AUTHORS: Ayzerman, M. A., Gantmakher, F. R.(Moscow) 103-19-6-9/13

TITLE: On the Stability of Periodic Methods of Operation in Nonlinear Systems With Piece-Wise Linear Characteristics (Ob ustoychivosti periodicheskikh rezhimov v nelineynykh sistemakh s kusochno -lineynoy kharakteristikoy)

PERIODICAL: Avtomatika i telemekhanika, 1958, Vol 19, Nr 6, pp 606 - 608 (USSR)

ABSTRACT: A method is described here by means of which the equations of a linear approximation for solving problems concerning the stability of a periodic solution in a system with piecewise linear characteristics can be found. As in references 1 and 2 the automatic control system is here expressed by equation (1). At first the more general equation (2) is investigated and beside it also the linear equations (3) which, supplemented by linear relations, yields equation (4). Formulae (3) and (4) together determine the discontinuous integral curves. The totality of (3) and (4) is designated as linear approximation of (2) for the periodic solution of (2) $z_i = \tilde{z}_i(t)$. ($f(z_i)$ is given function which is piecewise linear). By additional

Card 1/2

limitations the following theorem is obtained:(reference 1): When the zero-solution $x_i = 0$ of a system of linear approximation (3) + (4) is asymptotically stable, the periodic solution $z_i = \tilde{z}_i(t)$ of the set of equations (2) also is asymptotically stable. Going back to the set of equation (1) the equations (3') and (4') are obtained for it. Linear relations are found and written down in matrix form: $x(t_o+\tau) = Ux(t_o)$, where U denotes the constant transformation matrix. For the stability of the periodic solution of system (1) it is sufficient when the roots of the characteristic equation $\det(U-\lambda E)=0$ lie on the circle of unit radius. The problem concerning the stability of the periodic solution of system (1) can also be solved by direct alignment. There are 4 references, 4 of which are Soviet.

SUBMITTED: May 15, 1957

Card 2/2

1. Servomechanisms--Mathematical analysis

AYZERMAN, M.A.; GANTMAKHER, F.R. (Moskva)

Stability of periodic motions. Prikl.mat. i mekh. 22 no.6: 750-758 N-D '58. (MIRA 11:12)

1. Moskovskiy fiziko-tekhnicheskiy institut.
(Motion)

13(1) PHASE I BOOK EXPLOITATION SOV/3113

Gantmakher, Feliks Ruvimovich and Lev Mikhaylovich Levin

Teoriya poleta neupravlyayemykh raket (Theory of Unguided Rocket Flight) Moscow, Fizmatgiz, 1959. 360 p. 8,000 copies printed.

Ed.: G. I. Fel'dman; Tech. Ed.: N. Ya. Murashova.

PURPOSE: This book is intended for students of exterior ballistics. It will be of interest to military, scientific, and technical personnel concerned with unguided rocket flight.

COVERAGE: This book constitutes a systematic course in the theory of exterior ballistics of unguided rockets and presupposes a knowledge of mathematics and theoretical mechanics at the vtuz level. The book considers two major problems: rocket trajectory and rocket dispersion factors. Approach to the problem and actual execution are the result of Soviet thinking and do not reflect work of western scientists. Rocket trajectory, the "solid state principle", vertical and distance dispersion, antitank rockets, finned and rotating rockets, effect of wind and Coriolis force, and aerodynamics are discussed. Examples of computations are given. The authors thank Yu. I.

Card 1/10

Korostelev. There are 12 references: 8 Soviet, 2 English, and 2 French.

TABLE OF CONTENTS:

TABLES

AVAILABLE: Library of Congress

Card 10/10

AC/os
2/2/60

GANIMAKHER, F.R

report to be presented at the 1st Intl Congress of the Intl Federation of Automatic Control, 25 Jun-5 Jul 1960, Moscow, USSR.

AGEYKIN, D. I. - "Compensating thermo-magnetic gas analysers"
ANDREYEV, N. I. - "Method of determining the optimum dynamic system according to the criterion of the functional extre, which is a given function of several other functions"
AYZERMAN, M. A., and GANTMAKHER, F. P. - "Some problems of the theory of nonlinear systems of automatic regulation with discontinuous characteristics"
BARBASH, E. A. - "Concerning the organization of the LYAPUNOV function for nonlinear systems"
BASHARIN, A. V. - "Graphic methods of synthesis of nonlinear systems of automatic regulation"
BASHTA, T. M. - "Problems of the application of high liquid pressures for automatic systems"
BEDEL'BAYEV, A. K. - "The theory of stability of regulation systems"
BELIKOV, YU. K. - "Multicoordinate nonlinear interpolator for program control of machines"
BERENDS, T. K., and TAL', A. A. - "Pneumatic alloy systems"
BERNSHADSKIY, V. L., YAKUBENIKOV, V. I., KRASHEVSKIY, V. V., MAZIN, L. V., POPOV, G. A. - "Automated electric drive of the propeller installation of the atomic icebreaker 'Lenin'"
BESEKERSKIY, V.A., and FEDOROV, S. M. - "Application of the equivalent transmission function in the calculation of follower systems by the logarithmic frequency curve method"
BILIK, R. V., KOCHIKASHVILI, V. A., and PRANGISHVILI, I. V. - "Contactless telemechanical systems with temporary separation of channels"
BOLTYANSKIY, V.G. , GAMKRELIDZE, P. V., MISHCHENKO, E. F., and PONTRYAGIN, L. S. - "The maximum principle in the theory of optimum control processes"
BROZGOL', M. M. - "Automated electric drives of a metallurgical plant"
BUROVOY, I. A. - "Automatic regulation of froth-layer processes in nonferrous metallurgy"

GANTMAKHER, Feliks Ruvimovich; IL'ICHEVA, G.M., red.; YERMAKOVA, Ye.A., tekhn.red.

[Lectures on analytic mechanics] Lektsii po analiticheskoi mekhanike. Moskva, Gos.izd-vo fiziko-matem.lit-ry, 1960. 296 p. (MIRA 14:4)

(Mechanics, Analytic)

S/194/61/000/006/021/077
D201/D302

16.8000

AUTHORS: Ayzerman, M.A. and Gantmakher, F.R.

TITLE: Fundamentals of the theory of non-linear automatic control systems with discontinuous characteristics

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 6, 1961, 33-34, abstract 6 V242 (V sb. Vses. Mezhvuz. konferentsiya po teorii i metodam rascheta nelineyn. elektr. tsepey, no. 1, Tashkent, 1960, 30-44)

TEXT: The analysis of systems is given which differ from the linear ones by the presence of one or several elements with straight line segmented characteristics. The peculiarities are explained in the notation of equations of motion in discontinuous systems and of the processes occuring during the transition over the discontinuity surface (slip states). An exact method is suggested for determining the periodic states and an analysis of their stability is given

Card 1/2

Fundamentals of the theory...

for the general case. The idea of a linear approximation is introduced. It is shown that in discontinuous systems equilibrium states may occur, an analysis of which is given. 6 figures. 18 references. [Abstracter's note: Complete translation]

VB

Card 2/2

80248

16.9500 16.3400 S/040/60/024/02/12/032

AUTHORS: Ayzerman, M. A., Gantmakher, F. R. (Moscow)

TITLE: On the Stability of the Position of Equilibrium in Discontinuous Systems

PERIODICAL: Prikladnaya matematika i mekhanika, 1960, Vol. 24, No. 2 pp. 283-293

TEXT: Let a discontinuous motion be described above or below the surface

(2) $F(x) = 0$

by the systems of equations

(+1) $\frac{dx}{dt} = f^{+}(x)$

or

(-1) $\frac{dx}{dt} = f^{-}(x)$

Both systems are assumed to possess unique solutions for given initial conditions and to be without singular points on the surface (2). The motion of the image point on (2) is not defined by (± 1) and must be additionally determined. Thereby positions of equilibrium can arise

Card 1/2

S/040/60/024/02/12/032

On the Stability of the Position of Equilibrium in Discontinuous Systems

on (2), the stability investigation of which has to be carried out either by considering the additional conditions or by considering the systems (± 1). The last case is investigated in the present paper. Let (2) be the plane $x_n = 0$, in the semiplane $x_n = 0$, $x_1 > 0$ the trajectories of (± 1) are assumed to proceed downwards and in the semiplane $x_n = 0$, $x_1 < 0$ to proceed upwards. Then (± 1) describes a point transformation G_1 of the semiplane $x_n = 0$, $x_1 > 0$ into the semiplane $x_n = 0$, $x_1 < 0$ and (-1) describes a point transformation G of $x_n = 0$, $x_1 < 0$ into $x_n = 0$, $x_1 > 0$. The limit $x_n = 0$, $x_1 = 0$ consists of fixed points of the transformations G_1, G_2, $G = G_1 G_2$. The stability of the fixed point $x = 0$ of G is equivalent to the stability of the position of equilibrium in the origin (see (Ref.8,9)). It is shown that, if $f^+(0)$ and $f^-(0)$ are not collinear vectors, the position of equilibrium $x = 0$ is unstable. In the case where $f^+(0)$ and $f^-(0)$ are collinear the authors give sufficient conditions for the stability and instability of the fixed point $x = 0$ (generalization of the results of Yu. J. Neymark (Ref.8),(Ref.5)).

There are 3 figures, and 10 references: 8 Soviet, 1 German and 1 Italian.

SUBMITTED: November 3, 1959

Card 2/2

31333
S/569/61/001/000/018/019
D274/D304

16,8000(1103, 1329, 1137)

AUTHORS: Ayzerman, M. A., and Gantmakher, F. R. (USSR)

TITLE: Some problems in the theory of nonlinear control systems with discontinuous characteristics

SOURCE: International Federation of Automatic Control. 1st Congress, Moscow, 1960. Teoriya neprerynykh sistem. Spetsial'nyye matematicheskiye problemy. Moscow, Izd-vo AN SSSR, 1961. Trudy, v. 1, 679-690

4

TEXT: A system with one nonlinear element is described by

$$\dot{x}_i = \sum_{j=1}^{n} a_{ij}x_j + \lambda_i y \ , \quad (i = 1,2,\ldots,n) \ , \qquad (1)$$

where $y = f(x_1)$ is a piecewise linear function. If the phase space of the system is divided by the discontinuity surfaces

Card 1/7

Some problems in...

$$F_{\alpha}(x_1, x_2, \ldots, x_n) = 0 \; ; \quad (\alpha = 1, 2, \ldots, n) \tag{2}$$

into parts, then the process in each part is described by

$$\dot{x}_i = f_i(x_1, x_2, \ldots, x_n) \; ; \quad (i = 1, 2, \ldots, n) \; , \tag{3}$$

where the right-hand sides are continuous. Certain aspects of the processes are discussed which arise on passing from one system (3) to another, through (2). An exact method is proposed for determining the periodic solutions in systems of type (1). Stability of the periodic solutions is analyzed. The systems of Eqs. (1) or (3) do not completely determine the motion, as the passage of the representative point in phase space through the discontinuity surface is not taken into account, nor is the motion of that point along the surface. For that purpose, the discontinuity surface is divided, by means of the manifolds Γ^+ and Γ^-, into slip regions C and regular regions P. The motion of the representative point is determined by means of these regions. Further, the response equation is defined as that obtained from system (1) by eliminating all

Some problems in...

x_1, except $x_1 = x$. If $f(x_1)$ is continuous and sufficiently smooth, the response equation for system (1) is written

$$D(p)x = K(p)y \quad , \tag{4}$$

where

$$y = f(x) \quad , \quad p = \frac{d}{dt} \quad , \quad x = x_1 \quad .$$

But in the present case, Eq. (4) has to be supplemented by the conditions (jumps) at the discontinuity surfaces

4

Some problems in...

$$\left.\begin{aligned} a_0\xi_0 &= b_0\eta_0 \ , \\ a_0\xi_1 + a_1\xi_0 &= b_0\eta_1 + b_1\eta_0 \ , \\ &\cdots\cdots\cdots\cdots \\ a_0\xi_{n-1} + a_1\xi_{n-2} + \cdots + a_{n-1}\xi_0 &= b_0\eta_{n-1} + b_1\eta_{n-2} + \cdots + b_{n-1}\eta_0 \end{aligned}\right\} \ , \quad (5)$$

where ξ and η are the discontinuities of x and y respectively and

$$D(p) = a_0p^n + \cdots + a_n \ ,$$

$$K(p) = b_0p^n + \cdots + b_n \ .$$

Further, the concept of "response equation" is discussed. The conditions of transition from one branch of the characteristic to another in systems

Card 4/7

Some problems in...

of type (1) involve 5 possible cases. Two of these cases correspond to special switching conditions and were apparently discovered by the authors; they are called "pseudoregular" and "pseudoslip" respectively. In all systems of type (1), as well as in systems which differ from (1) by the presence of a given periodic disturbance, the periodic solutions can be found exactly, i.e., without neglecting the harmonics. For this purpose, the authors used a method proposed by Ye. N. Rozenvasser, whereby system (1) is replaced (4) and (5); in (4), x and y are replaced by

$$x = \sum_{r=-\infty}^{+\infty} \alpha_r e^{ir\omega t}, \quad y = \sum_{r=-\infty}^{+\infty} \beta_r e^{ir\omega t};$$

4

β is expressed in terms of η and t_i. These equations lead to a system of transcendental equations in t_i, i.e., to the equation of the periods. Stability of periodic solutions: System (3) is considered.

Card 5/7

Some problems in...

Let $t = t_i$ be the time moments when the trajectory which corresponds to the periodic solution cuts the discontinuity surface. In order to apply Lyapunov's theorem, the equations of linear approximation are set up:

$$\Delta \dot{x}_i = \sum_k \left[\frac{\partial f_i}{\partial x_k} \right]_{\tilde{x}_i(t)} \Delta x_i \quad (i = 1,2,\ldots,n) \quad , \qquad (7)$$

supplemented by the linear "discontinuity conditions":

$$\Delta x_i^+ - \Delta x_i^- = \xi_i \sum_k h_k^- \Delta x^- = \xi_i \sum_k h_k^+ \Delta x^+ \quad , \qquad (8)$$

where

Card 6/7

31333
S/569/61/001/000/018/019
D274/D304

Some problems in...

$$h_k^{\pm} = \left[\frac{\partial F_\alpha}{\partial x_k} \Big/ \left(\frac{\partial F_\alpha}{\partial t} \right)^{\pm} \right]_{M_\alpha}$$

The authors studied the appearance of stable-equilibrium points on the discontinuity surface for system (3). Three theorems are formulated for the special case when the manifolds Γ^+ and Γ^- coincide without being contiguous to the slip region. These theorems involve the stability conditions for the special case. A discussion followed. There are 6 figures and 20 references: 19 Soviet-bloc and 1 non-Soviet-bloc.

Card 7/7

GANTMAKHER, F. R.

AYZERMAN, M. A., and GANTMAKHER, F. R.

"Problem of absolute stability of controlled systems in the list of works"

Report presented at the Conference on Applied Stability-of-Motion Theory and Analytical Mechanics, Kazan Aviation Institute, 6-8 December 1952

AM4016855 BOOK EXPLOITATION S/

Ayzerman, Mark Aronovich; Gantmakher, Feliks Ruvimovich

Absolute stability of control systems (Absolyutnaya ustoychivost' reguliruyemy*kh sistem) Moscow, Izd-vo AN SSSR, 63. 0138 p. illus., biblio., 5000 copies printed. (At head of title: Akademiya nauk SSSR. Institut avtomatiki i telemekhaniki.)

TOPIC TAGS: automatic control, absolute stability, control system absolute stability, frequency analysis of control, Lyapunov method, direct method, Popov criterion, Lur'ye resolvent equation method

PURPOSE AND COVERAGE: This book is devoted to a new approach to the theory of automatic control and its absolute stability, initiated by the Rumanian scientist V. M. Popov, and contains a systematic exposition of the main results, along with the point of view of the authors themselves regarding the present status of the problem. The book is intended for a large group of specialists interested in stability, and the mathematical approach is therefore somewhat simplified.

Card 1/2

L 11598-63 EWT(d)/BDS AFFTC/APGC/ASD Pg-4/Pk-4/Pl-4/Pa-4/Pq-4
IJPC(C)/BC

ACCESSION NR: AP3001082 S/0103/63/024/006/0732/0737 74

AUTHOR: Ayzerman, M. A. (Moscow); Gantmakher, F. R. (Moscow)

TITLE: On critical cases in the theory of absolute stability of control systems 9

SOURCE: Avtomatika i telemekhanika, v. 24, no. 6, 1963, 732-737

TOPIC TAGS: control system, absolute stability, critical case, limiting stability, control system stability

ABSTRACT: Popov's criteria of absolute (global) stability are applied to a control system described by the equation

$$\frac{dx}{dt} = Ax + by, \quad y = \varphi(\sigma), \quad \sigma = c'(x), \qquad (1)$$

where x, y are column vectors and c' is a row vector; A is a constant square matrix, all the eigen-values of which are located on the left hand side of the imaginary axes; and $\varphi(\sigma)$ is a continuous scalar function satisfying the condition $0 = \varphi(\sigma)/\sigma \leq k$, where k is a finite number. These criteria, previously applied

Card 1/3

to noncritical cases, are realized here for all critical cases by narrowing down the class of characteristic functions $y = \varphi(\sigma)$ by inequality

$$\varepsilon \leqslant \frac{\varphi(\sigma)}{\sigma} \leqslant k, \qquad (2)$$

where ε is an arbitrarily small positive number. The general criterion of absolute stability is formulated in the following theorem: For the absolute stability of system (1) in any critical case when $\varphi(\sigma)$ satisfies inequality (2), it is sufficient to satisfy the Popov inequality

$$\mathrm{Re}(1 + iq\omega)\, W(i\omega) + 1/k > 0 \qquad (3)$$

for any finite real q and for all real ω and to satisfy the condition of "limiting stability," i.e., to make stable the linear system derived from (1) at $y = \varepsilon\sigma$ for any small $\varepsilon > 0$. Necessary and sufficient conditions which the frequency characteristic $W(i\omega)$ must satisfy to secure the "limiting stability" of a linear systems are formulated, and the proof of the theorem is presented.

GANTMAKHER, V.F.; KANER, E.A.

Dimensional effect in the presence of a drift of electrons inside a metal. Zhur. eksp. i teor. fiz. 45 no.5:1430-1444 N '63. (MIRA 17:1)

1. Institut fizicheskikh problem AN SSSR i Institut radiofiziki i elektroniki AN UkrSSR.

GANTMAKHER, F.R. (Moscow); YAKUBOVICH, V.A. (Leningrad):

"Absolute stability of non-linear controls."

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 64.

GANTMAKHER, V. F.; SHARVIN, Yu. V.

"Temperature dependence of the electron mean free path in tin at liquid helium temperature."

report presented at the 9th Intl Conf on Low Temperature Physics, Columbus, Ohio, 31 Aug-4 Sep 64.

Inst for Physical Problems, AS USSR.

VASIL'YEV, A.N., starshiy nauchnyy sotrudnik; Prinimal uchastiye:
GANTMAKHER, M.A., mladshiy nauchnyy sotrudnik

Economic efficiency of the use of the newest loom types in the linen industry. Tekst.prom. 22 no.11:43-46 N '62.
(MIRA 15:11)

1. TSentral'nyy nauchno-issledovatel'skiy institut lubyanykh volokon (TSNIILV) (for Vasil'yev).
(Looms)

83582

S/056/60/038/005/015/050
B006/B070

2201
1143

24,7400

AUTHORS: Sharvin, Yu. V., Gantmakher, V. F.

TITLE: Anisotropy of Surface Tension at the Interface Between the Superconducting and the Normal Phases of Tin

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 38, No. 5, pp. 1456-1470

TEXT: The present paper is a detailed report on the determination of the anisotropy Δ of surface tension at the interface between the superconducting (s) and the normal (n) phases of tin, using two methods that give directly independent values for Δ. Δ has the dimension of a length, and is related to the free surface energy σ_{ns} by the relation $\sigma_{ns} = \Delta H_c^2/8\pi$. The difficulties in the experimental determination of Δ are discussed in the introduction. Then, the first method is described. It is based on an analysis of the structure of the intermediate state on samples with different crystalline orientations, the analysis being made with the help of ferromagnetic powder. The apparatus used is schematically

Card 1/3

Anisotropy of Surface Tension at the Interface Between the Superconducting and the Normal Phases of Tin

S/056/60/038/005/015/050
B006/B070

shown in Fig. 1. The results of the method, called "the method of frozen flux" and described in detail, are separately discussed for the individual samples. Figs. 4-7 reproduce photographs of the structures of the intermediate stage in a field of view 1.4 cm in diameter; the white regions are superconducting, the arrows show the projection of the crystallographic axis onto the surface of the sample. The numbers of the samples and the temperatures are also given. Figs. 8-10 and 13-15 give the corresponding polar diagrams. The second method is based on the measurement of the moments of force acting on spherical samples in a magnetic field. This method is called the "method of torsion balance", and is also described in detail. Due to the anisotropy, the free energy of the sample depends on the orientation of the magnetic field relative to the crystallographic axes of the sample. The sample is suspended by an elastic thread in such a way that in the state of equilibrium the moment $M = -\partial F/\partial \alpha$ may be determined from the angle of rotation α in a horizontal magnetic field; Δ is calculated from M. Densities, impurity concentrations, and the moment m of nine samples are given in Table 1. Figs. 18-21 show the angular dependence of the moments m ($m = 8\pi M_i/H_c^2 V$, V - sample volume) for different

axes of suspension (axes of rotation). The f-values measured in the various positions (f is the free energy divided by $VH_c^2/8\pi$), $|m|_{max}$ and Δm are given in Table 2. The results relating to the dependence of surface tension on the direction of the normal to the interface, the order of absolute magnitude of this effect, and its temperature dependence are discussed in detail. Finally, the results of the two methods are compared with each other as well as with the results of the theory.

P. A. Bezuglyy, N. N. Bogolyubov, V. L. Ginzburg, and L. D. Landau are mentioned in this connection. The authors thank Academician P.L.Kapitsa for his interest, and A. I. Shal'nikov for discussions. There are 21 figures, 2 tables, and 21 references: 15 Soviet, 3 US, and 3 British.

ASSOCIATION: Institut fizicheskikh problem Akademii nauk SSSR (Institute of Physical Problems of the Academy of Sciences USSR)

SUBMITTED: December 31, 1959

GANTMAKHER, V.F.; SHARVIN, Yu.V.

Nonmonotonous dependency of the surface impedance of tin on the magnetic field at a frequency of 1.9 mc. Zhur. eksp. i teor. fiz. 39 no.2:512-513 Ag '60. (MIRA 13:9)

1. Institut fizicheskikh problem Akademii nauk SSSR.
(Tin) (Metals at low temperatures--Electric properties)

24.2140 (1158, 1160, 1495)

AUTHORS: Sharvin, Yu. V., Gantmakher, V. F.

TITLE: The Depth of Penetration of a Magnetic Field Into a Superconductor as a Function of the Magnetic Field Strength

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 5(11), pp. 1242-1250

TEXT: So far, the intensity and characteristic of nonlinear effects in real superconductors has not been clarified by experiment and theory. The theory of V. L. Ginzburg and L. D. Landau furnishes the following expressions for a temperature range close to T_c:

$$\alpha = \frac{\varkappa(\varkappa + 2\sqrt{2})}{8(\varkappa + \sqrt{2})^2}, \quad \varkappa = \frac{\sqrt{2}\,/\,e_{eff}\,/}{\hbar c} H_c \delta^2(0).$$ According to L. P. Gor'kov (Ref. 2), e_{eff} has to be twice the charge of electrons in order to agree with modern superconductor theories, and the range of application of the above relations has to be limited, too. Evidently,

Card 1/4

The Depth of Penetration of a Magnetic Field Into a Superconductor as a Function of the Magnetic Field Strength

S/056/60/039/005/012/051
B029/B077

no investigations have been made so far for ranges where the theories of Ginzburg and Landau do not apply. To clarify several discrepancies, the authors studied many specimens, employing the more accurate radar-frequency method. A. A. Abrikosov, L. P. Gor'kov, and I. M. Khalatnikov (Ref. 12) developed a method for a theoretical estimation at limited frequencies. On the basis of the experimental data, the authors selected an operating frequency of 2 megacycles. The following part of this paper deals with the measuring methods, the measuring instruments and their calibration, the necessary control tests, and the evaluation of the results. Superconductivity vanishes at the sharp bend of the curve $\Delta f_1(H)$; Δf_1 denotes the frequency shift of the signal of the first generator. Sometimes this superconductivity vanishes at a field strength greater than H_c. In another specimen the dependence of the effective increment $\Delta_{eff} \delta = (dr/df_1)\Delta f_1$ of $h = H_0/H_c$ was nearly parabolic. The rapid increase of α at $T \rightarrow T_c$ seems to be caused by secondary effects. The following expression was found for the transverse field:

The Depth of Penetration of a Magnetic Field Into a Superconductor as a Function of the Magnetic Field Strength

$\Delta_{eff}/\delta(0) = (\frac{1}{2}\alpha h_\perp^2 + \frac{3}{8}\beta h_\perp^4)$; $h_\perp$ denotes the ratio of the strength of the external field to that where the specimen is no longer superconducting. Other specimens showed considerable deviations of the curves $\Delta_{eff}(h_\perp^2)$ from linearity at small values of $h_\perp^2 < 0.2$, probably due to the fact that superconductivity vanishes near the surface of the specimens. According to these experiments, α for tin is between $1.4 \cdot 10^{-2}$ and $2 \cdot 10^{-2}$ in the temperature range close to T_c; in the same temperature range $\beta = 1 \cdot 10^{-3}$ to $2 \cdot 10^{-3}$. These values are only an upper limit of α. The values of α for $T \rightarrow T_c$ found in this investigation are smaller than the values calculated by Ginzburg and Landau from the penetration depth. The theoretical value of β, $4.5 \cdot 10^{-4}$, agrees with the experimental value. The values for α are two to three times greater than the one determined by M. Spiewak (Ref. 19). It would be interesting to study the surface impedance of superconductors as a function of field strength at relatively low frequencies (10^6-10^9 cycles). Academician P. L. Kapitsa and A. I. Shal'nikov are thanked for their

The Depth of Penetration of a Magnetic Field Into a Superconductor as a Function of the Magnetic Field Strength

S/056/60/039/005/012/051
B029/B077

interest and for discussing the results. There are 6 figures, 1 table, and 19 references: 11 Soviet, 3 US, and 5 British.

ASSOCIATION: Institut fizicheskikh problem Akademii nauk SSSR (Institute of Physical Problems, Academy of Sciences USSR)

SUBMITTED: July 15, 1960

Card 4/4

S/056/62/042/005/046/050
B108/B138

AUTHOR: Gantmakher, V. F.

TITLE: A method of measuring the momentum of electrons in a metal

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 5, 1962, 1416-1418

TEXT: A constant magnetic field causes the electrons on a spiral path to penetrate into the metal beyond the skin depth. If the size of the specimen is equal to the diameter of the electron orbit, this will cause scattering of the electrons from the crystal boundaries. The diameter depends on the field strength. This kind of effect becomes evident in the behavior of the impedance. Experiments were made with single-crystal tin plates with an electron free path of $1-3\cdot10^{-1}$ cm at helium temperatures. The variation in frequency ($\sim10^{6}$ cps) with variation in magnetic field strength owing to the specimen-induced variation in the reactance of the oscillatory circuit was measured by a modulation method. $5.7\cdot10^{-20}$ g·cm/sec was the value obtained for the orbit
Card 1/2

diameter in momentum space. This method can also be used to study the Fermi surfaces of metals. . There is 1 figure .

ASSOCIATION: Institut fizicheskikh problem Akademii nauk SSSR (Institute of Physical Problems of the Academy of Sciences USSR)

SUBMITTED: March 12, 1962

39678
S/056/62/043/001/052/056
B102/B104

24240

AUTHOR: Gantmakher, V. F.

TITLE: A size effect in metal with multiple magnetic fields

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 1(7), 1962, 345-347

TEXT: A new type of size effect was observed when measuring the field dependence of the surface impedance of tin at helium temperatures, using frequencies of 1-5 Mc. The measurements were made with a highly pure single crystal ($\sim 10^{-4}$% impurities) cut as a plate perpendicular to the [100] axis, thickness d = 0.39 mm; the electron mean free path was $(1-3)\cdot 10^{-1}$ cm, the skin depth at 1-5 Mc was 10^{-4} cm. At a field $H_o = 2cp/ed$ (p - half width of extreme electron orbit in the momentum space, perpendicular to the $\vec{H}$ direction and normal to the surface) the curve X(H) has a singularity (Gantmakher, ZhETF, 42, 1416, 1962). Such singularities were now found to arise also at nH_o (measured up to n=5)

Card 1/2 (PROBABLY 'liquid' Helium

when the plate thickness equals 2np. This is ascribed to the fact that near the extreme cross sections of the Fermi surface (i. e. for extreme widths of the electron trajectories in the plate) the electron concentration is greatly increased, and likewise the current density at this depth (2p). There are 2 figures.

ASSOCIATION: Institut fizicheskikh problem Akademii nauk SSSR (Institute of Physical Problems of the Academy of Sciences USSR)

SUBMITTED: May 18, 1962

Card 2/2

SHARVIN, Yu.V.; GANTMAKHER, V.F.

Growing metal single crystals in optically polished molds.
Prib. i tekh. eksp. 8 no.6:165-167 N-D '63. (MIRA 17:6)

1. Institut fizicheskikh problem AN SSSR.

L 17610-63 EWT(1)/EPF(n)-2/EWP(q)/EWT(m)/FCC(w)/BDS/EES(s)-2 AFFTC/ASD/
IJP(C)/SSD Pu-4/Pt-4 WW/JD S/056/63/044/003/0C6/053

73
72

AUTHOR: Gantmakher, V. F.

TITLE: Investigation of the Fermi surface of tin by the size effect

PERIODICAL: Zhurnal eksperimental'noy i tekhnicheskoy fiziki, v. 44, no. 1, 1963, 811-822

TEXT: The size effect during measurements of surface resistance Z = R + iX of a metal in a magnetic field at not too high radio frequencies is a new convenient method for the study of Fermi surfaces described by the author in an earlier paper (Ref. 1: ZhETF, 42, 1416, 1962). This paper contains results of the observed size effect during surface resistance measurement in tin at helium temperatures and frequencies between 1 and 5 Mc/s, and presents detailed data about the sizes of extremal electron orbits in momentum space with magnetic fields lying in the /100/ and /110/ planes. The article concludes with a thorough evaluation of the results, their comparison with the results of other authors, and with the model of almost free electrons. However, more information is still needed before final conclusions can be reached. There are 13 figures and 1 table.

Card 1/2

L 17610-63

S/056/63/044/003/006/053

Investigation of the Fermi surface...

ASSOCIATION: Institut fizicheskikh problem Akademii nauk SSSR (Institute for Physics Problems of the Academy of Sciences of the USSR)

SUBMITTED: September 26, 1962

Card 2/2

GANTMAKHER, V.F.

Studying the Fermi surface of tin with the aid of the dimensional effect. Zhur. eksp. i teor. fiz. 44 no.3:811-822 Mr '63. (MIRA 16:3)

1. Institut fizicheskikh problem AN SSSR.
(Fermi surfaces) (Tin)

ACCESSION NR: AP4042563 S/0056/64/046/006/2028/2034

AUTHOR: Gantmakher, V. F.

TITLE: Concerning the Fermi surface of tin

SOURCE: Zh. eksper. i teor. fiz., v. 46, no. 6, 1964, 2028-2034

TOPIC TAGS: tin, Fermi surface, free electron, electron orbit

ABSTRACT: Continuing an earlier investigation (ZhETF, v. 44, 811, 1963), the dimensional effect is used to study the extremal electronic orbits of a tin specimen in the (001) plane, with the magnetic field lying in the (001) plane. The installation used was the same as in the earlier investigation. The results show the following to exist in tin: an open surface very similar to the almost free electron model, a closed surface whose dimensions provide a basis for assuming it to correspond to the surface of zone 4b of the model, a surface corresponding to the closed surface obtained in the earlier

Card 1/2

ACCESSION NR: AP4042563

investigation, and a complicated open surface whose detailed structure has not yet been ascertained. It is pointed out that the data admit of ambiguous interpretations and that information on the extremal orbits of the three principal crystallographic planes is inadequate for the complete determination of all the Fermi surfaces. "The author thanks Yu. Shavrin for a detailed description of the results." Orig. art. has: 5 figures.

ASSOCIATION: Institut fizicheskikh problem Akademii nauk SSSR (Institute of Physics Problems, Academy of Sciences SSSR)

SUBMITTED: 22Jan62 DATE ACQ: ENCL: 00

SUB CODE: NP, SS NR REF SOV: 008 OTHER: 003

Card 2/2

GANTMAKHER, V.F.

Fermi surface of tin. Zhur.eksp.i teor.fiz. 46 no.6:2028-2034 Je '64.

1. Institut fizicheskikh problem AN SSSR.

(MIRA 17:10)

L 22574-65

ACCESSION NR: AP5001835 S/0056/64/047/006/2111/2115

AUTHOR: Gantmakher, V. F.; Krylov, I. P.

TITLE: Size effect in indium on helical trajectories in an inclined magnetic effect

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 6, 1964, 2111-2115

TOPIC TAGS: indium, single crystal, skin effect, Fermi surface, electron trajectory

ABSTRACT: The size effect at radio frequencies was observed in high-purity indium single crystals with the experimental set-up described by Gantmakher earlier (ZhETF, v. 44, 811, 1963). The measurements were made at 1.3K and approximately 3 Mcps. The samples were in the form of disks 18 mm in diameter and 0.4--0.5 mm thick. The angle between the direction of the magnetic field and the surface of the sample was regulated by tilting the Dewar relative to the electromagnet. The size effect itself and the splitting of the size-effect lines were observed for several samples with different orientations. The splitting of the

Card 1/2

L 22574-65

ACCESSION NR: AP5001835

lines when the field is inclined several degrees to the sample surface can be explained as being due to the drifting of electrons in extremal noncentral cross sections of the Fermi surface, in a direction perpendicular to the surface of the sample, thus allowing these electrons to penetrate the distance from the skin layer on one side of the sample to the skin layer on the other side. The splitting of the size-effect lines by inclination of the magnetic field makes it possible to estimate the mean free path of the individual electron groups, in the same manner as for the electrons near the limiting points (Gantmakher and E. A. Kaner, ZhETF v. 45, 1430, 1963), and to differentiate between central and noncentral orbits, thus allowing the shape of the Fermi surface to be determined. "The authors thank Academician P. L. Kapitsa for affording the opportunity to do the work at the Institute of Physical Problems, Academy of Sciences SSSR, and also Yu. V. Shevrin for a detailed discussion of the results." Orig. art. has: 4 figures and 3 formulas. [02]

ASSOCIATION: Institut fizicheskikh problem Akademii nauk SSSR (Institute of Physical Problems, Academy of Sciences, SSSR); Institut fiziki tverdogo tela Akademii nauk SSSR (Institute of Solid State Physics, Academy of Sciences, SSSR)

SUBMITTED: 28Jul64 ENCL: 00 SUB CODE: SS, NP

NO REF SOV: 002 OTHER: 004 ATD PRESS: 3172

Card 2/2

L 52954-65 EWT(d)/EWT(l)/EWT(m)/EWP(w)/EPF(c)/EEC(k)-2/EPF(n)-2/EWA(d)/EPR
T/EWP(t)/EWG(c)/EWP(b)/ETC(m) Pr-4/Pu-4 IJP(c) JD/WW

ACCESSION NR: AP5010501 UR/0056/65/048/004/1077/1080

AUTHOR: Gantmakher, V. F.; Sharvin, Yu. V.

TITLE: Temperature dependence of the mean free path of electrons in tin at low temperatures

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 4, 1965, 1077-1080

TOPIC TAGS: tin, electron mean free path, Fermi surface, size effect, electron phonon scattering, low temperature research

ABSTRACT: The temperature dependence of the amplitude of the size effect was measured at the limiting points in tin for the purpose of obtaining detailed data on the mean free path of the electrons at low temperatures. The procedure used is that proposed by one of the authors earlier (Gantmakher, with E. A. Kaner, ZhETF v. 45, 1430, 1963) and based on the measurement of the relative line intensity in the size effect, as described in another paper (Gantmakher, ZhETF v. 44, 811, 1963). The measured size-effect was found to increase like the 3.3 power of the temperature, which is close to the cubic dependence expected from the Bloch theory. The effective mean free path between two elementary acts of interaction with phonons

Card 1/2

L 52954-65

ACCESSION NR: AP5010501

4

was determined from the experimental data for electrons located near the investigated point on the Fermi surface, and found to be of the order of several centimeters at 2K. The results show that in addition to the lines whose intensity changes by one order of magnitude in the investigated range of temperatures, there is also a line whose amplitude is temperature-independent within the limits of experimental error. This line corresponds to the extremal trajectory enveloping the cylinder in the fourth zone of the Fermi surface of the tin sample in the (100) plane. This absence of temperature dependence is attributed to the cylindrical shape of the investigated part of the Fermi surface, but no qualitative explanation is found for this connection. "The authors thank P. L. Kapitsa for interest in the work, and M. Ya. Azbel' and A. I. Shal'nikov for a discussion of the results."
Orig. art. has: 2 figures.

ASSOCIATION: Institut fiziki tverdogo tela Akademii nauk SSSR (Institute of Solid State Physics, Academy of Sciences SSSR)

SUBMITTED: 25Nov64 ENCL: 00 SUB CODE: SS

NR REF SOV: 006 OTHER: 001

Card 2/2

L 60349-65 EWT(l)/EWT(m)/EPA(w)-2/EWP(t)/EWP(b)/EWA(m)-2 Pz-6/Pi-4 IJP(c)
ACCESSION NR: AP5016548 JD/AT UR/0056/65/048/006/1572/1582

AUTHOR: Gantmakher, V. F.; Kaner, E. A.

TITLE: Radio-frequency size effect in a magnetic field perpendicular to the surface of a metal

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 6, 1965, 1572-1582

TOPIC TAGS: size effect, Fermi surface, tin, electron trajectory, impedance oscillation, cyclotron frequency

ABSTRACT: The authors investigated experimentally and theoretically a new size effect, due to the motion of ineffective electrons in a metal situated in a magnetic field perpendicular to the surface of the sample. The effect is analogous to the oscillations observed in the static conductivity of metallic plates when the field is varied. The theoretical analysis is based on a determination of the distribution of an electromagnetic field in the space occupied by the metal, under certain assumptions concerning the nature of the Fermi surface. The experimental study was based on a modulation procedure for measuring the dependence of the imaginary parts of the surface impedance of the metallic sample on the magnetic field, described by the authors earlier (ZhETF 45, 1430, 1963). The results show that the motion of

Card 1/3

the ineffective electrons produces a weakly damped field component inside the metal, and this in turn produces impedance oscillations in a plane-parallel plate. The oscillations are periodic in a straight field. The periods are determined by the extremal values of the electron displacement along the magnetic field during the cyclotron period. Two types of electron trajectories, namely trajectories with limiting points and helical trajectories, are considered, which result in similar oscillations. The experiments were performed on tin single crystals with magnetic field directions close to that of the [100] crystallographic axis. In fields 2--10 kOe, the oscillations were periodic in the straight field, and the period is independent of the temperature and frequency, but is inversely proportional to the thickness of the sample. Several types of oscillations were observed, each being interpreted on the basis of the proposed theory. Although the observed effect gives in principle the same information on the electron spectrum as oscillations of the static conductivity in a normal magnetic field, the radio-frequency size effect is considered by the authors to be preferable, since the amplitude of the oscillations of the static conductivity should decrease rapidly with increasing magnetic field. "The authors thank P. L. Kapitsa for affording the possibility of performing the experimental part of the work at Institut fizicheskikh problem (Institute of Physics Problems) AN SSSR, and Yu. V. Sharvin for a discussion of the results."

L 60349-65
ACCESSION NR: AP5016548

2

Orig. art. has: 7 figures and 18 formulas.

ASSOCIATION: Institut fiziki tverdogo tela Akademii nauk SSSR (Institute of Solid State Physics, Academy of Sciences, SSSR); Institut radiotekhniki i elektroniki Akademii nauk UkrSSR (Institute of Radio Engineering and Electronics, Academy of Sciences, UkrSSR)

SUBMITTED: 12Jan65 ENCL: 00 SUB CODE: SS, EM

NR REF SOV: 010 OTHER: 006

Card 3/3 dOP

L 8875-66 EWT(m)/EWP(b)/EWP(t) IJP(c) JD

ACC NR: AP5026594 SOURCE CODE: UR/0056/65/049/004/1054/1067

47
13

AUTHOR: Gantmakher, V. F.; Krylov, I. P.

ORG: Institute of Solid State Physics, Academy of Sciences, SSSR (Institut fiziki tverdogo tela Akademii nauk SSSR); Institute of Physical Problems, Academy of Sciences, SSSR (Institut fizicheskikh problem Akademii nauk SSSR)

TITLE: Radio-frequency size effect in indium 27

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 4, 1965, 1054-1067

TOPIC TAGS: semiconductor, Fermi surface, indium, free electron model, free electron, magnetic field

ABSTRACT: The Fermi surface in In is investigated by the radio frequency size effect technique at a frequency of 3 Mc/s. Identification of the experimental cross sections was made using the dependence of the size effect lines on the inclination of the magnetic field relative to the sample's surface. The complex shape of the isoenergetic surface in the second band resulted in the appearance of a number of size effect lines due to the presence of breaks in the electron trajectories in a magnetic field. These lines are not related to the electromagnetic field bursts within the metal but to less notable features of the field distribution between the bursts. The set of lines associated with the Fermi surface of the second band confirms the fact that this surface is very similar to that predicted by the almost free electron model.

Card 1/2

L 8875-66

ACC NR: AP5026594

No lines have been observed which would indicate that the Fermi surface may be open. It also follows from the experimental data that the Fermi surface in the third energy band consists of tubes connected into rings, the axes of the tubes being oriented along (110). The shape of the central cross section of the tube produced by intersection with a plane perpendicular to the tube axis was determined by using several samples with different directions of the normals. No lines have been observed which would indicate the existence of tubes with axes parallel to (101). Orig. art. has: 14 figures. [CS]

SUB CODE: 20/ SUBM DATE: 21May65/ ORIG REF: 011/ OTH REF: 006/ ATD PRESS: 4152

Card 2/2

GANTMAKHER, V.F.

"Free" electrons in metals. Priroda 54 no.7:11-23 Jl '65. (MIRA 18:7)

1. Institut fiziki tverdogo tela AN SSSR, Moskva.

GANTMAKHER, V.F.

Surface impedance in Bi at frequencies of 1 - 10 Mc in weak magnetic fields. Pis'. v red. Zhur. eksper. i teoret. fiz. 2 no.12:557-562 D '65. (MIRA 19:1)

1. Institut fiziki tverdogo tela AN SSSR i Institut fizicheskikh problem AN SSSR. Submitted Nov. 9, 1965.

L 02194-67 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6032469 SOURCE CODE: UR/0056/66/051/003/0740/0745

48
46
B

AUTHOR: Krylov, I. P.; Gantmakher, V. F.

ORG: Institute of Physical Problems, Academy of Sciences SSSR (Institut fizicheskikh problem Akademii nauk SSSR); Institute of Solid State Physics, Academy of Sciences SSSR (Institut fiziki tverdogo tela Akademii nauk SSSR)

TITLE: Radio-frequency size effect at the limiting point in indium 27

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 51, no. 3, 1966, 740-745

TOPIC TAGS: indium, magnetic field, frequency size effect, Fermi surface curvature, electron model, almost free electron, electron mean free path

ABSTRACT: The curvature of the Fermi surface of indium near the [111] direction was measured by means of the radio frequency size effect at the limiting point in an inclined magnetic field. The experimental value of the curvature is identical with that yielded by the almost-free electron model. A study of amplitude dependence of the size effect lines showed the electron mean free path to be a function

Card 1/2

L 02194-67

ACC NR: AP6032469

2

of temperature. The thickness of the skin layer was determined on the basis of size effect line width, and on its dependence upon the frequency. The authors thank Academician P. L. Kapitsa for making their work possible, and Yu. V. Sharvin for discussing results of their research. Orig. art. has: 5 figures, and 2 formulas. [Based on authors' abstract]

SUB CODE: 20/ SUBM DATE: 23Mar66/ ORIG REF: 009/ OTH REF: 003/

Card 2/2 lgh

ACC NR: AP7003535 SOURCE CODE: UR/0386/67/005/001/0017/0020

AUTHOR: Gantmakher, V. F.; Dolgopolov, V. T.

ORG: Institute of Physics Problems, Academy of Sciences SSSR (Institut fizicheskikh problem Akademii nauk SSSR)

TITLE: Excitation of standing sound waves in Bi by an electromagnetic method

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 5, no. 1, 1967, 17-20

TOPIC TAGS: bismuth, sound propagation, low temperature research, surface property, skin effect

ABSTRACT: The authors report here the results of preliminary experiments in which they observed excitation of sound in Bi by an electromagnetic wave incident on its surface. Single-crystal Bi samples in the form of discs were placed inside an inductance coil, with which they were cooled to helium temperatures. The coil together with the sample served as the inductance of the tank circuit of an rf oscillator, which included a blocked semiconductor diode. The dependence of the barrier capacitance of its p-n junction on the blocking voltage made it possible to vary smoothly the oscillation frequency, and also to modulate it sinusoidally at a frequency $\varphi = 19$ cps. The oscillator output was detected and fed to a narrow-band amplifier with synchronous detector, tuned to double the modulation frequency 2φ. As a result, the output signal was proportional to $\partial^2 R/\partial f^2$ (R = real part of Bi sample surface imped-

Card 1/2

ACC NR: AP7003535

ance). The dependence of $\partial^2 R/\partial f^2$ on f was investigated in the interval 1 - 10 MHz. In magnetic fields on the order of 10 - 100 Oe and parallel to the coil axis, a group of equidistant peaks appeared on the $\partial^2 R/\partial f^2$ curves, separated by frequency intervals larger by one order of magnitude than the width of each individual group. The magnitude and direction of the magnetic field affected only the amplitudes of the peaks, the positions of which remained unchanged. Arguments are presented to show that the observed excitation of sound in Bi is due to some specific mechanism, connected with emission of sound as a result of large electron drift velocity. It is concluded, however, that further experiments are needed to clarify the sound-excitation mechanism. The authors thank Academician P. L. Kapitsa for the opportunity to perform the experiments at the Institute of Physics Problems, and Yu. V. Sharvin for interest in the work. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 10Oct66/ ORIG REF: 001/ OTH REF: 003

Card 2/2

L 12071-65 EWT(1) IJP(c)

ACC NR: AP6002661 SOURCE CODE: UR/0386/65/002/012/0557/0562

AUTHOR: Gantmakher, V. F.

ORG: Institute of Solid-State Physics, Academy of Sciences SSSR (Institut fiziki tverdogo tela Akademii nauk SSSR); Institute of Physics Problems, Academy of Sciences SSSR (Institut fizicheskikh problem Akademii nauk SSSR)

TITLE: Surface impedance of Bi at 1--10 Mc in weak magnetic fields

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 2, no. 12, 1965, 557-562

TOPIC TAGS: bismuth, electric impedance, surface property, skin effect, weak magnetic field

ABSTRACT: In a search for a convincing explanation of the strong nonmonotonic variations of the surface impedance Z of a metal with varying magnetic field H near H = 0, the author carried out experiments on the behavior of bismuth single crystals in weak fields. Bismuth discs 18 mm in diameter containing ~10^{-4}--10^{-5}% impurities were placed in the coil of a radio-frequency tank circuit and were cooled together with the coil to helium temperatures. The experiments consisted of recording $\partial f/\partial H$ (f = frequency) as a function of H with an automatic two-coordinate plotter in the magnetic-field range from 0 to 5 oe. The measuring apparatus was de-

Card 1/3

ACC NR: AP6002661

scribed by the author earlier (ZhETF v. 44, 811, 1963). The measures taken to eliminate the influence of extraneous factors are described. The results of the experiments give grounds for assuming that the observed nonmonotonicity and the related dependence on the amplitude of the hf field are connected with the quasistatic distribution of the magnetic field inside the skin layer. The inhomogeneity of the magnetic field in the skin layer greatly complicates the integral relation between the current and the electric field in the skin layer. Application of a small constant field shifts the picture of the instantaneous field distribution in the skin layer, and this naturally should lead to a decrease in the impedance. If the proposed explanation of the observed nonlinearity is correct in principle, then similar investigations can yield information

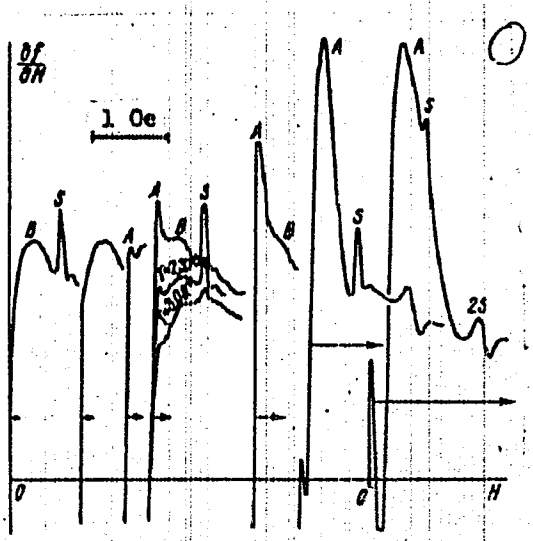


Fig. 1. Dependence of the oscillation frequency on the constant magnetic field at different amplitudes of the hf field

L 12071-66

ACC NR: AP6002661

9

on the structure of the field in the skin layer. Author is grateful to Academician P. L. Kapitsa for affording the opportunity to work at the Institute of Physics Problems of the Academy of Sciences SSSR and to Yu. V. Sharvin for a discussion of the results. Orig. art. has: 1 figure.

SUB CODE: 20/ SUBM DATE: 09Nov65/ ORIG REF: 004/ OTH REF: 002

HW

Card 3/3

[illegible]

Uber schwache totalstetige operatoren. Matem. sb., 7(4?), (1940), [illegible].
O linejnykh prostranstvakh, edinichnaya sfera kotorykh slabo kompaktna. DAN 17 (1937), 91-94.
O slaboy kompaktnosti v prostranstve banakha. Matem. sb. ?(50), (1940), [illegible].

SO: Mathematics in the USSR, 1917-1947
edited by Kurosh, A.G.,
Markushevich, A.I.,
Rachevskiy, P.I.,
Moscow-Leningrad, 1948.

GANTMACHER F. R.

SUBJECT USSR/MATHEMATICS/Differential equations CARD 1/1 PG - 51
AUTHOR GANTMACHER E.R. AJZERMAN M.A.
TITLE On an algebraic problem in the theory of automatic control.
PERIODICAL Uspechi mat. Nauk 9, No. 1, 136-138 (1954)
reviewed 5/1956

The following problem is considered: two real polynomials $D_1(p)$ and $D_2(p)$ are given. The number of their zeros in each of the four quadrants, on the positive and on the negative semiaxis and in the origin of the coordinates is known. It is asked for necessary and sufficient conditions for this distribution of zeros such that the polynomial $D_1(p) + D_2(p)$ satisfies the Hurwitz conditions of stability.
Necessary and sufficient conditions are given for a series of special cases. For the general case there are presented only four necessary (but not sufficient) conditions.

L 57795-65 EPR/EPA(s)-2/EWA(h)/EWT(d)/EWT(1)/EWT(m)/EPA(b) ... EWP(f) Pa-4/Pt-7/Pz-6/Peb TT/AT

ACCESSION NR: AP5016779 UR/0286/65/000/010/0106/0106
621.83
629.13.01/06

AUTHOR: Abramovich, R. B.; Arinushkin, L. S.; Belyayev, Yu. V.; Gantman, A. M.; Golodovskiy, A. Ye.; Zaslavskiy, G. M.; Zhukov, Ye. P.; Mayzenberg, I. M.

TITLE: Aircraft turbodrive. Class 47, No. 171234

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 10, 1965, 106

TOPIC TAGS: aircraft turbodrive, constant rpm generator, torus drive, gear train

ABSTRACT: An Author Certificate has been issued for an aircraft turbodrive unit for the air-turbine starting of engines and for driving a constant-rpm a-c generator. The unit contains an air turbine, an a-c generator, a starter and generator gear train, and an unguided free-wheeling clutch. For increased economy and reliability, to decrease weight, and to shorten starting time, the unit is equipped with a twin torus drive in the form of two driver torus disks mounted on a drive shaft and two driven torus disks mounted on a fixed shaft and separated by a thrust bearing. The unit is also equipped with intermediate rollers which are automatically rotated by

Card 1/3

L 57795-65
ACCESSION NR: AP5016779

a control device; these provide interaction between the drive and the driven torus disks in transmitting rotation from the engine to the constant-rpm generator through a differential control mechanism and the generator gear train (see Fig. 1 of the Enclosure). Orig. art. has: 1 figure. [LB]

ASSOCIATION: Organizatsiya gosudarstvennogo komiteta po aviatsionnoy tekhnike SSSR (Organization of the State Committee on Aviation Technology, SSSR)

SUBMITTED: 05May64 ENCL: 01 SUB CODE: AC

NO REF SOV: 000 OTHER: 000 ATD PRESS: 4041

Card 2/3

PHASE I BOOK EXPLOITATION SOV/5399

Kompleksnaya mekhanizatsiya i avtomatizatsiya proizvodstva; iz opyta zavodov Penzenskogo sovnarkhoza (Overall Industrial Mechanization and Automation; From Experience of Factories Under the Penza Council of the National Economy) [Penza] Penzenskoye knizhnoye izd-vo, 1959. 230 p. Errata slip inserted. 2,000 copies printed.

Ed.: V. Tsar'kov; Tech. Ed.: Ye. Voronkova.

PURPOSE: This collection of articles is intended for the general reader interested in the mechanization and automation of machine-tool production

COVERAGE: The efforts of industrial workers of the Penza district to fulfill ahead of time the objectives set forth in the Seven Year Plan are discussed in these 11 articles. The need for complete automation in the production of machine tools and instruments is strongly emphasized. No personalities are mentioned. There are no references.

TABLE OF CONTENTS:

HIGH-EFFICIENCY PROCESS EQUIPMENT

FOR OVERALL IMPROVEMENT IN PRODUCTION TECHNIQUES

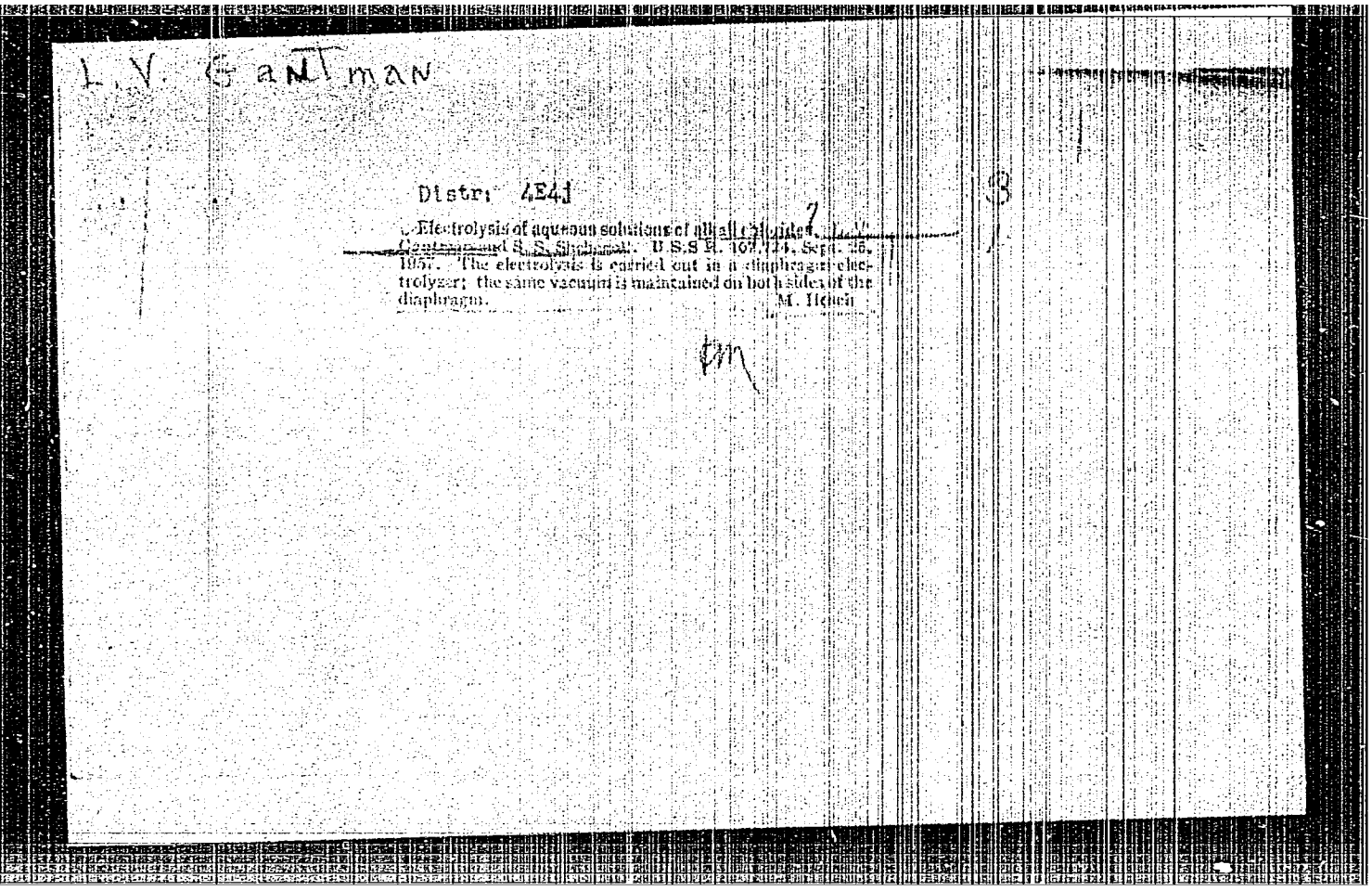
AVAILABLE: Library of Congress

Card 3/3

VK/rwa/gap
8-11-61

GANTMAN, L.V., inzhener; SHVEDOV, Ye.P., inzhener

Industrial production of reactive hydrochloric acid. Khim.prom. no.4:115-117 Ap '47. (MLRA 8:12)
(Hydrochloric acid)



L. V. Gantman

Distr: 4E4j

Electrolysis of aqueous solutions of alkali chlorides. [illegible] and S. S. Shchigol'. U.S.S.R. 107,124, Sept. 26, 1957. The electrolysis is carried out in a diaphragm electrolyzer; the same vacuum is maintained on both sides of the diaphragm. M. Hirsch

GANTMAN, L.V.

Designing multieffect evaporators. Khim.prom. no.3:169-170 Ap-My '57. (MLRA 10:7)
(Evaporating appliances)

AUTHOR: Gantman, L. V. SOV/64-58-5-11/21

TITLE: The Intensification of the Working Plants for the Concentration of Electrolytic Caustic Potash (Intensifikatsiya deystvuyushchikh ustanovok kontsentrirovaniya elektroliticheskogo kaustika)

PERIODICAL: Khimicheskaya promyshlennost', 1958, Nr 5, pp. 309 - 311 (USSR)

ABSTRACT: The three-membered evaporation apparatus of the system GNIIKhM is the one most often used in the Soviet factories. Since this apparatus has some deficiencies, and the production of caustics has increased, a new apparatus was constructed in one of the chemical plants which has a much greater output and better economic properties. Besides the author of this article P.V.Bonyuk, L.S.Genin, V.S.Yevdokimova, S.M.Kruglyy, G.V. Seleznev, I.E.Spektor, P.G.Khain and Sh.S.Shchegol' also participated in this construction. The paper gives a diagram of this new evaporation apparatus, and from its description it may be seen that in the second stage new apparatus with forced circulation of the solution (after the construction by the NIIkhimmash) were employed. Some changes in the dimensions were made. The heat transfer coefficient was increased 2-3-fold in the first

Card 1/2

stage by a proper use of the function of the heat transfer coefficient vs. the temperature difference, while in the second stage it increased 3-4-fold by the above mentioned change. For separating the salt from the liquid caustic potash automatic horizontal centrifuges of the type AG were used. These centrifuges were manufactured by the Sumy Factory imeni M.V.Frunze (Sumskiy zavod im.M.V.Frunze). The scheme elaborated for the plant is automatic in almost all operations, and the author hopes that it will become completely automatic. There are 1 figure, 2 tables, and 5 reference all of which are Soviet.

1. Potassium carbonates--Production 2. Evaporators--Construction
3. Evaporators--Applications 4. Evaporators--Operation

GANTMAN, M.N.

Ion-selective membranes and methods for testing them. Issl.po vodopodg. no.3:210-237 '59. (MIRA 12:9)
(Ion exchange)

LASKORIN, B.N.; SMIRNOVA, N.M.; GANTMAN, M.N.; VORONOVA, A.I., red.; VLASOVA, N.A., tekhn. red.

[Ion-exchange membranes and their use] Ionoobmennye membrany ikh primenenie. Moskva, Gos.izd-vo lit-ry v oblasti atomnoi nauki i tekhniki, 1961. 162 p. (MIRA 14:12)
(Ion exchange)

8(1) SOV/107-58-12-42/55

AUTHOR: Gantman, S.

TITLE: VDZh-400 Ferrocarbon Elements (Zhelezo-ugol'nyye elementy VDZh-400)

PERIODICAL: Radio, 1958, Nr 12, pp 45-46 (USSR)

ABSTRACT: The author states that as a result of work carried out by the Vsesoyuznyy nauchno-issledovatel'skiy institut istochnikov toka (All-Union Scientific Research Institute for Sources of Current), a ferrocarbon element has been produced having an alkaline electrolyte and electrodes made of activated carbon and porous iron which serve a similar purpose to cupric oxide elements (MOE) and elements with manganese-air depolarization (MVD), but which do not use non-ferrous metals and other scarce materials. They can be used for the filament power supply of the "Rodina", "Iskra" and "Nov'" battery radio receivers,

Card 1/4

VDZh-400 Ferrocarbon Elements

railroad signalling and automatic block systems, telephone lines, lighting etc. The electrical power is produced by the reaction of active porous iron oxidation by the oxygen in the air. The negative electrode of the element is the porous iron (porosity of 75-80%), the positive one is the air polarization carbon electrode. The composition of this electrode is fully described. The element is contained in a steel cylindrical container: its inner construction, main feature of which is the horizontal positioning of the electrodes, is described and illustrated in Figure 1. The horizontal positioning of the electrodes improves the working conditions of the carbon electrode, makes it possible to use pieces of porous iron which have not been specially processed mechanically, and simplifies the design. An element ready for work is shown in Figure 2a and two elements mounted

VDZh-400 Ferrocarbon Elements

on top of each other in Figure 2b. The basic features of the element are as follows; diameter 221 mm, height 75 mm, weight 5 kg, emf 0.9-1.0 v, normal discharge current 0.5 amps, maximum permissible current 0.8-1.0 amp, capacity with a continuous discharge into a resistance of 1.25 ohms up to a voltage of 0.5 v is not less than 500 amp-hrs, capacity with discharges of a lengthy, interrupted nature is about 400 amp-hrs. The discharge curves of the element when it is under continuous discharge against resistances of 1.25 and 0.8 ohms are shown in Figure 3a and comparative discharge curves of the element with that of the MOE-500 cupric oxide element (curve 2) in Figure 3b. The basic characteristics of the VDZh-400 and MOE-500 elements and the MVD "Ekran" and "Deviz" batteries are given in the table. The final conclusions of

VDZh-400 Ferrocarbon Elements

the author are that the VDZh-400 element has the following advantages; it does not use up scarce non-ferrous metals, has a simple design and is very suitable for mass production. There are 1 schematic diagram, 2 drawings, 2 graphs and 1 table.

124-57-1-1221

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 1, p 167 (USSR)

AUTHOR: Gantman, S.A.

TITLE: Determination of the Rigidity of the System "Lathe - Product - Instrument" in an Automatic Longitudinal-profile Lathe (Opredeleniye zhestkosti sistemy "stanok - detal' - instrument" avtomata prodol'no-fasonnogo tocheniya)

PERIODICAL: Tr. Penzensk. industr. in-ta, 1955, Nr 3, pp 49-60

ABSTRACT: Bibliographic entry

1. Lathes--Stability--Bibliography 2. Lathes--Performance

Card 1/1

GANTMAN, S.A.; KUZNETSOV, K.A.

Selecting the method of machining on automatic turret lathes. (MIRA 10:11)
Priborostroenie no.10:28-30 O '57.
(Turning)

GANTMAN, S.A., kand. tekhn. nauk, dotsent

Checking the precision of adjustment of automatic machine tools. Izv. vys. ucheb. zav.; mashinostr. no.3/4:155-164 '58. (MIRA 12:5)

1.Penzenskiy industrial'nyy institut.
(Machine tools)

28(5)
AUTHORS: Gantman, S. A., Candidate of Technical Sciences, Kuznetsov, K. A., Engineer

SOV/119-59-1-12/20

TITLE: More Exact Shapes of Turned Parts (Povysheniye tochnosti formy obtachivayemykh detaley)

PERIODICAL: Priborostroyeniye, 1959, Nr 1, pp 22-23 (USSR)

ABSTRACT: The degree of exactitude of the shape of turned parts depends on many factors, above all, however, on the geometrical accuracy of the lathe. The error of non-parallelism of the axis of the spindle and the axis of the shell of a turret lathe may be reduced for example by applying the cutting tool under a certain angle α to the horizontal. The angle α can be computed from the equation $\alpha = \text{arc tg} \frac{\Delta 1}{\Delta 2}$. Δ_1, Δ_2 are the deviation in the horizontal and vertical plane. In case that the piece to be worked is easily deformable the effect of elastic deformation of the lathe piece may be eliminated when the tool is applied to an angle α_1 opposite to the horizontal direction. A corresponding formula is derived for the determination of the angle α_1.

Card 1/2

If the inequation $a_2 \leq \frac{\Delta_1}{\cos\varphi}$ is not valid (a_2 = summation error which takes into account the elastic and temperature deformation of the piece to be worked and the wear of the tool) the lathe tool must be adjusted under an angle of 45° to the horizontal plane; this must be done in such a way that the errors Δ_1, Δ_2 are positive. There are 2 figures.

SOV/146-58-4-19/22

25(1)

AUTHORS: Gantman, S.A., Candidate of Technical Sciences, and Kuznetsov, K.A., Engineer

TITLE: The Selection of the Shape of Center Punch Marks for Drilling on Preliminary Punched Marks

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Priborostroyeniye, 1958, Nr 4, pp 127-133 (USSR)

ABSTRACT: In instrument building, drilling of holes in parts of a thickness of less than 5 mm with preliminary marking in special presses found a wide-spread application. The shapes of the marks applied in plant practice and the drilling systems are shown in Figure 1. One of the principle factors influencing the accuracy of the location of the hole during drilling on preliminary marking is the magnitude of drill axis shift in regard to the mark axis during the initial motion of the drill. When using multiple drill presses, the centering operation is performed automatically. However, when drilling a small number of holes manually, the preliminary marking is of great importance, since it provides the

Card 1/2

The Selection of the Shape of Center Punch Marks for Drilling on Preliminary Punched Marks

centering of the drill at the proper location. Based on the experience of the Penzenskiy chasovoy zavod (Penza Watch Plant), the author recommends a center punch as shown in Figure 3. This punch has a tapered point and the tip is ground at an angle of 80-90 degrees. In case the hole to be drilled is close to the border of the part, or in the immediate vicinity of another hole, the author recommends a center punch point shaped as shown in Figure 1-1. There are 3 diagrams, 1 graph, 4 tables and 2 Soviet references.

ASSOCIATION: Penzenskiy industrial'nyy institut (Penza Industrial Institute)

SUBMITTED: November 8, 1957

Card 2/2

ALEKSEYEVA, G.Ye., kand. tekhn. nauk, dots.; MELESHKINA, L.P., dots., kand. tekhn. nauk; BALUYEV, V.K., inzh.; BAMDAS, A.M., prof., doktor tekhn. nauk; VENIKOV, V.A., prof., doktor tekhn. nauk; YEZHKOV, V.V., kand. tekhn. nauk; ANISIMOVA, N.D., dots., kand. tekhn. nauk; GANTMAN, S.A., kand. khim. nauk; GLAZUNOV, A.A., dots., kand. tekhn. nauk; GOGUA, L.K., inzh.; GREBENNICHENKO, V.T., inzh.; GRUDINSKIY, P.G., prof.; GORFINKEL', Ya.M., inzh.; ZVEZDIN, A.L., inzh.; KAZANOVICH, G.Ya., inzh.; KNYAZEVSKIY, B.A., dots., kand. tekhn. nauk; KOSAREV, G.V., dots., kand. tekhn. nauk; MESSERMAN, S.M., kand. tekhn. nauk, dots.; KOKHAN, N.D., inzh.; KUVAYEVA, A.P., dots., kand. tekhn.nauk; SOKOLOV, M.M., dots., kand. tekhn. nauk; LASHKOV, F.P., dots., kand. tekhn. nauk; LAZIN, A.I., inzh.; YUDIN, F.I., inzh.; LIVSHITS, A.L., kand. tekhn. nauk; METEL'TSIN, P.G., inzh.; NEKRASOVA, N.M., dots., kand. tekhn. nauk; OL'SHANSKIY, N.A., dots., kand. tekhn. nauk; POLEVAYA, I.V., dots., kand. tekhn. nauk; POLEVOY, V.A., dots., kand. tekhn. nauk [deceased]; RAZEVIG, D.V., prof., doktor tekhn. nauk; RAKOVICH, I.I., inzh.; SOLDATKINA, L.A., dots., kand. tekhn. nauk; TREMBACH, V.V., dots., kand. tekhn. nauk; FEDOROV, A.A., prof., kand. tekhn. nauk; FINGER, L.M., inzh.; CHILIKIN, M.G., prof., doktor tekhn. nauk, glav. red.; ANTIK, I.V., inzh., red. GOLOVAN, A.T., prof., red.; PETROV, G.N., prof., red.; FEDOSEYEV, A.M., prof., red.

(Continued on next card)

ALEKSEYEVA, G.Ye.---- (continued). Card 2.

[Electrical engineering manual] Elektrotekhnicheskii spravochnik. Pod obshchei red. A.T. Golovana i dr. Moskva, Energiia. Vol.2. 1964. 758 p. (MIRA 17:12)

1. Moscow. Energeticheskiy institut. 2. Moskovskiy energeticheskiy institut (for Golovan, Grudinskiy, Petrov, Fedoseyev, Chilikin, Venikov). 3. Chlen-korrespondent AN SSSR (for Petrov).

L 33381-66 EWP(k)/EWT(d)/EWT(m)/T/EWP(l)/EWP(v) IJP(c) DS
ACC NR: AP6021433 SOURCE CODE: UR/0413/66/000/011/0031/0032

16
B

INVENTOR: Ruvinskiy, L. G.; Gantman, S. A.; Petrova, G. N.; Pivnik, Ye. D.

ORG: none

TITLE: Machine for manufacturing electrodes for chemical power sources. Class 21, No. 182199

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 11, 1966, 31-32

TOPIC TAGS: electrode manufacturing equipment

ABSTRACT: This Author Certificate introduces an automatic machine for manufacturing electrodes for chemical power sources, e.g., positive electrodes for silicofluoro-

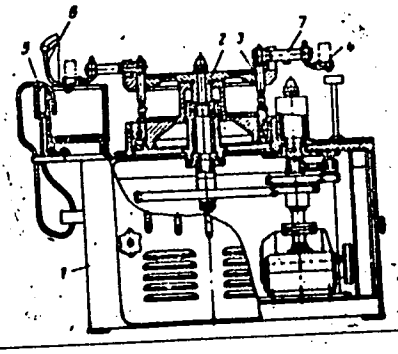


Fig. 1. Machine for manufacturing electrodes for chemical power sources

1 - Frame; 2 - drum with drive; 3 - sliding blocks; 4 - combs; 5 - tanks with solutions; 6 - suction; 7 - rods.

UDC: 621.3.035.2.002.2

Card 1/2

L 33381-66

ACC NR: AP6021433

hydrogen power sources, consisting of a rotating drum, sliding blocks, electrode holders, tanks with solutions, circulation pumps and electric heaters (see Fig. 1). To improve both the automatic feature of the machine and the quality of electrodes produced, it is equipped with rods rigidly fixed in the sliding blocks and evenly distributed in a circle. Orig. art. has: 1 figure. [JR]

SUB CODE: 13/ SUBM DATE: 27Mar64/ ATD PRESS: 5026

Card 2/2 JS

GANTMAN, V.

The main thing is to learn how to drive a car properly. Avtomobilist (MIRA 15:1)
1:77-78 '61.

(Automobile drivers)

GANTMAN, V.

Automobile and a motorboat. Avtomobilist 1:130-134 '61.
(MIRA 15:1)

(Automobiles) (Outboard motorboats)