$$x = x_0 - i0{,}5\,\frac{x_0}{D} \qquad (8)$$

and the formula is valid if $|D| > 20$. The numerical investigation is extended to the modes H_{11}, E_{11}, H_{12}, E_{12}, H_{13} all having the same azimuthal variation. The gradual mathematical transition from one mode into another can also be physically realized by varying the surface impedance in a prescribed manner. Mode transducers of this type can transform a less lossy spurious mode into a lossy one and so followed by a lossy section can serve as filters in an all-metal wave guide run. The authors believe that the H_{12} mode could be effectively filtered out by employing this technique. There are 6 figures.

SUBMITTED: September 1, 1961

ARTEM'YEV, A.A.; GENKINA, Ye.V.; MALIMONOVA, A.B.; TROFIL'KINA, V.P.; ISAYENKOVA, M.A.

Reduction of nitrocyclohexane with sodium thiosulfate.
Zhur.VKHO 10 no.5:588-589 '65.
(MIRA 18:11)

1. Gosudarstvennyy institut azotnoy promyshlennosti i produktov organicheskogo sintëza.

ISAYEV, A., mayor.

Needed unity of opinion in understanding SMS rules. Voen. sviaz. 16 no.1:24 Ja '58. (MIRA 11:2)
(Telegraphers--Study and teaching)

ISAYEV, A.

Projector for showing filmstrips. Politekh. obuch. no.8:77-78 Ag '59. (MIRA 12:10)

1. Norvash-Shigalinskaya semiletnyaya shkola Pervomayskogo rayona Chuvashskoy ASSR.
(Projectors)

ISAYEV, A.

First mechanical car with improved roadability. Avt.transp. 37 no.11:42-43 N '59. (MIRA 13:2)
(Locomotives)

ISAYEV, A.

Showing of automobile engineering at the Polytechnical Museum in Moscow. Avt.transp. 38 no.11:52 N '60. (MIRA 13:11)
(Automobile engineering)
(Moscow--Industrial museums)

1. ISAYEV, A. A.

2. USSR (600)

4. Construction Industry

7. Experience with the work of all-around brigades. Biul. stroi. tekh. 9, no. 20, 1952

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

ISAYEV, A.A., podpolkovnik; RUDIN, M.Z., polkovnik, red.; VOLKOVA, V.Ye., tekhn.red.

[Green cap; stories and sketches about the border guards] Zelenaia furazhka; rasskazy i ocherki o pogranichnikakh. Moskva, Voen.izd-vo M-va obor.SSSR, 1960. 428 p. (MIRA 13:11)
(Border guard)

ISAYEV, A., mayor tekhnicheskoy sluzhby.

Studying the local flying with the aid of electric charts. Vest. Vozd.Fl.34 no.11:53-56 N '51. (MLRA 8:3)
(Navigation (Aeronautics))

ISAYEV, Akybay; KARTAVOV, M.M., dots., otv. red.

[Geography of the industrial crops of Kirghizistan] Geografiia tekhnicheskikh kul'tur Kirgizii. Frunze, Ilim, 1964. 124 p. (MIRA 17:12)

SOV/46-4-4-12/20

AUTHORS: Isayev, A.A., Mikhaylov, I.G. and Khimunin, A.S.

TITLE: On a Modification of an Ultrasonic Interferometer (Ob odnom vidoizmenenii skhemy ul'trazvukovogo interferometra)

PERIODICAL: Akusticheskiy Zhurnal, 1958, Vol 4, Nr 4, pp 363-364 (USSR)

ABSTRACT: When a quartz plate is used both as a generator and as a stabilizing element in a Cady--Pearson interferometer the ultrasonic frequency is strongly affected by the reciprocal action of ultrasound on the quartz plate. Moreover the Cady--Pearson interferometer cannot be used in liquids because of strong attenuation. The authors describe a simple interferometer which can be used in liquids and which is free of these troubles. The circuit of the interferometer generator is shown in Fig 1. Quartz Q_1 is the radiator while quartz Q_2 is the stabilizing element. Negative feedback is obtained via the inter-electrode capacitance of the triode used (see Fig 1). The equivalent circuit of the grid part of the generator is shown in Fig 2: C_0 is the capacitance of both quartz plates; L_2, C_2 and R_2 are the equivalent parameters of the stabilizing quartz Q_2; L_1 is the equivalent inductance corresponding to the vibrating mass of the quartz Q_1; L_g corresponds to the vibrating mass of the medium; C_1 represents

Card 1/2

On a Modification of an Ultrasonic Interferometer

the elasticity of the radiating quartz; r_k and r_s are the loss and radiation resistance respectively. The generator describedhas high stability at all positions of the interferometer reflector; this stability is not less than that of the standard heterodyne wavemeter. The interferometer is also very sensitive: at 1 Mc/s it is possible to measure the sound velocity in castor oil at distances of 15-20 cm between the radiating quartz and the reflector. A d.c. amplifier with a pointer instrument was used as an indicator. The whole apparatus contains only one valve of the "button" type, which is a double triode. There are 2 figures.

ASSOCIATION: Leningradskiy gosudarstvenyy universitet (Leningrad State University)

SUBMITTED: April 15, 1958

S/194/62/000/004/061/105
D295/D308

AUTHORS: Isayev, A. A. and Khimunin, A. S.

TITLE: The measurement of sound velocity in thin plates

PERIODICAL: Referativnyy zhurnal, Avtomatika i radioelektronika, no. 4, 1962, abstract 4-5-36kh (V sb. Prom. primeneniye ul'trazvuka. Kuybyshevsk. aviats. in-t, Kuybyshev, 1961, 161-166)

TEXT: An apparatus is described for the measurement of the velocity of propagation of longitudinal and transverse ultrasonic waves in slabs of minimum thickness ~1 mm. A ring-type starter method, with preliminary retardation of the signal passing through the sample, is used in the apparatus. The mode of operation is pulsed. The apparatus operates as follows: A pulse generator feeds an acoustical transducer, which radiates short ultrasonic pulses, into a delay line, at whose opposite end is a sound receiver. The signal from the sound receiver is used for the next starting of the pulse generator. Thus the pulse repetition frequency is determined by the

Card 1/2

S/194/62/000/004/061/105
D295/D308

The measurement of sound ...

time of acoustic delay of the signal. If the slab investigated is placed between the delay line and the sound receiver, the delay time of the signal increases and the pulse repetition frequency decreases. A simple calculation enables one to determine the sound velocity in the object investigated from the values of the pulse repetition frequency and the thickness of the object investigated. A diagram of the installation is given. [Abstracter's note: Complete translation.]

Card 2/2

S/194/62/000/004/059/105
D295/D308

AUTHORS: Isayev, A. A., Nikhaylov, I. G. and Khimunin, A. S.

TITLE: A new ultrasonic interferometer circuit

PERIODICAL: Referativnyy zhurnal, Avtomatika i radioelektronika, no. 4, 1962, abstract 4-5-34m (V sb. Prom. primeneniye ul'trazvuka. Kuybyshevsk. aviats. in-t. Kuybyshev, 1961, 167-173)

TEXT: The circuit of an ultrasonic interferometer is described, which makes it possible to measure sound velocity to a sufficiently high degree of accuracy (0.01 - 0.02%) and to avoid the use of buffer stages and high-stability d.c. voltage sources in the electronic generator. As a result, the circuit of the generator is considerably simplified and the number of valves reduced. The generator is assembled on one half of the 6Н15П (6N15P) twin triode with capacitive feedback and with an oscillatory circuit in the grid circuit. The oscillatory circuit consists of a stabilized piezoelectric crystal and a quartz radiator connected in parallel to it. The

Card 1/2

A new ultrasonic ...

S/194/62/000/004/059/105
D295/D308

radiator diameter is 20 mm and the radiation passes into the liquid through a wavelength thickness brass plate. At a frequency of 1.00015 Mc/s instability of the circuit amounted to 5×10^{-6} for all distances between radiator and reflector. Standing-wave maxima are recorded on the basis of the variation of the voltage across the radiator, which is equal to 15 - 20 V when the distance between radiator and reflector is 10 cm, and which increases with distance. For recording the maxima, the second half of the triode is used, in the anode circuit of which is connected a 15 mA milliammeter together with a relay enabling the number of peaks to be counted by means of a M3C-54 (MES-54) pulse counter. The circuit is fed from an ordinary rectifier with an L-filter, after which a stabilovolt is connected. 2 figures. /Abstracter's note: Complete translation./

Card 2/2

ISAYEV, A.A.; KHIMUNIN, A.S.

Ultrasonic densitometer. Akust.zhur. 8 no.3:308-313 '62.
(MIRA 15:11)

1. Leningradskiy gosudarstvennyy universitet.
(Ultrasonics) (Densitometer)

ISAYEV, A.D.

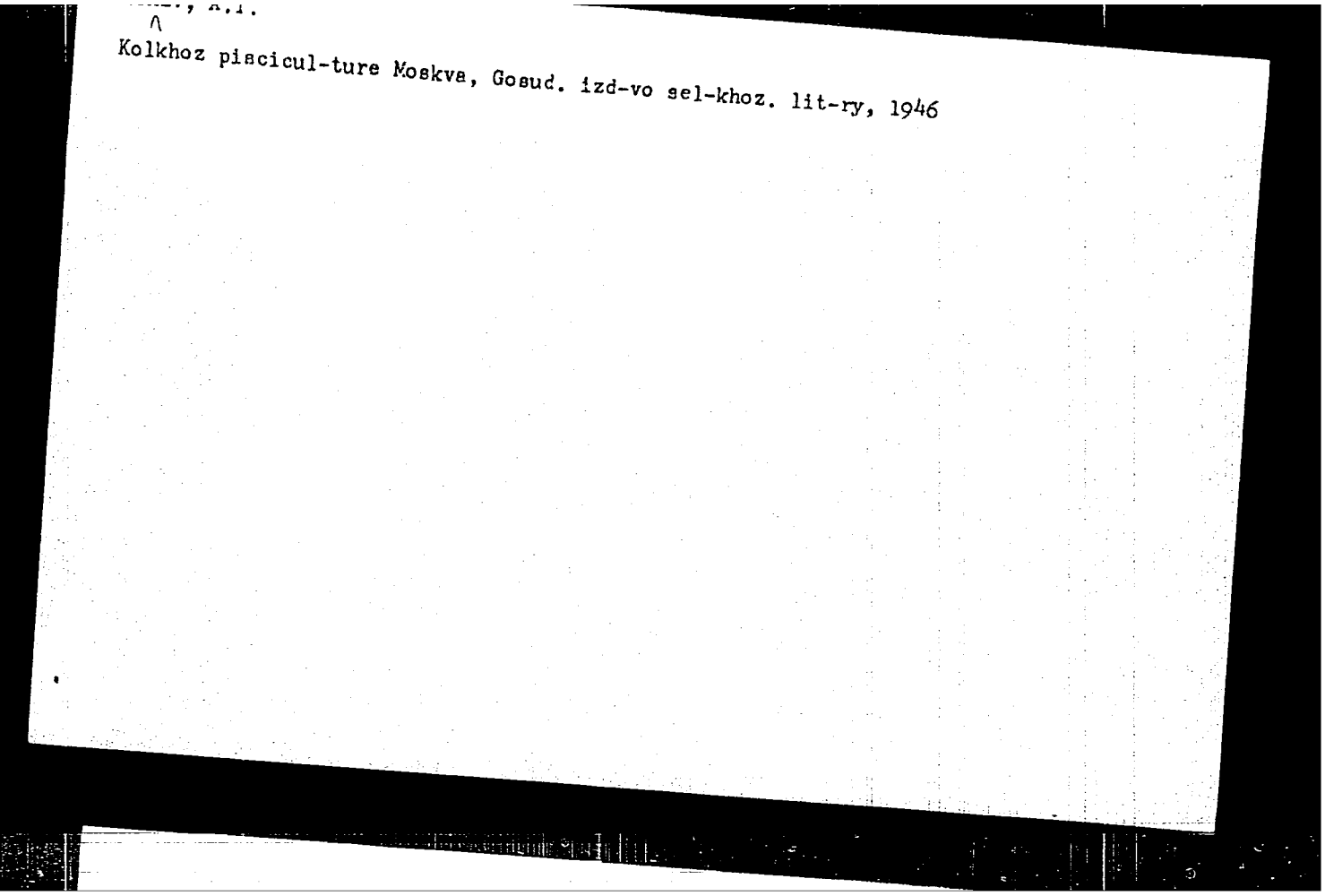
Centennial of the gas industry of Moscow. Gaz. prom. 10 no.6:13-17 '65. (MIRA 18:6)

ISAYEV, A.I.

Methods for the reduction of raw material overhead costs. Spirt.prom. 20 no.2:25-27 '54. (MLRA 7:6)
(Liquor industry)

ISAYEV, A.I.

Brief historical and geographical study of industrial crop cultivation in Kirghizistan during the prerevolutionary period. Izv. AN Kir. SSR. est. i tekh. nauk 4 no.4:57-71 '62. (MIRA 16:4)
(Kirghizistan—Field crops)



Kolkhoz piscicul-ture Moskva, Gosud. izd-vo sel-khoz. lit-ry, 1946

ISAYEV, A.I.; DOROKHOV, S.M.

[Fish culture on collective farms] Rybovodstvo v kolkhozakh. Moskva, Sel'khozgiz, 1946. 178 p. (MIRA 15:8)
(Fish culture)

Organizing fisheries on local reservoirs "oskva, Pishcheprom izdat, 1948. 93 p.

ISAYEV, A. I.,

Agriculture & Plant & Animal Industry

Fish industry in the shelterbelt regions. Moskva, Pishchepromizdat, 1951.

9. Monthly List of Russian Accessions, Library of Congress, April 1952. Unclassified.
2

ISAEV, A. I.

Fisheries in shelter belt regions Moskva, Fishchepromizdat, 1951 151 p.

ISAYEV, Aleksandr Ivanovich; SUKHOVERKHOV, Filipp Mikhaylovich; CHERNOV, Petr Georgiyevich; MATTISEN, A.E., retsenzent; TSIUNCHIK, P.I., retsenzent; IL'INA, V.V., redaktor; CHEBYSHEVA, Ye.A., tekhnicheskiy redaktor.

[Designing and operating hydraulic installations in waters used for fishing] Proektirovanie i ekspluatatsiia gidrosooruzhenii rybovodnykh khoziaistv. Moskva, Pishchepromizdat, 1956. 270 p.
(Hydraulic engineering)
(Fishways)
(Fish culture)
(MLRA 9:8)

DENISOV, L.I.; ISAYEV, A.I.; KUZ'MINA, V.S., red.; KISINA, Ye.I., tekhn.red.

[Using reservoirs for commercial fisheries] Rybopromyshlennoe ispol'zovanie vodokhranilishch. Moskva, Pishchepromizdat, 1957. 226 p. (MIRA 11:1)

(Fisheries) (Reservoirs)

MATTISEN, Anatoliy Ernestovich; KIRILLOV, Aleksandr Aleksandrovich; POSPELOV, Vladimir Nikolayevich; ISAYEV, A.I., spetsred; KUZ'MINA, V.S., red.; KISINA, Ye.I., tekhn. red.

[Reference manual on hydraulic engineering in relation to fish culture] Spravochnik po rybokhoziaistvennoi gidrotekhnike. Moskva, Pishchepromizdat, 1958. 427 p. (MIRA 11:10)
(Fish culture) (Hydraulic engineering)

AKHMEROV, A.Kh., kand.biol.nauk; BATENKO, A.I., kand.sel'skokhoz.nauk; BRUDASTOVA, M.A., kand.tekhn.nauk; GOLOVINSKAYA, K.A., kand.biolog. nauk; GORDON, L.M., kand.ekon.nauk; DOROKHOV, S.M., rybovod-biolog; YEROKHINA, L.V., rybovod-biolog; IL'IN, V.M., rybovod-biolog; ISAYEV, A.I., rybovod-biolog; KADZEVICH, G.V., rybovod-biolog; KOMAROVA, I.V., kand.biol.nauk; KRYMOVA, R.V., rybovod-biolog; KULAKOVA, A.M., rybovod-biolog; MANONTOVA, L.N., kand.biol.nauk; MEYSNER, Ye.V., kand.biol.nauk; MIKHEYEV, P.V., kand.biol.nauk; MUKHINA, R.I., kand.biol.nauk; PAKHOMOV, S.P., kand.biol.nauk; SUKHOVERKHOV, F.M., kand.biol.nauk; SOKOLOVA, Z.P., rybovod-biolog; TSIUNCHIK, R.I., rybovod-biolog; RYZHENKO, M.I., red.; KOSOVA, O.N., red.; SOKOLOVA, L.A., tekhn.red.

[Handbook on pond fish culture] Spravochnik po prudovomu rybovodstvu. Red.kollegiia: A.I.Isaev i dr. Moskva, Pishchepromizdat, 1959. 374 p. (MIRA 13:4)

1. Moscow. Vserossiyskiy nauchno-issledovatel'skiy institut prudovogo rybnogo khozyaystva.
(Fish culture)

ISAYEV, A.I.

Acclimatization of Pacific salmons in the Barents and White Seas.
Vop. ikht. 1 no. 1:46-51 '61. (MIRA 14:5)

1. Glavgosrybvod pri Sovete Ministrov RSFSR.
(Barents Sea—Salmon) (White Sea—Salmon)
(Acclimatization)

CHERFAS, B.I.; BERDICHEVSKIY, L.S.; ISAYEV, A.I.

Outlook for the development of fisheries in inland waters of the Soviet Union. Izv. AN SSSR. Ser.biol. no.6:926-930 N-D '61.
(MIRA 14:11)

1. The Ichthyological Committee of the Academy of Sciences of the U.S.S.R., Moscow.

(FISHERIES)

GORDON, L.M.; ISAYEV, A.I.; MARTYSHEV, F.G.

Pond fish culture in the U.S.S.R. today and its future development. Trudy sov. Ikht. kom. no.14:3-12 '62. (MIRA 15:12)

1. Ikhtiologicheskaya komissiya AN SSSR i sektsiya rybovodstva Vsesoyuznoy akademii sel'skokhozyaystvennykh nauk imeni Lenina.

(Fish culture)

PAVLOVSKIY, Ye.N., akademik, glav. red.; KOZHIN, N.I., prof., red.; PIROZHNIKOV, P.L., kand. biol. nauk, red.; ISAYEV, A.I., red.; REZNICHENKO, O.G., red.; GIDALEVICH, A.M., red.izd-va; MAKUNI, Ye.V., tekhn.red.

[Fishing industry of inland bodies of water of the U.S.S.R.] Rybnoe khoziaistvo vnutrennikh vodoemov SSSR; osnovnye doklady. Moskva, Izd-vo AN SSSR, 1963. 227 p. (MIRA 16:12)

1. Vsesoyuznoye soveshchaniye po biologicheskim osnovam rybnogo khozyaystva na vnutrennikh vodoyemakh SSSR. 2. Gosudarstvennyy nauchno-issledovatel'skiy institut ozernogo i rechnogo rybnogo khozyaystva , Leningrad (for Pirozhnikov).

ISAYEV, A.I.

"Machining of Ring Shaped Specimens"--pp. 106-115

A paper contained in the symposium "A New Method of Investigation of Relaxation and Creep of Metals," edited by I.A. Oding, Mashgiz, 1949.

ISAYEV, A. I.

29129 Prevrashchenie R_2O_5 superfosfata i nazota v zavisimosti ot srokov vzaimodeystviya udobreniy s. pochvoy. Izvestiya Akad. nauk Azerbaydzh. SSSR, 1949, No. 8, s. 46-50 -- Rezyume na azerbaydzh. yaz. -- Bibliogr: 8 nazv.

SO: Letopis' Zhurnal'nykh Statey, Vol. 39, Moskva, 1949

ISAEV, A. I.

Protsess obrazovaniia pverkhnostnogo sloia pri obrabotke metallov rezaniiem. Moskva, Mashgiz, 1950. 360 p.

(Process of forming a surface film during metal cutting.)

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

ISAYEV, A. I.

"Investigation of the Process of Surface Layer Formation in Metal Cutting." Sub 11 Apr 51, Moscow Machine-Tool and Tool Inst imeni I. V. Stalin

Dissertations presented for science and engineering degrees in Moscow during 1951.

SO: Sum. No. 480, 9 May 55

ISAYEV, A. I.

Chistovaia obrabotka konstruktsionnykh metallov. Sbornik statei (Finishing process on construction metals; collected articles). Moskva, Mashgiz, 1951. 194 p.

SO: Monthly List of Russian Accessions, Vol 6, No. 3, June 1953

ISAYEV, A. I.

Metals--Finishing

Influence of the wear of a cutter on the formation of the surface layer. (Trudy) TsNIITMASH no. 44, 1951.

9. Monthly List of Russian Accessions, Library of Congress, April 1953, Uncl.

IDAYEV, A. I.

Rezanie metallov keramicheskim instrumentom [Cutting metals with a ceramic instrument]. Moskva, Mashgiz, 1952. 92 p.

SO: Monthly List of Russian Accessions, Vol. 6 No. 5, August 1953

ISAYEV, A. I.

Item No. 9

165/99 621.937 :666.762.1

The Employment of Ceramic Materials for Cutting Metals

A. I. Isayev, N.N. Zorev, I.A. Kozhevnikov

Stanki Instrum. (4), 12-14 1952

U.S.S.U.

The use of Alumina-based materials in place of high-speed steel and carbide tools is considered and the superiority of ceramic VK-332 as a cutting tool is shown. Principles governing the design of tools with detachable ceramic tips are discussed. Methods of grinding ceramic tool bits and tests on the cutting of a medium carbon steel are described; comparisons in each case being made with titanium-bearing carbide tools.

(From Engrs' Dig., 14(2), 61-62, Feb., 1953, U.K.

metals met Engg 4 (3)

ISAYEV, A. [illegible] Prof.

METAL CUTTING

Cutting tools made of clay. Sov. soiuz 28 no. 6 (1952)

9. Monthly List of Russian Accessions, Library of Congress, September 1953, Uncl.

1. KATANOV, P. A.; ISAYEV, A. I.

2. USSR (600)

4. Metal Cutting

7. Set of posters on the subject of surface finish ("Quality of surface finish." P. Ye. D'yachenko, I. S. Shteynberg. Reviewed by Eng. B. A. Katanov, Prof. A. I. Isayev). Vest. Mash. 32 no. 8 1952.

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

1. ISAYEV, A. I.: ZOREV, N. N.: KUCHMA, L. K.

2. USSR (600)

4. Turning

7. High-speed turning of cast iron with ceramic tools. Vest. mash. 32 no. 10, 1952.

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

ISAYEV, A.I., professor, doktor tekhnicheskikh nauk; MIKHALENOK, Ye.I., kandidat tekhnicheskikh nauk; TARASEVICH, Yu.S., kandidat tekhnicheskikh nauk, redaktor; POPOVA, S.M., tekhnicheskiy redaktor.

[Speed turning of large parts with broad cutters] Skorostnoe tochenie krupnykh detalei shirokimi reztsami. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1954. 87 p. (MLRA 8:5)
(Metal cutting) (Cutting tools)

ISAYEV, A.I., professor, doktor tekhnicheskikh nauk; TOREV, N.N., kandidat tekhnicheskikh nauk; ARTAMONOV, A.Ya., inzhener; BRODSKIY, M.G., inzhener, redaktor; TIKHONOV, A.Ya., tekhnicheskiy redaktor

[Semifinish turning with large feeds] Poluchistovoe tochenie s bol'shimi podachami. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. i sudostroit. lit-ry, 1954. 73 p. (MLRA 7:10)
(Turning)

ISAYEV, A.I., redaktor.

[General adoption of methods for highly productive machining of parts] Obobshchenie opyta vysokoproizvoditel'noi mekhanicheskoi obrabotki detalei. Moskva, Mashgiz, 1954. 200 p. (MLRA 8:2D)

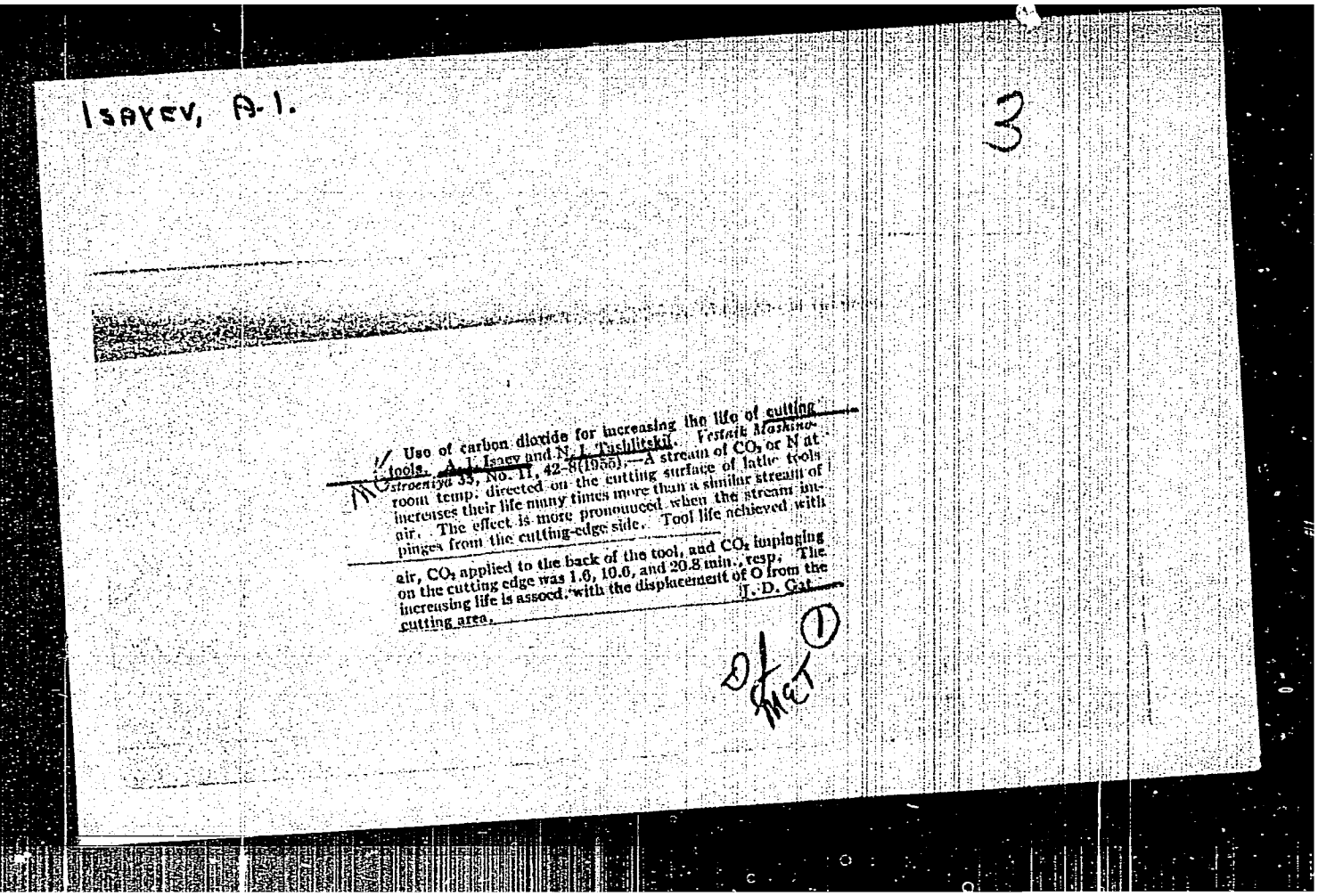
VOINOV, A.M.; GULENKO, G.B.; ISAYEV, B.M.; MARGULIS, U.Ya.

[Distribution of deep-seated telecurietherapeutic doses due to radioactive cobalt in a water-filled phantom] Raspredelenie glubinnykh doz v vodnom fantome ot telekiuriustanovki, zariazhennoi radioaktivnym kobal'tom. Moskva, Medgiz, 1955. 9 p. (MIRA 11:4)
(COBALT--THERAPEUTIC USE)

ISAYEV, A.I.

Device for economizing oscillograph paper. Zav.lab.21 no.10: 1256 '55. (MLRA 9:1)

1.Molotovskiy sel'skokhozyastvennyy institut.
(Oscillograph)



ISAYEV, A. I.

3

Use of carbon dioxide for increasing the life of cutting tools. A. I. Isaev and N. I. Tushlitskii. *Vestnik Mashinostroeniya* 35, No. 11, 42–6(1955).—A stream of CO_2 or N at room temp. directed on the cutting surface of lathe tools increases their life many times more than a similar stream of air. The effect is more pronounced when the stream impinges from the cutting-edge side. Tool life achieved with air, CO_2 applied to the back of the tool, and CO_2 impinging on the cutting edge was 1.6, 10.6, and 20.8 min., resp. The increasing life is assocd. with the displacement of O from the cutting area. I. D. Cat

ISAYEV, A.I.

ANTIPOV, K.P., inzhener; BALAKSHIN, B.S., doktor tekhnicheskikh nauk, professor; BARYLOV, G.I., inzhener; BEYZEL'MAN, R.D., inzhener; BERDICHEVSKIY, Ya.G., inzhener; BOBKOV, A.A., inzhener, KALININ, M.A., kandidat tekhnicheskikh nauk; KOVAN, V.M., doktor tekhnicheskikh nauk, professor; KORSAKOV, V.S., doktor tekhnicheskikh nauk; KOSILOVA, A.G., kandidat tekhnicheskikh nauk; KUDRYAVTSEV, N.T., doktor khimicheskikh nauk, professor; KURYSHEVA, Ye.S., inzhener; LAKHTIN, Yu.M., doktor tekhnicheskikh nauk, professor; MAYERMAN, M.S., inzhener; NOVIKOV, M.P., kandidat tekhnicheskikh nauk; PARIYSKIY, M.S., inzhener; PEREPONOV, M.N., inzhener; POPILOV, L.Ya., inzhener; POPOV, V.A., kandidat tekhnicheskikh nauk; SAVERIN, M.M., doktor tekhnicheskikh nauk, professor; SASOV, V.V., kandidat tekhnicheskikh nauk; SATEL', E.A., doktor tekhnicheskikh nauk, professor; SOKOLOVSKIY, A.P., doktor tekhnicheskikh nauk, professor [deceased]; STANKEVICH, V.G., inzhener; FRUMIN, Yu.L., inzhener; KHRAMOV, M.I., inzhener; TSEYTLIN, L.B., inzhener; SHUKHOV, Yu.V., kandidat tekhnicheskikh nauk; BABKIN, S.I., kandidat tekhnicheskikh nauk; VOLKOV, S.I., kandidat tekhnicheskikh nauk; GORODETSKIY, I.Ye., doktor tekhnicheskikh nauk, professor; GOROSHKIN, A.K., inzhener; DOSCHATOV, V.V., kandidat tekhnicheskikh nauk; ZAMALIN, V.S., inzhener; ISAYEV, A.I., doktor tekhnicheskikh nauk, professor; KEDROV, S.N., kandidat tekhnicheskikh nauk; MARDANYAN, M.Ye., inzhener; MALOV, A.N., kandidat tekhnicheskikh nauk; PANCHENKO, K.P., kandidat tekhnicheskikh nauk; SEKRETEV, D.N., inzhener; STAYEV, K.P., kandidat tekhnicheskikh nauk; SYROVATCHENKO, P.V., inzhener; TAURIT, G.B., inzhener; EL'YASHEVA, M.A., kandidat tekhnicheskikh nauk;

(Continued on next card)

AMTIPOV, K.F. ---(continued) Card 2.

GRANOVSKIY, G.I., redaktor; [illegible], redaktor; CHARNKO, D.V., redaktor; [illegible] [deceased]; SOKOLOVA, T.F., [illegible]

[Machine builder's manual] Spravochnik [illegible]; v dvukh tomakh, red.sovet V.M.[illegible] ... i dr. Moskva, Gos.nauchno-tekh.izd-vo mashinostroit. lit-ry. Vol. 1. (Pod red. A.G.Kosilovoi) 1956. [illegible] p. (Machinery industry)

ISAYEV, Aleksey Il'ich, doktor tekhn. nauk, prof.; KIRILLOVA, Ol'ga Mikhaylovna, inzh.; REMEZOV, N.S., inzh., ved. red.; RUKAVISHNIKOV, V.I., inzh., red.; SMIRNOV, B.M., tekhn.red.

[Investigating the cutting properties of cutting tools with TSM-332 ceramic metal tips]Issledovanie rezhushchikh svoistv reztsov s mineralokeramicheskimi plastinkami TsM-332. Moskva, Filial Vses.in-ta nauchn. i tekhn.informatsii, 1957. 17 p. (Peredovoi nauchno-tekhnicheskii i proizvodstvennyi opyt. Tema 11 No.M-57-68/3) (MIRA 16:3)

(Metal-cutting tools--Testing)

ISAYEV, A.I., doktor tekhnicheskikh nauk; SILIN, S.S., inzhener.

Investigating temperatures caused by grinding steels and alloys. Mashinostroitel' no.2:36-40 F '57. (MLRA 10:5)
(Grinding and polishing)

ISAYEV, A.I.

122-5-19/35

AUTHORS: Isayev, A.I. (Dr.Tech.Sc., Professor) and Silin, S.S.(Engineer)

TITLE: Computation Procedure for the Surface Temperature in Grinding. (Metodika rascheta temperatur pri shlifovanii)

PERIODICAL: Vestnik Mashinostroyeniya, 1957, Nr 5, pp.54-59 (USSR)

ABSTRACT: An analysis of the temperature field proceeds from the differential equation of heat conduction solved for the case of a plane heat source at the boundary of a semi-space. A heat source of limited duration is introduced and yields a temperature field at the end of the process. The variables of grinding, combined in a power formula for the grinding force, according to E.N.Maslov (Ref.2), yield a heat balance for the total heat distributed between the component, the wheel and the chip. The variation of this balance is shown at different depths of grinding and workpiece surface speeds. 60 to 85% of the total heat are retained in the workpiece. The percentage diminishes with increasing depth and speed. With abundant coolant, the resulting heat expansion does not exceed a small fraction of a micron. The analysis also yields the maximum contact temperatures. The computed values are plotted against the grinding depth, the rate of feed and the

Card 1/2

PA - 3613

AUTHOR: ISAYEV,A.I., KUNITSYN,S.I.

TITLE: Investigation of the Dynamics of the Cutting Process for the Gearing of Bevel Gears by Means of Cutting Heads. (Issledovanie dinamiki protsessa rezaniya pri narezanii konicheskikh koles krugovymi zub'yami, Russian)

PERIODICAL: Stanki i Instrument, 1957, Vol 28, Nr 6, pp 12 - 15 (U.S.S.R.)

ABSTRACT: This investigation is of direct practical importance for a rational selection of the cutting values, the construction of cutting heads, calculation of the strength of the components of the kinematic lines of machines, the selection of suitable driving motors, etc. Besides, it is possible, according to the law for the variations of cutting force components, to calculate working accuracy in consideration of the rigidity of the elastic technological system: machine-workpiece-tool.

As shown by experiments carried out, the diameter of cuttings differs; it depends on the position of the cutter in the cavity of the gear to be worked. Cutting widths of the exterior and interior steel cutter are not equal, which means that they are also subjected to different stresses. As may be seen from illustration 8, the maximum stress acting upon the outer steel cutters is up to 3 times as great as that of the inner cutter, which means that it will also be subjected to greater wear. The different stress acting upon

Card 1/2

ISAYEV, A.I., doktor tekhnicheskikh nauk, professor; YEGOROV, A.N., kandidat tekhnicheskikh nauk.

Investigating the vibration resistance of elastic systems during turning. Trudy MATI no.32:7-29 '57. (MLRA 10:8)
(Lathes--Vibration)

ISAYEV, Aleksey Il'ich, doktor tekhn. nauk; MOROZOV, Nikolay Aleksandrovich, inzh.; MEDVEDEVA, Ye.T., kand. tekhn. nauk, ved. red.; TOLMACHEV, V.B., inzh., red.; PONOMAREV, V.A., tekhn. red.

[Effect of methods and conditions of metal finishing on the operational properties of gas-turbine blade alloys]Vliianie metoda i rezhima chistovoi obrabotki na ekspluatatsionnye kachestva gazoturbinnykh lopatochnykh splavov. Moskva, Filial Vses. in-ta nauchn. i tekhn. informatsii, 1958. 20 p. (Peredovoi nauchno-tekhnicheskii i proizvodstvennyi opyt. Tema 10. No.M-58-127/21) (MIRA 16:3)

(Heat-resistant alloys--Testing)
(Metals--Finishing) (Gas turbines--Blades)

ISAYEV, Aleksey Il'ich, prof., doktor tekhn. nauk; KOYRE, Viktor Yevseyevich; GOLITSYN, Ya.K., inzh., ved. red.; KANEVSKIY, B.M., inzh., red.; SHVETSOV, G.V., tekhn. red.

[Finish milling of large surfaces instead of scraping]Chistovoe frezerovanie bol'shikh ploskostei vmesto shabreniia. Moskva, Filial Vses. in-ta nauchn. i tekhn. informatsii, 1958. 29 p. (Peredovoi nauchno-tekhnicheskii i proizvodstvennyi opyt. Tema 10. No. M-58-231/37) (MIRA 16:3)

(Metal cutting)

69516

SOV/123-59-21-87666

Translation from: Referativnyy zhurnal. Mashinostroyeniye, 1959, Nr 21, p 78 (USSR)

18.5200

AUTHORS: Isayev, A.I., Kirillova, O.M.

TITLE: Investigation of the Cutting Properties of Mineral-Ceramic Tools

PERIODICAL: V sb.: Rezaniye mineralokeram. instrumentami, Moscow, Oborongiz, 1958, pp 20 - 36

ABSTRACT: Results are given of the investigations of cutting and physical-mechanical properties of mineral-ceramic plates (MP), their structure and the state of machine part surface layers, machined with MP tools. The investigations were carried out during the discontinuous turning of the steel grades 40Kh and 45Kh under the following cutting conditions: $v = 190$ m/min, $s = 0.3$ mm/revolution, and $t = 1 \div 2$ mm. The strength of the cutting blade was rated by the number of its being put into operation and taken off during the working process. The best results concerning the strength of the cutting blade were obtained at the following geometry: width of chamfer $f = 0.2$ mm, front angle on chamfer γ_{av} from -20° to -25°, $\gamma = 5^\circ \div 10^\circ$, $\alpha = 3^\circ \div$ $\lambda = 0^\circ$, and $\varphi = 45^\circ$. It was found that a variation of σ_b bend within the limits of 22 - 44 kg/mm^2 and of the specific gravity

Card 1/2

69516

SOV/123-59-21-87666

Investigation of the Cutting Properties of Mineral-Ceramic Tools

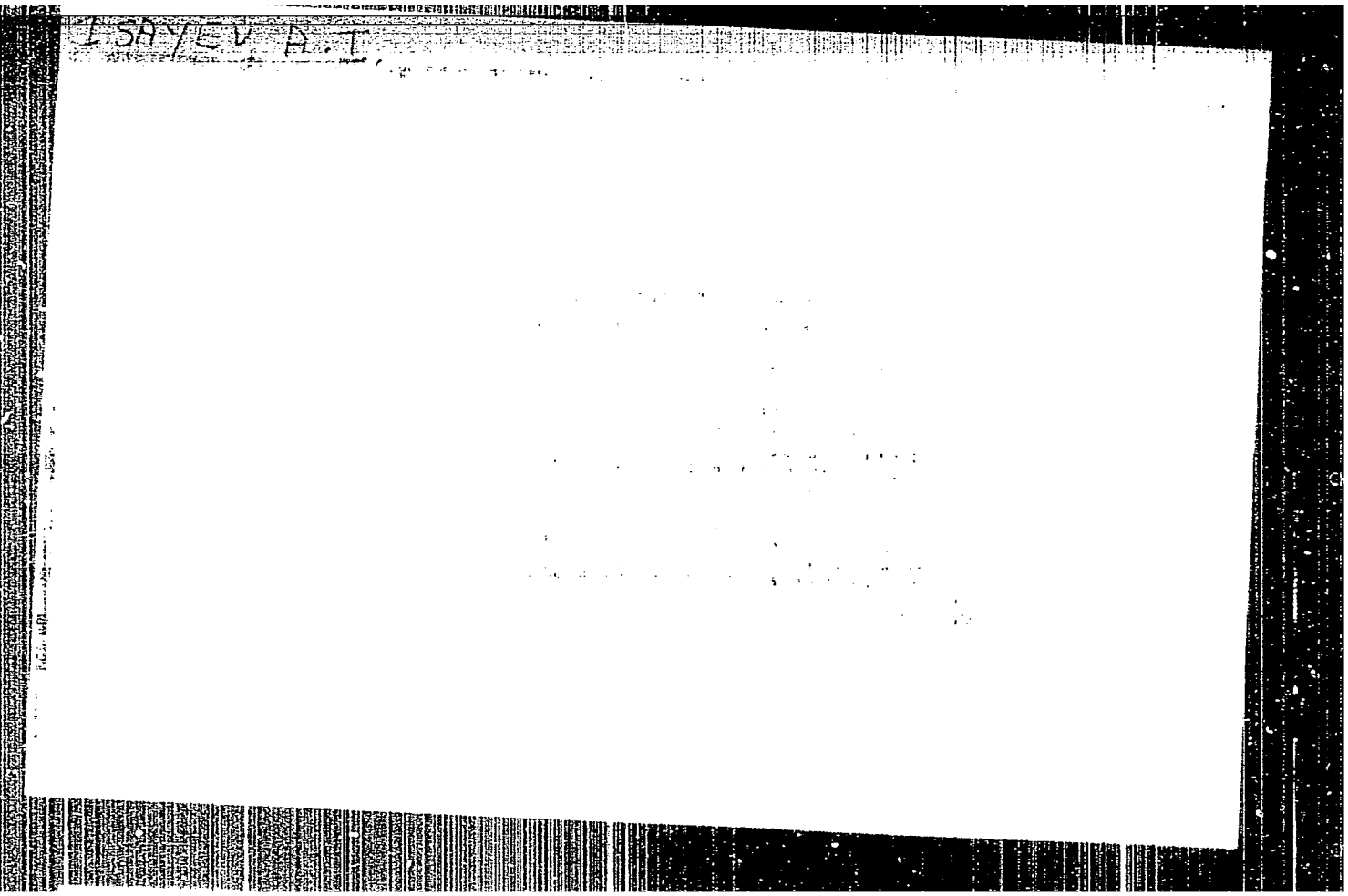
within a range of 3.8 - 3.92 does not show any considerable effect on the resistance to wear of MP during a continuous turning process, but with a discontinuous turning operation they essentially affect the resistance to wear and strength of the tools. A diagram is given of the effect of the grain size in the MP structure on the tool durability during continuous and discontinuous turning operations. A connection is established between the tool durability, the presence of aluminum oxide grains in the MP structure, and defects caused by technological factors. It was found that the quality of the machined surface did not show any considerable changes when the cutting rate was varied. Investigation results are given of the effect of the cutting rate, feed and magnitude of tool wear on the magnitude of residual stresses in the surface layer when turning with MP tools. An analysis of the specimens as to their corrosion resistance showed a higher corrosion resistance of those specimens which were machined with the TsM-332 grade compared with the T15K6 grade. 24 figures.

B.I.L.

Card 2/2

ISAYEV, A.I., doktor tekhn.nauk prof.; CHERNYY, A.P., inzh.

Designs of screw taps for cutting large-diameter cylindrical threads. Energomashinostroenie 4 no.5:38-39 My '58. (MIRA 11:9)
(Taps and dies)



ISAYEV, A.I., doktor tekhn. nauk; KUNITSYN, S.I., inzh.

Investigating the effect of machine-tool rigidity on the precision of machining round-toothed bevel gear. Vest. mash. 38 no.1:73-77 Ja '58. (MIRA 11:1)

(Gear cutting)

MALOV, A.N., kand.tekhn.nauk; BABKIN, S.I., kand.tekhn.nauk; VOLKOV, S.I., kand.tekhn.nauk; GORODETSKIY, I.Ye., prof., doktor tekhn.nauk; GOROSHKIN, A.K., inzh.; DOSCHATOV, V.V., kand.tekhn.nauk; ZAMALIN, V.S., inzh.; ISAYEV, A.I., prof., doktor tekhn.nauk; KEDROV, S.M., kand.tekhn.nauk; MARDANYAN, M.Ye., inzh.; PANCHENKO, K.P., kand. tekhn.nauk; SEKRETEV, D.M., inzh.; STAYEV, K.P., kand.tekhn.nauk; SYROVATCHENKO, P.V., inzh.; TAURIT, G.E., inzh.; EL'YASHEVA, M.A., kand.tekhn.nauk; KOVAN, V.M., prof., doktor tekhn.nauk, glavnyy red.; MARKUS, M.Ye., inzh., red. [deceased]; SOKOLOVA, T.F., tekhn.red.

[Manual for mechanical engineers; in two volumes] Spravochnik tekhnologa mashinostroitelia; v dvukh tomakh. Glav.red. V.M.Kovan. Chleny red.soveta B.S.Balakshin i dr. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry. Vol.2. Pod red. A.N.Malova. 1959. 584 p. (MIRA 12:11)

(Mechanical engineering)

Isayev, A.I.

25(1) P.2-3 PHASE I BOOK EXPLOITATION SOV/3090

Moscow. Aviatsionnyy tekhnologicheskiy institut

Issledovaniye protsessov vysokoproizvoditel'noy obrabotki metallov rezaniyem (Analysis of High-productivity Metal-cutting Processes) Moscow, Oborongiz, 1959. 130 p. (Series: Its: Trudy, vyp. 38) 3,600 copies printed.

Sponsoring Agency: Ministerstvo vysshego obrazovaniya SSSR.

Ed. (Title page): A.I. Isayev, Doctor of Technical Sciences, Professor; Ed. (Inside book): S.I. Bumshteyn, Engineer; Ed. of Publishing House: P.B. Morozova; Tech. Ed.: N.A. Pukhlikova; Managing Ed.: A.S. Zaymovskaya, Engineer.

PURPOSE: This collection of articles is intended for designers and engineers in the field of machine-tool equipment and mechanical machining. It may also be useful to workers at scientific research institutes and aspirants.

COVERAGE: This collection of articles deals with problems arising in high-productivity metal-cutting processes. Emphasis is given to grinding operations for parts made from constructional alloys. Machining regimes and methods

Card 1/3

of improving machining operations are presented. No personalities are mentioned. References follow each article.

TABLE OF CONTENTS:

The authors present results of an investigation on the effect of temperature and other factors on the workability of the Zl Sr M583-10 alloy.

AVAILABLE: Library of Congress

VK/jb
1-29-60

ISAYEV, A.I.
P. 2, 6.

PHASE I BOOK EXPLOITATION SOV/3384

Moscow. Aviatsionnyy tekhnologicheskiy institut

Voprosy avtomatizatsii i mekhanizatsii tekhnologicheskikh protsessov (Problems in the Automation and Mechanization of Manufacturing Processes) Moscow, Oborongiz, 1959. 103 p. (Series: Its: Trudy, vyp. 39) Errata slip inserted. 6,300 copies printed.

Sponsoring Agency: Ministerstvo vysshego obrazovaniya SSSR.

Ed.: A. I. Isayev, Doctor of Technical Sciences, Professor; Ed. of Publishing House: I. A. Suvorova; Tech. Ed.: N. A. Pukhlikova; Managing Ed.: A. S. Zaymovskaya.

PURPOSE: This collection of articles is intended for engineer-technologists and scientific workers in the field of technology of machine construction, and students in the same special field.

COVERAGE: This collection of articles considers, on the basis of investigations conducted, methods for the automation of manufacturing processes involving the machining of parts on metal-cutting machine tools; it presents information

Card 1/5

regarding a suitable selection of machine tools for lot production and deals with methods of mechanizing the machining and inspection of parts having a complex form.

The report of B. V. Shaskol'skiy and Yu.G. Savkin presents the results of investigations of automation of the primary adjustment in lathe work. The authors consider an extremely timely problem, the positive solution of which, under actual manufacturing conditions, may have far-reaching technical and economic effects.

In the report of B. V. Shaskol'skiy and A. A. Nikolayev, the authors consider a problem which up to now has been only slightly dealt with -- the problem of selecting suitable types of lathes for lot production. The material presented in this report is of interest to designers working in the field of machine-tool construction and to industrial engineers.

A. I. Isayev and L. M. Pomerantsev present in their report the results of investigations in the field of the mechanization of machining and inspection of the blade surfaces of propeller-type hydroturbines. Based on an investigation of the machining process of model blades, the report presents a draft

design of the equipment and machinery necessary for machining and checking the dimensions of full-scale hydroturbine blades. The results of these investigations may be of use to industrial engineers and engineers who work in the field of hydroturbine construction.

The report of I. V. Dunin-Barkovskiy and A. N. Kartasheva considers the problem of criteria for reliable checking of measuring instruments, a problem which, in connection with the development of the manufacture of different kinds of devices for automatized technological processes, presents definite practical and scientific interest.

The report of A. A. Chistakov on a method for determining the permissible unbalance in the rotors of high-speed turboengines will be useful for designers and engineers in motor and turbine plants.

The collection was prepared for printing by Docent S. I. Gurevich, Candidate of Technical Sciences. References are given at the end of each article.

TABLE OF CONTENTS:

ISAYEV, A.I.

PHASE I BOOK EXPLOITATION SOV/4804

Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut tekhnologii i mashinostroyeniya

Nekotoryye voprosy tekhnologii tyazhelogo mashinostroyeniya, chast' 2: Obrabotka metallov rezaniyem i kontrol' kachestva detaley (Some Problems in the Manufacturing Processes of Heavy Machinery, Pt. 2: Metal Cutting and Quality Control of Parts) Moscow, Mashgiz, 1960. 173 p. (Series: Its: [Trudy] kn. 97) 2,500 copies printed.

Sponsoring Agencies: Gosudarstvennyy komitet Soveta Ministrov SSSR po avtomatizatsii i mashinostroyeniyu; Tsentral'nyy nauchno-issledovatel'skiy institut tekhnologii i mashinostroyeniya.

Ed.: Ye.P. Unksov, Doctor of Technical Sciences, Professor; Managing Ed. for Literature on Heavy Machine Building: S.Ya. Golovin, Engineer; Ed. of Publishing House: G.N. Soboleva; Tech. Ed.: Z.I. Chernova.

PURPOSE: This book is intended for technical personnel in heavy-machinery plants and for scientific workers in factory laboratories and research institutes.

Card 1/4

COVERAGE: The book contains a summary of work conducted by the personnel of TsNIITMASh in the field of mechanical machining and quality control of parts. Included is a discussion on the correct combination of depth, feed, and speed in cutting with maximum capacity of the machine tool. Also considered are the development of machining methods in rough and semifinishing production, and the application of ultrasonic devices for flaw detection and measurement of wall thickness. No personalities are mentioned. References follow some of the chapters.

TABLE OF CONTENTS:

AVAILABLE: Library of Congress

ZOREV, N.N., doktor tekhn.nauk; TASHLITSKIY, N.I., kand.tekhn.nauk; KUCHMA, L.K., kand.tekhn.nauk; VERSHINSKAYA, A.D., inzh.; OVUMYAN, G.G., inzh.; ISAYEV, A.I., doktor tekhn.nauk; KIRILLOVA, O.M.; kand.tekhn.nauk; KATSNEL'SON, V.Yu., inzh.; LAPIN, N.A., kand.tekhn.nauk; FEDOROV, N.M., inzh.; CHERNYY, A.P., inzh.; MOROZOV, N.A., inzh.; DOGAK, N.S.; ANDREYEV, G.S., kand.tekhn.nauk; MIKHAYLENOK, Ye.I., kand.tekhn.nauk; MAKAREVICH, B.K., kand.tekhn. nauk; YEREMIN, N.I., kand.tekhn.nauk; YERMOLOV, I.N.; inzh.; UNKSOV, Ye.P., doktor tekhn.nauk, prof., red.; SOBOLEVA, G.N., red.izd-va; CHERNOVA, Z.I., tekhn.red.

[Engineering problems in the manufacture of heavy machinery] Nekotorye voprosy tekhnologii tiazhelogo mashinostroeniia. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroitel'noi lit-ry. Pt. 2 [Metal cutting and quality control of parts] Obrabotka metallov rezaniem in kontrol' kachestva detalei. 1960. 173 p. (Moscow. TSentral'nyi nauchno-issledovatel'skii institut tekhnologii i mashinostroeniia. [Trudy], vol.99). (MIRA 13:8)

(Machinery industry)
(Metal cutting)
(Quality control)

ISAYEV, A.I., prof., doktor tekhn.nauk, otv.red.; GORSHKOV, G.B., red.izd-va; YEGOROVA, N.F., tekhn.red.

[Materials for metal-cutting tools] Instrumental'nye reshmashchie materialy. Moskva, 1960. 137 p. (MIRA 14:2)

1. Akademiya nauk SSSR. Institut mashinovedeniya.
(Metal-cutting tools)

S/122/60/000/001/013/018
A161/A130

AUTHORS: Isayev, A. I., Doctor of Technical Sciences, Professor; Morozov, N. A., Engineer

TITLE: Investigation of the surface finish effect on the service properties of turbine blades

PERIODICAL: Vestnik mashinostroyeniya, no. 1, 1960, 58-62

TEXT: The high surface finish required for gas turbine blades takes 25-30% of worktime in the production of gas turbines. The required finish class at turbine plants is usually 9. TsNIITMASh has studied the surface finish effect in experiments with heat resistant ЭИ 765 (EI765) alloy being considered good for blades of stationary and transport machine gas turbines with a service temperature of 700-750°C. It had been stated before experiments that the high initial finish on the work portion of blades rapidly goes down to class 5, but this practically did not affect the turbine efficiency. Specimens for experiments were prepared in shape corresponding the blade work portion, i.e., if they were templets cut from blades, and subjected to different machining - turning, milling, grinding and polishing to different finish classes. The EI765 alloy has only

Card 1/3

low workhardening susceptibility, and a considerable hardness increase after machining was stated only to a depth of 10-15 micron. The metal structure of surface layers was studied by electrolysis and photographing with a horizontal МИМ-3 (MIM-3) microscope with x500 amplification. 1) The degree and depth of the plastic deformation from different machining methods is slight. 2) The deformation from turning and milling is alike and consists in distortion of grains at the surface (crumpling, stretching and bends, with clear orientation in one direction). Grinding causes shifts in single grains at the very surface. Polishing causes insignificant deformation consisting in grain orientation at the very surface. No structure transformations were observed. Specimens were tested for corrosion fatigue in a ЯаМ (YaM) test machine of TsNIITMASh design permitting fatigue resistance tests of specimens fixed by one end, in symmetric bending with 2,850 cpm, in 750°C in gas corresponding the chemical composition of turbine gas (air + 0.3% SO_2 + 6% H_2O). The turned specimens with surface finish class 6 (▽6) had the highest fatigue resistance (35 kg/mm^2). The machining method had no significant effect on corrosion fatigue resistance. Mechanical strength was tested in whole blades in an experimental turbine, ЭГТУ-850 (EGTU-850) of TsNIITMASh design, presenting the active stage of gas turbine, with work temperature 800-850° and service conditions close to the

actual gas turbine service: the blade temperature in critical section 750°, rotor velocity 7,000 rpm, gas flow speed over the blades work portion 250-300 m/sec. Strength of blades with turned and milled class 6 finish was not below the strength of blades with ground and polished class 8 and 9 surface. The changing surface finish was watched during strength tests, with a П4-2 (PCh-2) profilometer, i.e., tests were interrupted for measurements. Generally, the surface smoothness deteriorated fastest from the highest finish. The conclusion was made that machining of blade work surface to finish class higher than 6th has no sense. There are 7 figures and 3 tables.

S/122/60/000/005/013/017
A161/A130

AUTHORS: Isayev, A. I., Professor, Doctor of Technical Sciences; Gorbunova, V. N., Engineer

TITLE: The plastic deformation process in chip-formation zone studied by high-speed photo-camera

PERIODICAL: Vestnik mashinostroyeniya, no. 5, 1960, 57-59

TEXT: Information is presented on a new method developed at TsNIITMASh for observation of metal flow at the cutting edge of tools. The method's novelty consists in the use of a heat-treated 8-10 mm thick glass screen preventing metal from flowing toward the recording camera, which could not be prevented in the numerous investigations carried out previously in the USSR and abroad. The method has been suggested by Professor A. I. Isayev (Author's Certificate no. 115008, 1959); the motion picture techniques were developed by Professor A. I. Isayev and Engineers V. N. Gorbunova and A. A. Gorlova. Operator P. M. Kosov participated in the preparation of films. The device (Fig. 1) includes a microscope in the place of the camera lens; the metal specimen (1) is thrust tightly to the transparent screen (2) with surface carefully polished [to class 13 finish per ГОСТ

Card 1/3

S/122/60/000/009/015/015/XX
A161/A026

AUTHORS: Isayev, A.I., Doctor of Technical Sciences, Professor; Ovumyan, G.G., Engineer

TITLE: The Dynamics of the Cutting Process With End Mills

PERIODICAL: Vestnik mashinostroyeniya, 1960, No. 9, pp. 67 - 70

TEXT: The process has been studied at TsNIITMASh under the supervision of the authors. A special dynamometer (Fig. 1a) had been designed by A.F. Zabrodin for torque measurements, provided with ribs between the openings in the casing (Fig. 1b). The ribs are placed at an angle to the casing axis to increase rigidity. Twist deformation causes compression of carbon transducers (5) by brackets (1) and (2) thus changing the current intensity in the resistance circuit. The end mill in holder (3) is attached by bolts (4). Current is taken off the rotating casing by carbon brushes and copper rings. The transducers (5) are connected in parallel so as to make possible a compensation of currents forming in them from bending deformation. The effect of forces P_x, P_z and P_y (Fig. 2) on the torque readings has been studied, and it has been stated that only the effect of forces in points (2) and (4) (Fig. 3) disturbed the resistor bridge balance, but the effect was slight and easily calculated because of its periodic nature. In

Card 1/5

The Dynamics of the Cutting Process With End Mills S/122/60/000/009/015/015/XX
A161/A026

rotation, the dynamometer always will come into such position that the vector force will coincide with the N - N direction. Apart from end mills, the dynamometer permits the milling with a single cutter. The component cutting forces were determined by a ДТУ-8000 (DTU-8000) lathe dynamometer of TsNIITMASh design (Fig. 2) [Abstractor's note: No design details are given.] The dynamometer was used on a horizontal milling machine with vertical table feed; dynamometer readings were recorded with a МПО-2 (MPO-2) oscillograph. The following conclusions were made: 1) Forces acting on the back edge of mill tooth must be considered in calculations of forces and power in milling. 2) The permissible wear chamfer on the back edge must be considered in calculations. 3) Metal sticking to the cutting edge has no material effect on cutting forces in milling "45" steel. 4) There is no increase of force at the moment when a tooth of the mill strikes metal. 5) Cutting speed in the range 5 - 100 m/min is practically of no effect on the cutting forces. 6) Specific work in milling with end mills can vary in a wide range (from 300 to 900 m^2) depending on the cutting conditions. 7) Workpiece metal hardness in the range HB 180-300 leads to increased cutting forces, mainly on account of increasing forces acting on the rear tooth edge. 8) Tangential forces on rear edge may be determined by extrapolating the dependence of the torque value from the cutting depth. 9) When the milled metal is carbon steel, stagging and sticking on the front tooth edge has no material effect on the contact of

Card 2/5

The Dynamics of the Cutting Process With End Mills

the rear edge with the metal being milled. There are 9 figures and 1 table.

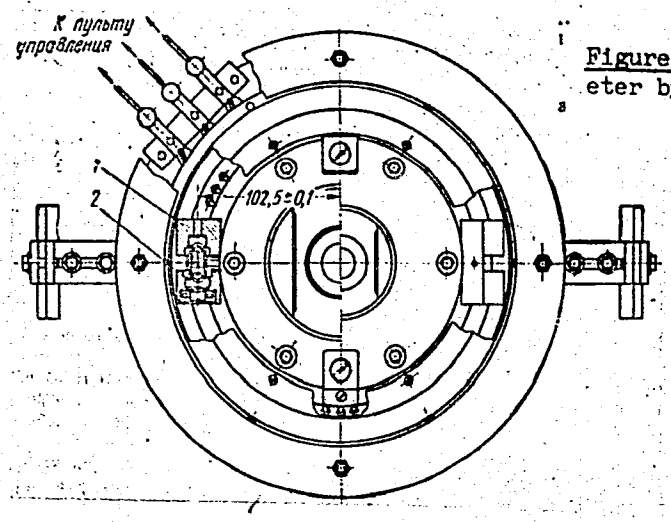


Figure 1a: Schematic diagram of dynamometer by A.F. Zabrodin

Card 3/5

S/114/60/000/012/002/009
E194/E484

26.2122

AUTHORS: Isayev, A.I., Doctor of Technical Sciences, Professor
Morozov, N.A., Engineer

TITLE: Tests on Gas Turbine Blades With Various Classes of Surface Finish

PERIODICAL: Energomashinostroyeniye, 1960, No.12, pp.30-32

TEXT: Blades were tested at TsNIITMASh on an experimental gas turbine type ЭГТУ-850 (EGTU-850) which is an active stage of a gas turbine. The operating conditions of 800 to 850°C are close to actual operating conditions in industrial and transport gas turbines. The turbine rotor is overhung and the disc has 32 slots in which were installed 16 test and 16 ballast blades of which 8 served to measure the metal temperature by means of thermocouples. The shape and size of the blades, made of heat resisting alloy ЭИ-765 (EI-765) are shown in Fig.1. The gas used in the turbine was a mixture of the combustion products of diesel fuel grade ДТ (DT) and air, the gas temperature at the nozzles was 800°C. The blades were tested with a temperature in the dangerous section of 750°C, the rated speed of the rotor

Card 1/5

Tests on Gas Turbine Blades With Various Classes of Surface Finish

was 7000 rpm. The gas flowed over the working surfaces of the blades at a speed of 250 to 300 m/sec. In order to avoid bending stresses, special precautions were taken to install the blades radially. Five groups of blades were tested with different classes of surface finish according to standard ГОСТ 2789-51 (GOST 2789-51), the first group was turned to a surface finish of class 6, the second was milled to a surface finish of class 6, the third was ground to a surface finish of class 6, the fourth was ground to a surface finish of class 8, the fifth group was polished to a surface finish of class 9. Three blades of each group were used plus an extra blade of group 1. The blade temperature and stress conditions were checked automatically and during the tests the deviation of blade temperature did not exceed $\pm$ 5°C; the speed was maintained constant at 7000 rpm $\pm$ 50 rpm. Of the 16 blades tested 12 were run to failure, that is until cracks occurred. Table 2 gives results of strength tests on the blades from which it will be seen that blade No.7 with class 8 ground finish failed first and blade No.27 with polished class 9 finish

Tests on Gas Turbine Blades With Various Classes of Surface Finish

failed second. It is concluded that the strength of blades with class 6 finish is not less than that of blades with higher class of finish. Finishing the blades by turning, milling or grinding makes no difference to the strength under the conditions of the test. The cracked blades were submitted to metallographic examination to establish whether the cracks arise on grain boundaries or in the body of grains at places of shear formed by mechanical working. Typical photographs of microstructure are shown in Fig.3 and 4 and it is concluded that in blades operating in a gas turbine at 760°C, cracks leading to failure originate only on the grain boundaries and that cracks develop within the body of the blade only along grain boundaries. Shear that may occur in the surface layers during machining did not lead to crack formation. Previous work by other authors has shown that in service, turbine blades lose their high initial surface finish. In a previous article by the same authors, published in Energomashinostroyeniye, 1969, No.5, it was shown that in tests with gas and ash particles after 40 hours the blade surface

Tests on Gas Turbine Blades With Various Classes of Surface Finish

becomes of class 6 finish and with clean gas after 140 hours. However, hitherto no special observations have been made of changes in surface finish of actual blades installed in gas turbines. Accordingly, the changes in surface finish were observed in the present tests and the results are given in Table 3. It is found that blades which are initially finished to class 6 maintain their initial finish for 300 hours after which there is a small deterioration in surface finish. In blades ground to class 8 finish the deterioration in surface finish commences from the first few hours of operation and is most intensive after 100 hours operation. In polished blades with class 9 finish in the first few hours of operation there is intensive deterioration of the surface finish. Thus the results obtained in the previous work are fully confirmed. It is concluded that the rate of deterioration of surface finish is greater the higher the initial surface finish. There is no point in improving the surface finish above class 6. Polished blades have lower resistance to erosion than blades finished by turning or milling. Accordingly,

S/114/60/000/012/002/009
E194/E484

Tests on Gas Turbine Blades With Various Classes of Surface Finish

it should be possible without loss, greatly to simplify the manufacture of turbine blading. There are 4 figures, 3 tables and 4 Soviet references.

√C

Card 5/5

S/122/61/000/005/008/013
D221/D304

AUTHORS: Isayev, A.I., Doctor of Technical Sciences, Professor, and Anokhin, V.S., Engineer

TITLE: Use of ultrasonic vibrations of tool for metal cutting

PERIODICAL: Vestnik mashinostroyeniya, no. 5, 1961, 56 - 62

TEXT: The effect of ultrasonic vibrations on metal cutting is described by L.V. Colwell (Ref. 1: The effects of high frequency vibrations in grinding, Transactions of the ASME, May 1956, vol. 78, no. 4) ЦНИИТМАШ (TsNIITMASh) filed an application, no. 19574, dated 9-7-1960, in connection with this work. Study of cutting process was made on lathe 163 and 1A62, with the tool as part of the vibratory system. The magnetostrictive oscillator was cooled with water circulating in the housing. It was fed by an 8 Kw generator УЗГ-10 (UZG-10). Prior to the experiments, the most suitable direction was determined for vibrations, by shoulder machining of steel СТ. 3 (ST. 3) which visibly reacts to ultrasonic vibrations of tool

Card 1/4

This is particularly noticeable with the use of transformer oil. A thread micrometer was used to measure the thickness of chips. A double microscope indicated microroughness due to machining with and without ultrasonics. Amplitude of tool vibration was indicated by a microscope. The system was tuned to resonance during cutting. Data obtained were tabulated. From above it is possible to deduce that the approach of the direction of vibrations to that of the motion of cutting produced a marked effect on finish and compactness of chips. The introduction of ultrasonic vibrations of tool may, therefore, result in an improvement of the machined surface. Next, the authors investigated the kinematics of the process itself. The work-piece moves to the right (Fig. 2) at a speed of v, the tool oscillates in the direction of axis z with a swing of 2A. Observation with an oscilloscope revealed that the motion is sinusoidal even during machining. This indicates that the speed of the tool in respect to the workpiece which is the true speed of machining $v_m = v - \omega A \sin \omega t$, where ω is the circular frequency, $\omega = 2\pi f$ (f is the frequency of tool vibrations); t is time. It follows that in contrast to the usual machining, the speed of cutting in the ca-

se of ultrasonic vibrations of tool is composed of a constant member v and a variable $\omega A \sin \omega t$. The authors introduce $k = v/\omega A$, as a coefficient of speed, and then considers two cases of $k \geq 1$ and $k < 1$. Results of mathematical analysis are given graphically. The action of the tool includes its hammering of the machined metal with ultrasonic frequency. The investigation studied the process of deformation by sudden stoppage of machining and subsequent metallographic analysis of the core in the chip. This revealed that in the case of normal machining there is a well developed build-up which does not exist when ultrasonics are applied. In the latter case the deformation is smaller than in the first case. Microhardness of deformed layer is close to that of the base metal (210 - 240 kg/mm^2) with vibratory tool, whereas in usual machining it reached 350-380 kg/mm^2. Study of the dynamics of machining were carried out with a spring indicator dynamometer AAM-600 (DDI-600) which held the ultrasonic tool, and using steel St. 3, titanium alloy, BT 2 (VT 2) and others. The effects of chip thickness, front rake, speed of machining and amplitude of oscillations were investigated, and plotted. Forced machining was examined in a set-up

S/590/61/102/000/001/005
D040/D113

AUTHORS: Isayev, A.I., Doctor of Technical Sciences, Professor, and Chernyy, A.P., Engineer

TITLE: Investigation of the process of cutting internal cylindrical threads of large diameter

SOURCE: Moscow. Tsentral'nyy nauchno-issledovatel'skiy institut tekhnologii i mashinostroyeniya. [Trudy] v. 102, 1961. Issledovaniye tekhnologicheskikh protsessov v tyazhelom mashinostroyenii, 5-44

TEXT: The results are given of an investigation conducted by the authors at the Tsentral'nyy nauchno-issledovatel'skiy institut tekhnologii i mashinostroyeniya (Central Scientific Research Institute of Technology and Machine Building), and technical recommendations are made for selecting designs for cutting tools. Difficulties in cutting large internal threads using tap sets in parts, such as turbine casings, are discussed and reasons for inaccuracies are classified and analyzed. The study was conducted to find ways of improving the accuracy of 60-200 mm diameter threaded bores in power machinery.

Card 1/7

Investigation of the process ... S/590/61/102/000/001/005
D040/D113

Various thread-cutting systems were compared because of the lack of published data on their effectiveness. Experiments were conducted using special split specimens of Cr-Mo, Ni, and austenitic steel, and cut surfaces were measured using the "copy method" and a Linnik's double microscope. None of the tested cutting methods resulted in removing the allowance from both sides of the thread groove; the highest profile accuracy and best surface finish were obtained with the cutting system based on the use of a thread-cutting head. The forces acting on a tap in the cutting process are analyzed to illustrate how much the real cutting process differs from the theoretical, and it is demonstrated that the undercutting of thread can be eliminated and the cutting accuracy raised if taps are provided with a guiding front portion so that every subsequent tap in a set fits the trace left by the preceding tap (Fig.14). The new taps based on this principle are described and illustrated. These taps, called M 72 (M72), should be solid for threading bores of up to 100 mm diameter, and with removable cutting tips for diameters above 100 mm. The material of the cutting portion of the taps was P 18 (R18) high-speed steel. The recommendations include the cutting and relief angles for threading dies used in thread-cutting heads for cutting different steel

Card 2/7

grades - the austenitic ЭИ 680 (EI680) and ЛА-1(LA-1) steels, and Cr-Mo steel of 20ХМ (20KhM) grade. The design and performance of new safety tap holders, which are mor sensitive to overloads than analogous friction type holders are described. Soviet researchers are stated to have discovered the causes of the formation of micro-unevenness on machined surfaces; in a previous study (Ref.1: Protsess obrazovaniya poverkhnostnogo sloya pri obrabotke metallov rezaniya [Formation process of a surface layer in working cutting metals], Mashgiz, 1950) Professor A.I. Isayev established that the state of the surface depends on the conditions of metal flow at the cutting edges of tools. The effect of the geometric parameters of the cutting portion of the tool, cutting speed, cutting fluid, and wear of the cutting portion in operation was studied, using a set of M 72 x 3 taps in a vertical drilling machine. The following conclusions were drawn concerning thread cutting by taps, and thread-cutting heads: I. Cutting by taps. - (1) Errors resulting from faults in the cutting system of a set of taps, and errors produced by forces arising in the cutting process mainly affect thread cutting accuracy. (2) The use of safety tap holders with a compensating element for axial forces considerably reduces the undercutting of the thread. (3) The system-

atic defect of undercutting may be fully eliminated by using the new tap design with a guiding cutting portion. (4) The cutting speed together with the cutting fluid affects the variations in the mean diameter. The combined effect of systematical and random factors results in mean diameter variations from 20 to 80μ. (5) Variations in the guiding portion taper angle φ from 8° to 18°30' and of the rake angle γ from 5° to 20° within the cutting speed range of V = 1.2 ÷ 10 m/min do not materially affect the variations in the mean thread diameter, i.e. the variations are within 20-40μ, which is within the tolerance field for class 2 accuracy. (6) Within the investigated cutting speed range, a variation in the rake angle of γ = 5° ÷ 20° does not materially affect the smoothness of the machined surface, i.e. the average height of unevenness is 1.5 to 2μ. (7) Reduction in the taper angle φ from 18°30' to 8° helps reduce micro-unevennesses by 2.0 - 3.0μ. (8) Generally in tapping using the self-tightening method, the smoothness of the upper and bottom flank on the thread differs. This difference is caused by forces arising in the cutting process, and it corresponds to the difference between two classes of finish. (9) The following geometric shape of the tap work-portion may be recommended for tapping 20XM(20KhM) type steel: (a) For

through holes, using a set of three taps: for rough taps - $\varphi_{1,2} = 4^\circ \div 7^\circ$; $\gamma = 5^\circ \div 10^\circ$; $\lambda = 2^\circ \div 4^\circ$; $\alpha = 5^\circ \div 8^\circ$; for the finish tap - $\varphi_3 = 8^\circ$; $\gamma = 8^\circ \div 10^\circ$; $\lambda = 2^\circ \div 4^\circ$; $\alpha = 5^\circ \div 8^\circ$. (b) for blind holes, using a set of three taps: for rough taps - $\varphi_{1,2} = 4^\circ \div 12^\circ$; $\gamma = 5^\circ \div 10^\circ$; $\lambda = 2^\circ$; $\alpha = 3^\circ \div 5^\circ$; for the finish tap: $\varphi = 18^\circ$, $\gamma = 8^\circ \div 10^\circ$, $\lambda = 2^\circ$, $\alpha = 3^\circ \div 5^\circ$. II. Cutting by thread-cutting heads. - (1) Heads operating according to the unilateral cutting system have considerable advantages over solid taps. (2) Proper design and geometry of the cutting portion of threading dies ensure class 2 accuracy and thread flanks' smoothness class 7 in threading austenitic refractory steel. (3) The КБ (KB) threading heads of the "Frezer" zavod (plant) may be recommended for low-pitch thread (S = 1.0; 1.5; 2.0 mm) cutting in single pass in austenitic refractory steel. (4) The threading head designs developed at TsNIITMASh are recommended for large-pitch thread (S = 3 ÷ 5 mm) cut in several passes. (5) The following geometry of threading dies is recommended for internal thread cutting in austenitic refractory steel of EI680 and LA-1 steel grades: $\varphi = 8^\circ \div 12^\circ$; $\gamma = 12^\circ \div 15^\circ$; $\lambda = 2^\circ \div 3^\circ$; $\alpha = 4^\circ \div 5^\circ$; relief angle from 1° to $1^\circ 30'$. The recommended cutting speed is from 1 to 4/min. It is recommended to use an 8-10%

Card 5/7

aqueous emulsol solution and sulfofrezol as cutting fluids. (6) The use of safety holders is obligatory when using threading heads. The safety holders developed by TsNIITMASh are recommended for cutting with threading heads according to the self-thightening method in several passes. These holders ensure displacement of the head in the feed direction independent of the machine tool spindle, as well as a gaged axial force acting on the head during incision into the metal. There are 39 figures, 7 tables and 6 Soviet references.

31115
S/590/61/102/000/002/005
D040/D113

26.2122

AUTHORS: Isayev, A.I., Doctor of Technical Sciences, Professor, and Morozov, N.A., Engineer

TITLE: The effect of machining on the operational properties of gas turbine blades

SOURCE: Moscow. Tsentral'nyy nachno-issledovatel'skiy institut tekhnologii i mashinostroyeniya. [Trudy] v. 102, 1961. Issledovaniye tekhnologicheskikh protsessov v tyazhelom mashinostroyenii, 45-57.

TEXT: Turbine blades of ЭИ 765 (EI765) alloy with different surface finish were tested to reveal the effect of turning, milling, grinding and polishing on different classes of finish. The EI765 alloy is suitable for stationary and transport gas turbines. Tests were conducted on an ЭГТУ-850 (EGTU-850) experimental turbine, with a rotor speed of 7000 rpm, under conditions similar to the service conditions of industrial and transport gas turbines. The temperature in the critical blade section was maintained at 750°C. A blade is shown in a drawing (Fig.1) Details of experimental techniques are given.

1/4

The effect of machining ...

Sixteen blades were tested, 12 of which broke or cracked. The difference in the machining method or class did not really effect the mechanical strength of the blades, and class 6 finish may be used for the blade work portion. As seen from photomicrographs, cracks initiated and propagated along the grain boundaries only, and were not created by grain displacements caused by machining. Measurements of surface roughness with a ПЧ-2 (PCh-2) profilometer and Linnik's double microscope revealed that turned and milled blades with class 6 finish retained the initial finish for 300 hours; however, ground blades of the same class started losing their finish after 200 hours, and ground blades with class 8 finish even from the first hours of testing, polished class 9 surface deteriorated rapidly from the first hours on. Reference is made to previous research conducted by the authors where this was observed on blade models of ЭИ 612 (EI612), ЭИ 673 (EI673) and ЭИ 434 (EI434) alloys. In general, the finish of EI765 alloy blades changed quickly, and the finer the initial finish, the more it was spoiled. Polished surface had a lower erosion resistance than turned and milled surfaces. Conclusions: High-class finish on the work portion of gas turbine blades is unnecessary, and class 6 may safely be used. Correspondingly amended requirements would

31115
S/590/61/102/000/002/005
D040/D113

The effect of machining ...

considerably cut the blades' production time and facilitate full mechanization of the machining process. Besides, special blade-finishing machines could be dispensed with. There are 12 figures, 3 tables and 1 Soviet reference.

Card 3/4

X

ISAYEV, A.I., doktor tekhn.nauk, prof.; OVUMYAN, G.G., inzh.

Investigating technological processes in cutting gears with pin-type involute gear cutters. [Trudy] TSNIITMASH 102:58-90 '61.
(MIRA 14:10)

(Gear cutting)