detains 90 - 95% of such particles. During the filtration of the D16 alloy, melted in a graphite cruci-

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Removing films from metals by filtration

ble at 750°C, the lump filter was placed in the spout, which was preheated to 700°C. 5 - 7 ingots 50 mm in diameter and 150 mm high were cast in succession. The number of films and their total area were counted on the fracture. Three lots of ingots were cast - without filtration, with filtration through lumps of magnesite brick of 5 - 10 lump size and with filtration through lumps of a melt consisting of equal parts calcium and magnesium fluorides of the same lump size. As a result of these tests it was found that ingots cast without filtration contained 12% impurities, those with magnesite filtration 3% and with fluoride filtration 1%. This filtration method was tested under service conditions with the AK5 alloy, the tests being carried out by Yu.I. Birevaya, L.A. Kats, S.A. Baranovskiy and A.M. Babarikina. Eleven ingots 110 mm in diameter were cast at a rate of 15 cm/min directly from the melting furnace at 750°C. The following filtering material was used: magnesite brick, an alloy of equal parts of calcium and magnesium fluorides, and magnesite brick impregnated with liquid flux of the 2 compositions: No. 1 - 40% NaF, 60% Na_3AlF_6; No. 2 - 64% NaF, 36% NaCl. The following filtering results were obtained: average impurity without filtration 5%; with filtration through magnesite 1.5%; with filtration through magnesite impregnated with No. 1 flux 0.9%; idem with No. 2 flux 0.5%; and filtration through the fluoride alloy 0.3%. Although this filtration meth-

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ed yielded good results the metal purity was still insufficient, which could be explained by the fact that the metal, after passing through the filter, ran in an open flow, thus oxidizing again and contaminating with film. Another test series was carried out under industrial conditions with the participation of P. Ye. Khodakov, V.V. Solov'yeva, M.G. Kasheyev and I.I. Ger'yev, where the filtration system was changed in such a way as to prevent the oxidation of the metal after filtration. Under these conditions the average contamination amounted to 1.7% without filtration and 0.24% with filtration. The results obtained make it possible to conclude that filtration through lump filters in the semi-continuous casting of aluminum alloys improves the metal purity considerably as regards film. The filter should be placed in the distributing funnel, while crushed magnesite brick, either with or without flux impregnation, and fluoride alloys can be used as filtering material. Magnesite and fluoride alloys are heavier than aluminum and there is no chemical reaction up to 1,000°C. Further tests with lump filters carried out during pressure casting by M.V. Pikunov, Ye.Ya. Lebedev and A.G. Spasskiy showed the applicability of this filtration method also for pressure casting. Various Al-alloys - АЛ9В (AL9V), АЛ3Ч (AL3Ch) АЛ14Ч (AL14Ch) and others - were cast in this way at the Moskovskiy zavod malolitrazhnykh avtomobiley (Moscow Small-Displacement Car Plant). Crushed magne-

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Removing films from metals by filtration

S/128/61/000/012/003/004
A004/A127

site brick in lumps of 12 - 15 mm, calcinated prior to use at 900°C was used as filtering material. Also the filtration of the ЦАМ4-1 (TsAM 4-1) zinc alloy resulted in a considerably improved metal purity. There are 8 figures, 1 table and 7 references: 4 Soviet-bloc and 3 non-Soviet-bloc.

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S/128/61/000/012/004/004
A004/A127

AUTHORS: Kurdyumov, A.V.; Teplitskiy, M.D.

TITLE: The effect of the melting conditions on the quality of Бр. AMц 9-2 (Br. AMts. 9-2) bronze

PERIODICAL: Liteynoye proizvodstvo, no. 12, 24 - 26 - 1961

TEXT: Since hitherto no standard technology of smelting aluminum bronze had been in existence, special investigations were carried out to establish the effect of the melting conditions on the properties of Br. AMts 9-2 bronze. These tests were carried out at the Institut tsvetnykh metallov im. M.I. Kalinina (Institute of Non-Ferrous Metals im. M.I. Kalinin) and aimed at determining the effect of the succession of adding the charge constituents on the contamination of the melt by nonmetallic inclusions and the mechanical properties. Besides, the purity of the alloy was studied when 50% each of pure metal and waste or only waste was used. Moreover, the Institute investigated the effect of various fluxes on the melt impurity, mechanical properties and metal losses with the slag when the charge constituents were added in different succession. The following fluxes were tested: borax, cryolite, the eutectic alloy of calci-

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um and magnesium fluorides and carbon cover. The contamination by nonmetallic impurities was compared for melting in electric and gas furnaces. The starting materials were pure aluminum and copper and a copper-manganese foundry alloy, containing 20% manganese. The charge weight was 3 - 5 kg. Melting was carried out in a graphite-chamotte crucible in a Silit furnace. The contamination of the melt by nonmetallic and oxide inclusions was checked by the Dobatkin and Zinov'yev test (Ref. 3: V.I. Dobatkin, V.K. Zinov'yev, "Zavodskaya laboratoriya", no. 4, 1955). Ingots 40 mm in diameter and 200 mm long were cast in a graphite mold. Specimens were cut out from the ingots and upset under a forging hammer and the oxide inclusions determined by the fracture, where they showed as gray-brown stains. The mechanical properties were determined on cast and turned specimens. The test results showed that in order to obtain a Br. AMts.9-2 bronze with a minimum contamination by nonmetallic impurities, high mechanical properties and low metal losses with the slag, it is necessary to melt this bronze under a flux layer, either cryolite or calcium and magnesium fluoride alloys in the order copper - foundry alloy (copper - manganese) - aluminum. If melting is carried out without protective cover or under a charcoal cover, it is not admissible to add the aluminum to the molten copper prior to manganese, since this would result in a considerable contamination of the bronze

by oxide inclusions. If the bronze is melted from waste it is necessary to melt the copper, then to add the necessary amount of manganese or copper manganese foundry alloy, and only thereupon the waste and aluminum. The use of charcoal as protective layer during the melting of Br. AMts 9-2 bronze is practically useless. There are 3 figures, 2 tables and 3 Soviet-bloc references

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S/128/62/000/002/005/007
A004/A127

AUTHORS: Kurdyumov, A.V., Stekol'nikova, G.A.

TITLE: The effect of vacuum treatment on the casting properties of the AL10 (AL10) alloy

PERIODICAL: Liteynoye proizvodstvo, no. 2, 1962, 28 - 30

TEXT: The authors point out the advantages of the vacuum treatment of metals, e.g., reduced porosity of the castings, improved surface finish, refining of macrograins and improved mechanical and casting properties, and state that this method has not yet been propagated in the casting of nonferrous metals owing to insufficient data on the effect of vacuum treatment on the casting and mechanical properties of these alloys. To study, in particular, the most important casting property, viz. the tendency to form cracks under difficult shrinkage conditions, tests were carried out to vacuum-treat the AL10 alloy. The authors give a description of the vacuum-treatment process of this alloy, present a schematic of the installation used and the results of determining the gas saturation of the AL10 alloy prior to and after the vacuum treatment on the alloy density, the magnitude of volumetric shrinkage of the castings and the tendency to crack formation. A

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The effect of vacuum treatment.....

S/128/62/000/002/005/007
A004/A127

Comparison of macrosections proved that vacuum-treated specimens showed a lower porosity than non-vacuum-treated ones, while the alloy density rose with an increased vacuum and holding time of the melt. The volumetric shrinkage also increases with a higher vacuum and reaches 9.8 - 10.3% at a residual pressure in the autoclave of 10 mm Hg. An increase in the vacuum-treatment temperature hardly affects the magnitude of volumetric shrinkage, while the maximum volumetric shrinkage of the castings can be observed with 15 - 20 minutes holding. On the other hand, the results show that the tendency to crack formation of the vacuum-treated AL10 alloy exceeds that of the non-vacuum-treated alloy nearly by a factor of 2, which can be explained by the increase in volumetric shrinkage and the decrease in gas saturation and porosity. Generally, the authors point out that the vacuum treatment at a comparatively low vacuum of 10 mm Hg essentially changes the properties of the AL10 alloy. The expediency of using this process should be decided for every single case, taking into consideration the considerably increased tendency of the alloy to crack formation. There are 5 figures and 6 Soviet-bloc references.

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S/149/62/000/003/010/011
A006/A101

AUTHORS: Kurdyumov, A. V., Stekol'nikova, G. A.

TITLE: The effect of vacuum treatment on casting properties of АЛ10 (AL10) alloy

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, no. 3, 1962, 147 - 153

TEXT: An investigation was made for the purpose of gathering data on the effect of vacuum-treatment upon the casting properties of Al alloys and to reveal the expediency of using such a method for AL10 alloys. The following factors were studied in particular: the effect of the vacuum rarefaction, holding time and temperature of the melt during vacuum-treatment upon gas-saturation, porosity of castings, volume shrinkage, the volume of an open shrinkage-cavity, crack sensitivity of the alloy during inhibited shrinkage, fluidity and density. Castings were produced under conventional conditions and with vacuum treatment on a unit shown in Figure 1 at 10, 100, 200 and 300 mm Hg residual pressure in the autoclave. It was found that vacuum treatment of liquid alloy AL10 changed consider-

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ably its casting properties at relatively low pressure (10 mm Hg). Vacuum treatment promotes the elimination of dissolved gas from the melt. Practically full elimination of the gas is assured by holding the melt in the autoclave for 25 - 30 minutes at 750 - 800°C and 10 mm Hg residual pressure. Porosity of vacuum-treated castings is below that of conventional specimens. Density increases with higher rarefaction and extended holding time in a vacuum. Volumetric shrinkage of vacuum-treated castings exceeds that of conventional ones. With a greater rarefaction in the vacuum, the shrinkage increases to 9.8 - 10.36% at 10 mm Hg residual pressure. Extended holding time at constant rarefaction and temperature increases volume shrinkage, whose maximum is observed at 15 - 20 minute holding time. The volume of an open shrinkage cavity increases with vacuum treatment. Crack sensitivity of AL10 alloy during inhibited shrinkage increases with greater rarefaction; it is almost twice as high as that of non-treated material; this is explained by higher volume shrinkage and reduced gas saturation and porosity of vacuum-treated samples. Fluidity is only affected by vacuum treatment at lower temperatures. It is greater for a vacuum-treated specimen. The expediency of using vacuum treatment should be established for each particular case by taking into account the increase in crack-sensitivity

during inhibited shrinkage. In the case of compact castings, when there is no particular shrinkage resistance from the mold, gaseous porosity will be eliminated and density will increase on account of large-volume concentrated shrinkage cavities. On the other hand, when shrinkage is inhibited by the mold or the core, vacuum-treatment will increase the amount of rejects due to cracks. There are 3 figures and 2 tables.

ASSOCIATION: Krasnoyarskiy institut tsvetnykh metallov (Krasnoyarsk Institute of Non-Ferrous Metals) Kafedra liteynoye proizvodstvo (Department of Foundry Practice)

SUBMITTED: November 16, 1961

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18.1744

S/128/62/000/004/002/010
A004/A127

AUTHORS: Kurdyumov, A.V.; Shestyrev, I.A.

TITLE: Crystallization of magnesium alloys under pressure

PERIODICAL: Liteynoye proizvodstvo, no. 4, 1962, 4 - 5

TEXT: The authors mention the fact that magnesium-alloy castings rather often show a considerable porosity. The industrial МЛ 4 (ML4) and МЛ 5(ML5) alloys possess a great crystallization temperature range of 210° and 157°C respectively. The volume of micropores may be considered insignificant, it is in the range of 0.75 to 1% of the total casting volume, but the tensile strength of specimens of 0.75% microporosity decreases already by a factor of 2. Investigations were carried out to study the possibility of applying pressurized crystallization in casting the ML4 and ML5 magnesium alloys, and to find out the effect of pressure on the casting porosity. The alloys were produced from fresh metal and master alloys and were cast in ingot molds. To prevent the feeding of the casting from the riser, the gate dimensions were chosen in such a way that the metal in it crystallized in the first place. For pressurized crystallization the mold was placed in an autoclave whose cover was closed after

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the metal was poured into the green mold. Compressed air was supplied into the autoclave and the mold was held under pressure for 10 - 15 min. The porosity of the pressurized castings was determined by comparing them to specimens cast in the conventional way. The results proved that pressurized crystallization of magnesium-alloys increased their density, and the higher the pressure, the lower will be the porosity. The best results were obtained at pressures of 3 - 5 atm. Moreover, a comparison of the porosity of specimens poured at 690 and 800°C respectively revealed that the pressure effect was higher when pouring was effected at elevated temperatures. The authors conclude by stating that pressurized crystallization, which has been successfully employed in the casting of Al-alloys, will result in a higher density and lower porosity of magnesium castings, the optimum pressure magnitude being 3 - 5 atm, while the pouring temperature should not be lower than 760 - 800°C. There are 4 figures.

KURDYUMOV, A.V.; STEKOL'NIKOVA, G.A.

Effect of vacuuming on the founding properties of the AL10 alloy. Izv. vys.ucheb.zav.; tsvet.met. 5 no.3:147-153 '62.
(MIRA 15:11)

1. Krasnoyarskiy institut tsvetnykh metallov, kafedra liteynogo proizvodstva.
(Aluminum founding) (Vacuum metallurgy)

KURDYUMOV, A.V.; AKIMOVA, K.I.

Hardening of Br.AMts 9-2 alloys by an addition of nickel. Izv. vys. ucheb. zav.; tsvet. met. 5 no.4:149-151 '62. (MIRA 16:5)

1. Krasnoyarskiy institut tsvetnykh metallov, kafedra liteynogo proizvodstva.

(Bromine compounds) (Nickel)

KURDYUMOV, A.V.

Refining copper alloys from oxide inclusions. Lit. proizv. no.5:41-42 My '62. (MIRA 16:3)
(Copper alloys—Inclusions) (Nonferrous metals—Founding)

ACCESSION NR: AP3000986 S/0149/63/000/002/0167/0171

AUTHOR: Stepanov, M. A.; Durdyumov, A. V.; Goloborodov, V. N.

TITLE: Corrosion resistance of iron-aluminum alloys in fluorine at temperatures of 500--700C

SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 2, 1963, 167-171

TOPIC TAGS: iron-aluminum alloys, iron-aluminum-calcium alloys

ABSTRACT: The corrosion behavior of Fe-Al and Fe-Al-Ca alloys in a fluorine atmosphere at 500--700C was studied. The alloys were melted in an h-f induction furnace from Armco iron with AV000 [99.99% pure] Al added in amounts ranging from 5.5 to 31.0%. In one case, 1.5% Ca and 5.5% Al were added. The microstructure of all the alloys was found to consist of Alpha solid solution and, in most cases, a second component of undetermined composition along the grain boundaries. Hardness increased with increasing Al content from 84 R sub B at 5.5% Al to 45 R sub C at 31% Al. Results of corrosion testing showed that none of the alloys was corrosion resistant

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ACCESSION NR: AP3000986

under the test conditions and that the corrosion products possessed no protective properties. At 500C the corrosion rate (weight gain) in 5- to 10-hr tests varied from 10 to 57 g/m sup 2 times hr; at 600--700C the rates were still higher. The Fe-Al-Ca alloy specimen was almost completely destroyed in the test at 500C. Orig. art. has: 3 figures and 3 tables.

ASSOCIATION: Moskovskiy institut stali i splavov. Kafedra liteynogo proizvodstva (Moscow Steel and Alloy Institute. Department of Founding)

SUBMITTED: 06Jul62 DATE ACQ: 21Jun63 ENCL: 00

SUB CODE: 00 NO REF SOV: 009 OTHER: 003

Card 2/2

S/123/63/000/003/005/005
A054/A126

AUTHORS: Kurdyumov, A.V., Frolov, V.V.

TITLE: The duration of the effect of inoculation during vacuum treatment of the AЛ 4 (AL4) alloy

PERIODICAL: Liteynoye proizvodstvo, no. 3, 1963, 41 - 42

TEXT: To avoid the formation of an acicular structure, the widely used AL4 alloy has to be modified by sodium salts. During th inoculation, however, the alloy adsorbs hydrogen resulting in a considerable porosity of the metal. Tests were carried out to establish a suitable refining method for this alloy, which would not weaken or shorten the effect of modification, by subjecting the alloy to vacuum treatment. In the tests the AL4 alloy, containing, besides Al, 9.9% Si, 0.25% Mg, 0.5% Mn and 0.4% Fe, was used. The degree of modification was assessed by the grain size of silicon in the eutectic (the bigger the grain size, the weaker the effect of inoculation). For modification the fluor and chlorine salts of sodium were used in a 2 : 1 ratio, amounting to 2% of the alloy quantity; samples were processed at temperatures between 750 and 810°C, and

Card 1/2

The duration of the effect of inoculation ....

in a vacuum of 10 and 20 mm Hg in the autoclave. The analysis of the fracture surface and microstructure of the specimens showed that the effect of sodium inoculation can be maintained for the longest time (20 - 30 min) and a dense metal structure can be obtained, if the AL4 alloy is vacuum-treated at 750 and 780°C ± 10°C in 10 - 20 mm Hg vacuum, due to which treatment the adsorbed gases are removed from the metal without weakening the effect of inoculation. There are 2 figures and 1 table.

KURDYUMOV, A.V.; DEMIN, Yu.V.; ZHDANOV, G.S.

Effect of technological factors on the mechanical properties and tendency toward crack formation of the ML5 alloy. Lit. proizv. no.8:17-18 Ag '63. (MIRA 16:10)

KURDYUMOV, A.V.; GOLOBORODOV, V.N.; STEPANOV, M.A.

Effect of magnesium and calcium on the corrosion resistance of nickel in an atmosphere of fluoride at 700-860°. Izv. vys. ucheb. zav.; tsvet. met. 6 no.4:138-144 '63. (MIRA 16:8)

1. Moskovskiy institut stali i splavov, kafedra tekhnologii liteynykh protsessov.

(Nickel—Corrosion)
(Metals at high temperatures)

S/126/63/015/002/014/033
E193/E383

AUTHORS: Kardonskiy, V.N., Kurdyumov, G.V. and Perkas, M.D.

TITLE: The fine structure of cold-worked high-carbon steel

PERIODICAL: Fizika metallov i metallovedeniya, v. 15, no. 2, 1963, 244 - 253

TEXT: The object of the present investigation was to study the relationship between the strength and fine structure of steel subjected to heat and mechanical treatment and to explain the part played by cementite and by its particle size in the formation of fine structure in the deformed α-phase. The experiments consisted of the following. Hot-rolled, 1.5 - 2.0 mm thick strip of steel Y10 (U10) and Y12 (U12) was (1) continuously patented by passing (at 2.7 m/min) through a furnace at 920 °C and then through a lead bath at 420 °C, or (2) annealed by maintaining for 20 min at 860 °C, furnace-cooling to 600 °C and then cooling in air to room temperature. The heat-treated strip was then cold-rolled to up to 95% reduction thickness. The UTS attained in steels U10 and U12 after patenting and cold-rolling was 270-290 and 300-320 kg/mm², respectively, the UTS of annealed and cold-rolled steel U10 being 180 kg/mm². The

Card 1/3

The fine structure ....

S/126/63/015/002/014/033
E193/E383

fine structure of steel after various degrees of cold deformation was studied with the aid of an electron microscope, X-ray diffraction measurements being used to determine the block dimensions and the magnitude of distortions of the second type. Conclusions: 1) the formation of sub-structure in ferrite during plastic deformation depends to a great extent on the presence of cementite and on the shape and size of crystals of this constituent. Small (0.1-0.2 μ) spacing between the platelets of the eutectoid, ensured by the patenting treatment, creates conditions favourable for a considerable reduction in the block dimensions of ferrite (100 - 150 Å) and cementite (30-50 Å) in cold-deformed steel. This is demonstrated in Fig. 10, where the UTS (σ_B, kg/mm^2), block dimensions (D.10^6 cm) and the magnitude of distortions of the second type ($\Delta a/a$) of steel U12 are plotted against the degree of deformation (bottom scale, %) and thickness of the strip (upper scale, mm), the circles and dots representing, respectively, the results obtained for patented and annealed specimens. 2) The high degree of fragmentation of the ferrite and cementite, high degree of misalignment of blocks in the interior of the grains, formation

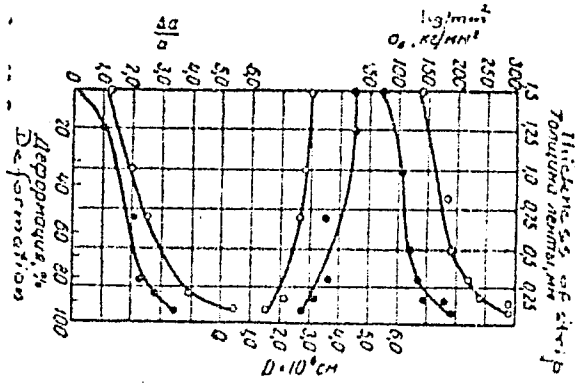
Card 2/3

The fine structure ....

of a very dense network of obstacles to movement of dislocations (both present in the ferrite grains and in the form of grain boundaries between ferrite and cementite particles) constitute the main causes of high strength of patented and cold-worked steel strip. There are 11 figures and 1 table.

ASSOCIATION: Institut metallofiziki TsNIIChM (Institute of Metal Physics, TsNIIChM)

SUBMITTED: August 1, 1962



Card 3/3

Fig. 10

ACCESSION NR: AP4038808 S/0128/64/000/005/0014/0016

AUTHORS: Kurdyumov, A. V. (Candidate of technical sciences); Skuchilov, A. I. (Engineer); Gorokhov, V. P. (Engineer); Kofman, L. M. (Engineer)

TITLE: Purification of AMg-6 alloy from oxide films by filtration through grain filters

SOURCE: Liteynoye proizvodstvo, no. 5, 1964, 14-16

TOPIC TAGS: grain filter, filtration, aluminum alloy, alloy AMg 6, oxide film, scab formation, aluminum titanium alloy, aluminum manganese alloy, carnallite flux, gas content, Dardell Gudchenko method, alloy AK6, alloy D16

ABSTRACT: The effectiveness of grain filters (with different chemical compositions) in freeing aluminum alloys AMg-6, AK6, and D16 of various nonmetallic inclusions (gases, slags, and oxide films) was studied experimentally. Aluminum AMg-6 was filtered in a device shown in Fig. 1 of the Enclosures. Here: 1- mixer; 2- siphon; 3- intermediate container; 4- filter; 5- casting box; 6- automatic regulator of metal level in crystallizer; 7- crystallizer; 8- ingot. Two filter types were tested: 1) magnesite grains (8-10 mm); 2) calcium fluoride and magnesium fluoride grains. The filtration material was cleaned by compressed air, heated to

Card 1/5

ACCESSION NR: AP4033808

500-600C, and poured into the filter box of the casting device. The metal passed through these filters before entering the crystallizer. In the process of metal pouring the melt samples were collected for chemical analysis. Their gas content was determined by the Dardell-Gudchenko method. The results showed that filtering of the alloys produced a considerable purification. According to the diagram shown in Fig. 2 of the Enclosures the ingots filtered through the magnesite grains (curve 2) had one half as many impurities, and those filtered through the fluoride grains (curve 3) had one third as many impurities as the nonfiltered samples (curve 1). Dark inclusions of magnesium oxide and spinel were practically absent. Gas concentration in ingots showed in a direct relation to the degree of their pollution (see Fig. 3 of the Enclosures). Orig. art. has: 3 tables and 9 figures.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 05Jun64 ENCL: 03

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

Card 2/5

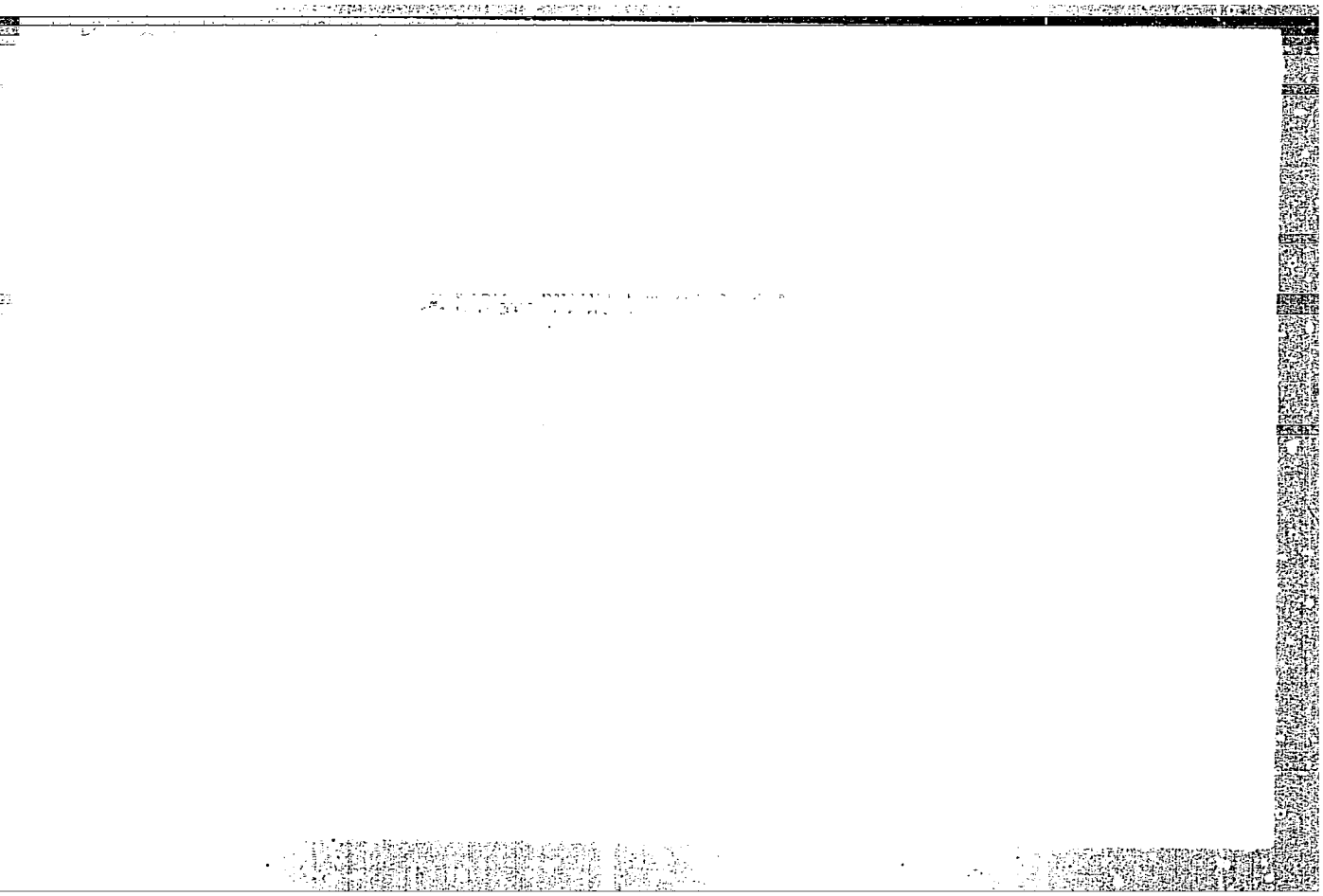
KURDYUMOV, A.V.; SKUCHILOV, A.I.; GOROKHOV, V.F.; KOFMAN, L.M.

Purification of the AMg-6 alloy from oxide film by filtration through a refractory material filter. Lit. proizv. 5:14-16 My '64. (MIRA 18:3)

KURDYUMOV, G.D.

New developments in earthwork done by hydromechanical methods.
Mekh.trud.rab. 9 no.12:43-45 D '55. (MLRA 9:5)

1. Glavnyy inzhener upravleniya gidromekhanizatsii.
(Hydraulic engineering) (Earthwork)



APPROVED FOR RELEASE: 06/19/2000 CIA-RDP86-00513R000927710003-2"

5(3)

AUTHORS: Semenenko,K.N. and Kurdyumov,G.M. SOV/55-58-2-28/35

TITLE: On Complex Compounds of Zinc Acetate With Nitrogenous Organic Substances (O kompleksnykh soyedineniyakh uksusnokislogo tsinka s azotsoderzhashchimi organicheskimi veshchestvami)

PERIODICAL: Vestnik Moskovskogo Universiteta.Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1958,Nr 2,pp 207-210 (USSR)

ABSTRACT: The compounds $Zn(CH_3COO)_2 \cdot 2C_5H_5N$ and $Zn(CH_3COO)_2 \cdot 2C_4H_8NH_2$ were produced and investigated. It was shown that zinc acetate solutions in water and several organic solvents possess an abnormally high viscosity. The monocrystals of the produced combinations mentioned above were radiographically investigated.
There are 3 tables, and 8 references, 1 of which is Soviet, 3 are German, 2 French, and 2 American.

SUBMITTED: June 7, 1957

Card 1/1

5(2)

AUTHORS: Semenenko, K.N. and Kurdyumov, G.M. SOV/55-58-3-22/30

TITLE: On the Combinations of Beryllium Hydroxybenzoate With Toluene and Halogen-Substituted Benzene (O soyedineniyakh oksibenzoata berilliya s toluolom i galogenzameshchennymi benzolami)

PERIODICAL: Vestnik Moskovskogo universiteta, Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1958, Nr 3, pp 187-190 (USSR)

ABSTRACT: By vaporization of a Be-hydroxybenzoate solution in a corresponding solvent there were obtained in crystalline form less stable combinations of Be-hydroxybenzoate with some organic molecules. A radiography was carried out and it showed that the organic molecules are enclosed in the interspaces of the crystal lattice of Be-hydroxybenzoate, whereby the original lattice is somewhat deformed.
There are 2 tables, and 2 Soviet references.

ASSOCIATION: Kafedra neorganicheskoy khimii (Chair of Inorganic Chemistry)

SUBMITTED: June 7, 1957

Card 1/1

SEMENENKO, K.N.; KURDYUMOV, G.M.

Some properties of beryllium α-hydroxynaphthoate. Vest. Mosk. un. Ser. 2: Khim. 15 no.5:56-58 S-O '60. (MIRA 13:11)

1. Moskovskiy gosudarstvennyy universitet, kafedra neorganicheskoy khimii.

(Beryllium compounds) (Naphthoic acid)

SEMENENKO, K.N.; KURDYUMOV, G.M.; GORDEYEV, I.V.

Heats of sublimation of beryllium oxysalts. Zhur.neorg.khim. 6 no.9:2025-2028 S '61. (MIRA 14:9)
(Beryllium salts)

SEMENENKO, K.N.; KURDYUMOV, G.M.

Beryllium oxysalts of the alicyclic and aliphatic series. Zhur.neorg.khim. 7 no.7:1512-1515 Jl '62. (MIRA 16:3)

(Beryllium salts)

KURDYUMOV, G.M.; SEMENENKO, K.N.

Beryllium oxybenzoate compounds with aromatic hydrocarbons.
Zhur.neorg.khim. 7 no.9:2115-2121 S '62. (MIRA 15:9)
(Beryllium compounds) (Hydrocarbons)

KURDYUMOV, G.M.; SEMENENKO, K.N.

Heats of formation and the structure of the compounds of beryllium hydroxybenzoate with benzene and styrene. Zhur. neorg. khim. 8 no.11:2545-2548 N '63. (MIRA 17:1)

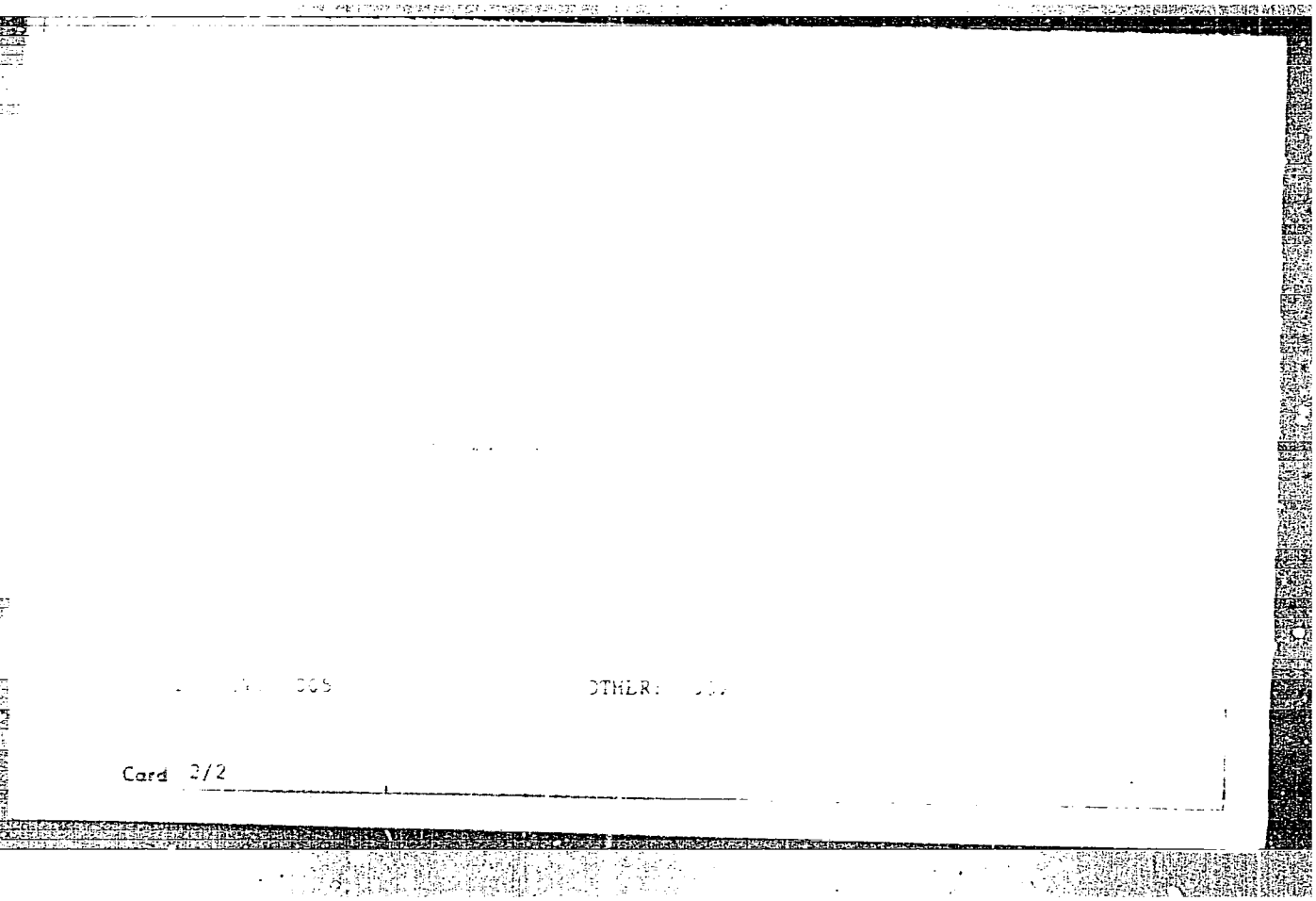
SHUL'MAN, L.Ye.; KAGAN, I.L.; CHUBUKOV, A.A.; SHAPIRO, A.A.; KURLYUMOV, G.M.

Automatic electric machine for briquetting cast iron chips.
Mashinostroitel' no.2:5-6 F '65. (MIRA 18:3)

[illegible] EWT(m)/EPF(c)/EPF(n)-2/T/EWP(t)/EWP(b)/EWA(c) Pr-4/Pu-4 IJP(c)

[illegible] AP5 [illegible]

ABSTRACT: The distribution of phosphorus and [illegible]



KURDYUMOV, G.M.

All-Union conference on the methods of obtaining high-purity substances. Khim.prom. 41 no.6:473 Je '65.

(MIRA 18:8)

L 02331-67 EWP(k)/EWT(d)/EWT(m)/EWP(h)/EWP(l)/EWP(v)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6030547 SOURCE CODE: UR/0413/66/000/016/0024/0024

INVENTOR: Molochko, V. A.; Mintskovskiy, A. Ya.; Kurdyumov, G. M.

ORG: none

TITLE: Equipment for purifying liquids by low temperature zone melting. Class 12, No. 184812 [announced by the All-Union Scientific Research Institute of Chemical Reagents and Ultrapure Chemical Substances (Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh reaktevov i osobo chistykh khimicheskikh veshchestv)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 16, 1966, 24

TOPIC TAGS: liquid purification, purification unit

ABSTRACT: This Author Certificate introduces equipment for purifying liquids by low-temperature zone melting. A purification unit equipped with a heater and cooler mounted in series is placed in a vertical body filled with heat-insulating material. In order to maintain and regulate the temperature of the cool sections of the purification unit, the latter is built in the form of a metallic cylinder equipped with a vessel for the coolant and an opening duct. The body of the metallic cylinder

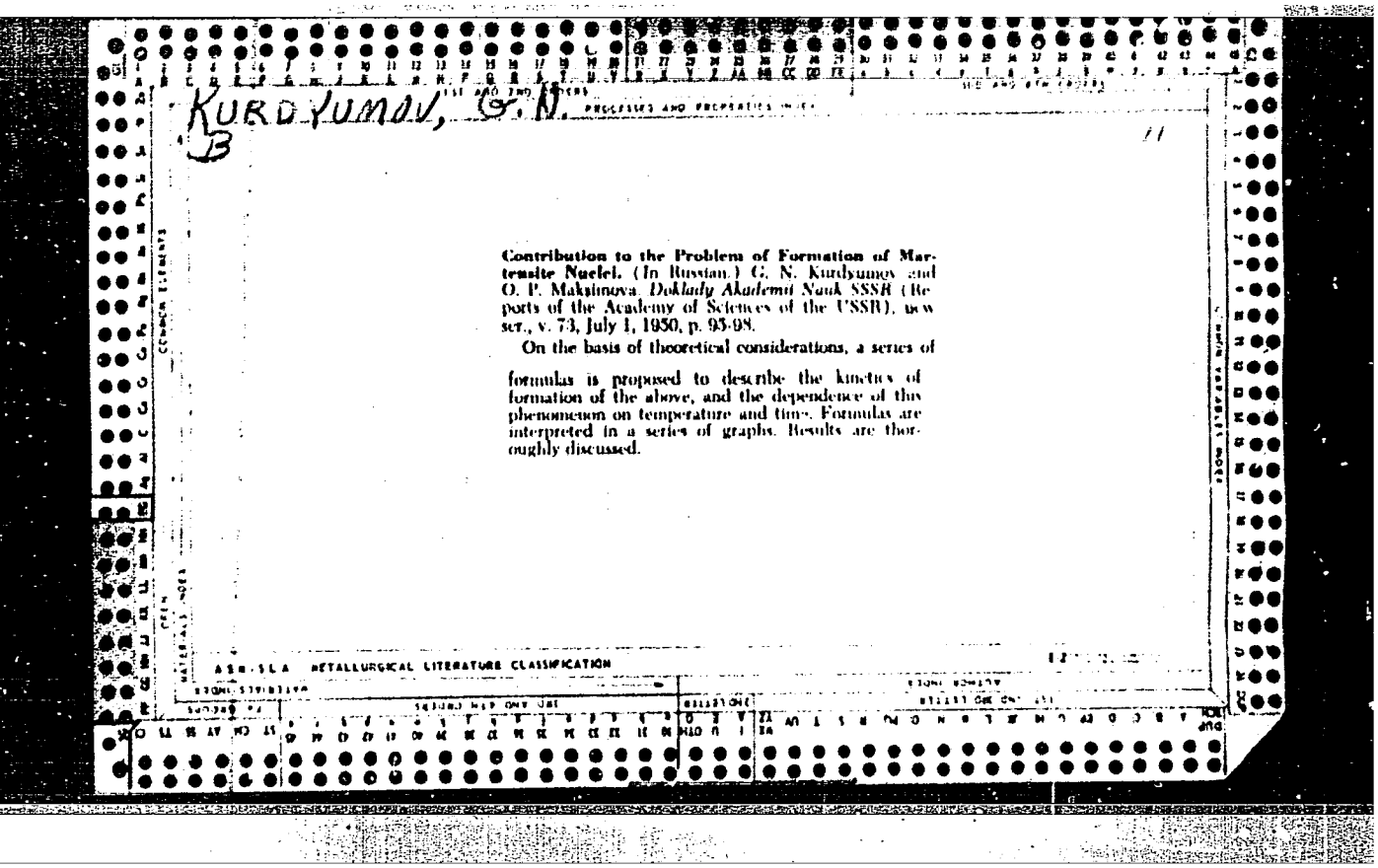
Card 1/2 UDC: 66.067.05

ACC NR: AP6030547

has slots for mounting the frames of the heaters. The slots are uniformly spaced along the opening duct. In order to keep the inside ampoule in the solid state before and after the purification process, a reservoir with the coolant is mounted in the frame of the equipment directly under the opening-duct. Orig. art. has: 1 figure. [Translation]

SUB CODE: 14/ SUBM DATE: 19May65/

Card 2/2



KURDYUMOV, G. V.
B

11

Contribution to the Problem of Formation of Martensite Nuclei. (In Russian.) G. V. Kurdyumov and O. P. Maksimova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 1, 1950, p. 95-98.

On the basis of theoretical considerations, a series of formulas is proposed to describe the kinetics of formation of the above, and the dependence of this phenomenon on temperature and time. Formulas are interpreted in a series of graphs. Results are thoroughly discussed.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

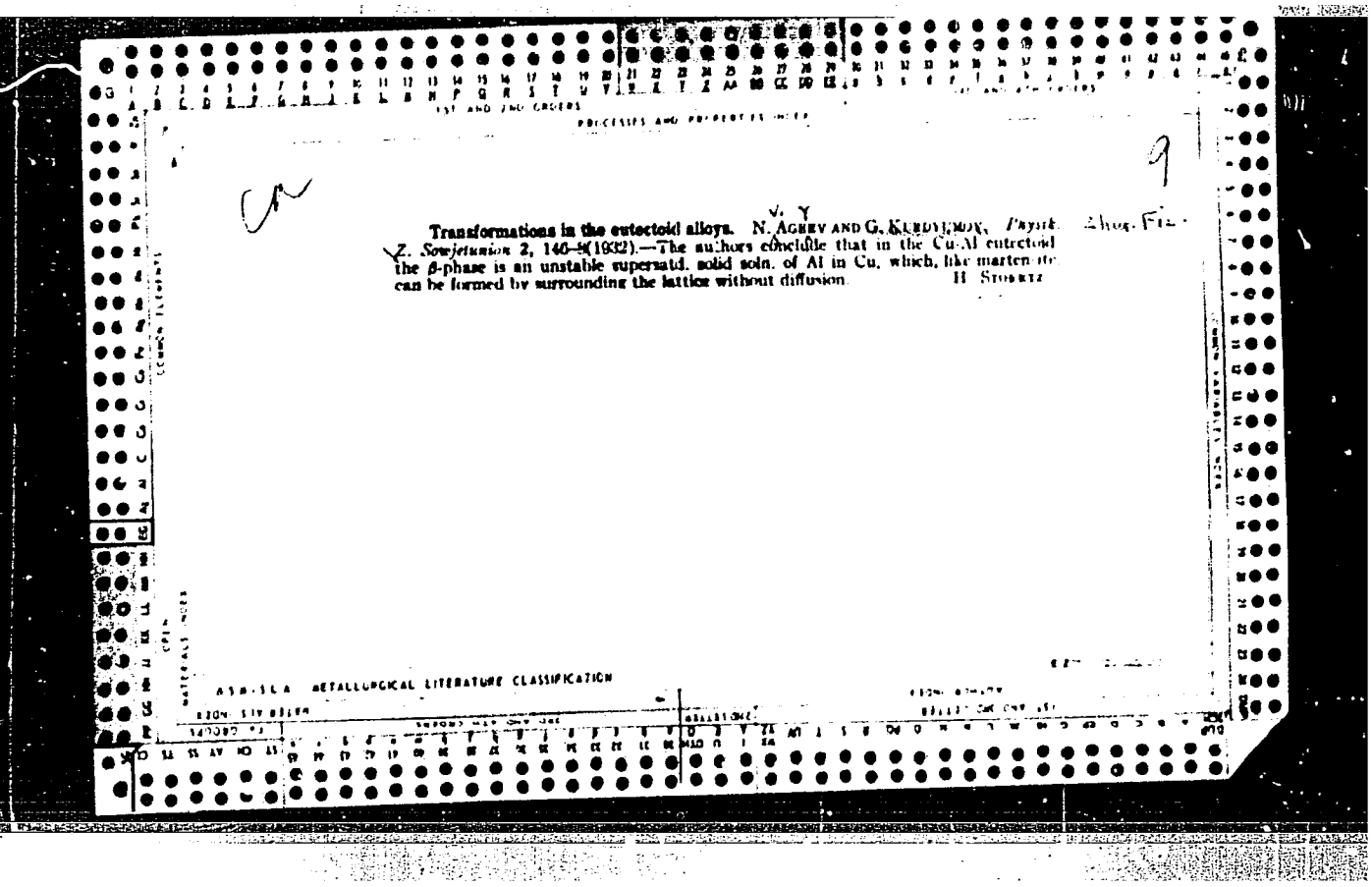
KURDYUMOV, G.V., akademik; ENTIN, R.I., doktor tekhn. nauk

Some trends in the development of theoretical study of metals.
Vest. AN SSSR 34 no.10:18-32 O '64.

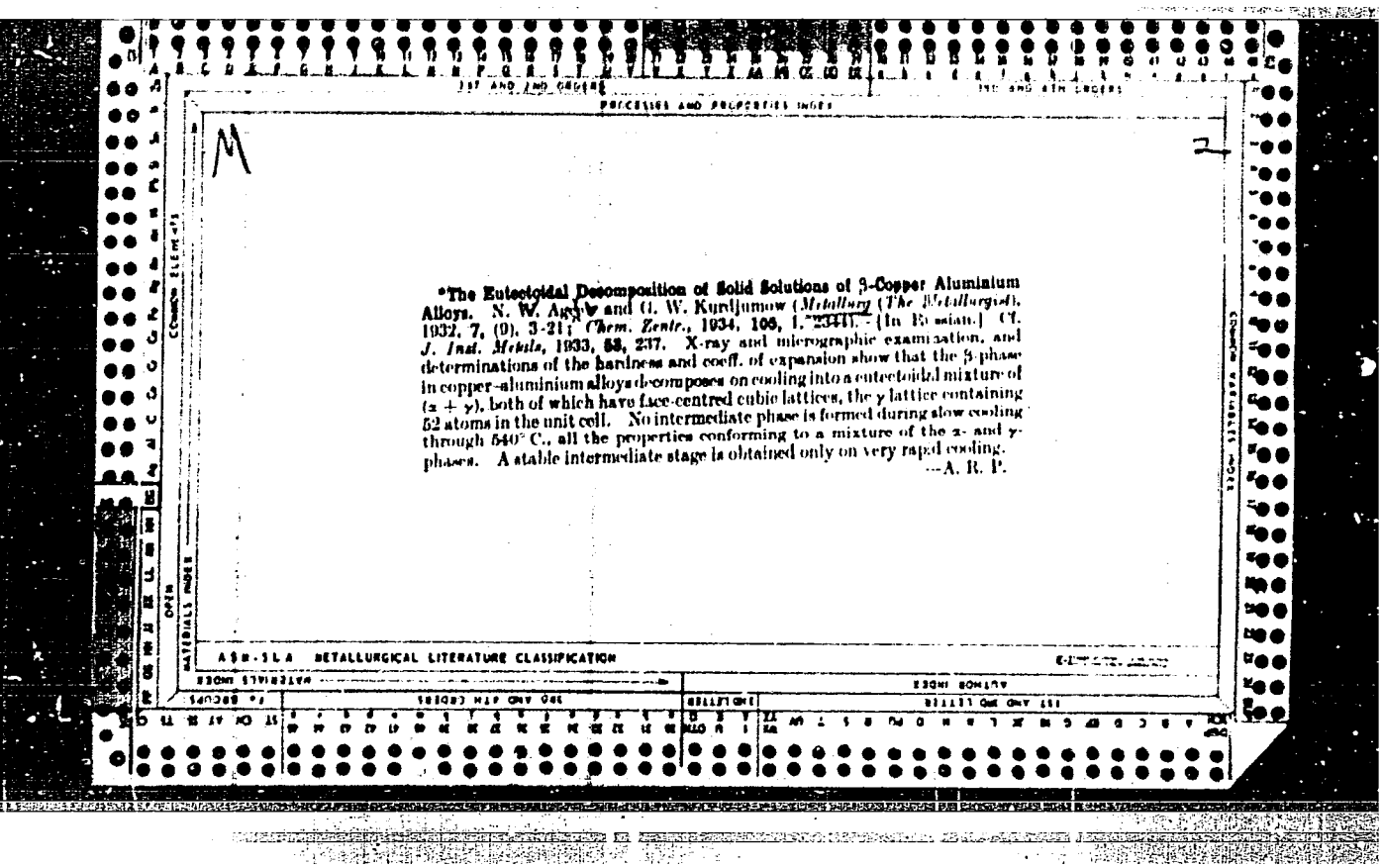
(MIRA 17:11)

KURDYUMOV, G. V., GUDTSOV, N. T. and SELYAKOV, N. Ya.

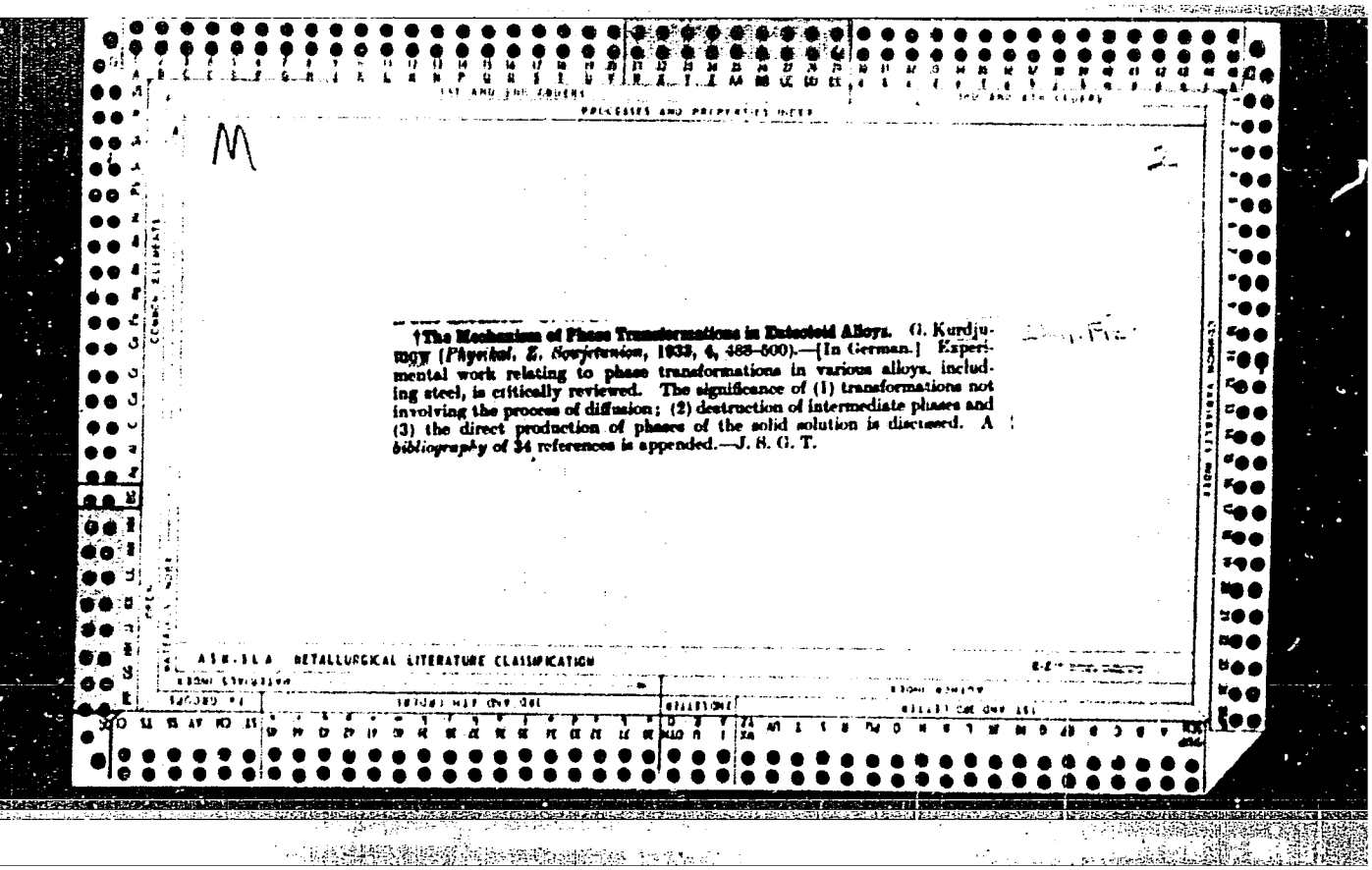
"Roentgenographic Investigation of the Structure of Carbon Steel," Zhur. Prik. Fiz, 4, No.2, 1927



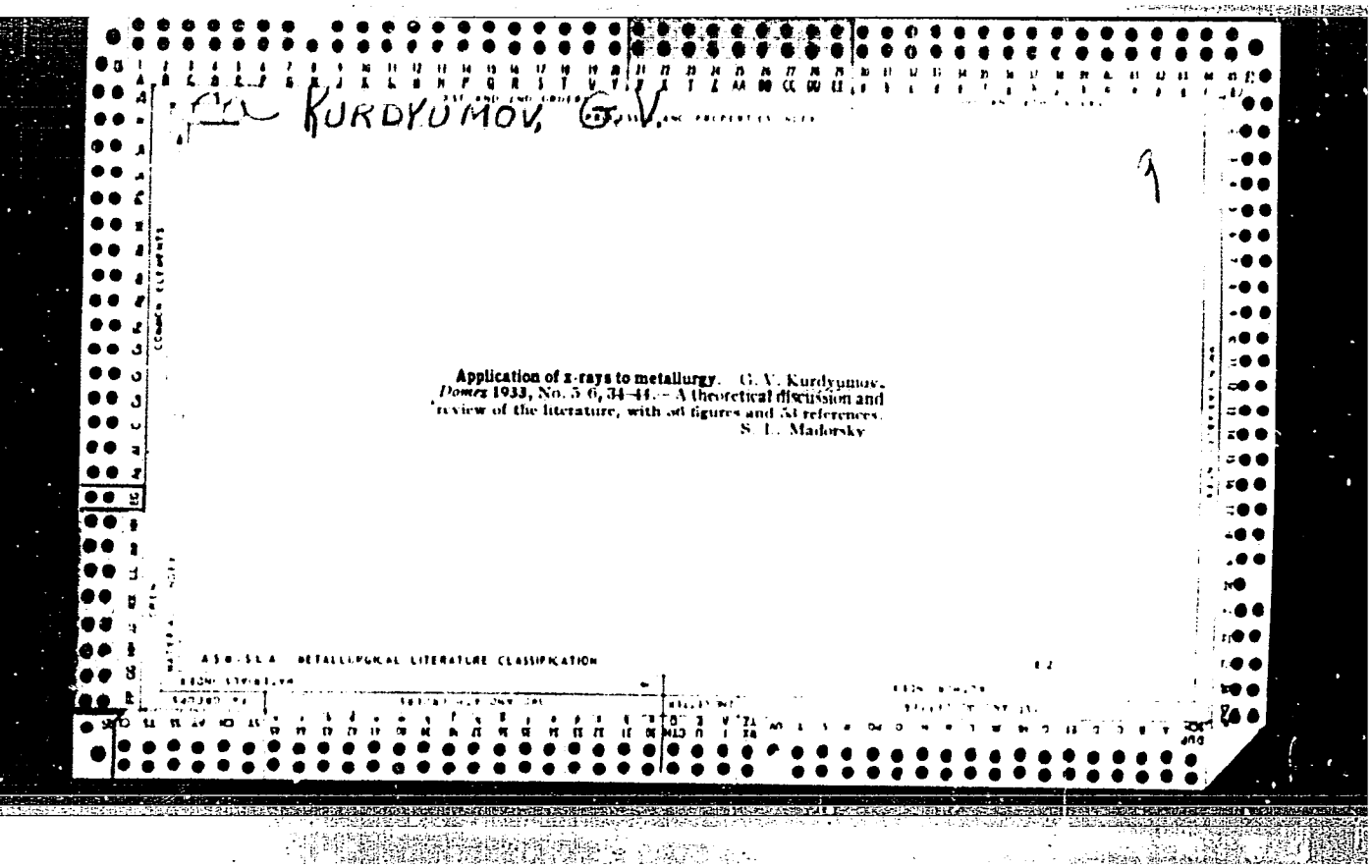
Transformations in the eutectoid alloys. N. AGREV AND G. KURDJUMOV, *Physik. Z. Sowjetunion* 2, 140–8(1932).—The authors conclude that in the Cu-Al eutectoid the β-phase is an unstable supersatd. solid soln. of Al in Cu, which, like martensite, can be formed by surrounding the lattice without diffusion. H. STOBBE



***The Eutectoidal Decomposition of Solid Solutions of β-Copper Aluminium Alloys.** N. W. Agéev and G. W. Kurdjumow (*Metallurg* (*The Metallurgist*), 1932, **7**, (9), 3-21; *Chem. Zentr.*, 1934, **105**, I., 2344. [In Russian.] Cf. *J. Inst. Metals*, 1933, **53**, 237. X-ray and micrographic examination, and determinations of the hardness and coeff. of expansion show that the β-phase in copper-aluminium alloys decomposes on cooling into a eutectoidal mixture of ($\alpha + \gamma$), both of which have face-centred cubic lattices, the γ lattice containing 52 atoms in the unit cell. No intermediate phase is formed during slow cooling through 540° C., all the properties conforming to a mixture of the α- and γ-phases. A stable intermediate stage is obtained only on very rapid cooling.
—A. R. P.



†**The Mechanism of Phase Transformations in Eutectoid Alloys.** G. Kurdjumow (*Physikal. Z. Sowjetunion*, 1933, 4, 488–500).—[In German.] Experimental work relating to phase transformations in various alloys, including steel, is critically reviewed. The significance of (1) transformations not involving the process of diffusion; (2) destruction of intermediate phases and (3) the direct production of phases of the solid solution is discussed. A bibliography of 34 references is appended.—J. S. G. T.

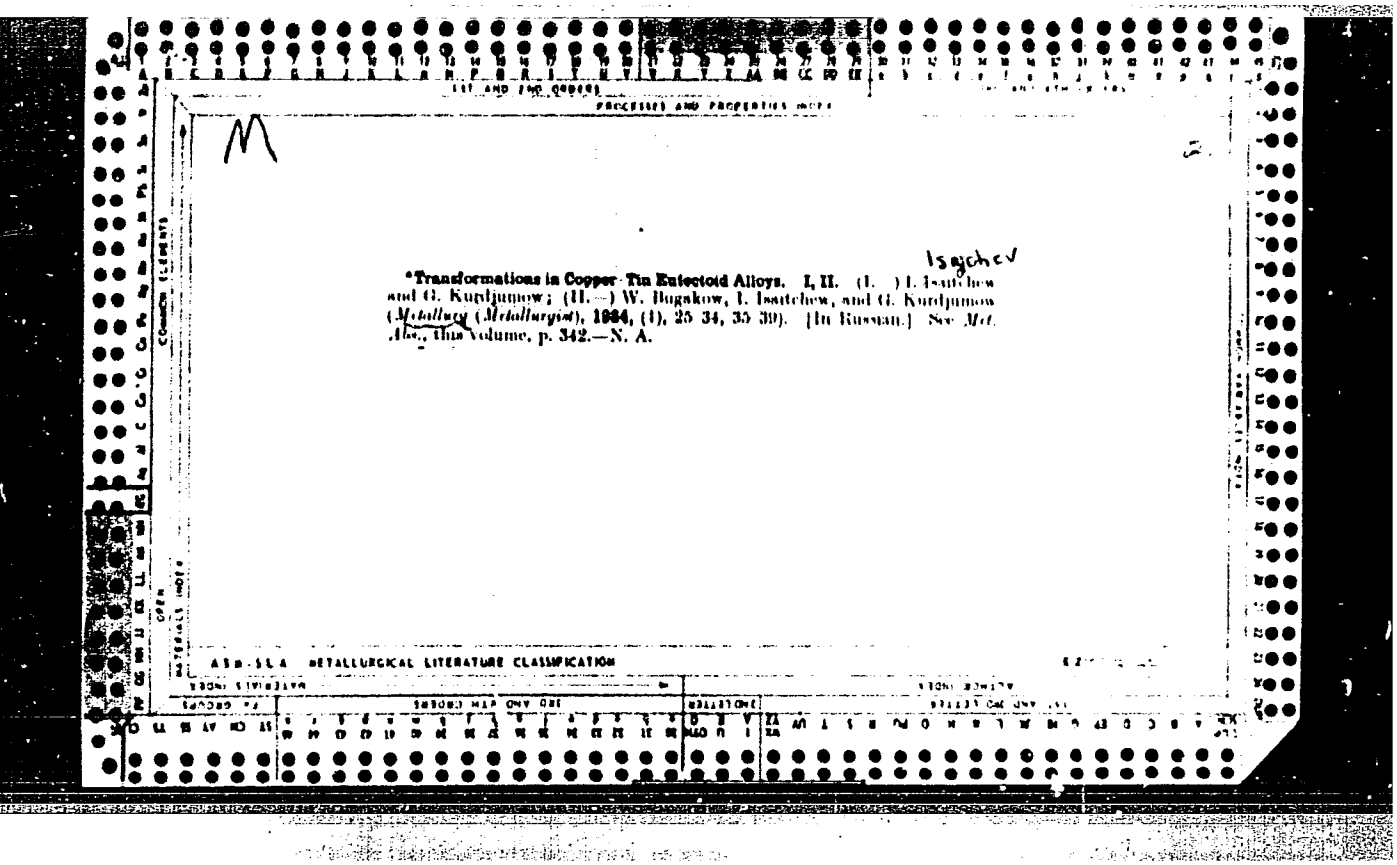


KURDYUMOV, G.V.

9

Application of x-rays to metallurgy. G. V. Kurdyumov. *Donets* 1933, No. 5-6, 34-44.—A theoretical discussion and review of the literature, with 26 figures and 51 references. S. L. Madorsky

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



Isachev

*Transformations in Copper-Tin Eutectoid Alloys. I, II. (I. —) I. Isatchew and G. Kurdjumow; (II. —) W. Bugakow, I. Isatchew, and G. Kurdjumow (*Metallurg* (*Metallurgist*), **1934**, (1), 25–34, 35–39). [In Russian.] See *Met. Abs.*, this volume, p. 342.—N. A.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

BC

B-I-7

Röntgenographic determination of residual strains. M. Shmidt, G. Kurdyumov, and A. Protopopov (Zavod. Lab., 1934, 3, 631—640).—A description of known methods. R. T.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

M

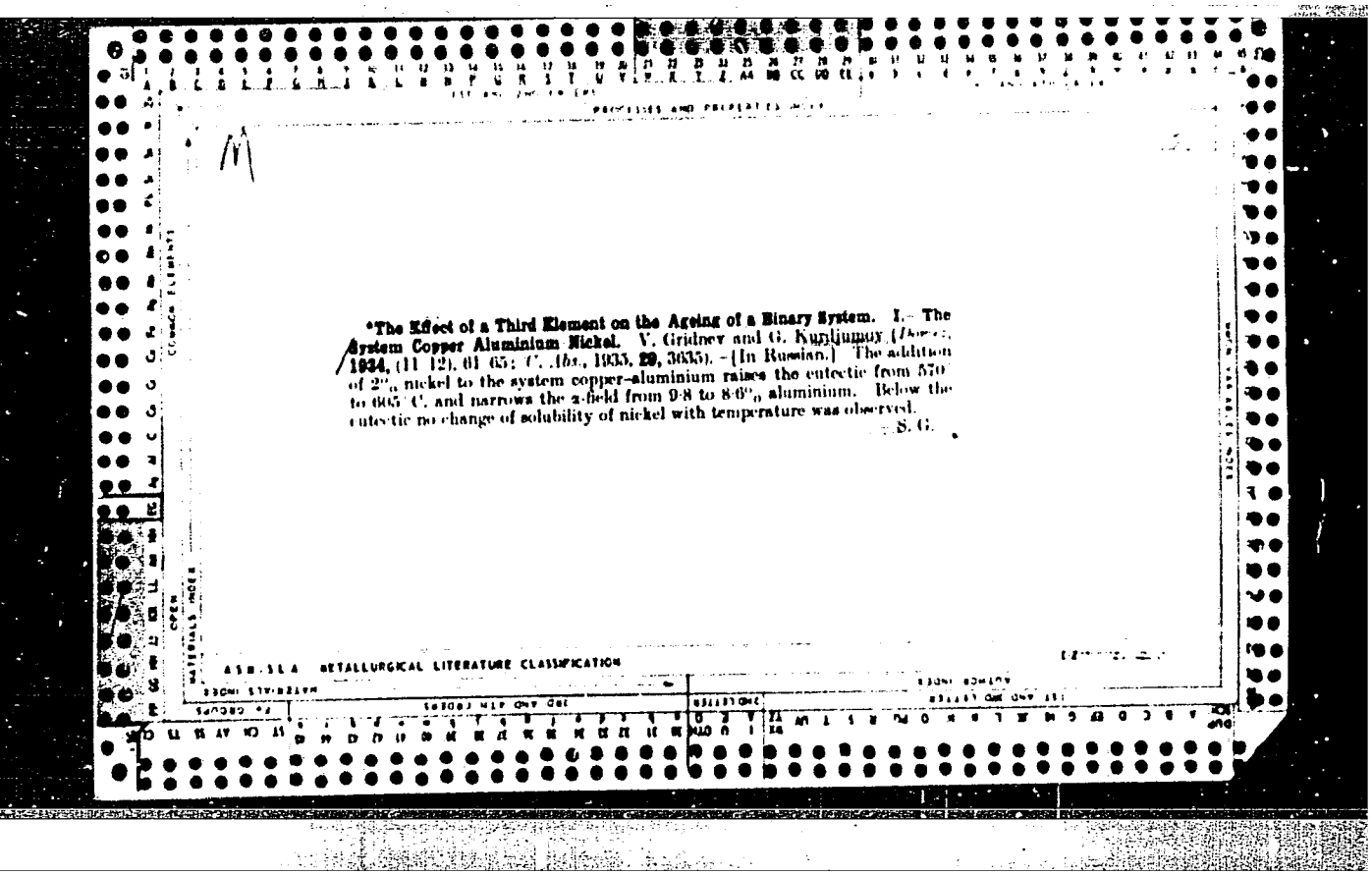
/Isakhev

Zhur. Fiz.

*Transformations in the Copper Tin Eutectoid Alloys. I. II. (I.) I. Isaitchew and G. Kurdjumow. (II.) W. Bugakow, I. Isaitchew, and G. Kurdjumow (*Physikal. Z. Sowjetunion*, 1934, 5, 6–21, 22–30).—[In German.] (I.—) By annealing copper tin eutectoid alloys, the β phase is not changed directly into the α- and γ-phases; an intermediate γ' phase is first produced. This γ' phase is characterized by a cubic lattice cell having a parameter approximately half that of the γ-phase; it is, however, possible that it is characterized by an hexagonal axis; in that case the axial ratio is 0·35. The orientations of the respective phases are briefly discussed. (II.—) The effect of temperature of annealing on the crystal structure, minute structure, and electrical resistance of the copper tin alloys is investigated. The production of an intermediate, γ', phase from the β-phase during annealing is marked by the lower electrical resistance and greater corrodibility characterizing this intermediate phase. The martensitic intermediate β' phase is produced by quenching under definite conditions; it is not produced from the β-phase by annealing. Temperatures at which structural changes occur are about 75° C. lower when powders are used than when massive samples or single crystals are used.

J. S. G. T.

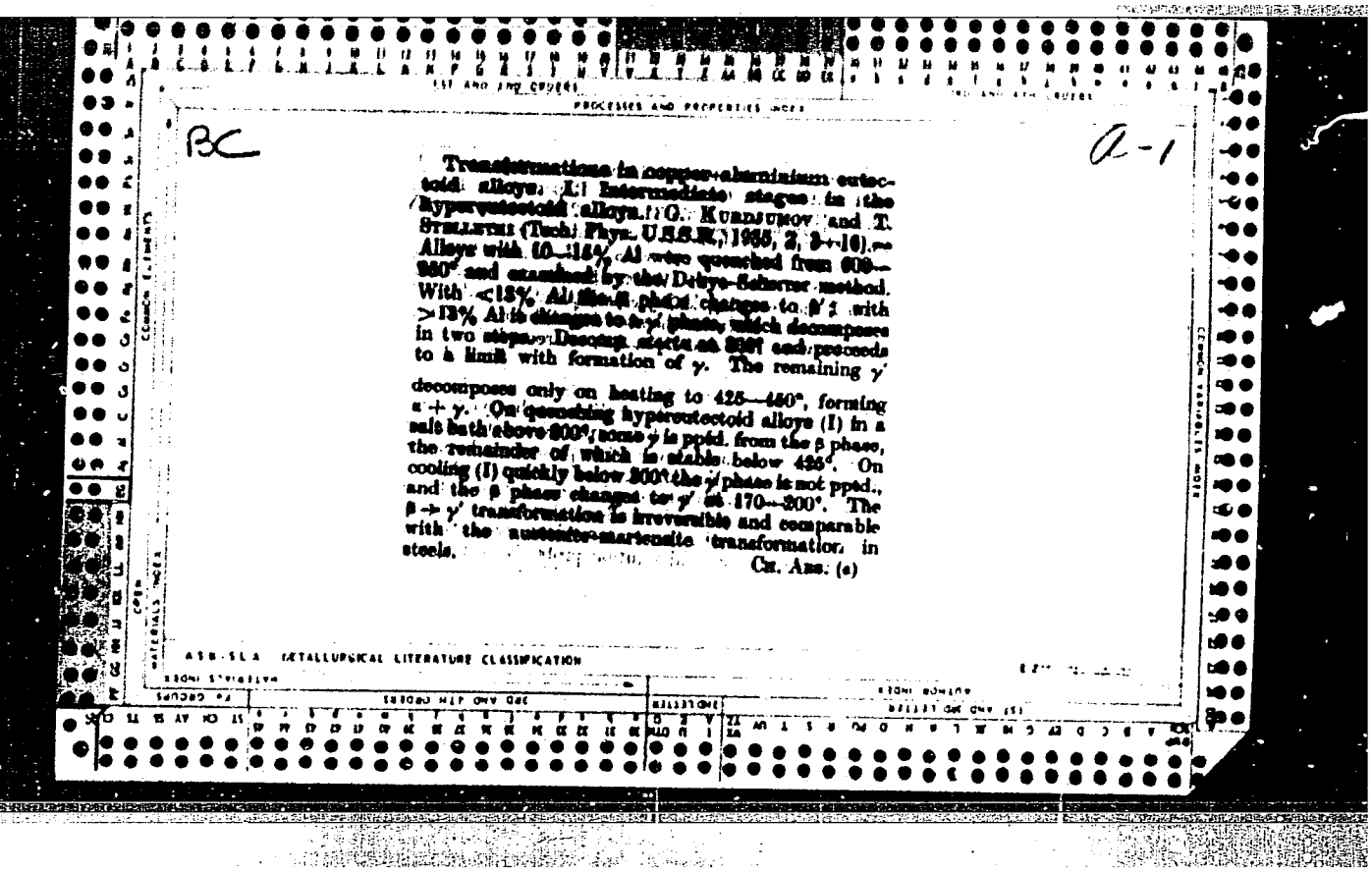
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



***The Effect of a Third Element on the Ageing of a Binary System. I.—The System Copper Aluminium Nickel.** V. Gridnev and G. Kurdjumov (*Zhurn. Russ. Fiz.-Khim. Obshch.*, **1934**, (II 12), 61–65; *C. Abs.*, 1935, **29**, 3655). —[In Russian.] The addition of 2% nickel to the system copper-aluminium raises the eutectic from 570° to 605° C. and narrows the α-field from 9·8 to 8·6% aluminium. Below the eutectic no change of solubility of nickel with temperature was observed.

—S. G.

A S M - S L A METALLURGICAL LITERATURE CLASSIFICATION



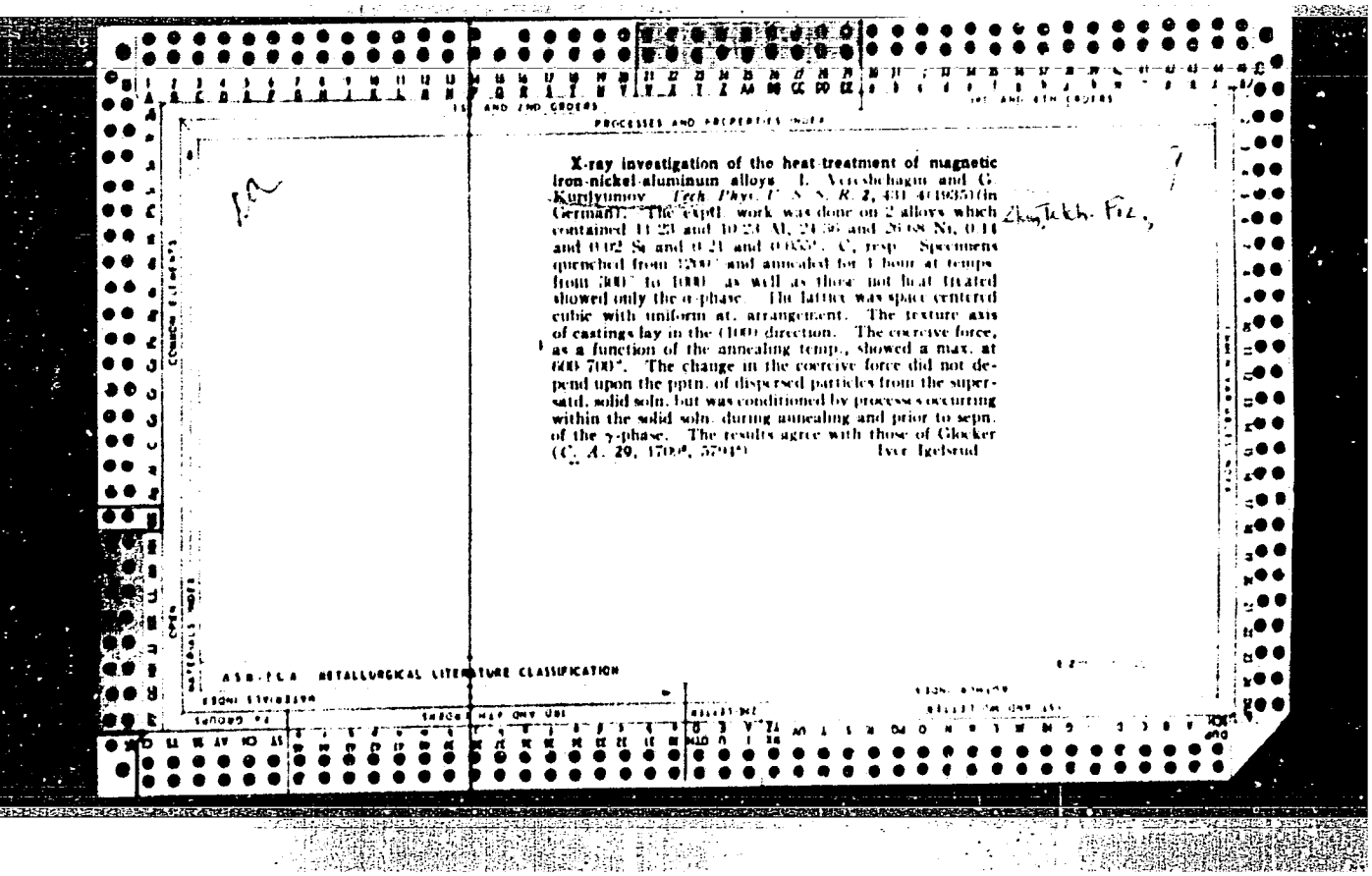
BC

A-1

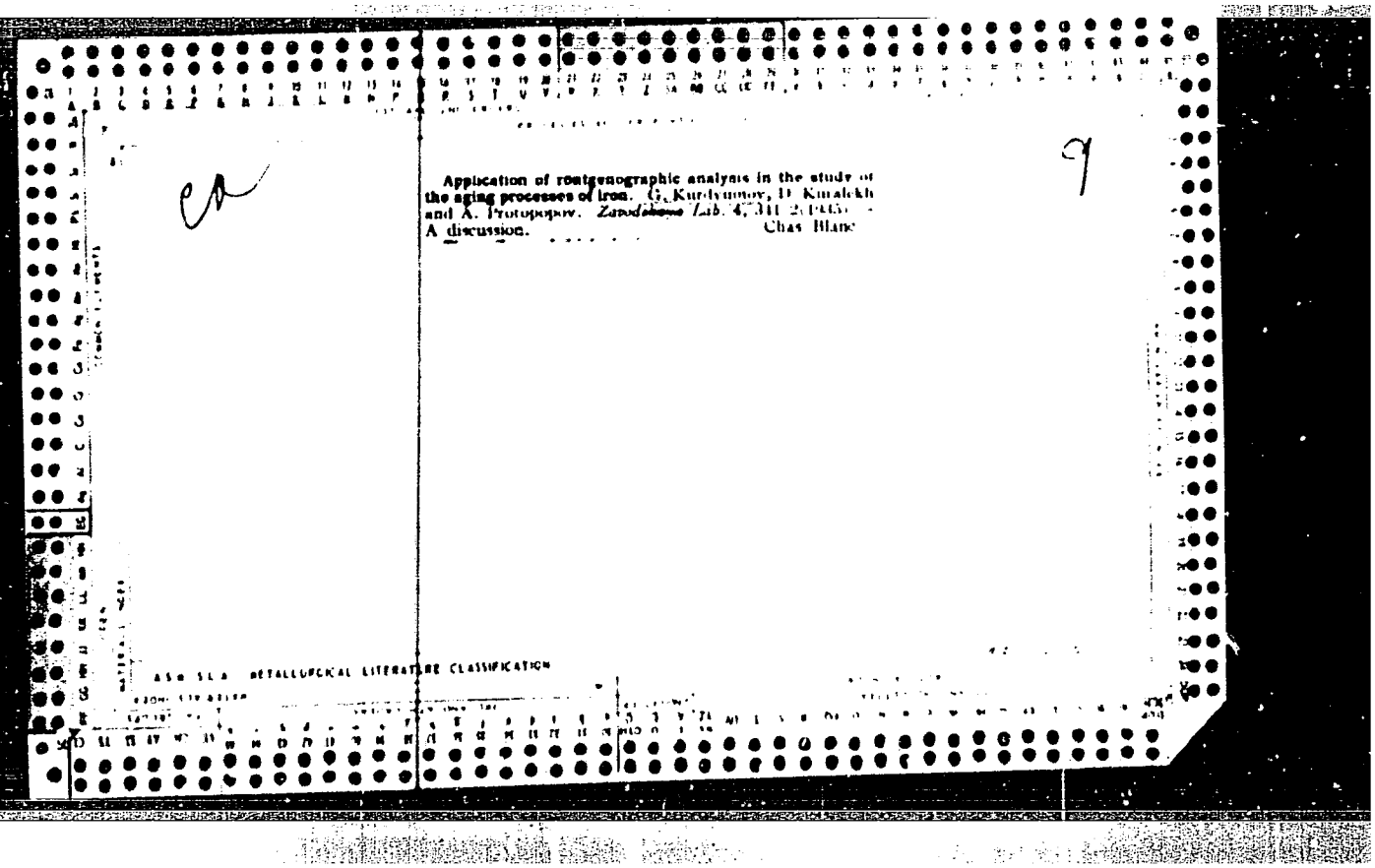
Transformations in copper-aluminium eutectoid alloys. I. Intermediate stages in the hypereutectoid alloys. O. KURNAKOV and T. STELLETSKI (Tech. Phys. U.S.S.R., 1935, 2, 9–16).—Alloys with 10–15% Al were quenched from 600–950° and examined by the Debye-Scherrer method. With <13% Al the β phase changes to β′ with >13% Al it changes to β-γ′ phase, which decomposes in two stages. Decomp. starts at 250° and proceeds to a limit with formation of γ. The remaining γ′ decomposes only on heating to 425–460°, forming α + γ. On quenching hypereutectoid alloys (I) in a salt bath above 300°, some γ is ppd. from the β phase, the remainder of which is stable below 425°. On cooling (I) quickly below 300° the γ phase is not ppd., and the β phase changes to γ′ at 170–200°. The β → γ′ transformation is irreversible and comparable with the austenite-martensite transformation in steels.

Cr. Abs. (a)

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

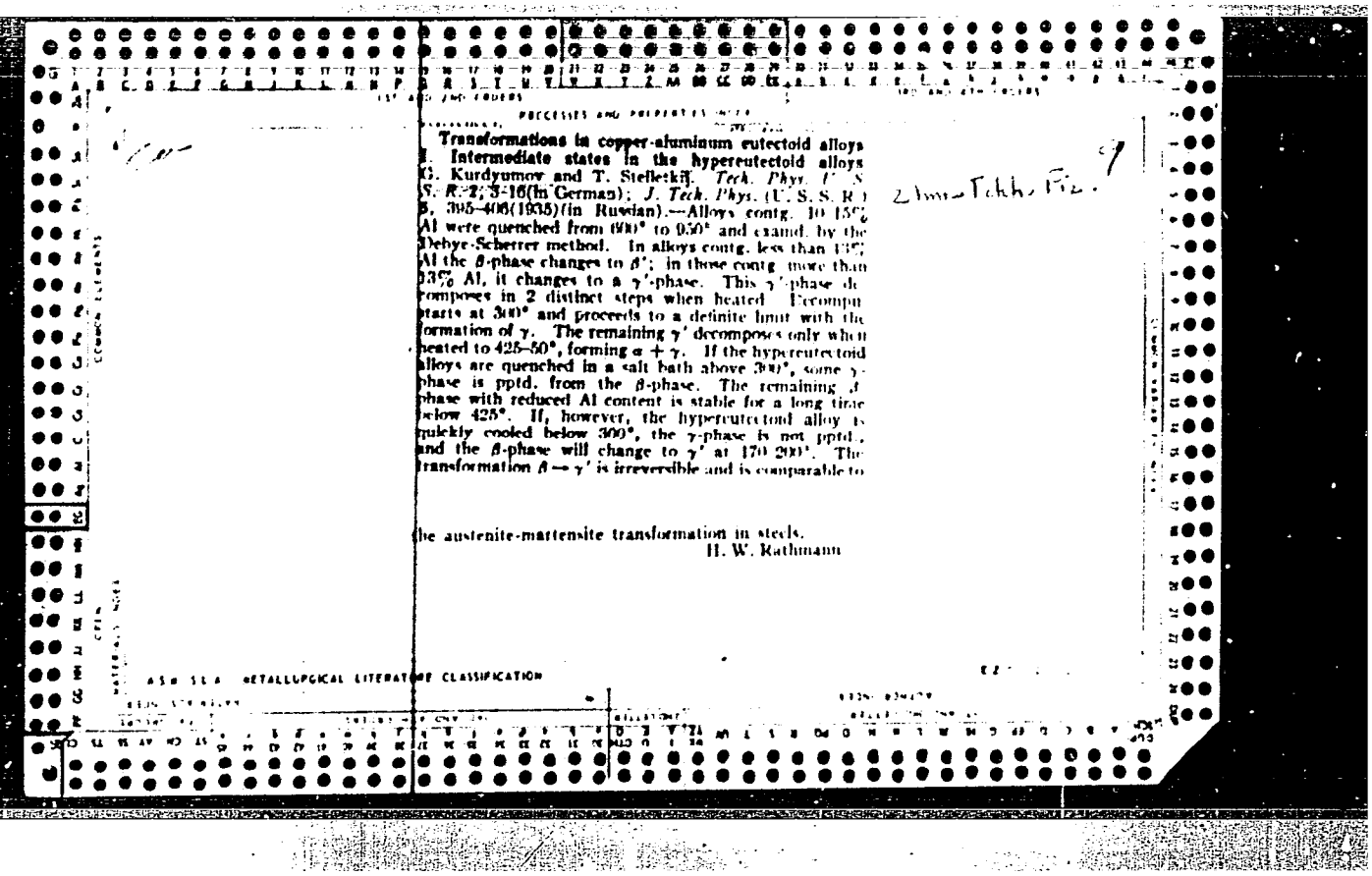


X-ray investigation of the heat-treatment of magnetic iron-nickel-aluminum alloys I. Vereshchagin and G. Kurdyumov *Tech. Phys. U. S. S. R.* **2**, 431-41(1935)(in German). The expt. work was done on 2 alloys which contained 11.23 and 10.24 Al, 24.36 and 26.68 Ni, 0.14 and 0.02 Si and 0.21 and 0.05% C, resp. Specimens quenched from 1250° and annealed for 1 hour at temps. from 300° to 1000° as well as those not heat treated showed only the α-phase. The lattice was space centered cubic with uniform at. arrangement. The texture axis of castings lay in the (100) direction. The coercive force, as a function of the annealing temp., showed a max. at 600-700°. The change in the coercive force did not depend upon the pptn. of dispersed particles from the supersatd. solid soln. but was conditioned by processes occurring within the solid soln. during annealing and prior to sepn. of the γ-phase. The results agree with those of Glocker (*C. A.* **29**, 1709⁸, 5794⁵). Iver Igelsrud



Application of roentgenographic analysis in the study of the aging processes of iron. G. Kurdyumov, D. Kinalekh and A. Protopopov. *Zavodskaya Lab.* 4, 311-2 (1935). A discussion. Chas Blanc

ASM SLA METALLURGICAL LITERATURE CLASSIFICATION



Transformations in copper-aluminum eutectoid alloys I. Intermediate states in the hypereutectoid alloys G. Kurdyumow and T. Stelletkij. *Tech. Phys. U. S. S. R.* 2, 3-16(in German); *J. Tech. Phys.* (U. S. S. R.) 5, 395–406(1935)(in Russian).—Alloys contg. 10-15% Al were quenched from 900° to 950° and examd. by the Debye-Scherrer method. In alloys contg. less than 13% Al the β-phase changes to β'; in those contg. more than 13% Al, it changes to a γ'-phase. This γ'-phase decomposes in 2 distinct steps when heated. Decomposition starts at 300° and proceeds to a definite limit with the formation of γ. The remaining γ' decomposes only when heated to 425–50°, forming $\alpha + \gamma$. If the hypereutectoid alloys are quenched in a salt bath above 300°, some γ-phase is pptd. from the β-phase. The remaining β-phase with reduced Al content is stable for a long time below 425°. If, however, the hypereutectoid alloy is quickly cooled below 300°, the γ-phase is not pptd., and the β-phase will change to γ' at 170-200°. The transformation $\beta \rightarrow \gamma'$ is irreversible and is comparable to the austenite-martensite transformation in steels.

H. W. Rathmann

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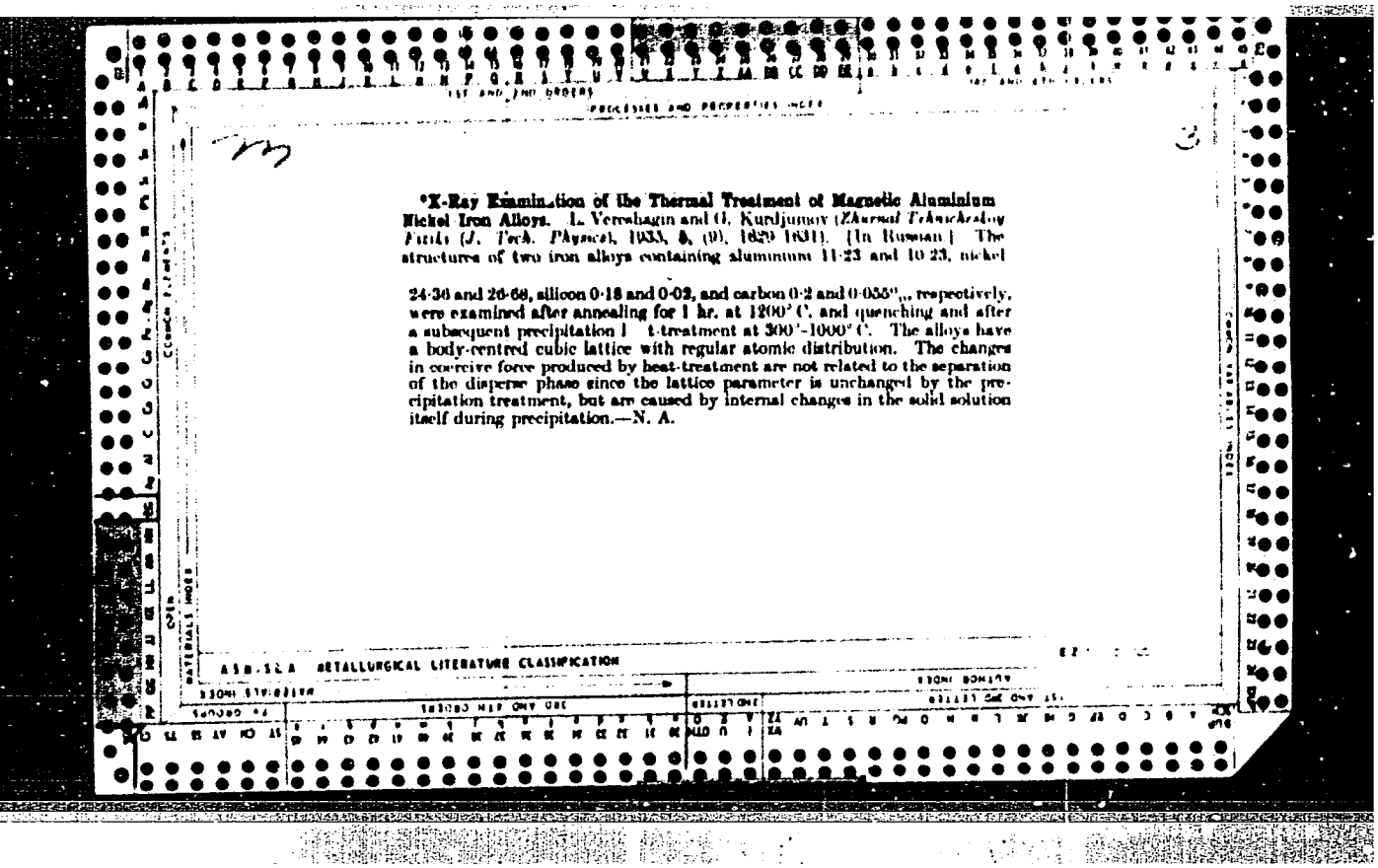
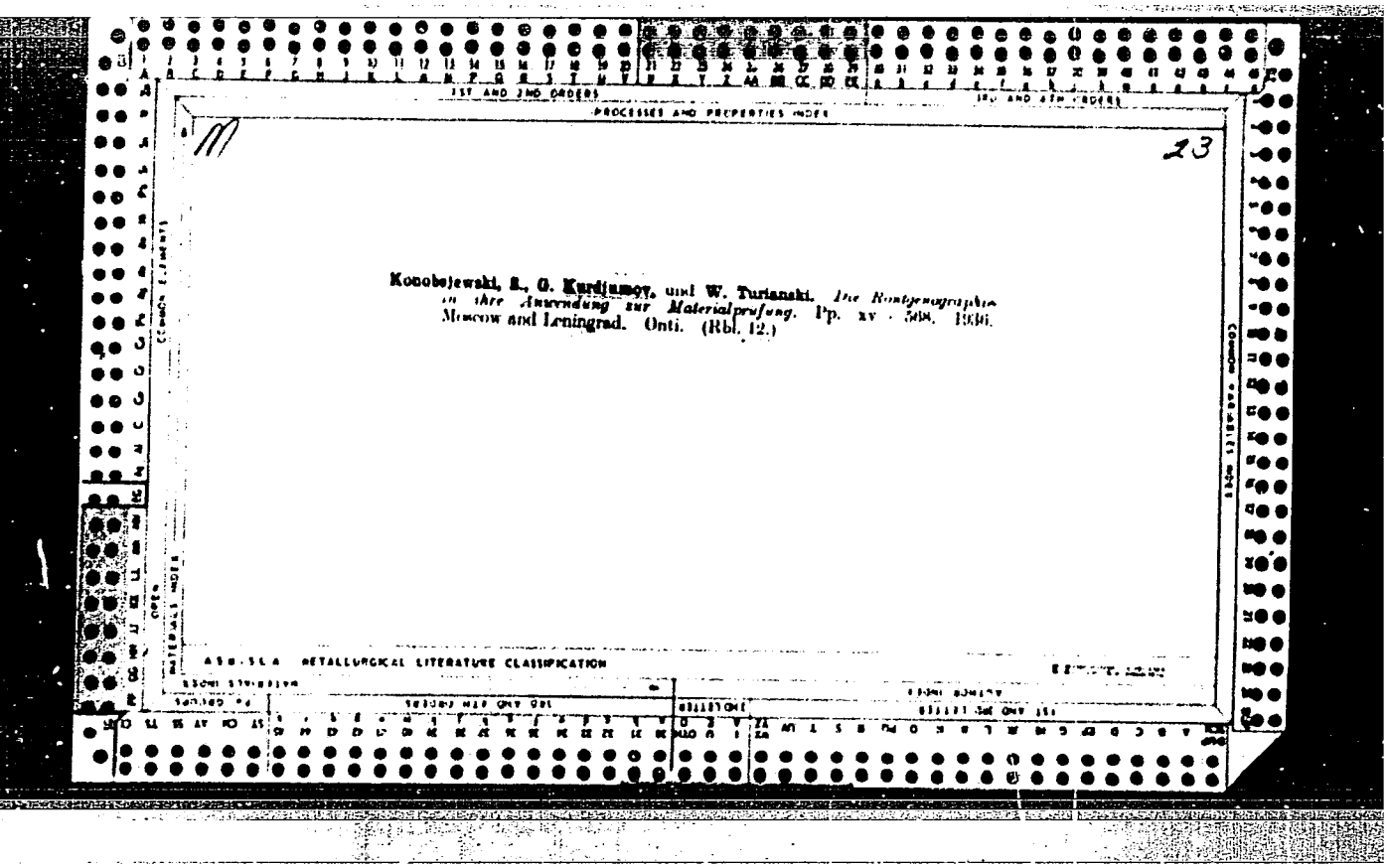
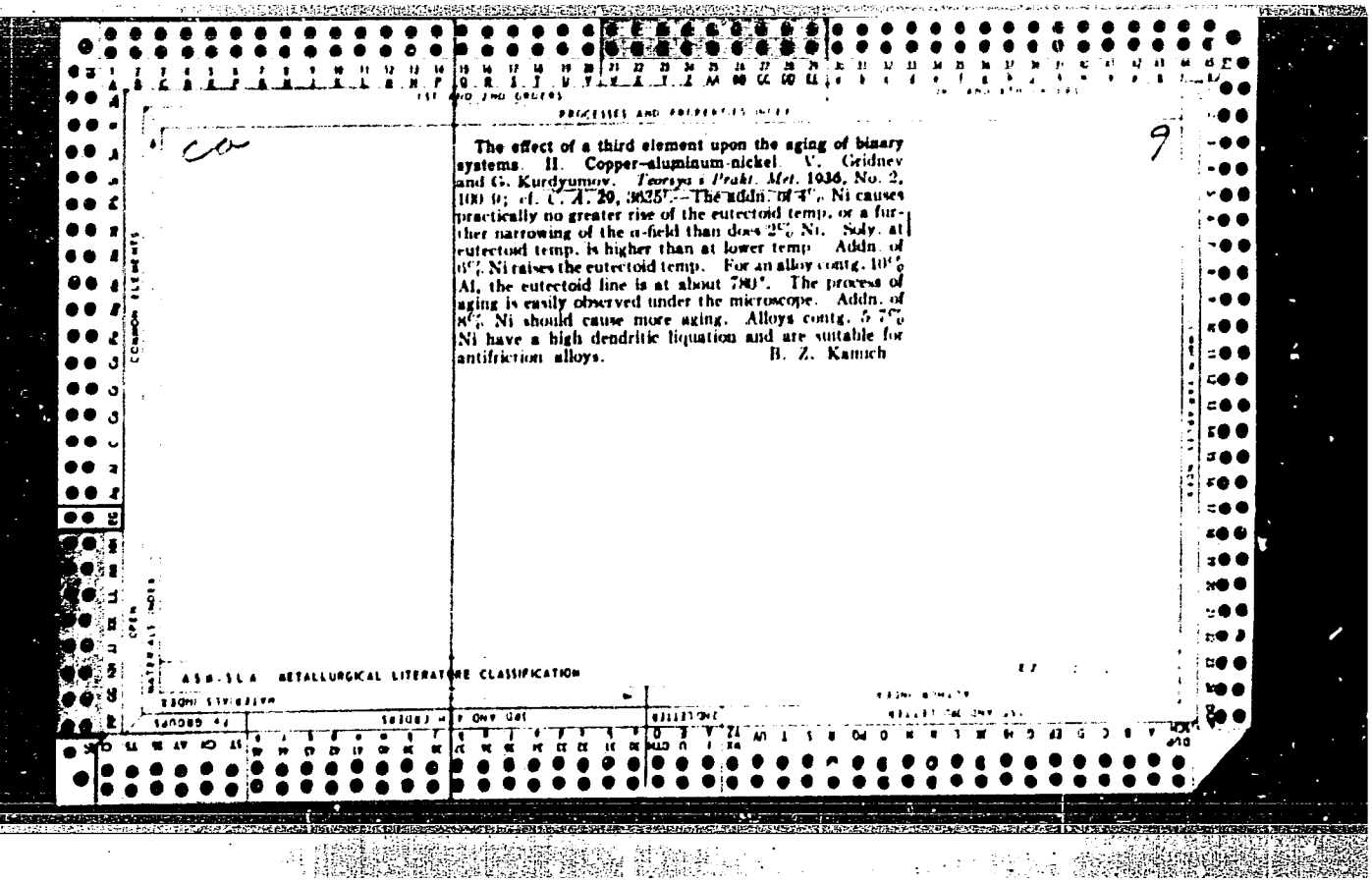


***X-Ray Examination of the Thermal Treatment of Magnetic Aluminium Nickel Iron Alloys.** L. Vereshagin and G. Kurdjumov (*Zhurnal Tekhnicheskoy Fiziki (J. Tech. Physics)*, 1933, **3**, (9), 1629–1631). [In Russian.] The structures of two iron alloys containing aluminium 11·23 and 10·23, nickel 24·36 and 26·68, silicon 0·18 and 0·02, and carbon 0·2 and 0·055%, respectively, were examined after annealing for 1 hr. at 1200° C. and quenching and after a subsequent precipitation heat-treatment at 300°–1000° C. The alloys have a body-centred cubic lattice with regular atomic distribution. The changes in coercive force produced by heat-treatment are not related to the separation of the disperse phase since the lattice parameter is unchanged by the precipitation treatment, but are caused by internal changes in the solid solution itself during precipitation.—N. A.





The effect of a third element upon the aging of binary systems. II. Copper-aluminum-nickel. V. Gridnev and G. Kurdyumov. *Teoriya i Praki. Met.* 1936, No. 2, 100-9; cf. C. A. 29, 3625.—The addn. of 3% Ni causes practically no greater rise of the eutectoid temp. or a further narrowing of the α-field than does 2% Ni. Soly. at eutectoid temp. is higher than at lower temp. Addn. of 6% Ni raises the eutectoid temp. For an alloy contg. 10% Al, the eutectoid line is at about 780°. The process of aging is easily observed under the microscope. Addn. of 8% Ni should cause more aging. Alloys contg. 5-7% Ni have a high dendritic liquation and are suitable for antifriction alloys. B. Z. Kamich

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

General laws of phase transformations in eutectoid alloys. G. Kurdyumov. *Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Ser. chim.*, No. 2, 271-84 (in English 283-4)(1936); cf. C. A. 30, 1010[?].—In supercooled solid solns. of eutectoid alloys 2 types of processes take place: (1) those in which the rate of change depends on temp. and which become zero at low temps., as diffusion and crystal growth, and (2) those which take place rapidly at any temp. The 1st type occurs without change of concn. To the 2nd type belong the transitions austenite → martensite, $\beta \rightarrow \beta'$ and $\beta \rightarrow \gamma'$ in Cu-Al and Cu-Sn, and $\beta \rightarrow \alpha'$ in Cu-Zn alloys. These transformation temps. become lower with increase in concn. of C, Al, Sn and Zn, resp. The mutual relations between diffusion and crystn. depend on temp.; hence various intermediate states can be obtained by quenching. The redistribution of concn. within solid solns. at temps. below which the solid soln. is stable is well shown. At very high temps. crystal growth may be so rapid as to be difficult to follow. H. E. M.

Akad. Nauk SSSR, Ser. Khim.

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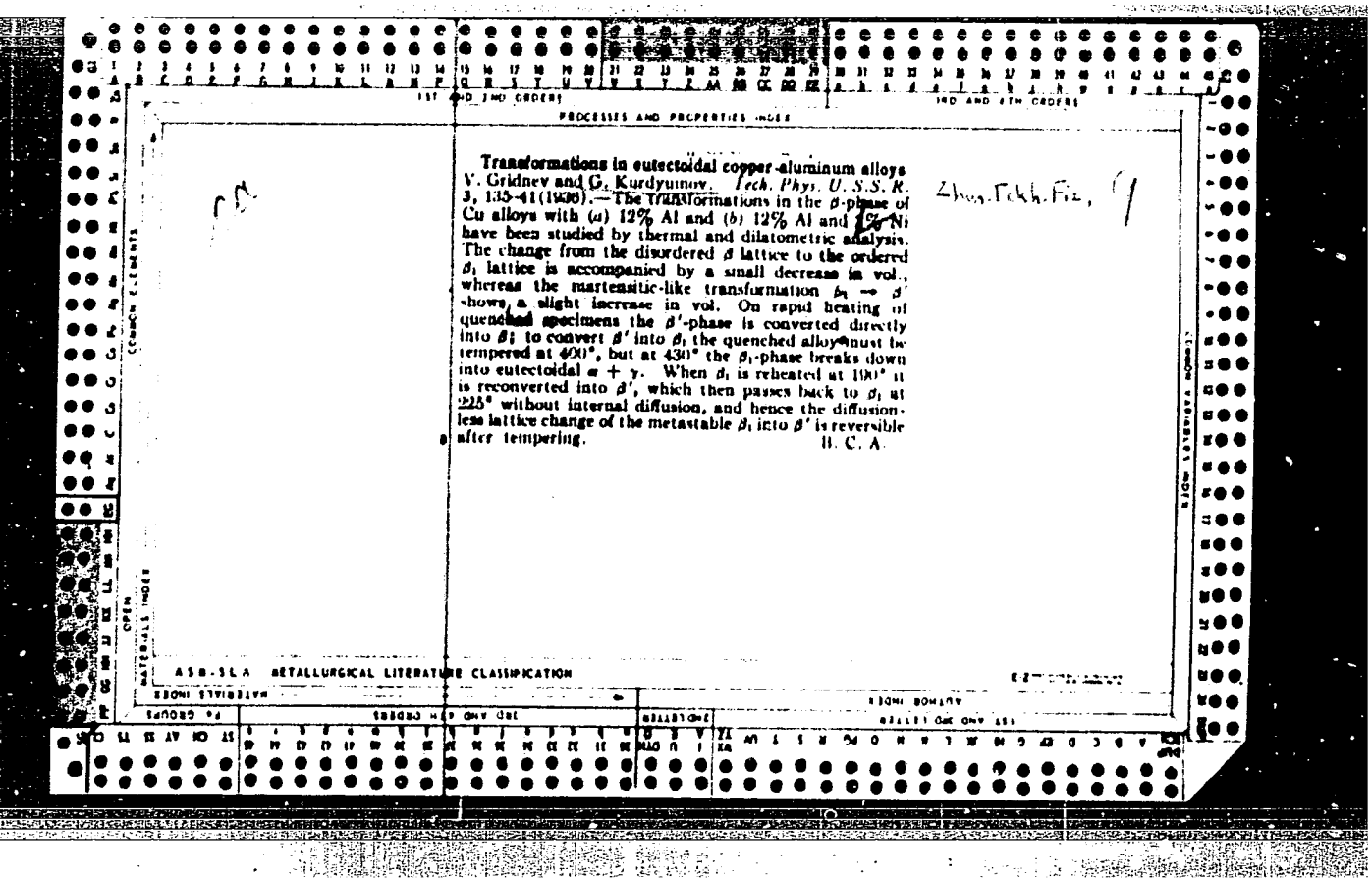

PROCESSES AND PROPERTIES INDEX

Transformations in eutectoidal copper-aluminum alloys V. Gridnev and G. Kurdyumov. *Tech. Phys. U.S.S.R.* 3, 135-41 (1936).—The transformations in the β-phase of Cu alloys with (*a*) 12% Al and (*b*) 12% Al and 1% Ni have been studied by thermal and dilatometric analysis. The change from the disordered β lattice to the ordered β_1 lattice is accompanied by a small decrease in vol., whereas the martensitic-like transformation $\beta_1 \rightarrow \beta'$ shows a slight increase in vol. On rapid heating of quenched specimens the β'-phase is converted directly into β_1; to convert β' into β_1 the quenched alloy must be tempered at 400°, but at 430° the β_1-phase breaks down into eutectoidal $\alpha + \gamma$. When β_1 is reheated at 100° it is reconverted into β', which then passes back to β_1 at 225° without internal diffusion, and hence the diffusionless lattice change of the metastable β_1 into β' is reversible after tempering. B. C. A.

Zhur. Tekh. Fiz. 6/1

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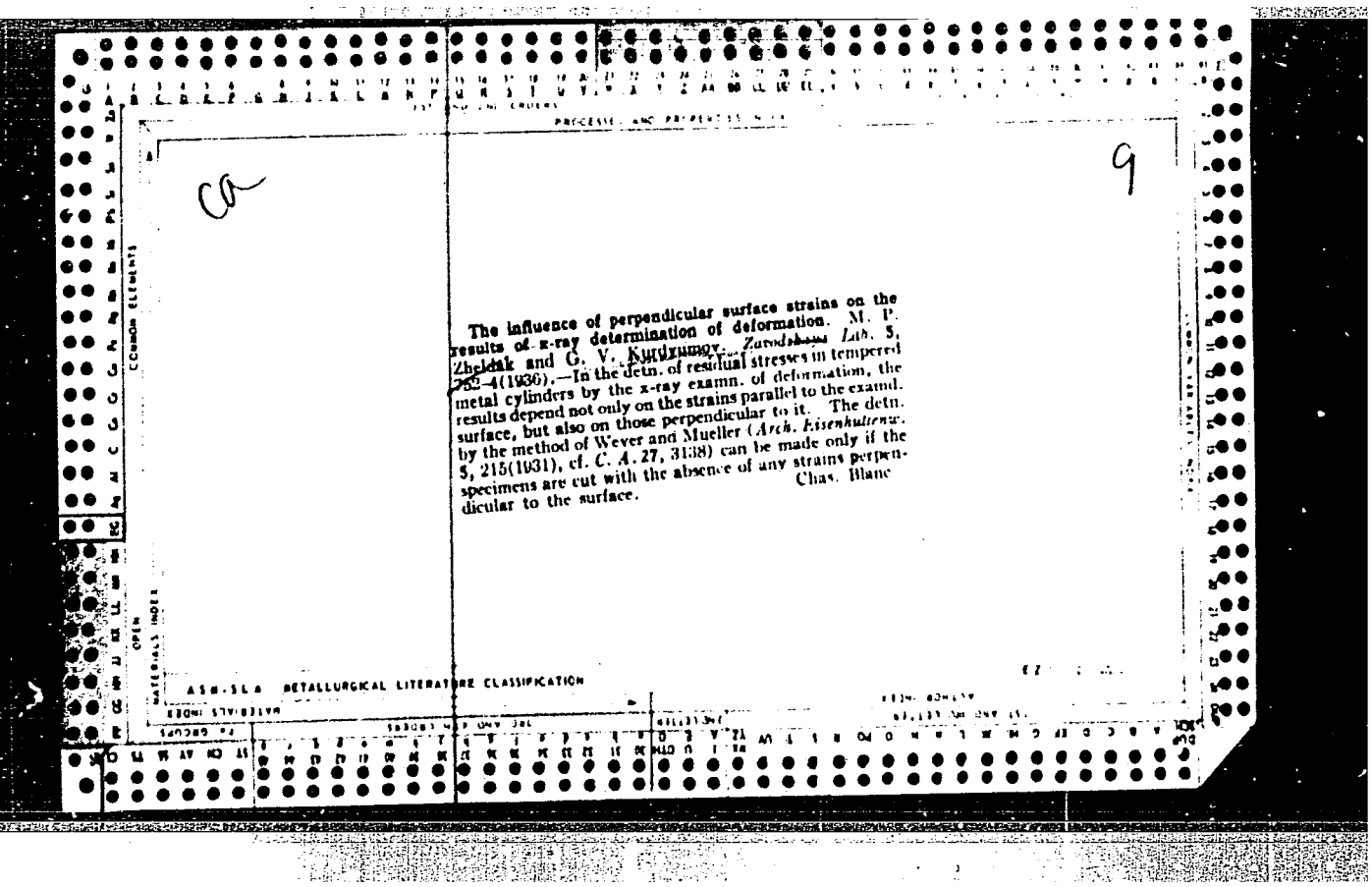
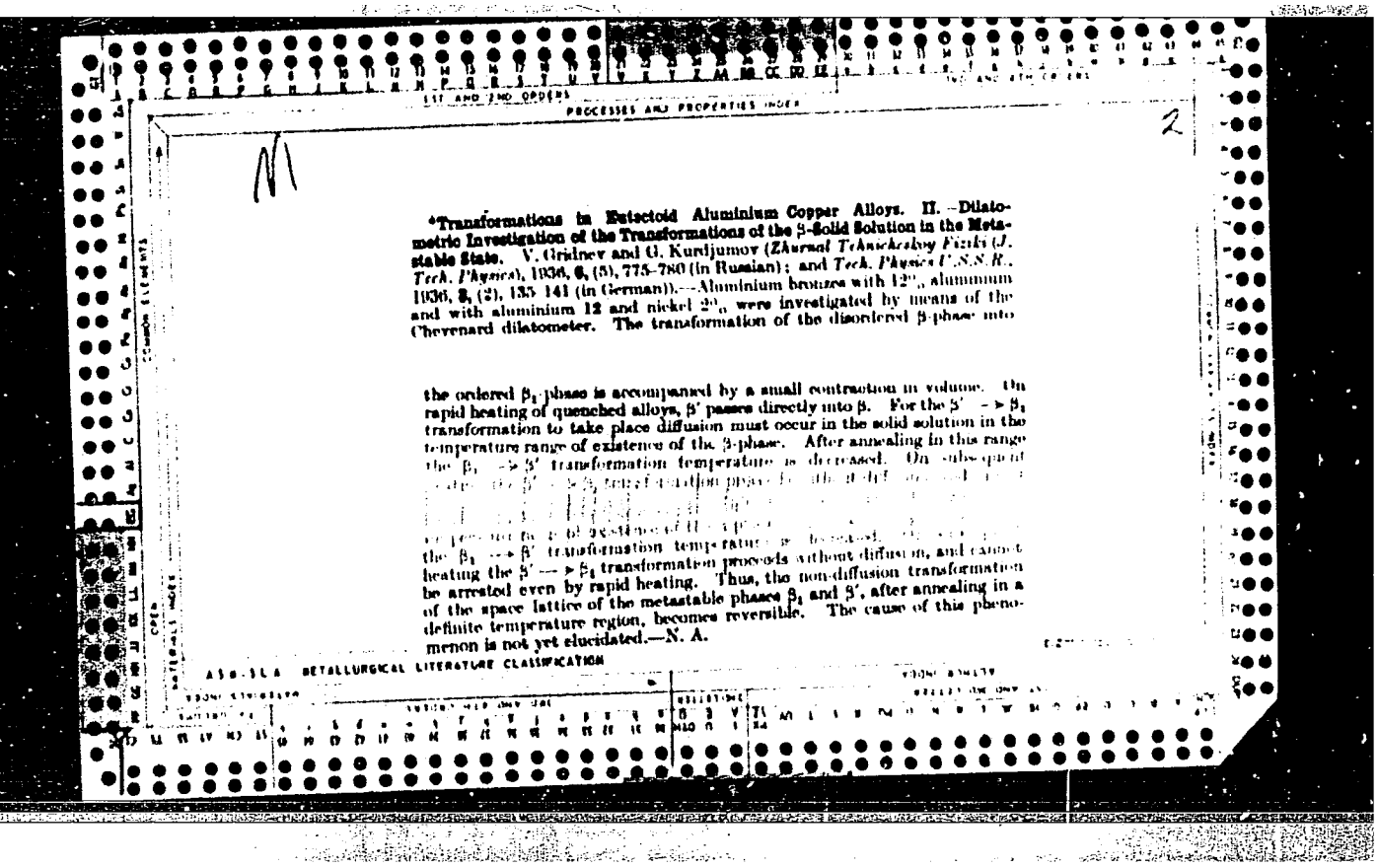


The influence of perpendicular surface strains on the results of x-ray determination of deformation. M. P. Zheldak and G. V. Kurdyumov. *Zavodskaya Lab.* 5, 252–4(1936).—In the detn. of residual stresses in tempered metal cylinders by the x-ray examn. of deformation, the results depend not only on the strains parallel to the examd. surface, but also on those perpendicular to it. The detn. by the method of Wever and Mueller (*Arch. Eisenhuttenw.* 5, 215(1931), cf. *C. A.* 27, 3138) can be made only if the specimens are cut with the absence of any strains perpendicular to the surface. Chas. Blanc



PROCESSES AND PROPERTIES INDEX

***Transformations in Eutectoid Aluminium Copper Alloys. II.—Dilatometric Investigation of the Transformations of the β-Solid Solution in the Metastable State.** V. Gridnev and G. Kurdjumov (*ZAurnal TeAnicheskoy Fiziki (J. Tech. Physics)*, 1936, **6**, (5), 775–780 (in Russian); and *Tech. Physics U.S.S.R.*, 1936, **3**, (2), 135–141 (in German)).—Aluminium bronzes with 12% aluminium and with aluminium 12 and nickel 2% were investigated by means of the Chevenard dilatometer. The transformation of the disordered β-phase into

the ordered β_1-phase is accompanied by a small contraction in volume. On rapid heating of quenched alloys, β′ passes directly into β. For the $\beta' \rightarrow \beta_1$ transformation to take place diffusion must occur in the solid solution in the temperature range of existence of the β-phase. After annealing in this range the $\beta_1 \rightarrow \beta'$ transformation temperature is decreased. On subsequent

the $\beta_1 \rightarrow \beta'$ transformation temperature is increased. On subsequent heating the $\beta' \rightarrow \beta_1$ transformation proceeds without diffusion, and cannot be arrested even by rapid heating. Thus, the non-diffusion transformation of the space lattice of the metastable phases β_1 and β′, after annealing in a definite temperature region, becomes reversible. The cause of this phenomenon is not yet elucidated.—N. A.

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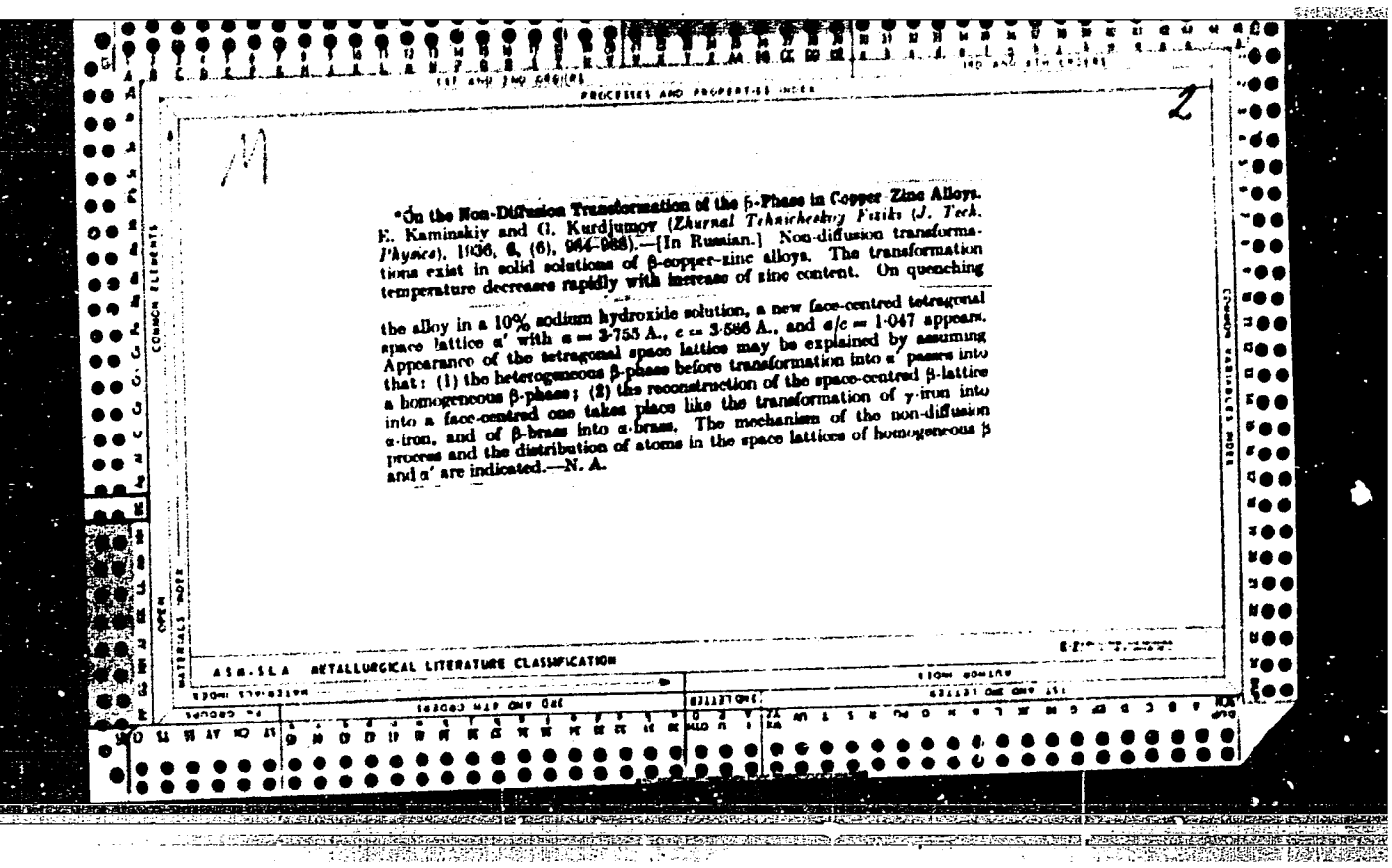

PROCESSES AND PROPERTIES INDEX

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M

*On the Non-Diffusion Transformation of the β-Phase in Copper-Zinc Alloys. E. Kaminskiy and G. Kurdjumov (*Zhurnal Tekhicheskoy Fiziki* (*J. Tech. Physics*), 1936, **6**, (6), 964–968).—[In Russian.] Non-diffusion transformations exist in solid solutions of β-copper-zinc alloys. The transformation temperature decreases rapidly with increase of zinc content. On quenching the alloy in a 10% sodium hydroxide solution, a new face-centred tetragonal space lattice α′ with $a = 3{\cdot}755$ A., $c = 3{\cdot}586$ A., and $a/c = 1{\cdot}047$ appears. Appearance of the tetragonal space lattice may be explained by assuming that: (1) the heterogeneous β-phase before transformation into α′ passes into a homogeneous β-phase; (2) the reconstruction of the space-centred β-lattice into a face-centred one takes place like the transformation of γ-iron into α-iron, and of β-brass into α-brass. The mechanism of the non-diffusion process and the distribution of atoms in the space lattices of homogeneous β and α′ are indicated.—N. A.

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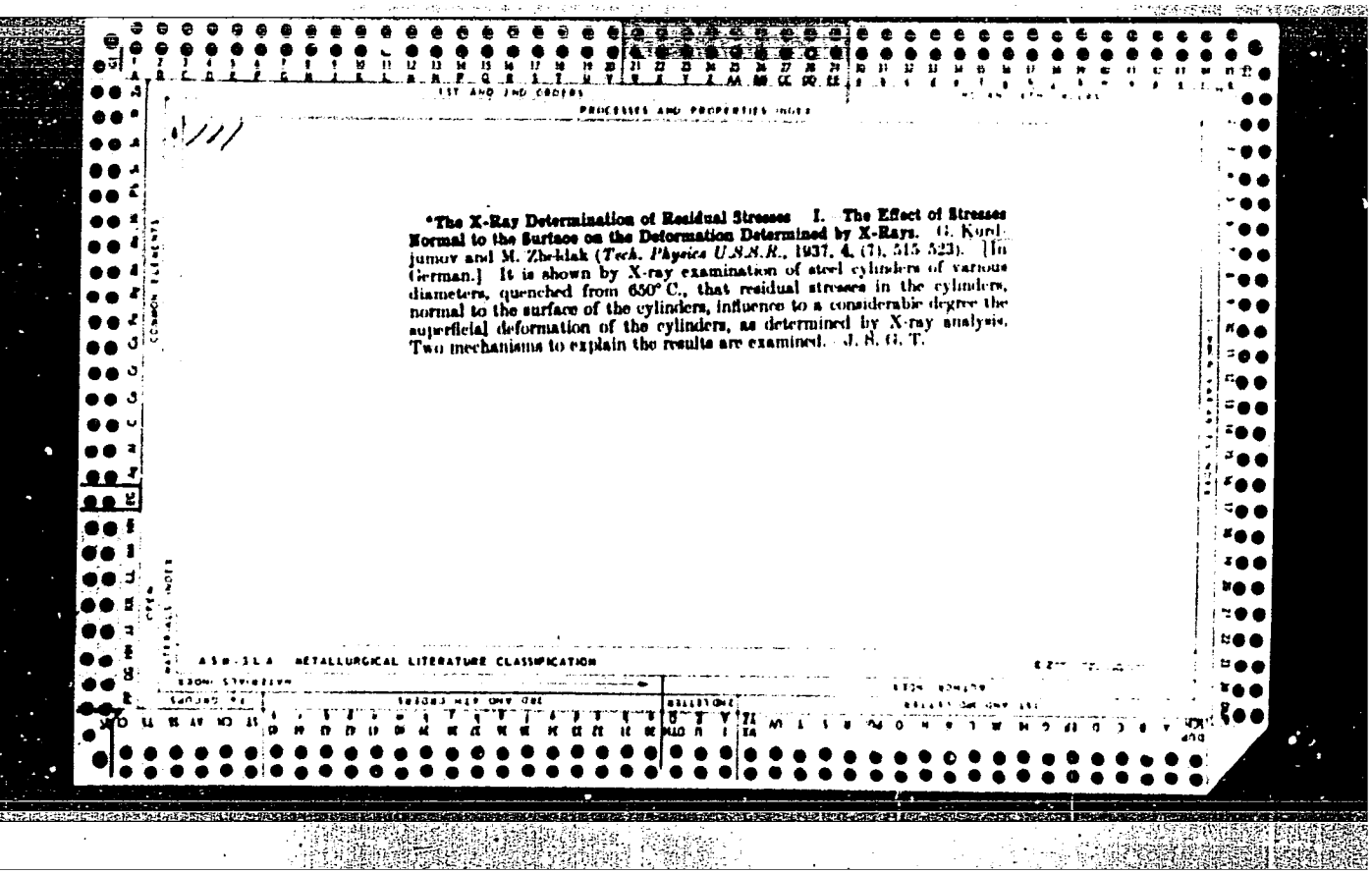


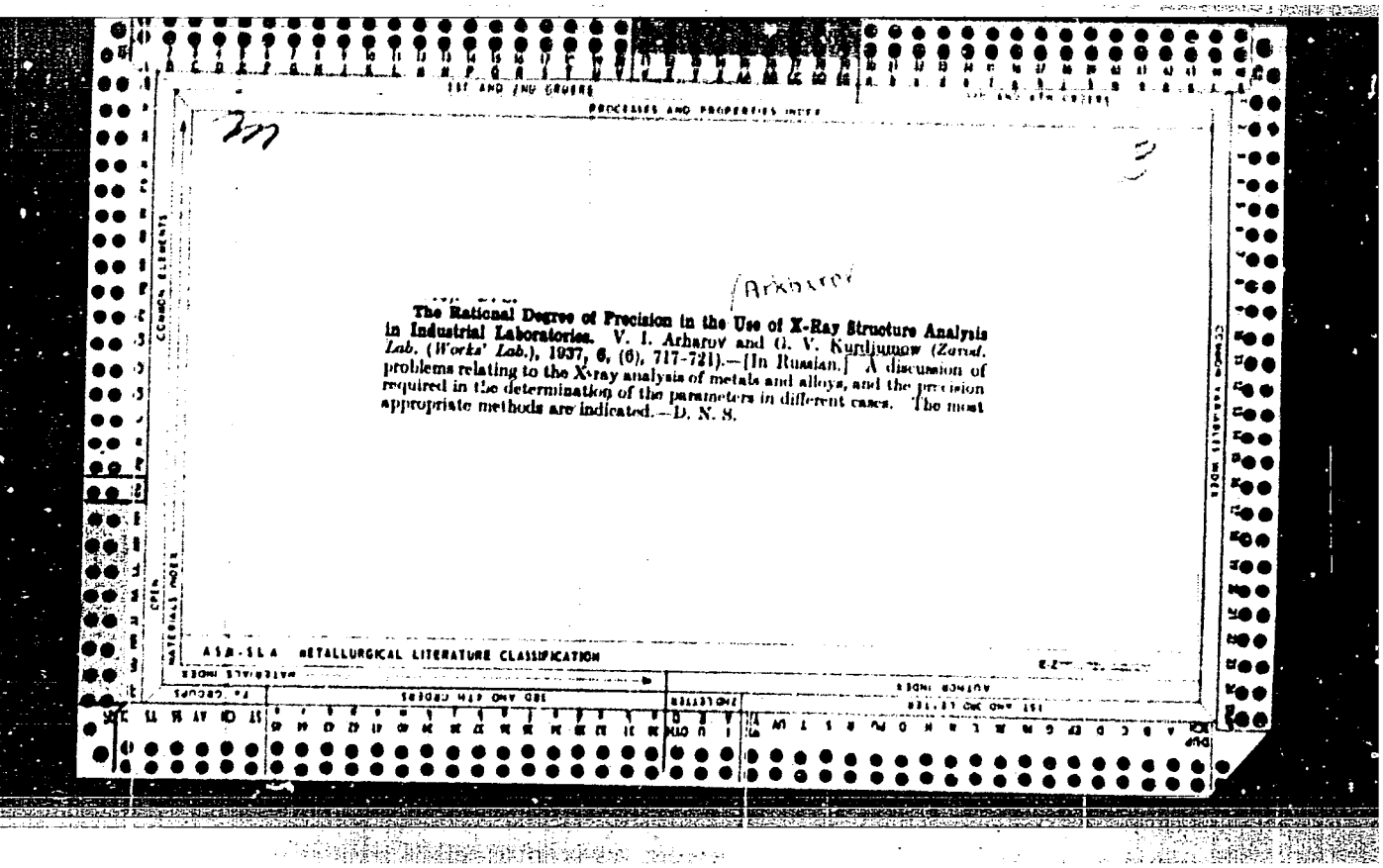
***The X-Ray Determination of Residual Stresses I. The Effect of Stresses Normal to the Surface on the Deformation Determined by X-Rays.** G. Kurdjumov and M. Zhelakak (*Tech. Physics U.S.S.R.*, 1937, 4, (7), 515-523). [In German.] It is shown by X-ray examination of steel cylinders of various diameters, quenched from 650° C., that residual stresses in the cylinders, normal to the surface of the cylinders, influence to a considerable degree the superficial deformation of the cylinders, as determined by X-ray analysis. Two mechanisms to explain the results are examined. J. S. G. T.

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

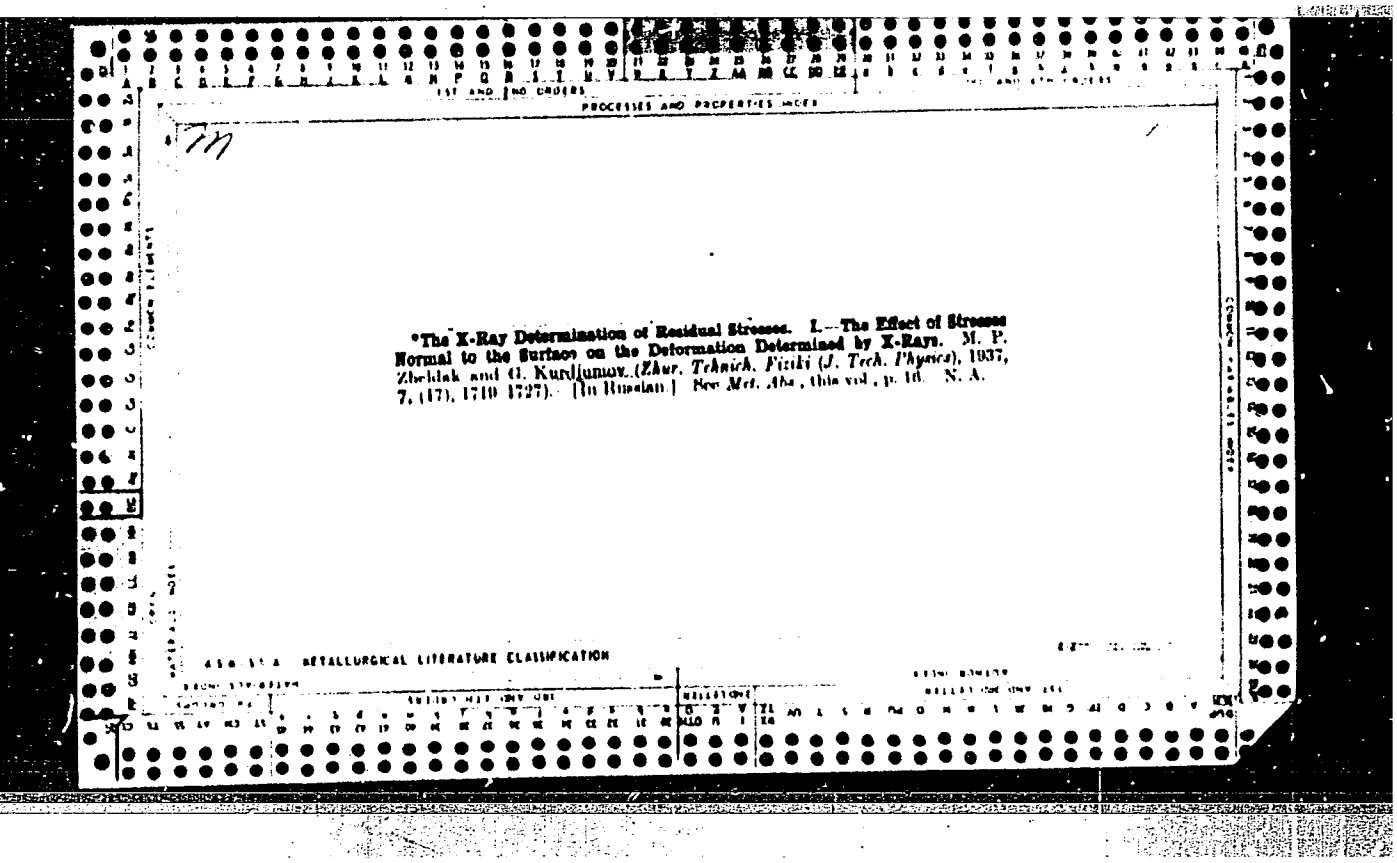
*The X-Ray Determination of Residual Stresses. III. Individual X-Ray Determination of the Three Principal Stresses in the Surface Layer. G. Kurdjumov, W. Romberg, and M. Zheldak (*Tech. Physics U.S.S.R.*, 1937, 4, (7), 533-536).—[In German.] X-ray analysis of steel cylinders quenched in water from 700°–650° C., shows that superficial deformation of the cylinders is attributable to additional stresses excited parallel to the surface by longitudinal stresses within the cylinder. The results thus differentiate in favour of one of the mechanisms discussed in Part I (abstract above).—J. S. G. T.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



Arkharov

The Rational Degree of Precision in the Use of X-Ray Structure Analysis in Industrial Laboratories. V. I. Arkharov and G. V. Kurdjumow (*Zavod. Lab.* (*Works' Lab.*), 1937, **6**, (6), 717-721).—[In Russian.] A discussion of problems relating to the X-ray analysis of metals and alloys, and the precision required in the determination of the parameters in different cases. The most appropriate methods are indicated.—D. N. S.



*The X-Ray Determination of Residual Stresses. I.—The Effect of Stresses Normal to the Surface on the Deformation Determined by X-Rays. M. P. Zheldak and G. Kurdjumov. (*Zhur. Tekhnich. Fiziki (J. Tech. Physics)*, 1937, 7, (17), 1710–1727). [In Russian.] See *Met. Abs.*, this vol., p. 16. N. A.

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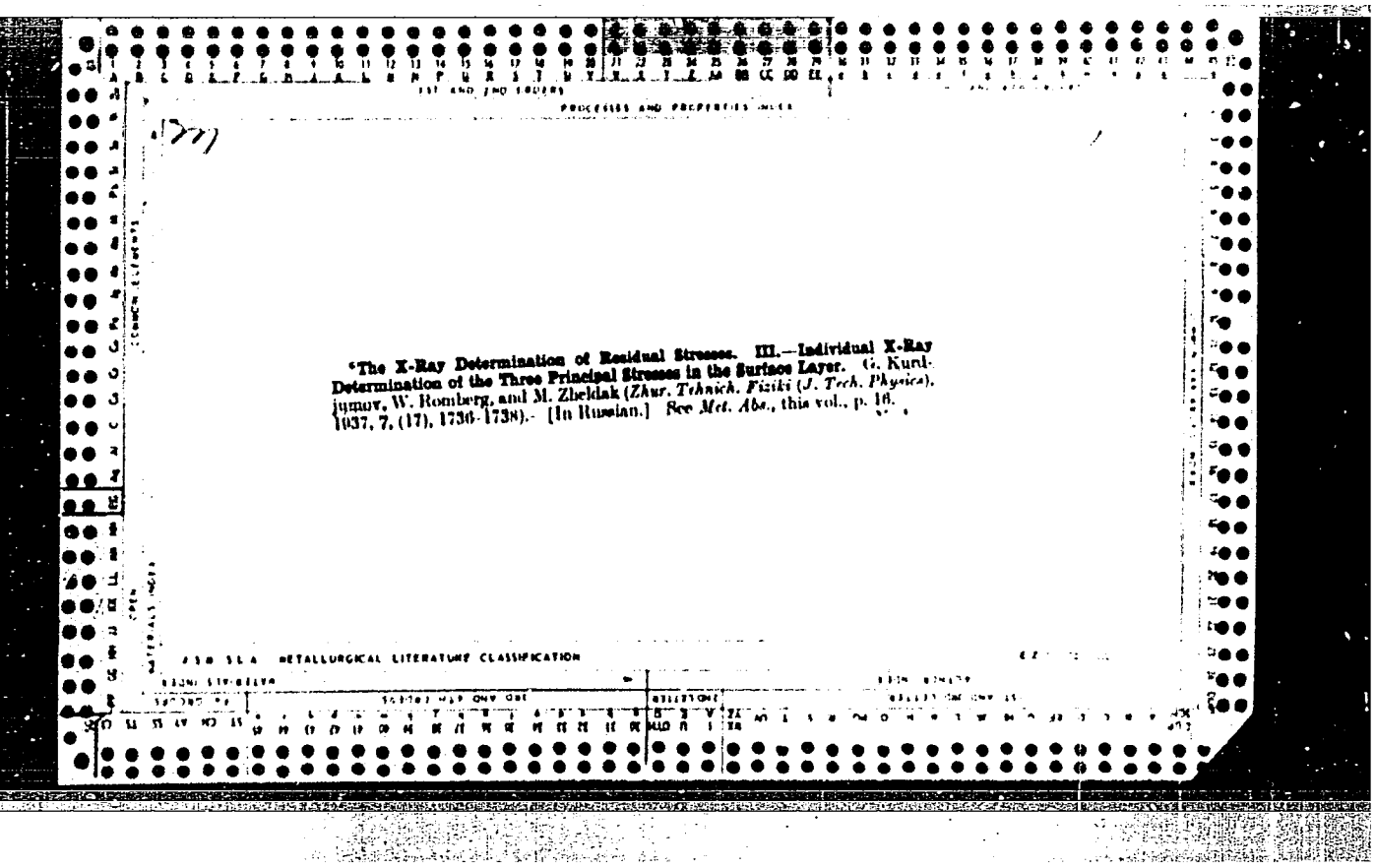
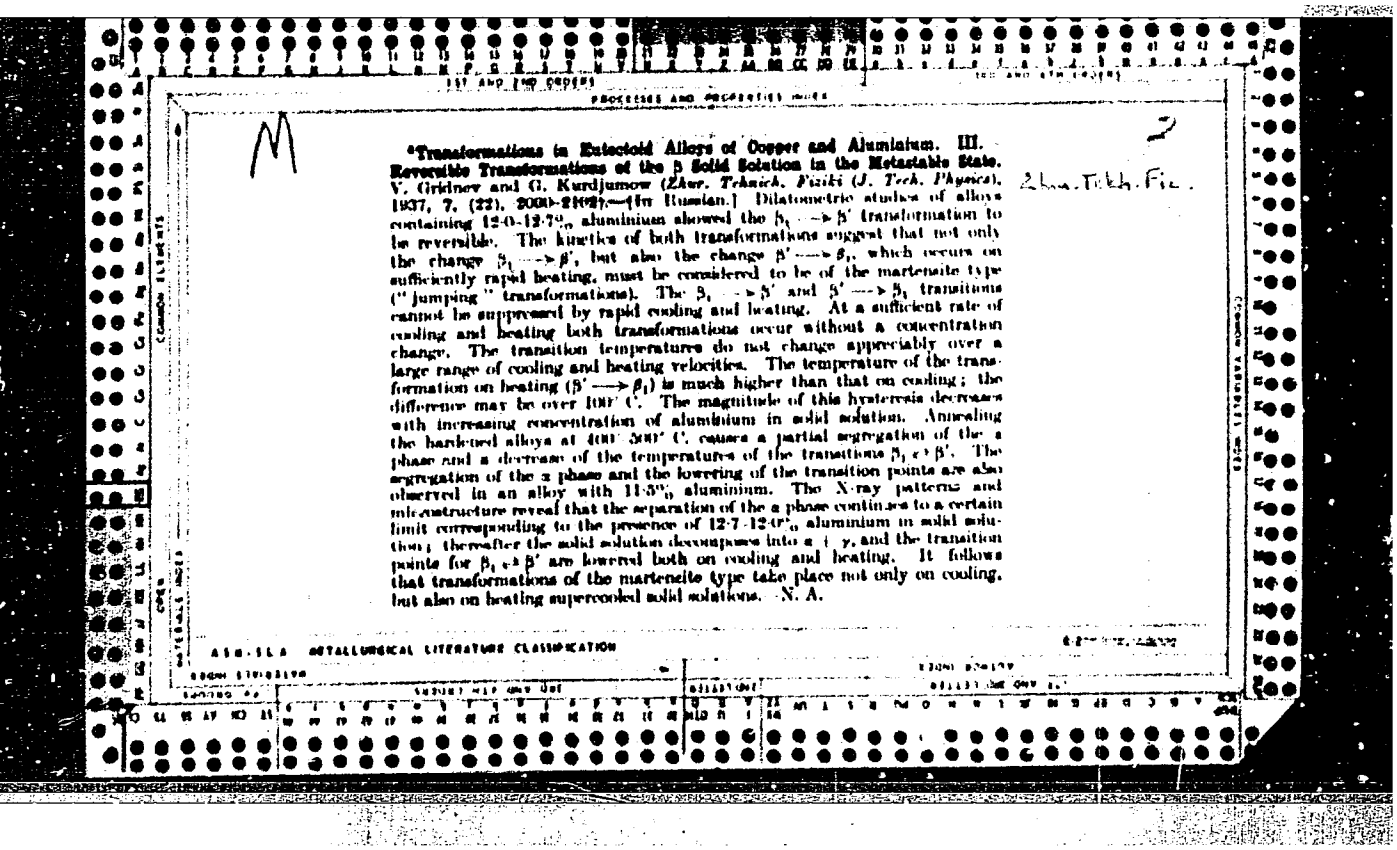
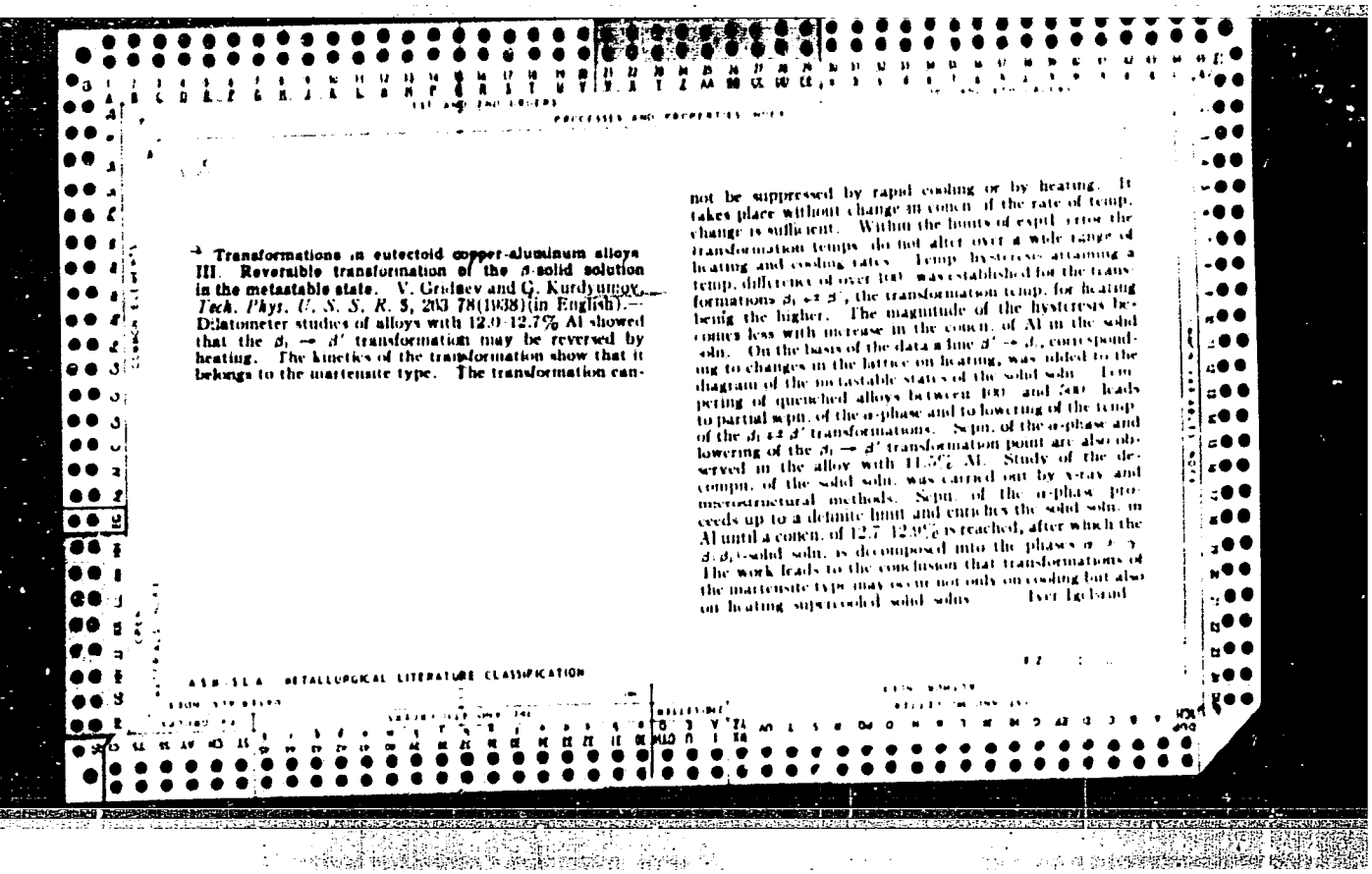


'The X-Ray Determination of Residual Stresses. III.—Individual X-Ray Determination of the Three Principal Stresses in the Surface Layer. G. Kurdjumov, W. Romberg, and M. Zbeldak (*Zhur. Tekhnich. Fiziki* (*J. Tech. Physics*), 1937, 7, (17), 1736-1738).- [In Russian.] See *Met. Abs.*, this vol., p. 16.

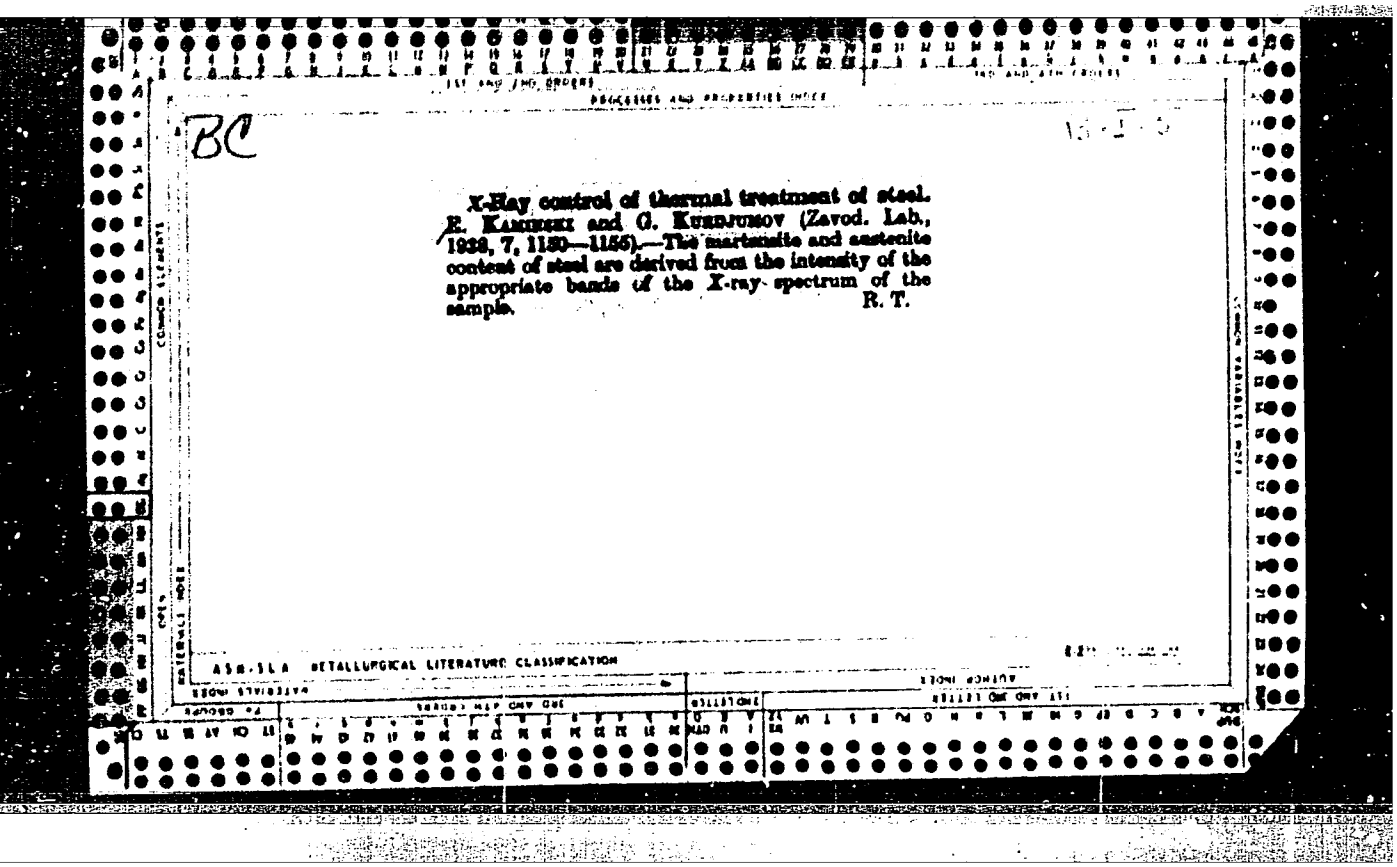


"Transformations in Eutectoid Alloys of Copper and Aluminium. III. Reversible Transformations of the β Solid Solution in the Metastable State. V. Gridnev and G. Kurdjumow (*Zhur. Tekhnich. Fiziki (J. Tech. Physics)*, 1937, 7, (22), 2081-2102.—[In Russian.] Dilatometric studies of alloys containing 12·0-12·7% aluminium showed the $\beta_1 \longrightarrow \beta'$ transformation to be reversible. The kinetics of both transformations suggest that not only the change $\beta_1 \longrightarrow \beta'$, but also the change $\beta' \longrightarrow \beta_1$, which occurs on sufficiently rapid heating, must be considered to be of the martensite type ("jumping" transformations). The $\beta_1 \longrightarrow \beta'$ and $\beta' \longrightarrow \beta_1$ transitions cannot be suppressed by rapid cooling and heating. At a sufficient rate of cooling and heating both transformations occur without a concentration change. The transition temperatures do not change appreciably over a large range of cooling and heating velocities. The temperature of the transformation on heating ($\beta' \longrightarrow \beta_1$) is much higher than that on cooling; the difference may be over 100° C. The magnitude of this hysteresis decreases with increasing concentration of aluminium in solid solution. Annealing the hardened alloys at 400°-500° C. causes a partial segregation of the α phase and a decrease of the temperature of the transitions $\beta_1 \rightleftarrows \beta'$. The segregation of the α phase and the lowering of the transition points are also observed in an alloy with 11·5% aluminium. The X-ray patterns and microstructure reveal that the separation of the α phase continues to a certain limit corresponding to the presence of 12·7-12·8% aluminium in solid solution; thereafter the solid solution decomposes into α + γ, and the transition points for $\beta_1 \rightleftarrows \beta'$ are lowered both on cooling and heating. It follows that transformations of the martensite type take place not only on cooling, but also on heating supercooled solid solutions.—N. A.



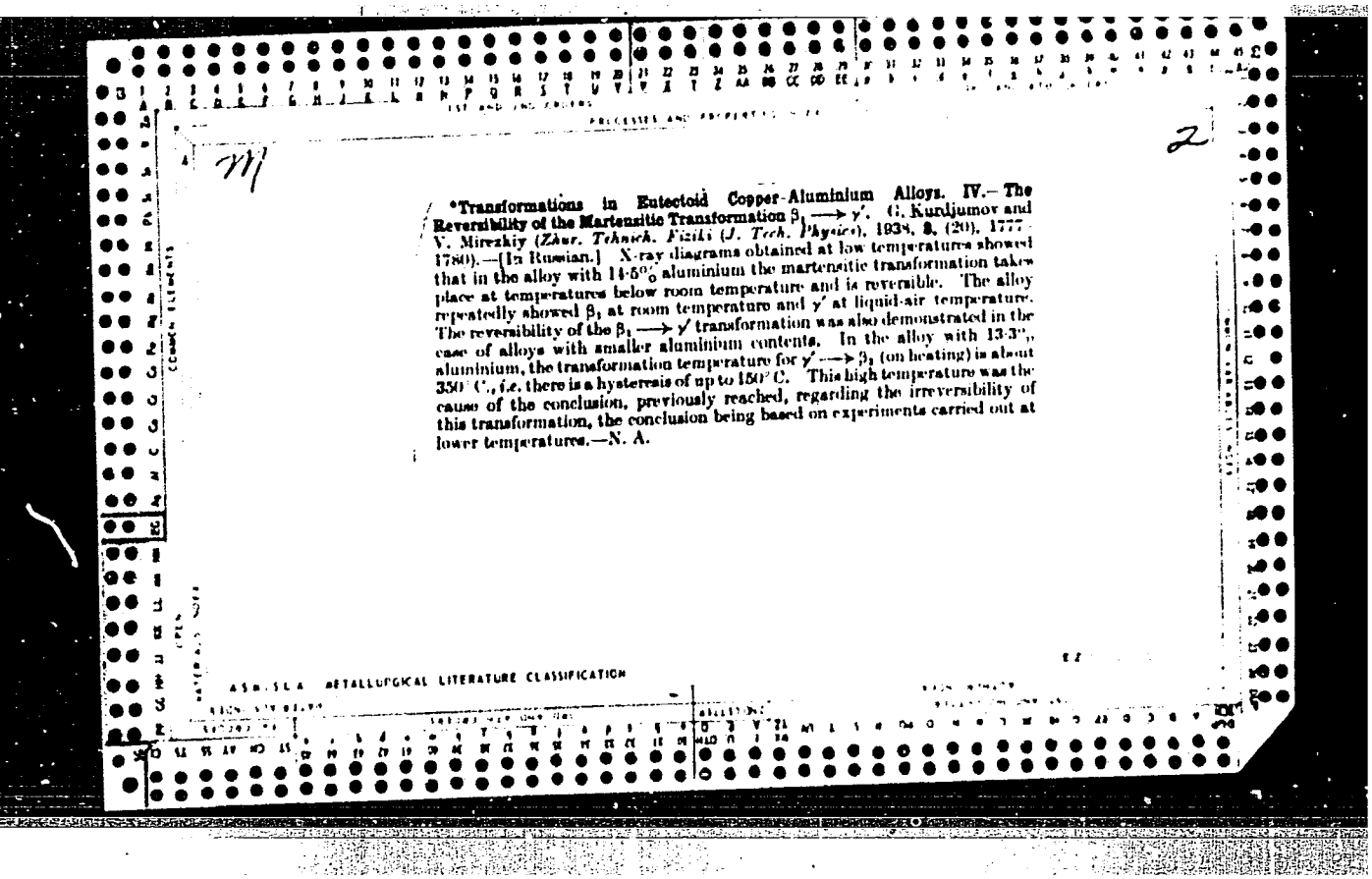
→ **Transformations in eutectoid copper-aluminum alloys III. Reversible transformation of the β-solid solution in the metastable state.** V. Grigoriev and G. Kurdyumov. *Tech. Phys. U. S. S. R.* 5, 203–78(1938)(in English).—Dilatometer studies of alloys with 12.0–12.7% Al showed that the $\beta_1 \rightarrow \beta'$ transformation may be reversed by heating. The kinetics of the transformation show that it belongs to the martensite type. The transformation cannot be suppressed by rapid cooling or by heating. It takes place without change in concn. if the rate of temp. change is sufficient. Within the limits of experimental error the transformation temps. do not alter over a wide range of heating and cooling rates. Temp. hysteresis assuming a temp. difference of over 100° was established for the transformations $\beta_1 \rightleftarrows \beta'$, the transformation temp. for heating being the higher. The magnitude of the hysteresis becomes less with increase in the concn. of Al in the solid soln. On the basis of the data a line $\beta' \rightarrow \beta_1$ corresponding to changes in the lattice on heating, was added to the diagram of the metastable states of the solid soln. Tempering of quenched alloys between 100° and 500° leads to partial sepn. of the α-phase and to lowering of the temp. of the $\beta_1 \rightleftarrows \beta'$ transformations. Sepn. of the α-phase and lowering of the $\beta_1 \rightarrow \beta'$ transformation point are also observed in the alloy with 11.5% Al. Study of the decompn. of the solid soln. was carried out by x-ray and microstructural methods. Sepn. of the α-phase proceeds up to a definite limit and enriches the solid soln. in Al until a concn. of 12.7–12.9% is reached, after which the β_1 (β_2)-solid soln. is decomposed into the phases α + γ. The work leads to the conclusion that transformations of the martensite type may occur not only on cooling but also on heating supercooled solid solns. Bert Ingelstand

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

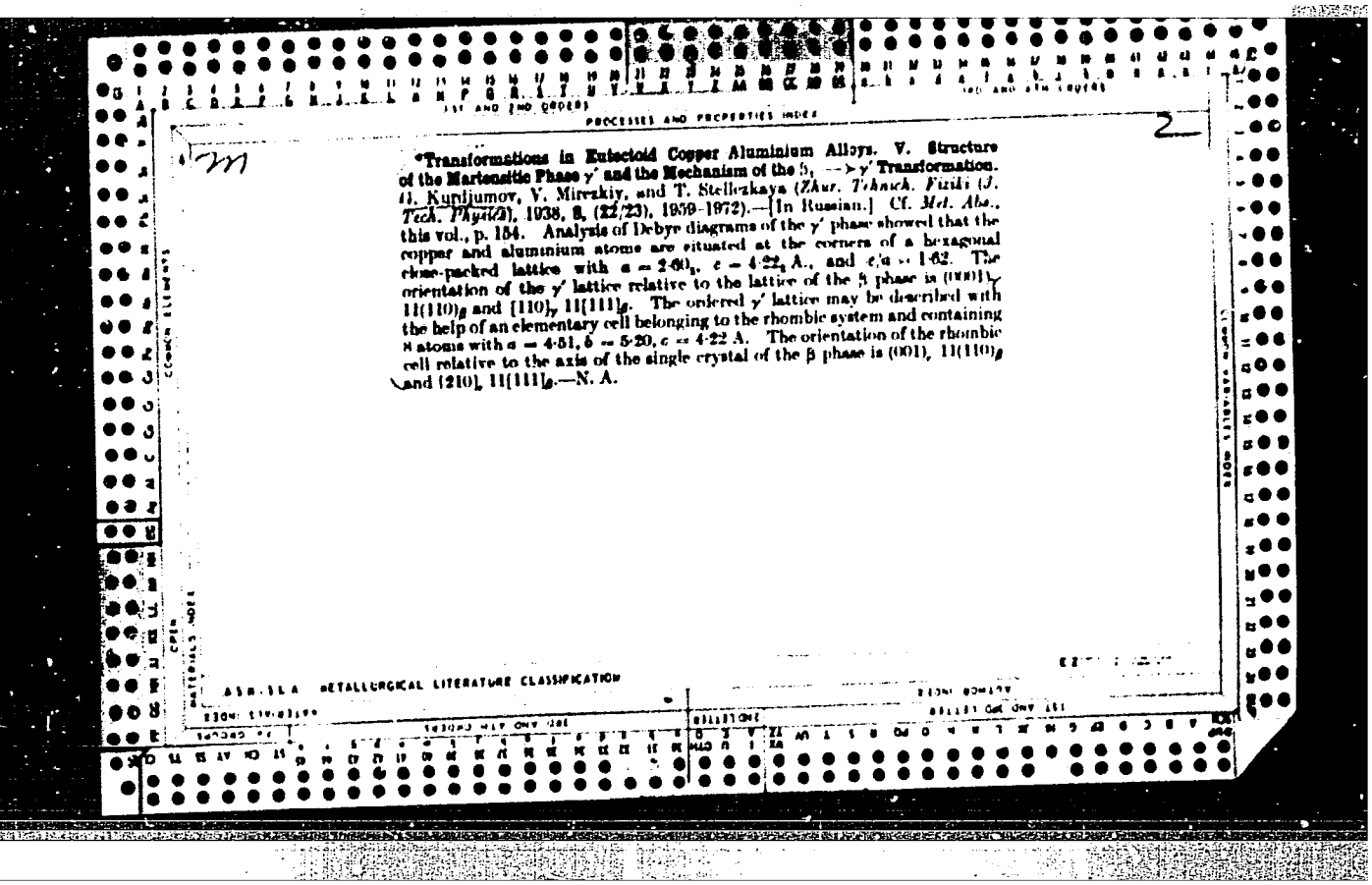


BC

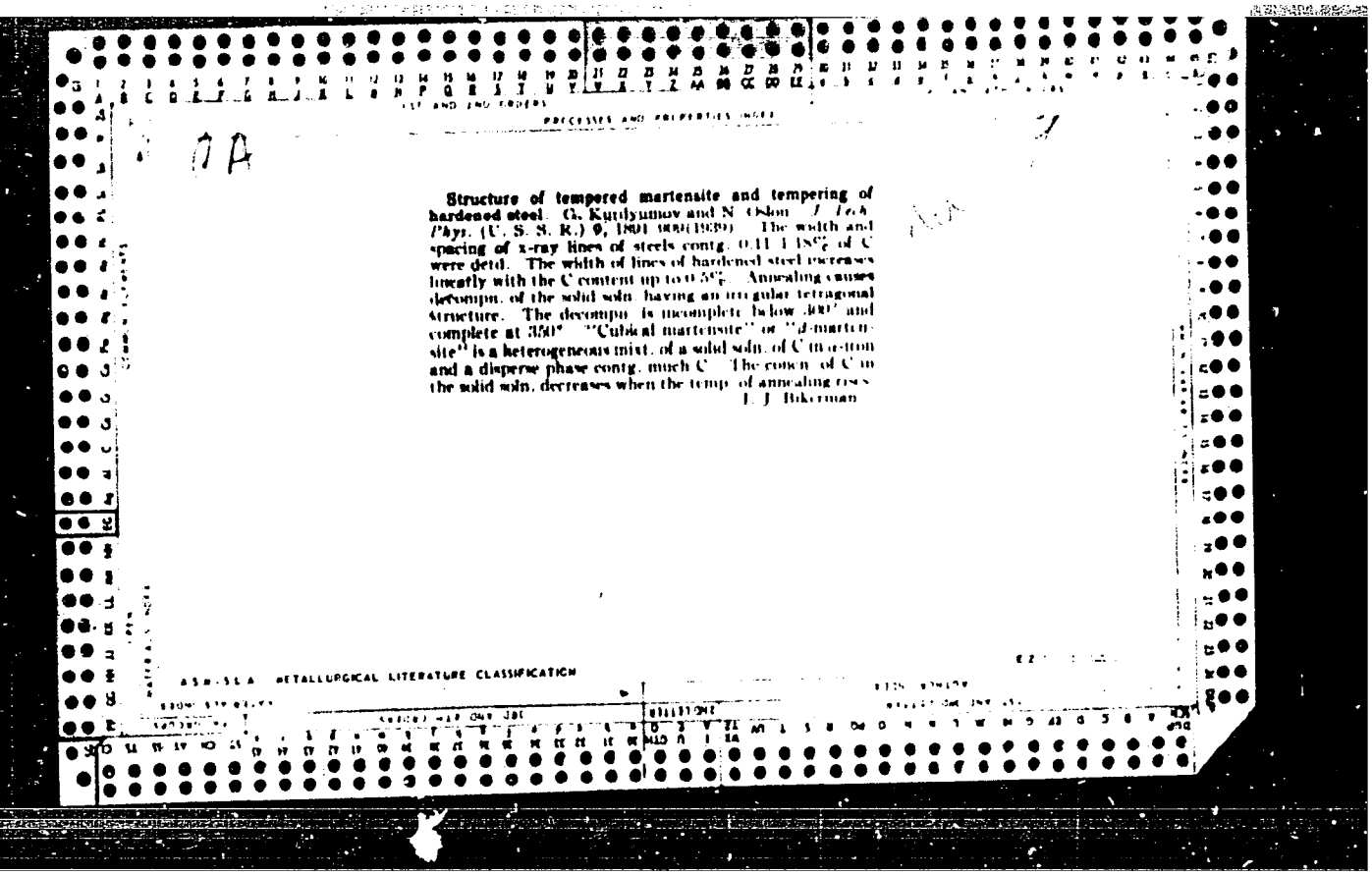
X-Ray control of thermal treatment of steel. E. KAMINSKI and G. KURDJUMOV (Zavod. Lab., 1938, 7, 1150—1156).—The martensite and austenite content of steel are derived from the intensity of the appropriate bands of the X-ray spectrum of the sample. R. T.



***Transformations in Eutectoid Copper-Aluminium Alloys. IV.—The Reversibility of the Martensitic Transformation $\beta_1 \longrightarrow \gamma'$.** G. Kurdjumov and V. Mirezkiy (*Zhur. Tekhnich. Fiziki* (*J. Tech. Physics*), 1938, **8**, (20), 1777–1780).—[In Russian.] X-ray diagrams obtained at low temperatures showed that in the alloy with 14·5% aluminium the martensitic transformation takes place at temperatures below room temperature and is reversible. The alloy repeatedly showed β_1 at room temperature and γ' at liquid-air temperature. The reversibility of the $\beta_1 \longrightarrow \gamma'$ transformation was also demonstrated in the case of alloys with smaller aluminium contents. In the alloy with 13·3% aluminium, the transformation temperature for $\gamma' \longrightarrow \beta_1$ (on heating) is about 350° C., *i.e.* there is a hysteresis of up to 150° C. This high temperature was the cause of the conclusion, previously reached, regarding the irreversibility of this transformation, the conclusion being based on experiments carried out at lower temperatures.—N. A.

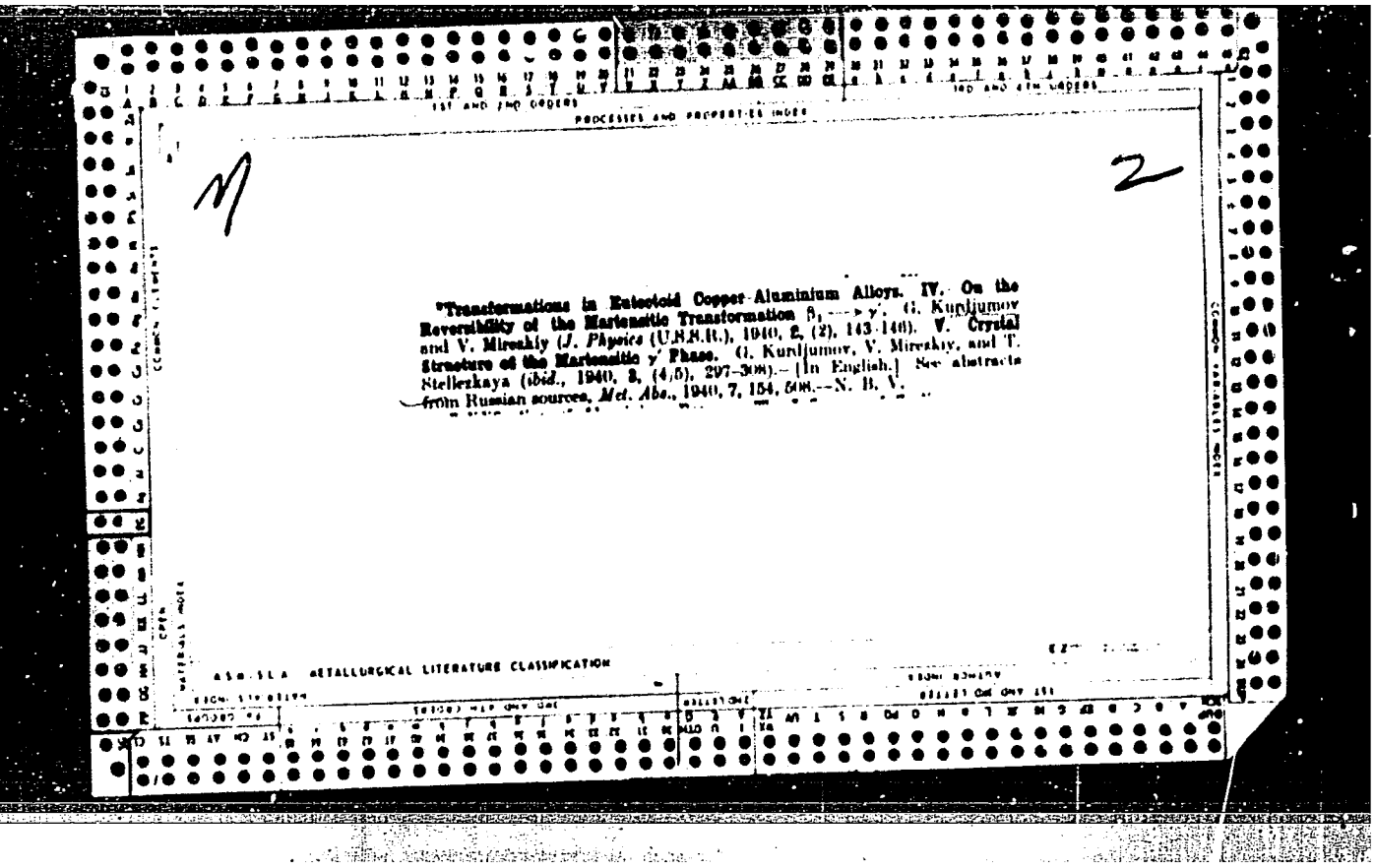


Transformations in Eutectoid Copper Aluminium Alloys. V. Structure of the Martensitic Phase γ′ and the Mechanism of the β ⟶ γ′ Transformation. G. Kurdjumov, V. Mirzakiy, and T. Stellezkaya (*Zhur. Tekhnich. Fiziki* (*J. Tech. Physics*), 1938, **8**, (22/23), 1959–1972).—[In Russian.] Cf. *Met. Abs.*, this vol., p. 154. Analysis of Debye diagrams of the γ′ phase showed that the copper and aluminium atoms are situated at the corners of a hexagonal close-packed lattice with $a = 2{\cdot}60_5$, $c = 4{\cdot}22_4$ A., and $c/a = 1{\cdot}62$. The orientation of the γ′ lattice relative to the lattice of the β phase is (100)$_\gamma$ ∥ 11(110)$_\beta$ and [110]$_\gamma$ ∥ 11[111]$_\beta$. The ordered γ′ lattice may be described with the help of an elementary cell belonging to the rhombic system and containing 8 atoms with $a = 4{\cdot}51$, $b = 5{\cdot}20$, $c = 4{\cdot}22$ A. The orientation of the rhombic cell relative to the axis of the single crystal of the β phase is (001), 11(110)$_\beta$ and [210], 11[111]$_\beta$.—N. A.

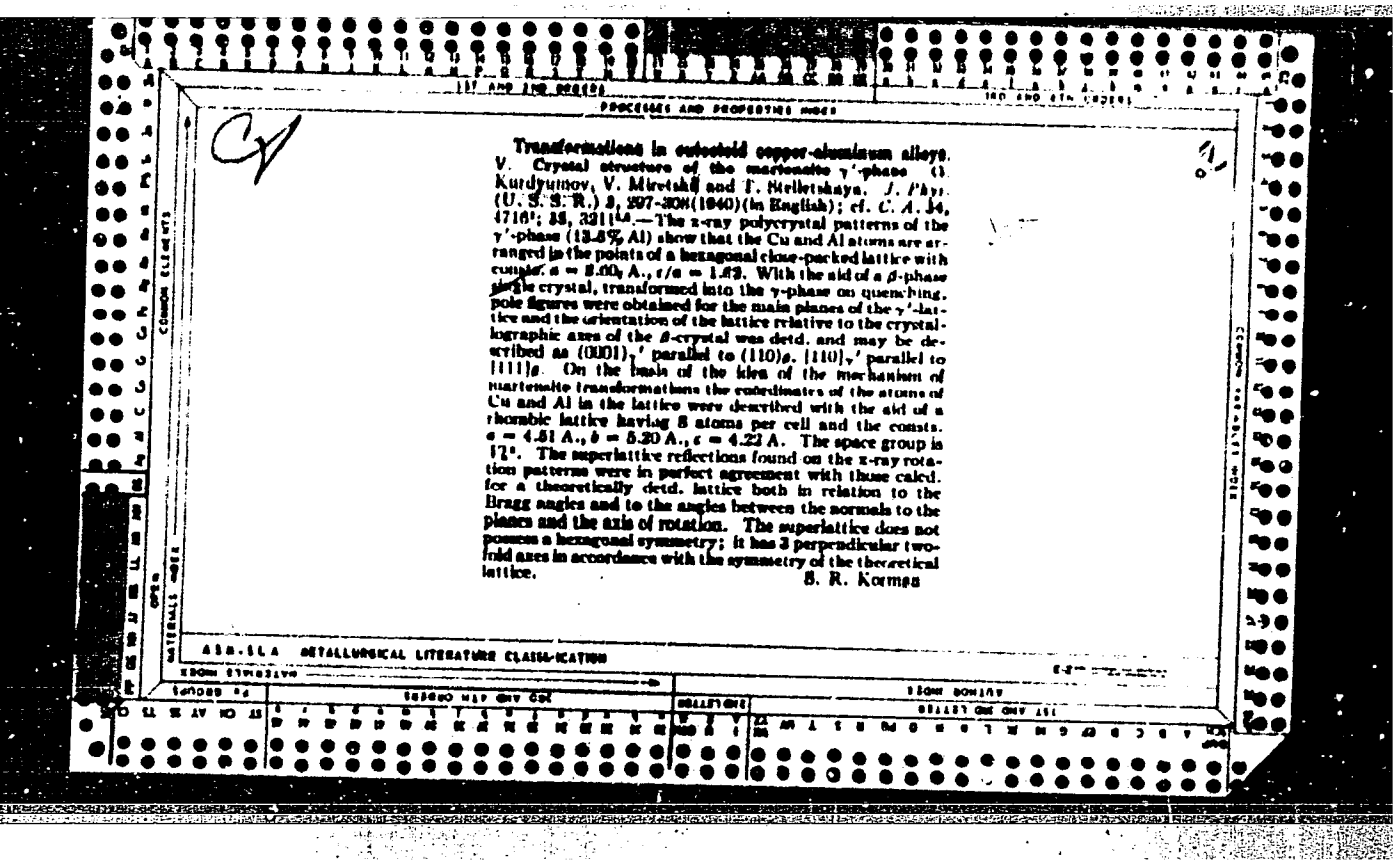


Structure of tempered martensite and tempering of hardened steel. G. Kurdyumov and N. Osbon. *J. Tech. Phys.* (U. S. S. R.) 9, 1801-880(1939). The width and spacing of x-ray lines of steels contg. 0.11-1.18% of C were detd. The width of lines of hardened steel increases linearly with the C content up to 0.5%. Annealing causes decompn. of the solid soln. having an irregular tetragonal structure. The decompn. is incomplete below 300° and complete at 350°. "Cubical martensite" or "α-martensite" is a heterogeneous mixt. of a solid soln. of C in α-iron and a disperse phase contg. much C. The concn. of C in the solid soln. decreases when the temp. of annealing rises.
L. J. Bikerman

A.S.M.-S.L.A. METALLURGICAL LITERATURE CLASSIFICATION



"Transformations in Eutectoid Copper-Aluminium Alloys. IV. On the Reversibility of the Martensitic Transformation $\beta_1 \rightarrow \gamma'$." G. Kurdjumov and V. Mirenkiy (*J. Physics* (U.S.S.R.), 1940, 2, (2), 143–148). V. Crystal Structure of the Martensitic γ' Phase. G. Kurdjumov, V. Mirenkiy, and T. Stellerzkaya (*ibid.*, 1940, 3, (4/5), 297–308).—[In English.] See abstracts from Russian sources, *Met. Abs.*, 1940, 7, 154, 508.—N. B. V.



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Transformations in eutectoid copper-aluminum alloys. V. Crystal structure of the martensite γ'-phase. G. Kurdyumov, V. Miretskiĭ and T. Shelletskaya. *J. Phys. (U. S. S. R.)* **3**, 397-308(1940)(In English); cf. *C. A.* **34**, 4716[1]; **35**, 3211[1].—The x-ray polycrystal patterns of the γ'-phase (13.8% Al) show that the Cu and Al atoms are arranged in the points of a hexagonal close-packed lattice with cubic. $a = 3.00_5$ A., $c/a = 1.62$. With the aid of a β-phase single crystal, transformed into the γ-phase on quenching, pole figures were obtained for the main planes of the γ'-lattice and the orientation of the lattice relative to the crystallographic axes of the β-crystal was detd. and may be described as $(0001)_{\gamma'}$ parallel to $(110)_\beta$, $[110]_{\gamma'}$ parallel to $[111]_\beta$. On the basis of the idea of the mechanism of martensite transformations the coördinates of the atoms of Cu and Al in the lattice were described with the aid of a rhombic lattice having 8 atoms per cell and the consts. $a = 4.81$ A., $b = 5.20$ A., $c = 4.22$ A. The space group is V_h^{17}. The superlattice reflections found on the x-ray rotation patterns were in perfect agreement with those calcd. for a theoretically detd. lattice both in relation to the Bragg angles and to the angles between the normals to the planes and the axis of rotation. The superlattice does not possess a hexagonal symmetry; it has 3 perpendicular two-fold axes in accordance with the symmetry of the theoretical lattice.

S. R. Korngs

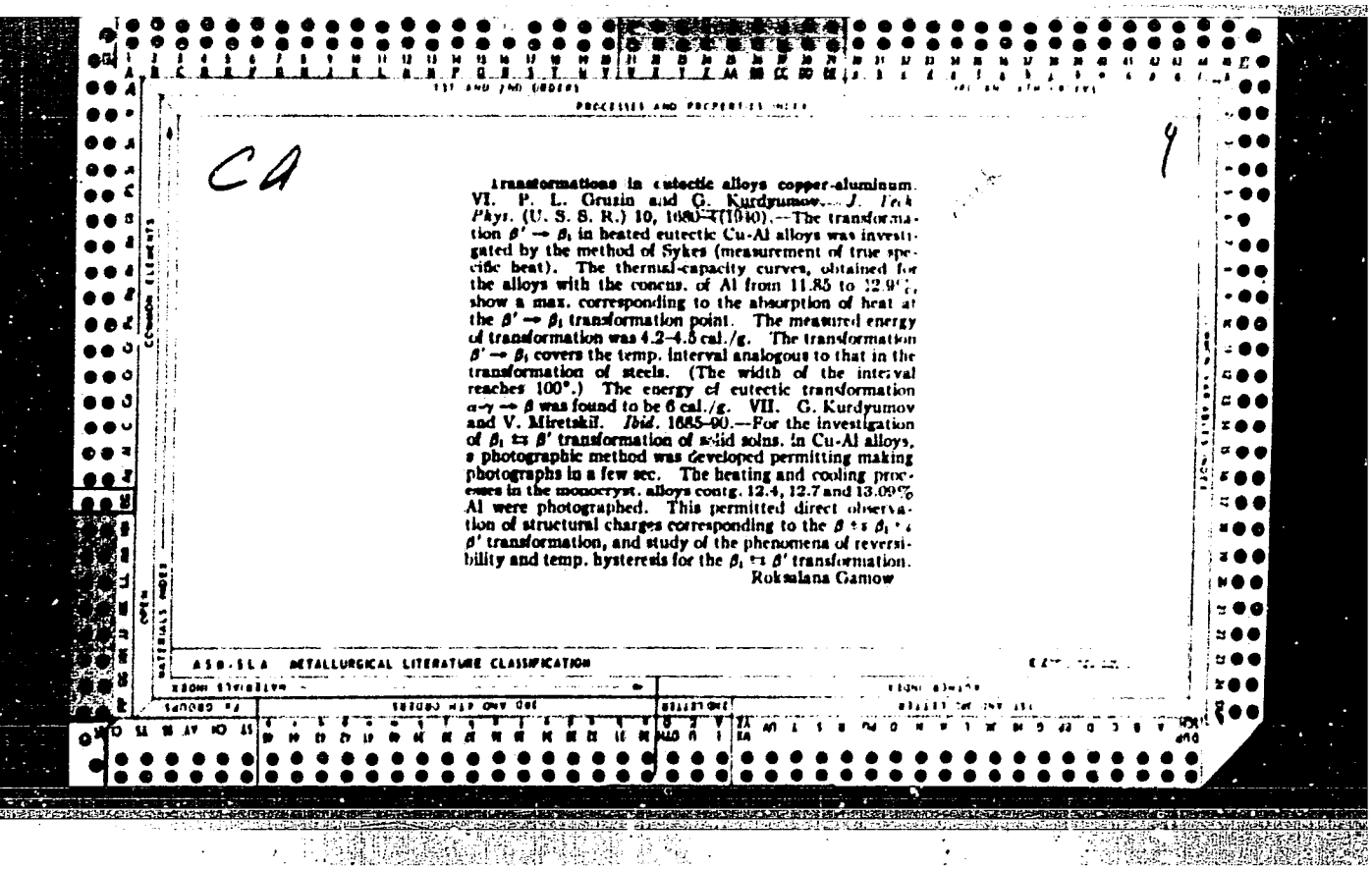
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

KURDYUMOV, G.

ARBUZOV, M. AND KURDYUMOV, G. C.A. Vol. 35 2456-3

"State of carbon in tempered steel." J. Tech. Phys. (U.S.S.R.) 10, 1093-1100 (1940).--

Monocrystals of austenite (1.4% C) which, after tempering, were in the process of transformation into the regularly orientated martensite crystals were examd. by x-rays. There was found in samples tempered at 130-300° a phase produced by the decay of martensite and of the remaining austenite. This phase represents a carbide of Fe, different from Fe_3C. The lack of sharpness of the interference picture indicates the high degree of dispersion of the "low-temperature" carbide crystals. At 300° the "low temp." carbide is transformed very slowly into Fe_3C, this transformation is much accelerated at 350-80°.



CA

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Transformations in eutectic alloys copper-aluminum. VI. P. L. Grusin and G. Kurdyumov. *J. Tech. Phys.* (U. S. S. R.) 10, 1680–7(1940).—The transformation $\beta' \rightarrow \beta_1$ in heated eutectic Cu-Al alloys was investigated by the method of Sykes (measurement of true specific heat). The thermal-capacity curves, obtained for the alloys with the concns. of Al from 11.85 to 12.9%, show a max. corresponding to the absorption of heat at the $\beta' \rightarrow \beta_1$ transformation point. The measured energy of transformation was 4.2–4.5 cal./g. The transformation $\beta' \rightarrow \beta_1$ covers the temp. interval analogous to that in the transformation of steels. (The width of the interval reaches 100°.) The energy of eutectic transformation $\alpha+\gamma \rightarrow \beta$ was found to be 6 cal./g. VII. G. Kurdyumov and V. Miretskii. *Ibid.* 1685–90.—For the investigation of $\beta_1 \rightleftarrows \beta'$ transformation of solid solns. in Cu-Al alloys, a photographic method was developed permitting making photographs in a few sec. The heating and cooling processes in the monocryst. alloys contg. 12.4, 12.7 and 13.09% Al were photographed. This permitted direct observation of structural charges corresponding to the $\beta \rightleftarrows \beta_1 + \beta'$ transformation, and study of the phenomena of reversibility and temp. hysteresis for the $\beta_1 \rightleftarrows \beta'$ transformation.
Roksalana Gamow

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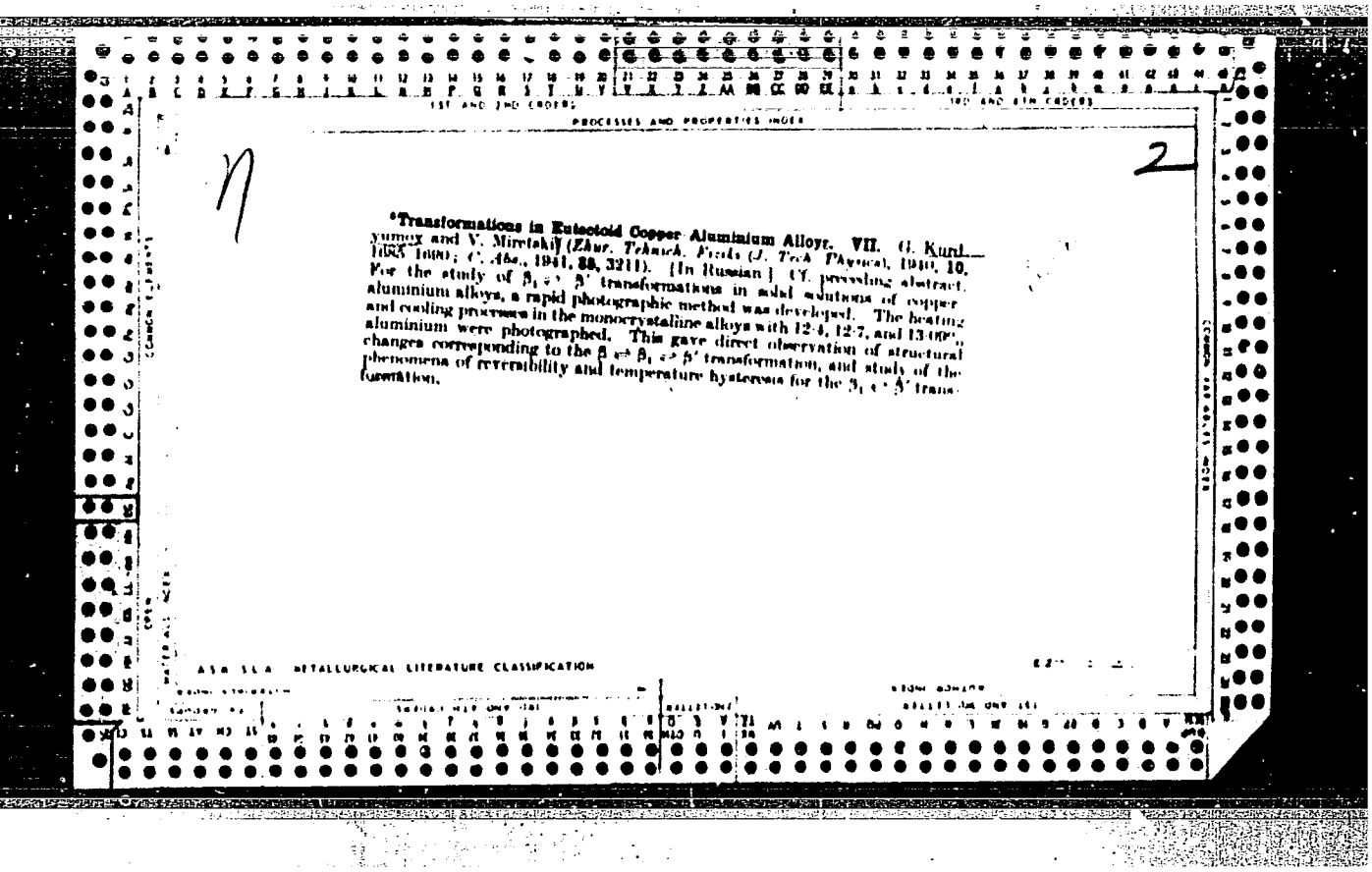

PROCESSES AND PROPERTIES INDEX

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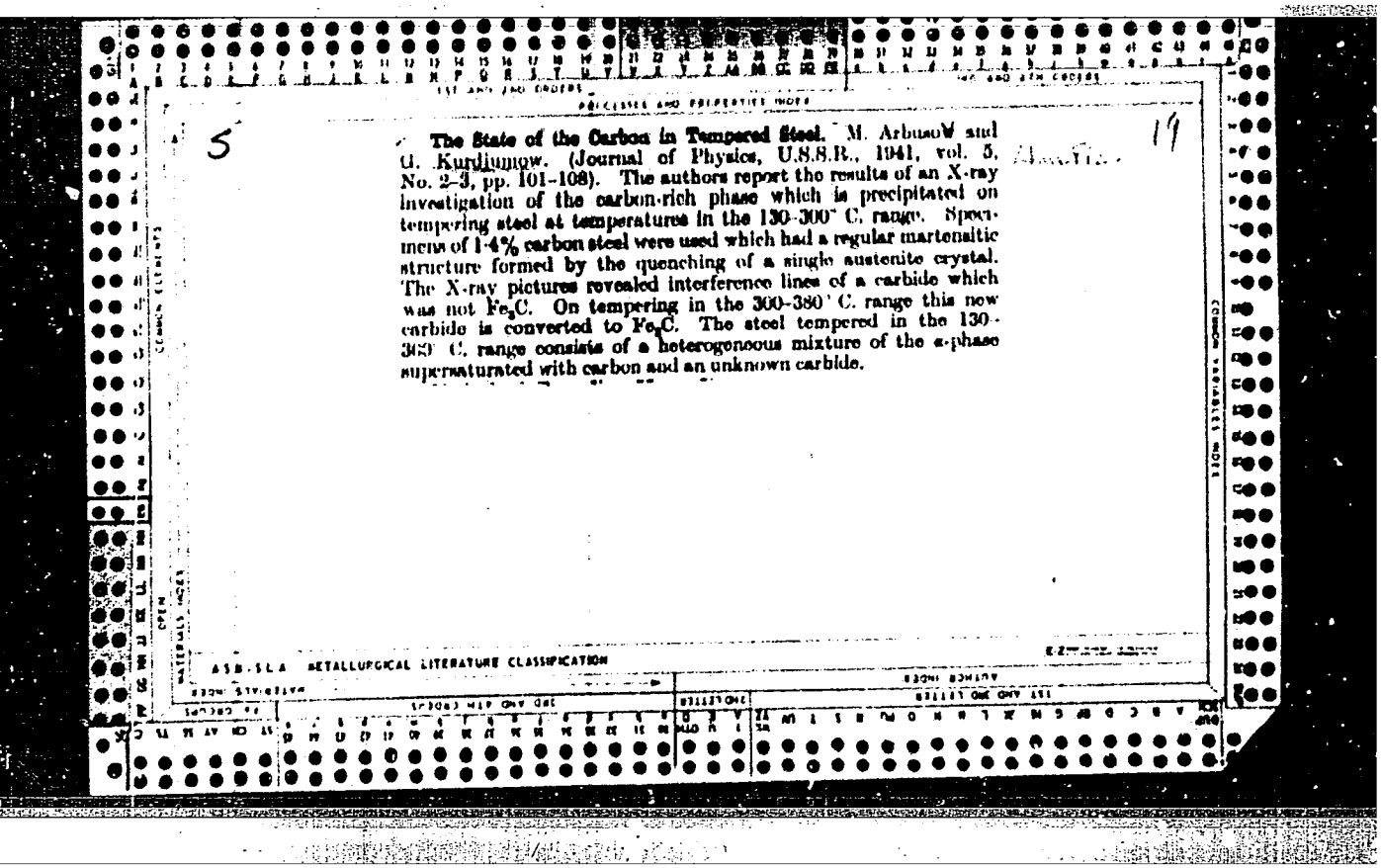
Transformations in Eutectoid Copper Aluminium Alloys. VII. G. Kurdyumov and V. Mirotshiĭ (*Zhur. Tekhn. Fiziki (J. Tech. Physics)*, 1940, 10, 1885–1890; *C. Abs.*, 1941, **35**, 3211). [In Russian.] Cf. preceding abstract. For the study of $\beta_1 \rightleftarrows \beta'$ transformations in solid solutions of copper aluminium alloys, a rapid photographic method was developed. The heating and cooling processes in the monocrystaline alloys with 12·4, 12·7, and 13·0% aluminium were photographed. This gave direct observation of structural changes corresponding to the $\beta \rightleftarrows \beta_1 \rightleftarrows \beta'$ transformation, and study of the phenomena of reversibility and temperature hysteresis for the $\beta_1 \rightleftarrows \beta'$ transformation.

ASM SLA METALLURGICAL LITERATURE CLASSIFICATION

KURDYUMOV, Georgiy Vyacheslavovich

"The Physical Bases of the Processing of Steel," Leningrad, 1941



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The State of the Carbon in Tempered Steel. M. Arbusow and G. Kurdjumow. (Journal of Physics, U.S.S.R., 1941, vol. 5, No. 2-3, pp. 101-108). The authors report the results of an X-ray investigation of the carbon-rich phase which is precipitated on tempering steel at temperatures in the 130-300° C. range. Specimens of 1·4% carbon steel were used which had a regular martensitic structure formed by the quenching of a single austenite crystal. The X-ray pictures revealed interference lines of a carbide which was not Fe_3C. On tempering in the 300-380° C. range this new carbide is converted to Fe_3C. The steel tempered in the 130-380° C. range consists of a heterogeneous mixture of the α-phase supersaturated with carbon and an unknown carbide.

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