PLYATSKIY, V.M., laureat Stalinskoy premii; SOKOLOV, A.N., kandidat tekhnicheskikh nauk, redaktor; SOKOLOVA, L.V., tekhnicheskiy redaktor.

[Casting under high pressure] Liteinye protsessy s primeneniem vysokikh davlenii. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. i sudostroit. lit-ry, 1954. 223 p. (MIRA 7:9)
(Die casting)

Plyatskiy, V.M.

PLYATSKIY,V.M.

Pressure casting of copper alloys. Lit.proizv. no.9:4-7 S'55.
(Copper alloys) (Die casting) (MLRA 8:12)

PLYATSKIY, V.M., kandidat tekhnicheskikh nauk.

Pressure casting of metals in the molten and plastic state and prospects for the development of this method. Lit.proizv. no.6: 7-11 Je '56. (MLRA 9:8)

(Die casting)

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PHASE II BOOK REVIEW

EV-3

Plyatskiy, Vladimir Mikhaylovich

[illegible]

Reviewers: Polyanskiy, A.P. and Merkulov, V.V., Engineers; Ed.: Krylov, V.I., Engineer; Ed. of Publishing House: Petrova, I.A.; Tech. Ed.: Rozhin, V.P.; Managing Ed.: Sokolov, A.I., Engineer.

INTRODUCTION: The book under review contains a very extensive description of various pressure casting methods in current use. The author treats these various methods in a very thorough manner and attempts to evaluate and to compare them to other metal forming processes, while pointing out future possibilities for their improvement and development. The die casting methods - hot and cold chamber - will be treated only cursorily in this review as they do not appear to differ substantially from the methods known and used in this country for many years. The chief emphasis in this review will be placed on two high-density casting processes: crystallization under pressure, and the "compression molding of molten metal." These two methods which appear to be emerging from the experimental stage in the USSR are claimed to have numerous advantages over die casting and forging. According to the author compression molding of molten metal differs substantially from die casting, although

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Pressure Casting

in some respects and at certain stages it is similar to the cold-chamber die casting process. As the principles of compression molding are applied in this country to the manufacture of thermosetting plastic parts, the Russian term "shtampovka"- literally press-forming - was translated as "compression molding" (of molten metal). In view of their many reputed advantages and possible applications, the methods of crystallization under pressure and compression molding of molten metal will receive as thorough a treatment as the scope of this review will permit. Chapters I to XIII deal with various aspects of casting under pressure. It is stated that the present trend in the casting industry is to produce high quality castings of good dimensional accuracy and high surface finish in order to cut down on expensive machining operations. The hot-as well as the cold-chamber die casting methods generally do give castings of good accuracy and finish; they are, however, frequently plagued by porosity, cavities, and uneven grain structure. During the last few years, it is reported, pressure casting in the USSR has been improved in many ways: castings up to 2000 mm in length and weighing 35 kg have been successfully produced. The specific pressure has been stepped up and can be applied in stages. Automatic metering of the charges and hydraulic ejection mechanisms have helped to improve the overall qualities of castings. All these achievements have failed, however, to free the pressure casting methods from their inherent drawbacks: cavities, porosity, and surface defects, although the author claims that by adhering closely to the scientifically established casting techniques these defects can be kept to a minimum. These chapters also deal with the theoretical aspects of pressure casting.

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Pressure Casting

The behavior of metal during the injection process is carefully studied and the causes of the frontal impact and the turbulence of metal flow are analyzed. The author goes on to describe the various casting machines of Soviet and foreign make, the design and making of dies, and the fundamentals of pressure-casting equipment design. Space is devoted to the composition, casting temperature and behavior of some alloys. In conclusion there is a brief review of various technological problems encountered in die casting. In Chapter XIV the author discusses the fundamentals of the two novel casting methods, namely, crystallization under pressure and the compression molding of molten metal. He begins by enumerating the drawbacks of die casting and the need for a casting process by which dense castings of thin and heavy sections with superior mechanical properties could successfully be produced. The preliminary conditions and requirements for such a process are listed and discussed, followed by an account of the development of such methods. The chief difficulties are said to arise during the solidification of metal in heavy sections of the casting and in other areas of local accumulations. Neither heavy gate-systems nor well designed riser systems can eliminate shrink cavities or porosity. In contrast to the hydrodynamic pressure acting only for a short period of time the hydrostatic pressure may be applied to the metal during the whole process of solidification.

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To achieve this it is necessary to create such conditions under which, after the hydrodynamic pressure has ceased (that is, after the mold cavity has been filled), the pressure of the moving plunger can be made to act on the whole surface of the casting until solidification is complete. It is well known that in hammer and press forging the forming of metal is combined with its densification, and the pressure of the deforming force is transmitted to the total surface of the work piece. Similar processes, which may be likened to semi-forging action, can be used to form and to densify molten metal. According to the author, such methods are crystallization under (plunger) pressure, and the compression molding of molten metal. The basic difference between these two methods is this: in crystallization under pressure the pressure is applied by a plunger but there is no flow or displacement of the metal; in compression molding of molten metal the pressure is also applied by a plunger, but the metal is first set in motion by the descending plunger and is squeezed out to fill the die cavity before the plunger begins to exert any compressive force on the metal. The action at that point is similar to impact extrusion. In both cases the pressure is maintained during the entire period of crystallization, this being the main feature of these two methods. As soon as the die cavity is filled under pressure the metal flow comes momentarily to a standstill, causing hydraulic hammer. This hydrodynamic pressure is instrumental in forming the sharp contours of the casting and also helps to densify the metal.

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Pressure Casting

The hydrodynamic pressure lasts only for a fraction of a second. It then becomes constant and the actual process of "pressing" or semi-forging begins. The full pressure of the press begins to act on the metal, increasing its density as the metal crystallizes under pressure and, later, depending on the specific pressure applied, the metal is further densified during plastic deformation. To summarize, these two methods differ from die castings in the kinematics of metal flow and in their ability to densify the metal. Below is a brief description of these two novel casting methods.

Crystallization under pressure. This method is used to produce solid castings or castings with heavy sections from nonferrous metals and cast iron. The essence of this process consists in filling an open mold with molten metal and applying pressure to the [illegible] surface of the metal by means of a plunger actuated by a hydraulic press. The pressure is maintained until the metal has completely solidified. The pressure applied during crystallization and solidification of metal eliminates shrink cavities and prevents gravitational segregation in alloys during crystallization. Gases contained in the molten metal remain in solution and do not cause porosity. The application of pressure also helps to improve the general mechanical properties of the casting. For high-integrity castings high specific pressure is used; for bearings and other antifriction devices where dendritic structure is desirable lower pressures are in order.

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Pressure Casting

Compression molding of molten metal . To obtain large thin-walled castings of complex configuration it has become mandatory to form the metal under a pressure acting on the whole surface of casting. External pressure molding is regarded as being not quite suitable for this purpose as, according to the author, crystallization of the metal takes place basically without pressure. Instead of filling a preassembled and closed die through a gate where the metal solidifies rapidly and cuts off the casting from the source of metal and pressure, the forming and solidification of metal should take place under continuous omnidirectional high pressure exerted by the plunger. To meet such conditions the metal should not be charged into a separate pressure chamber as it is done in die casting but it should be ladled directly into the die and then forced by the descending plunger into the space formed by the clearance between the die walls and the plunger in the closed position, thus determining the shape of the casting (see Fig. 172, card 15).
The compression molding process is described as follows:

1. A carefully measured amount of molten metal is ladled directly into an open preheated and coated die cavity.
2. Pressure is applied to the metal by a moving plunger activated by a hydraulic press, displacing some of the metal and pressing it tightly against the confining walls of the die with an upward displacement. The pressure is maintained until crystallization is complete. The plunger is then withdrawn and the casting ejected.

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Pressure Casting

Listed below are the advantages of this method over forging, as claimed by the author.

1. No need to prepare preformed blanks from bar stock.
2. Parts may be prepared, using various nonferrous metals unsuitable for ordinary casting.
3. 6 to 8 times less pressure required as compared to hot forging.
4. Thin-walled deep castings of complex configuration may be produced.
5. No defects due to improperly located blanks.
6. Less wear on dies. Close dimensional tolerances may be maintained over longer periods of time.

The author also mentions several specific advantages over die casting:

1. The metal travels a shorter distance and maintains its flowability at lower pressures.
2. No air can be entrapped in the open die because of the lower speed of metal flow.
3. In die casting the metal enters the die through a side gate, striking the opposite wall and dissipating the hydrodynamic pressure. In compression molding the metal flows through the whole cross section of the cavity parallel to the die walls without any turbulence. The hydraulic hammer occurs when the metal flow stops and helps to produce sharp contours and a denser casting.

4. No loss of metal for risers and gating. Losses amount to 50-300% in other systems

In Chapters XV to XVII the author discusses the first of the two aforementioned methods of casting, namely, crystallization under pressure. These chapters contain numerous technological data pertaining to this method. Figures are given for the necessary pressures, temperature of cast metal, and the time necessary for solidification of castings depending on their size. Some [illegible] a steel wheel hub is presented. This method is said to produce good results as the shrinking of the cast metal around the steel hub gives a very tight fit. (see Fig.203). Experiments have been carried out for casting long cylindrical shapes with a core made of powdered quartz. These chapters contain numerous tables, diagrams, and illustrations explaining the various aspects of crystallization under pressure.

Chapter XVIII deals with the technicalities and special aspects of compression molding of molten metal which, as previously described, is a variation of the crystallization under pressure method. The author discusses various aspects of compression molding such as the forming of molten metal in liquid, semi-liquid and in an almost plastic state. Various methods of forming depending on the configuration of the part are also extensively treated.

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Pressure Casting

Various hollow shapes which are said to be most suitable for compression molding may require in some cases a special approach. Parts with a small central cavity are produced by displacing a small volume of metal. Finned hollow parts require a molten metal basin below the casting configuration (see Fig. 209). The ratio of the volume of the part to the volume of the cavity determines the speed with which the metal is displaced. In molding of shaped castings such as turbine blades, careful metering of the metal is said to be essential. Turbine blades which must be held to close tolerances (plus or minus 0.2 mm) without machining require extremely careful metering of metal, as an overdose will produce a thick and innacurate profile (see Fig. 214). Another factor claimed to be of importance is the ratio of the total area of contact with the die to the volume of the part. A large area of contact with the die will cause rapid cooling of the metal; this in turn calls for higher pressure. To produce flat and, especially, annular shapes closed dies are used and the method itself resembles the cold-chamber die casting method, or transfer molding as employed in the plastics industry (see Fig. 215). According to the author, however, the method possesses numerous advantages over the cold-chamber method, where the metal enters the die through a side gate from a separate pressure chamber. These are its reputed advantages:

1. relatively slow flow of metal reduces the erosion of dies and prolongs their service life.

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2. The metal flows more orderly and remains free of impurities as it is squeezed out from the bottom of the cavity.
3. The metal receives the required velocity at the very beginning of the forced flow which permits the use of heavy gating to transmit the necessary high pressure to densify the casting. In this method hydraulic hammer occurs towards the end of the metal flow causing high back pressures in the die. The metal should be forced into a closed die under high specific pressure (on the order of 1000 kg/sq cm). If the part has some heavy sections far from the gate additional risers must be provided.

Having discussed in previous chapters the technology of compression molding of molten metal, the author proceeds to discuss in Chapter XIX and XX the operational requirements for successful compression molding of molten metal. Below, some figures are given pertaining to the casting regimes of these new methods. These figures are said to be the result of numerous tests and experiments conducted by Soviet scientists and engineers. In compression molding of molten metal it is important to preheat the dies to the right temperature which is said to vary from 100°C to 350°C, depending on the metal. The following figures are given for the optimum temperature of metal during casting: brass at 900-950°C; silumin at 600-650°C. To avoid turbulence of flow and entrapment of air the plunger speed must be carefully estimated and maintained. For small parts the plunger speed is given as 0.2-0.4 meters per second, and 0.1 meters per second for large parts.

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Pressure Casting

At 0.8 meters per second and over, there is a danger of turbulent flow and air entrapment. The minimum pressure is said to be in the range of 300 to 400 kg/sq.cm. To insure proper metering of the metal various devices have been introduced. One of them consists of an overflow channel in the upper part of the die. The metal is supposed to drain off to the level of the channel and leave a predetermined amount in the die. This method permits close metering of metal, but the density of the cast part suffers. The use of other overflow and compensating arrangements as well as the use of a spring-loaded plunger result in good dimensional accuracy, but the density if often of a low order. To reduce the wear of dies and plungers and to facilitate ejection from the die these parts must be coated with lubricants such as spindle oil with 5% graphite, or castor oil with 4-5% graphite. Powdered asbestos in suspension is also used.
Chapter XXI contains a description of equipment used in compression molding and in crystallization under pressure. Hydraulic presses are the basic pieces of equipment. Some specialized presses with multiple cylinders are reported to be under development or in the experimental stage. Various machines are said to be easily adaptable for these methods (see Fig.238 and 237). The compression molding of molten metal may be carried out in Soviet cold-chamber die casting machines Numbers 408 and 1220.

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Pressure Casting

These machines, unlike other types, do not have a separate pressure chamber and the metal may be poured directly into the cavity. The parting line of the die coincides with the axis of the moving plunger. This feature makes it possible to use these machines for compression molding of molten metal. Other pieces of equipment described are various distributing arrangements and furnaces for the preparation of melt.

In the last chapters - XXII to XXV - the author deals with production planning and the organization of casting houses for the various aforementioned casting methods. In conclusion he attempts to present some of the economic advantages to be gained by employing these two new methods. The savings in metal alone are reputed to be at least 30 percent and may be as high as 75-80 percent in the case of small parts which ordinarily have to be machined from solid blanks. Also some sectionally manufactured parts can be cast in one piece by the compression molding method. Some cast iron parts, according to the text, may be made from zinc alloys more cheaply and rapidly, although the original cost of material is higher. It is further reported that when one of the large plants adopted the crystallization under pressure method the material requirements were reduced from 80 to 25 tons a month. Various bearing parts, although being of simple configuration, require a great deal of metal [illegible] In the production of [illegible] the metal requirements [illegible] the net weight of the finished part [illegible] offered some advantages but when compression molding was introduced, [illegible] times less metal was used.

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Pressure Casting

Having cited the above instance the author concludes that compression molding is highly suitable for the manufacture of small bushings and bearing rings. Finally, it is stated that in spite of its certain disadvantages, die casting should not be replaced by compression molding and crystallization under pressure as these two methods should be reserved for high-integrity solid and thick-walled castings and castings for high pressure service.

SUMMARY. As far as it can be judged from the information on hand the two casting methods discussed above are not currently employed in the United States. Although compression molding can be compared to cold-chamber die casting where high pressures are also exerted on the metal during solidification and early stages of cooling so as to produce a denser structure, the author claims that there are several differences between these two methods; it is also said that compression molding has several definite advantages over cold-chamber die casting. From the text alone it is hard to determine the practical difficulties and the engineering problems connected with this casting method. Furthermore, all the figures mentioned in this review, as well as the arguments in favor of crystallization under pressure and the compression molding of molten metal, come from a Russian source and, as far as it is known, have not been verified by an independent source.

Pressure Casting

There is no doubt, however, that the ability to economically produce high-density, high-integrity castings from various nonferrous metals would be an important technological improvement. The savings of metal and manhours according to Soviet figures appear to be very great indeed. These two methods of casting, taking the author's statements at face value, appear to be most suitable for various high-pressure hydraulic and pneumatic systems as used in aircraft. Other uses mentioned include the manufacture of turbine blades, bearings, bushings, gear blanks, and various fittings. Even if some of these claims should be exaggerated and excessive, these methods of casting do deserve a full and thorough investigation as their uses could be numerous and might find some application in the aircraft industry.

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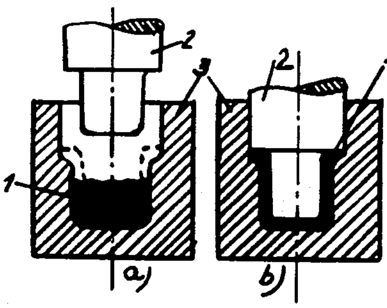

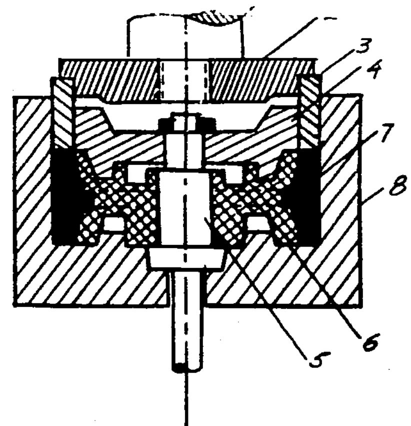

?2. **Schematic diagram of compression molding of molten metal**
(A.)Initial stage of molding(B) Final stage

1. Molten metal 2. Plunger
3. Die block 4. [illegible]

203. **Die arrangement for casting a bronze tire on a steel hub by crystallization under pressure**

1. Main plunger 2. Plunger holder
3. Annular plunger
4. [illegible] 6. Locating pin
5. Steel hub 7. Bronze tire
8. Die block

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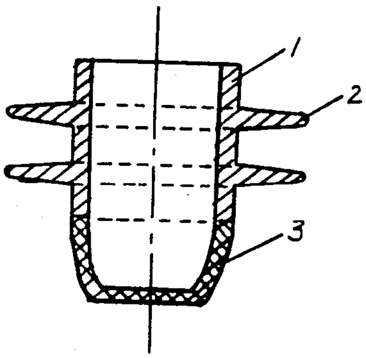
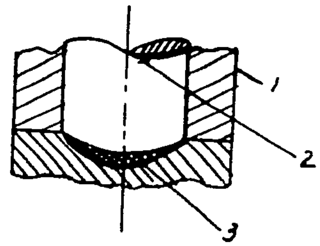


209. Schematic diagram showing the arrangement for compression molding of
1. Finned hollow shape 2. Fin
3. Molten metal chamber



214. Schematic diagram showing compression molding of a turbine blade
1. Die 2. Plunger
3. Turbine blade

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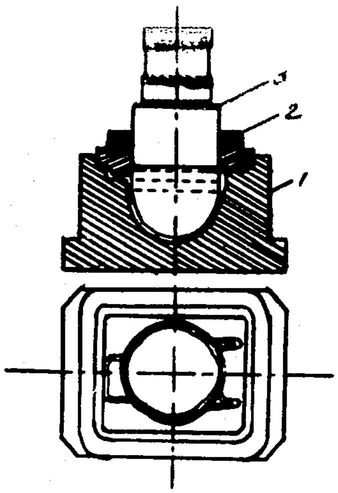

215. Transfer die for forcing the metal into a cavity located in the upper part of the die block

1. Die 2. Upper part of die
3. Plunger

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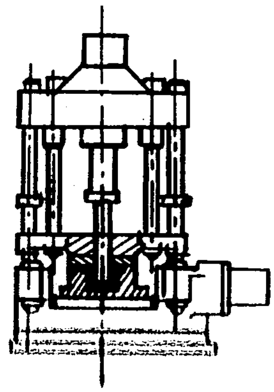
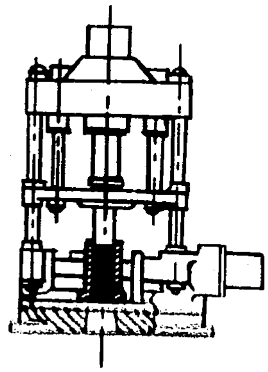


238. Schematic diagram of crystallization under pressure on a universal machine



237. Schematic diagram of compression molding of molten metal on a universal machine with horizontal parting

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Plyatskiy, V. M.

137-1957-12-24053

Translation from: Referativnyy zhurnal, Metallurgiya, 1957, Nr 12, p 165 (USSR)

AUTHOR: Plyatskiy, V. M.

TITLE: Improving the Properties of Diecastings (Povysheniye kachestva zagotovok, litykh pod davleniyem)

PERIODICAL: V sb.: Novoye v liteyn. proiz-ve. Nr 2, Gor'kiy, Knigoizdat, 1957, pp 286-307

ABSTRACT: The drawbacks of diecasting (DC) and means for eliminating them are examined, also liquid die-stamping and the process of crystalization under piston pressure. The major drawbacks of diecasting are the inclusions of air. Thin-walled castings, free of air inclusions, may be obtained with a rational pouring system (PS), but with increasing wall thicknesses the removal of air from the mold becomes more complicated. A demonstration using three identical discontinuous patterns with differing PS's showed the effect of the PS on the mechanical properties which, in this instance, differed by 60-80 percent among the patterns. Measures for the removal of air from the cavity of the mold may be summarized as follows: a) the design of a rational ventilation

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137-1957-12-24053

Improving the Properties of Diecastings

system; b) the design of a PS which would assist in transferring the air contained in the metal into the ventilation system. For the elimination of air special distillation reservoirs are used, into which the initial portions of oxidized metal are conveyed along with the air. These reservoirs are placed in points most distant from the inlet sprue. In crystallization under piston pressure the gases remain in the reservoir and porosity and blisters are avoided. A forced filling up of voids and blisters by liquid metal occurs under the pressure action of the piston; the shrinkage head and the PS are unnecessary. The usable output reaches 98 percent. This method is employed for pouring of blanks and ingots. By contrast, for purposes of making more complex shapes, stamping of liquid metal is employed, and the filling of the mold is accomplished by means of forcibly pressing the metal in by means of a punch.

I. B.

1. Diecastings-Properties 2. Diecastings-Production-Equipment
3. Diecastings-Quality control

Card 2/2

PLYATSKIY, V.M.

BELOGAY, V.M.

25(1) p.3 PHASE I BOOK EXPLOITATION SOV/1440

Nauchno-tekhnicheskoye obshchestvo mashinostroitel'noy promyshlennosti. Leningradskoye oblastnoye pravleniye

Lit'ye povyshennoy tochnosti (High-precision Casting) Moscow, Mashgiz, 1958. 196 p. (Series: Its: Sbornik, kn.45) 7,000 copies printed.

Ed.: A.N. Sokolov; Tech. Ed.: L.V. Sokolova; Managing Ed. for Literature on Machine-building Technology (Leningrad Division, Mashgiz): Ye. P. Naumov, Engineer.

PURPOSE: This book is intended for engineers and technicians at foundries and planning and research institutes.

COVERAGE: The book contains the transactions of a special conference called in November, 1956, by the Leningrad Oblast Administration of the Nauchno-tekhnicheskoye obshchestvo NTO (Scientific and Technical Society of the Machine-building Industry). The articles describe advanced techniques used in

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High-precision Casting SOV/1440

Card 4/5

Plyatskiy, V.M.

PHASE I BOOK EXPLOITATION 892

Angervaks, A.I., Brin, I.D., Gil'denblat, S.M., Golovneva, M.A., Golovnev, Ivan Fedorovich, Kamnev, Petr Vladimirovich, Kutsovskiy, F.V., Plyatskiy, V.M., Sokolov, N.L.

Bezobloynaya shtampovka (Flashless Press-forming) Moscow, Mashgiz, 1958. 294 p. 7,000 copies printed.

Ed. (title page): Golovnev, I.F., Candidate of Technical Sciences; Reviewers: Stel'makov, S.M. Engineer, and Eduardov, M.S., Engineer; Ed. (inside book): Obolduyev, G.T., Engineer; Ed. of Publishing House: Chfas, M.A.; Tech. Ed.: Speranskaya, O.V.; Managing Ed. for literature on the technology of machine building (Leningrad Division of Mashgiz): Naumov, Ye.P., Engineer.

PURPOSE: The book is intended for engineering personnel and it may be useful to students of vtuzes and technical schools.

COVERAGE: The book presents the processes of press forming without flash in closed dies from steel and nonferrous alloys later called

Card 1/2

flashless press-forming. The following suggestions for mastering this process are made: technical and economical indices, rules for designing parts to be made by this process, determining heating regimes preventing scale formation, methods of designing and cutting blanks, determination of capacity of forging equipment, design and calculation of dies, and reference tables. Typical production examples are included (with calculation and drawings for dies) and new data on flashless press forming techniques abroad are presented. There are 32 references of which 21 are Soviet and 11 are English.

SOV/122-58-5-10/26

AUTHOR: Plyatskiy, V.M. Candidate of Technical Sciences

TITLE: New Machines and Fixtures for the Pressing of Liquid Metal (Novyye mashiny i prisposobleniya dlya pressovaniya zhidkogo metalla)

PERIODICAL: Vestnik Mashinostroyeniya, 1958, Nr 5, pp 42 - 47 (USSR).

ABSTRACT: Several set-ups embodying the crystallisation of castings under pressure (or the pressing of liquid metal) are described. In 1955, a universal 4-cylinder casting machine UIM (diagrammatically illustrated in Figure 1) had completed a 3-year production test run. The central, vertical cylinder with 70 tons pressure pushes the plunger into the liquid metal. Two auxiliary vertical cylinders manipulate moulds with a horizontal parting plane. A horizontal cylinder is used with moulds having a vertical parting plane. The pressings are ejected downwards in such moulds. A variant of the machine, suitable for a single operator has been developed. Figure 2 shows the UIM machine adapted for casting ingots or solid castings under pressure in bronze and aluminium alloys. 12-15 ingots per hour (80 mm dia., 300 mm height) are produced by two operators. Figure 3 shows a mould design for castings with a large central cavity. A large

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sleeve of 150 mm dia. and length and 20 mm wall thickness can be pressed even with a small draw (2-3°). Compared with centrifugal casting, a better strength is obtained and 20% metal economy. Shorter sleeves are produced in the mould shown in Figure 3 with the help of a ring-shaped punch. The mould is mounted on a base plate. For the pressing of small components a mould insert is contained in a fixture with a lower punch backed by an additional hydraulic cylinder inside the baseplate and so acts as an ejector pin. Some variants of pressing tools are shown embodying telescopic punch designs, so that the pressure is directly applied not only inside the cavity but also on the casting faces (Figure 5). Figure 6 shows a typical mould with a vertical parting plane and is similar to a pressure die casting die including the casting-in of bosses and holes. Inaccuracies in certain dimensions (mainly height) are often caused by inexact dosage of metal. More precise components (such as turbine blades) can be obtained by the ejection of surplus metal into a riser space. The amount of surplus metal is nevertheless smaller than in the pressure die casting process, where large runners are required. Dense castings without surface defects are obtained by this method, with appropriate punch design. Examples are illustrated of complex form castings made in moulds with moving transverse pins and of a mould for casting under pressure a bronze crown of a wormwheel on a steel hub. There are 11 figures and 1 table.

Card 3/3 1. Presses--Equipment 2. Liquid metal--Pressing

PLYATSKIY, V.M.; BELOUSOV, N.N.

Modern achievements in die casting. [Izd.] LONITOMASH 45:112-126 '58. (MIRA 11:6)

(Die casting)

12(2) SOV/113-59-3-12/17

AUTHORS: Plyatskiy, V.M., Candidate of Technical Sciences, Aleksandrov, V.V.

TITLE: The Manufacturing of Aluminum Alloy Engine Cylinders by Casting Under Pressure (Izgotovleniye iz alyuminiyevogo splava tsilindrov dvigatelya lit'yem pod davleniyem)

PERIODICAL: Avtomobil'naya promyshlennost', 1959, Nr 3, pp 38 - 39 (USSR)

ABSTRACT: During past years research was conducted in the USSR and abroad on casting the aluminum ally cylinders of air-cooled engines under pressure. The author considers the various properties which such an alloy must have, citing French and German alloys in Table 1. The author recommends that alloy AL2 be used for pressure casting of cylinders. Besides aluminum, the alloy must contain 9 - 11% silicon, 1 - 1.2% nickel, 0.6 - 0.9% copper and 0.3 - 0.5% magnesium.

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SOV/113-59-3-12/17

The Manufacturing of Aluminum Alloy Engine Cylinders by Casting Under Pressure

The yield point is 15.40 kg/mm^2, ultimate strength 18.4 kg/mm^2 and the relative elongation 2.0%. The alloy AL1 (GOST 2685) was used for casting the pistons. The author finally describes the technology of the casting which was performed on a Pollack "2255". There are 2 photographs, 2 diagrams and 2 tables.

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S/128/61/000/001/003/009
A054/A133

AUTHOR: Plyatskiy, V. M.

TITLE: Fundamental principles of designing runner systems in die casting

PERIODICAL: Liteynoye proizvodstvo, no. 1, 1961, 6-12

TEXT: Although die casting has been improved considerably, there are still some drawbacks in this method which could not yet be eliminated. The major drawback is the formation of air-inclusions and local surface defects owing to the whirling or flowing of the metal along the cold walls of the mold. By ensuring a linear velocity of the metal flow with a suitable runner system and subsequent pressing out the air-bubbles from the part of the mold that is not easily ventilated, air-inclusions do not originate. The runner system also affects the service life of the pattern. Studies carried out by the author show that compacting of the metal is of great importance whereby the air bubbles and blisters can be eliminated. In this connection, control of the metal flow entering the mold is very effective. Therefore, all factors governing the metal flow: fluidity of the liquid metal, flow of the metal along the mold wall and the heat balance of the mold are of importance, while, at the same time, factors causing the above-mentioned phenomena: excessive velocity, whirling, formation of hydrodynamic resistance must be eliminated. To determine the effect of these factors, tests were made with different runner systems for three main types of castings (I. box-type, II. pipe sockets, III. flat pieces). The experimental runner systems were designed in such a way, that the thickness of the riser could be varied (from 0.8 to 6 mm, 4 - 8 and 3 - 7 mm). To investigate the metal flow, metal was poured in from different sides of the mold and in various directions (perpendicularly, tangentially) to the core, (Figs. 1 and 5). Based on the numerous experiments carried out under varying conditions it was established that with hydraulic casting machines, developing a high specific pressure, it is possible to fill the mold adequately, with a wide range of cross sections of the runner (from 1 mm to the wall thickness of the casting). For thin-walled castings runners with small cross sections should be used, since, generally, the larger the cross section of the riser, the greater the possibility of controlling the metal flow and of reducing whirling. However, in spite of the larger cross section of the feeder gate, the required high velocity of metal flow must be attained. In modern die casting machines with horizontal pressure chambers this is easy to ensure, as the speed of the pressing piston can be regulated within a wide range. Hence, the conventional method of increasing the pouring rate by reducing the cross section of the riser can be dispensed with. It is possible to arrive at an optimum runner system, by controlling the piston speed and increasing the riser cross section. By these measures the development of friction and hydrodynamic resistance will be prevented. When the piston speed, (w, in m/sec), the die cross-sectional area (F) and the optimum riser-section (f) are known, the speed of the metal flow in the runner channel w_1 can be calculated from:

$$w_1 \cdot f = w \cdot F.$$

When the gravimetric density G of the casting and that of the poured metal are known, (Y), pouring time τ can be defined by:

$$\tau = \frac{G}{Y \cdot \frac{\pi d^2}{4} \cdot D \cdot w}.$$

With large diameter risers and runners it is possible to cast the metal at lower temperatures. This is important regarding the compacting of the metal. With low-temperature pouring a certain amount of solid phase forms in the stream of the metal at the moment the poured metal solidifies and crystallization is accelerated. The tests made in three groups with three main types of castings proved that in nearly all cases the bigger riser diameter favourably affected the quality of castings, when the metal flow was introduced from various sides of the mold and at different angles, as long as casting was carried out without frontal impact. All the experimental and industrial-scale castings proved that although the increase in the riser cross section reduces whirling, increases the life of the mold and helps to reduce air-enclosures, all these positive effects are obtained only when the increase in riser-cross section is accompanied by the proper direction of the metal flow. Nor has the riser cross section any influence on the pouring time, as this depends on machine-capacity. The optimum riser cross section should be as near to the wall thickness of the casting as possible. The basic principle in designing the runner system is to control the metal flow and to design a system which will eliminate whirling and ventilate the large hollows in the mold. Recent types of runner systems try to eliminate the recurrent metal flow and to fill the difficult to ventilate areas of the mold in the first place. Three types of runner systems are mentioned: vertical-lateral risers, controlled risers and a version of the central runner system adapted to horizontal-pressure-chamber die casting machines. In vertical-lateral risers, the metal enters the lowest part of the hollow space, extruding the air from there (Fig. 10). The controlled runner system is based on the great linear speed of the liquid metal poured in through a small-diameter gate, in passing through an empty area with rectangular transverse and longitudinal sections, without encountering any projections (Fig. 12). In molds fed only on one side, to avoid whirling, it may happen that the metal flow, having to cover long distances, is considerably cooled when it arrives at the spot farthest from the pouring gate. For such molds it is necessary to supply heating containers at the end opposite the feeder in order to maintain the required temperature for the metal flow and the mold. On the other hand, it is sometimes necessary to lower the high temperatures of the metal accumulating in sections of the mold nearest to the risers and to eliminate the delay in flow and the waste of kinetic energy. This can be achieved with special devices cutting off a considerable part of the riser mass. There are 14 figures and 1 table.

Fundamental principles of designing...

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A054/A133

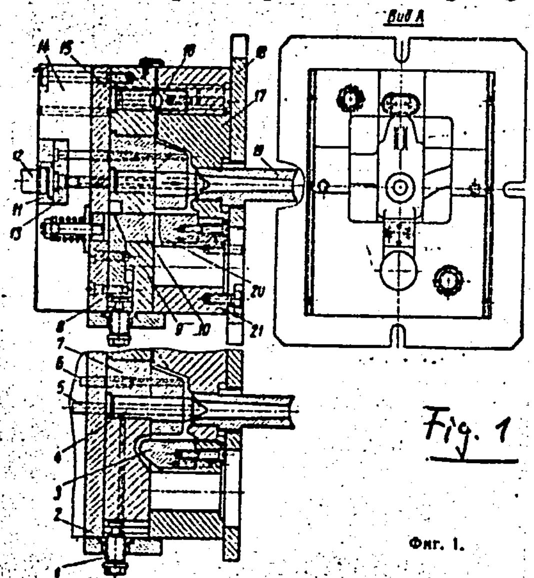

Figure 1:

Die no. 1 for casting box type products in casting machine with horizontal pressure chamber:

1 - screw feeding the insert, 2 - insert, 3 - exchangeable insert, 4 - insert pusher, 5 - cutter pusher, 6 - pusher, 7 - central core, 8 - wedge, 9 - liner, 10 - insert, 11 - clamping plate, 12 - shaft end of hydraulic drive, 13 - pusher plate, 14 - support, 15, 16 - inserts, 17 - matrix insert, 18 - matrix base, 19 - feeder, 20 - insert, 21 - matrix.

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Fundamental principles of designing... S/128/61/000/001/003/009
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Figure 5:

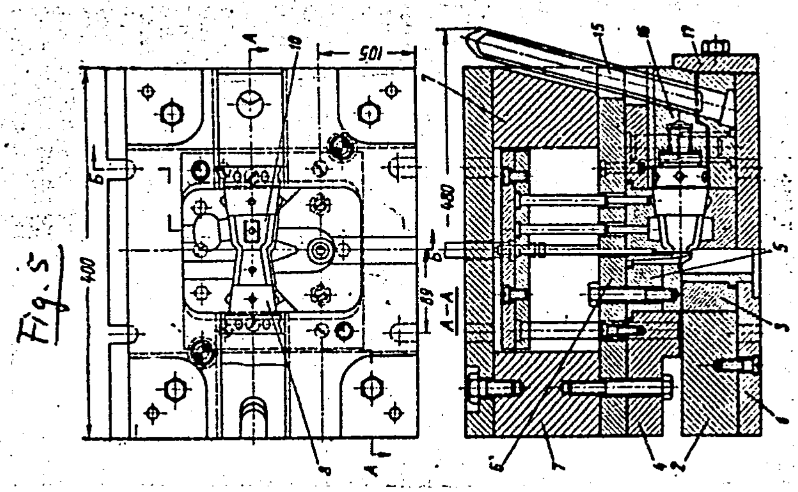

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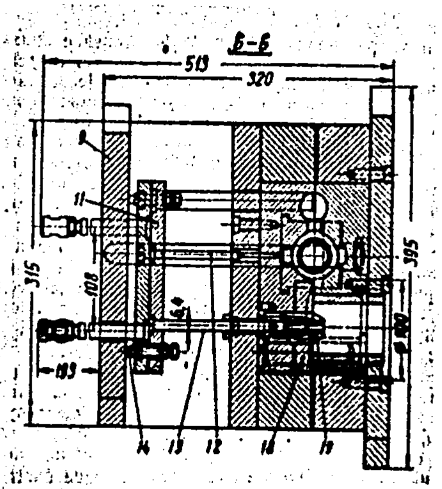
Figure 5: (continued)

Die no. 2 for casting pipe sockets

1, 6, 9 - plates,
2 - matrix,
3, 5 - inserts,
4 - die,
7 - support,
8, 10 - exchangeable cores,
11 - pusher plate,
12, 13 - pushers,
14 - support,
15 - inclined rod,
16 - jaw,
17 - lock,
18 - exchangeable feeder insert,
19 - cutter.



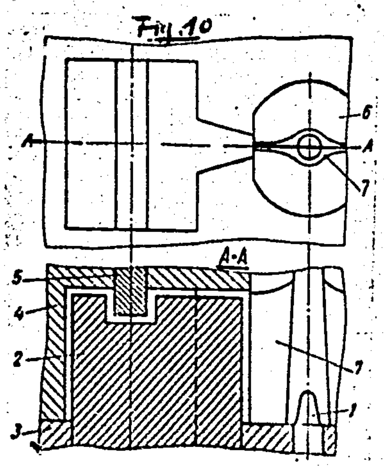


Figure 10:

Vertical-lateral riser

1 - breaking device,
2 - central core,
3 - die plate,
4 - matrix plate,
5 - core,
6 - removable insert,
7 - vertical riser.

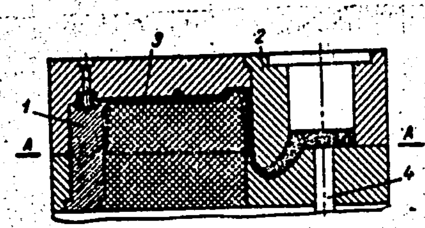


Fig. 12 Фиг. 12.

Figure 12:

Guided (controlled) riser

1 - insert,

2 - bush,

3 - core,

4 - pusher.

S/122/61/000/006/006/011
D244/D301

AUTHOR: Plyatskiy, V.M., Doctor of Technical Sciences

TITLE: Trends in the construction of machines for the manufacture of close-grained castings

PERIODICAL: Vestnik mashinostroyeniya, no. 6, 1961, 46-50

TEXT: Close-grained castings are often used instead of forgings and hot stampings, the main reason being a metal saving of 55-70%. However, in the absence of the mass production of special machines, some firms carry out this special casting process in universal equipment. Within the last 15 years, 4 types of special machine for close-grained casting have been released in small batches. Production experience with them has resulted in determining the field of application of this type of casting. However, the further development and adoption of these processes has been retarded owing to the absence of machines designed on the basis of long-term production experience. The universal casting machine УЛМ-2(ULM-2) represents a combination of 2 hydraulic presses,

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the main cylinders of which are at an angle of 90° to each other. This machine has been modernized. All control operations are carried out hydraulically. Cross sections of modernized ULM-2 type machines for various methods of close-grained castings are illustrated. In all cases where the pressure acting on the form grip is insufficient, wedge type or clamp type grips (Fig. 5) are successfully used. There are 5 figures.

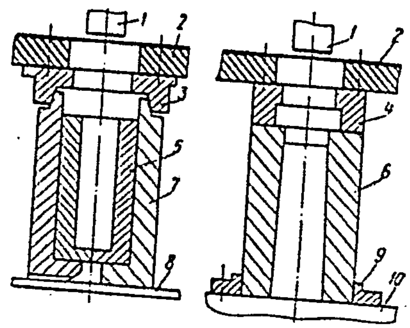

Fig. 5. Lock and clamps used to ensure effective closing of the die. Legend: 1 - punches; 2 - cross pieces of the machines; 3 - locking device to retain the split die in the closed condition; 4 - clamp to ensure tight contact between the lower face of the non-split container and the machine table; 5 - split die halves; 6 - container; 7 - universal block die holder for setting up interchangeable dies; 8 - supporting plank; 9 - base; 10 - machine table.

PLYATSKIY, V.M., doktor tekhn.nauk

Trends in the manufacture of machines for pressure casting.
Vest. mash. 41 no.6:46-50 Je '61. (MIRA 14:6)
(Die casting)

JUN 25 1963

PHASE I BOOK EXPLOITATION SOV/6248

Plyatskiy, Vladimir Mikhaylovich, Doctor of Technical Sciences

Beskovshovaya zalivka i avtomaticheskaya dozirovka v liteynom proizvodstve (Ladleless Casting and Automatic Dosing in Foundry Work). Moscow, Mashgiz, 1962. 174 p. 4000 copies printed.

Ed. of Publishing House: A. I. Sirotin, Engineer; Tech. Eds.: L. A. Vladimirova and N. F. Demkina; Managing Ed. for Literature on Hot Working of Metals: S. Ya. Golovin, Engineer.

PURPOSE: This book is intended for engineering and technical personnel in foundries and also for designers and production engineers.

COVERAGE: Uncoordinated Soviet and non-Soviet information on ladleless casting and automatic dosing is for the first time systematized; it is supplemented with data from industrial practice, and discussed in connection with various casting methods. Variant methods of ladleless casting are described and analyzed, and results

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of some scientific studies in this field are presented. The author makes the following claims for the method. Ladless casting and automatic dosing eliminate the disadvantages of ladle pouring. Numerous critical parts working under high loads, which formerly had to be forged or stamped, can now be manufactured directly by casting. Ladle pouring, on the other hand, is the most unreliable and weakest link in foundry work, since it permits slag entrapment, oxidation of metal, scum formation, and breakdown of protruding parts of sand and graphite molds; in special types of casting it considerably reduces productivity and causes losses of metal by not ensuring correct dosing. No personalities are mentioned. There are 49 references: 20 Soviet, 21 English, 5 German, and 3 French.

TABLE OF CONTENTS:

ACCESSION NR: AT4017181

S/0000/63/000/000/0356/0364

AUTHOR: Plyatskiy, V. M. (Leningrad)

TITLE: Thermal conditions of the casting process with crystallization under plunger pressure

SOURCE: AN BSSR. Fiz.-tekhn. institut. Teplofizika v liteynom proizvodstve (Thermal physics in the foundry industry). Minsk, 1963, 356-364

TOPIC TAGS: casting, crystallization, metal crystallization, heat treatment, plunger pressure casting, compacting, squeeze casting

ABSTRACT: Compacting differs from casting under pressure in that the first is carried out under hydrostatic pressure which does not stop until the cast hardens completely. The present investigation considers the problem of compacting casts depending on the thermal processes during casting. Several scientists (Tamman, Bridgeman, Welter, et al. and later V. A. Bobrov, A. A. Bochvar) have observed some increase in the melting temperature of alloys under high pressure. When crystallization proceeds under plunger pressure, the rapid hardening under pressure, the close contact with the heat conducting mold, and the lack of gas clearances lead to intensive overcooling of the alloy. All casting defects are eliminated when casting and crystallization are done under plunger pressure. At present,

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extrusion of liquid metal is being modernized by the use of telescopic dies, as well as by the removal of large hollow blocks from the dies. (See Fig. 1 of the Enclosure). The plunger pressure method is used for manufacturing reinforced bi-metallic parts and cast tools (mills). Orig. art. has: 4 figures.

ASSOCIATION: Fiz.-tekhn. institut AN BSSR. (Institute of Physics and Technology, AN BSSR.)

SUBMITTED: 19Apr63 DATE ACQ: 06Mar64 ENCL: 01

SUB CODE: MM NO REF SOV: 003 OTHER: 000

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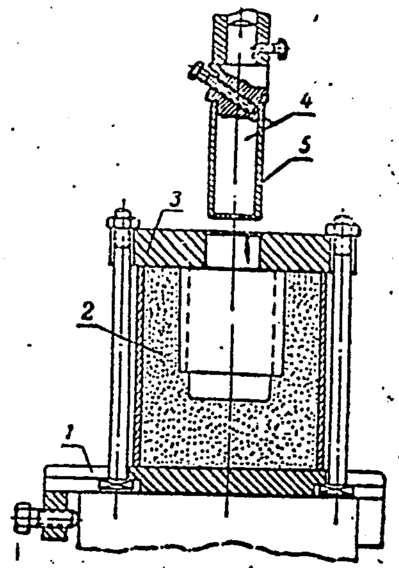
ACCESSION NR: AT4017181

ENCLOSURE: 01



Mold for casting end mold by the liquid metal extrusion method
1 - base plate; 2 - mold; 3 - upper part of mold; 4 - pressing die;
5 - sleeve

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[illegible]-65 EPA(s)-2/EWT(m)/EPF(n)-2/[illegible] BOOK EXPLOITATION [illegible]/EWA(h) Pt-10/Pab/Pu-4 JD/WW/JG
ACCESSION NR AM4043707 S/

Plyatskiy, V. M.

Molten metal pressing (Shtampovka iz zhidkogo metalla), Moscow, Izd-vo "Mashinostroyeniye", 1964, 314 p. illus., biblio. 4,000 copies printed.

TOPIC TAGS: die casting, iron, steel, nonferrous metal

PURPOSE AND COVERAGE: This book is the first monograph on the stamping of articles from liquid metal, a new process in which the advantages of casting under pressure and metal pressing in the plastic state are combined. The process has found use at a large number of plants (over 150). At many of them, 200 or more items fabricated from all the nonferrous metals, iron, and steel are produced. The process results in no loss of metal in gating systems and hot tops which permits a great savings of metal. The book presents the 25-year experience of the author in the development of the theoretical principles of the process and the investigation of the effect of various factors on obtaining [illegible] quality articles. There is a detailed treatment of material [illegible] of the process at plants with a description of the design features of the [illegible]ion molds and attachments. Various pro[illegible] process including the design of special equipment are examined. The book is intended for engineers,

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ACCESSION NR AM4043707

technicians, designers and workers of foundry and pressing-stamping shops; it can also be used by students at higher technical education institutions.

TABLE OF CONTENTS [abridged]:

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L 31801-65
ACCESSION NR AM4043707

SUBMITTED: 27Jan64

SUB CODE: MM

NO REF SOV: 034

OTHER: 005

Card 3/3

MITROPOL'SKIY, B.I.; PLYATSKIY, V.M.; TKACHEV, K.I.

Die casting is an important potential in the manufacture of textile machinery. Izv. vys. ucheb. zav.; tekh. tekst. prom. no.4:151-155 '64. (MIRA 17:12)

1. Leningradskiy institut tekstil'noy i legkoy promyshlennosti im. S.M. Kirova.

PLYATSKO, G.U.

(12)

S/198/62/008/005/008/009
D234/D308

AUTHOR: Botte, O. V.

TITLE: Dissertations defended in 1961 at the Institutes of the Division of Technical Sciences, AS UkrSSR, in the field of mechanics

PERIODICAL: Akademiya nauk Ukrayins'koyi RSR. Instytut mekhaniky. Prikladna mekhanika, v. 8, no. 5, 1962, 571-575

TEXT: The following dissertations were presented by the collaborators of the above section and approved: For the degree of Candidate of Technical Sciences: Instytut mekhaniky (Institute of Mechanics): Vasyl' Mykolayovych Buyvol, Aspirant: 'Plane problems of the theory of elasticity for multiply-connected regions with cyclic symmetry', on March 16, 1961, at Dnipropetrovsk Universty. Yaroslav Mykhaylovych Hryhorenko, Junior Scientific Collaborator: 'Stressed state of round plates and conical shells of linearly varying thickness under asymmetric loads', on April 6, at Dnipropetrovsk University. Igor Tymofiyovych Selezov, Aspirant, 'Investigation of the propa-

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Dissertations defended in ... S/198/62/008/005/008/009
D234/D308

gation of elastic waves in plates and shells', on June 19, at Ky-
yivs'kyy politekhnichnyy instytut (Kiev Politechnic Institute).
Andriy Feofanovych Ulitko, Aspirant, 'Solution of 3-dimensional
problems of the theory of elasticity by the method of vector eigen-
functions', on September 26, at Kiev University. Mykhaylo Petrovych
Petrenko, Junior Scientific Collaborator, 'Transverse and longi-
tudinal vibrations in short rods of constant and variable thick-
ness, due to impacts', on October 24, at Kiev University. Mariya
Dmytrivna Synyavs'ka, Junior Scientific Collaborator, 'Increase of
wear resistance of piston rings of integral combustion engines
with the aid of galvanic coating', on October 24, at Kyyivs'kyy
avtomobil'no dorozhnyy instytut (Kiev Institute of Automobiles and
Highways). Heorkiy Ivanovych Dybenko, Engineer, 'Change of strength
and deformability of ДСП (DSP) plastics in time at increased tem-
peratures', on November 28, at Kiev Institute of Automobiles and
Highways. For the degree of Doctor of Technical Sciences: Instytut
elektrosvaryuvannya im. Ye. O. Patona (Institute of Electric Weld-
ing imeni Ye. O. Paton): Boris Oleksiyovych Movchan, Senior Scien-
tific Collaborator, Candidate of Technical Sciences, 'Microscopic

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inhomogeneities in cast alloys', on May 16, at the Siberian sections of AS USSR. For the degree of Candidate of Technical Sciences: Instytut mashynoznavstva ta avtomatyky (Institute of Machine Science and Automation): Hryhoriy Semenovyen Kit, Junior Scientific Collaborator, 'Approximate solution of the problem of free torsion', on March 16, at Dnipropetrovsk University. Hryhoriy Vasyl'ovych Plyatsko, Junior Scientific Collaborator, 'Nonstationary problems of heat conduction and thermoelasticity', on April 20, at the Institute of Mechanics of AS UkrSSR. Mykola Yuriyovych Shvayko, Aspirant, 'Some problems of elastoplastic torsion of prismatic rods', on December 25, at L'viv University. Instytut metalokeramiky i spetsial'nykh splaviv (Institute of Metal Ceramics and Special Alloys): Volodymyr Ivanovych Kovpak, Aspirant: 'Investigation of durable strength during programmed change of load and temperature', on October 23, at Kiev Polytechnic Institute.

PLYATSKOVSKIY, O.A., kand.tekhn.nauk; LIVSHITS, A.S., kand.tekhn.nauk; Prinimali uchastiye: AGAYEV, Kh.A.; EL'BERT, S.M.; BRAYLOVSKIY, V.P.; SYRKINA, A.F.; ORLOV, S.T.

Selection of wear resistant steels for mandrels of continuous and three-roll pipe mills. Biul.nauch.-tekh.inform.VNITI no.4/5:51-61 '58. (MIRA 15:1)

(Pipe mills)

35917

18.1100

S/148/62/000/002/004/008
E082/E435

AUTHORS: Plyatskovskiy, O.A., Khokhlov-Nekrasov, O.G.

TITLE: Deformation and mechanism of cavitation of the core of a billet during cross-rolling operations

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no.2, 1962, 88-97

TEXT: The authors describe experiments to determine the stress conditions arising in a billet during cross-rolling, and the causes of cavitation in its core. For this purpose they used lead billets into which strain gauges were inserted. Preparation of billets is described and the results are shown by graphs and oscillograph recordings illustrating characteristic deformation of the core, and of different layers of the metal. Due to the greater speed of flow of the peripheral layers compared with that of the core and at the ends of the billet, considerable longitudinal tensile stresses arise in the core. There is also considerable plastic deformation of the core in the longitudinal direction which increases as the billet travels through the roll-pass. As the billet enters the rolls compressive deformation is observed

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S/148/62/000/002/004/008
E082/E435

in the peripheral layers of the metal. This changes to a rapidly increasing longitudinal tensile deformation. A corresponding change of radial stresses from compression to tension takes place in the meridional section of the billet. In the "plastic cone" area, and in the adjacent metal, compressive stresses appear in the direction of the external forces but perpendicular to this, and at an angle, transverse-radial tensile stresses arise. The plastic displacement of the peripheral layer relative to the core, increases the tension in the core of the billet. Maximum inequality of stress and deformation was observed at the boundaries between the plastic cone and the end portions of the billet. Cavitation, due to the influence of bursting stresses, precedes plastic deformation. When rolling billets with different ratios of length to diameter, the stress conditions are analogous, but the magnitude of stress differs. It is possible to reduce the inequality of deformation, magnitude of additional stresses and probability of cavitation by increasing "pinch" and reducing the length of the zone of deformation (e.g. by increasing roll angle, increasing feed angle, etc). Photographs show examples of cavitation obtained when rolling steel at 1800°C. There are 7 figures.

ASSOCIATION: Ukrainskiy nauchno-issledovatel'skiy trubnyy institut (Ukrainian Scientific Research Institute for Pipes)

SUBMITTED: October 27, 1960

PLYATSKO, Grigoriy Vasil'yevich; LEONOV, M.Ya., doktor fiz.-mat.nauk, prof., otv.red.; KAZANTSEV, B.A., red.izd-va; MATVEYCHUK, A.A., tekhn. red.

[Nonstationary problems in heat conductivity and thermoelesticity; supplement for calculatory elements of heat power units] Nestatsionarnye zadachi teploprovodnosti i termouprugosti; s prilozheniem k raschetu elementov teplosilovykh ustanovk. Kiev, Izd-vo Akad.nauk USSR, 1960. 103 p. (MIRA 14:12)

(Heat--Conduction) (Thermal stresses)

PLYATSKO, G.V.

Determining temperature fields in a symmetrically heated hollow cylinder and sphere. Nauch.zap.IMA AN URSR. Ser.mashinoved 7 no.6:128-142 '60. (MIRA 13:8)
(Thermal stresses) (Heat—Conduction)

PLYATSKO, G. V.

Temperature field in a hollow cylinder at different rates of heating. Nauch.zap.IMA AN URSR. Ser.mashinoved. 7 no.6:143-149 '60.
(MIRA 13:8)
(Heat--Conduction) (Thermal stresses)

PLYATSKOVSKIY, O.A., kand.tekhn.nauk; Prinimali uchastiye: OSLON, N.D.; NODEV, E.O.; DEVYATISIL'NYY, V.I.; SULTINSKIKH, A.N.; SHANIN, P.K.; KUKARSKIKH, V.I.; RAKHNOVETSKIY, L.Y.; DUYEV, V.N.

New technological processes used in rolling 102-170 mm. diameter pipes of stainless steel 1Kh18N9T. Biul.nauch.-tekh.inform.VNITI no.4/5:24-30 '58. (MIRA 15:1)

(Pipe mills)

PLYATSKOVSKIY, O.A., kand.tekhn.nauk; YEVTEYEV, D.P., inzh.

Making pipe from metal produced by continuous casting. Stal' 24 no.7:628-630 Jl '64. (MIRA 18:1)

L 23312-66 EWT(d)/EWT(m)/EWP(v)/EWP(t)/EWP(k)/EWP(n)/EWP(1) JD/HM

ACC NR: AP6011200 SOURCE CODE: UR/0413/66/000/006/0032/0032

INVENTOR: Semenov, O. A.; Alferova, N. S.; Yankovskiy, V. M.; Kolesnik, B. P.; Ostrin, G. Ya.; Plyatskovskiy, O. A.; Kheyfets, G. N.; Gleyberg, A. Z.; Chemerinskaya, R. I.; Gomelauri, N. G.; Blanter, M. Ye.; Sharadzenidze, S. A.; Suladze, O. N.; Gol'denberg, A. A.; Tsereteli, P. A.; Ubiriya, A. Ye. Seperteladze, O. G.

ORG: none

TITLE: Method of manufacturing strengthened tubes. Class 18, No. 179786 [announced by the Ukrainian Scientific Research Institute of Pipes (Ukrainskiy nauchno-issledovatel'skiy trubnyy institut)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 6, 1966, 32

TOPIC TAGS: tube manufacturing, tube rolling, tube strengthening, tube heat treatment

ABSTRACT: This Author Certificate introduces a method of strengthening hot-rolled tubes. According to this method, the hot-rolled tube is quenched immediately after it leaves the first rolling mill, and then is sized or reduced at a tempering temperature. [ND]

SUB CODE: 13/ SUBM DATE: 12Nov63/ ATD PRESS: 4230

Card 1/1 UDC: 621.78.08.621.771.2

L 61699-65 EWT(m)/EWA(d)/T/EWP(t)/EWP(k)/EWP(z)/EWP(b)/EWA(c) Pf-4 MJW/JD/HW
ACCESSION NR: AR5012848 UR/0137/65/000/003/D029/D029

SOURCE: Ref. zh. Metallurgiya, Abs. 3D202

AUTHOR: Plyatskovskiy, O. A.; Yuferov, V. M.; Pavlovskiy, B. G.; Vorona, N. M.; Lezinskaya, Ye. Ya.

TITLE: Production of tubes from EP27 steel

CITED SOURCE: Sb. Proiz-vo trub. Vyp. 13. M., Metallurgiya, 1964, 5-8

TOPIC TAGS: metal tube, steel, temperature interval, hot rolling, billet, metal ductility, heat treatment, cold working/ EP27 steel

TRANSLATION: It has been established as the result of an investigation that the optimum temperature interval for the hot rolling of tubes of EP27 steel lies within the limits of 1150-1180°. In heating the tube shaped billets, it is necessary to take into account the heating up of the metal in the broaching operation. Hot rolled tubes of EP27 steel have a sufficient reserve of ductility for further cold working without special heat treatment. The intermediate and final heat treatment of the EP27 steel tubes should be carried out by heating them to 1050-1100° with a holding time at this temperature depending on their wall thickness, and by

L 61699-65

ACCESSION NR: AR5012848

subsequent cooling in air. N. Yudina.

SUB CODE: MM ENCL: 00

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L 56680-65 EWT(m)/EPF(c)/EWA(d)/EWP(t)/EWP(z)/EWP(b) MJW/JD/WB

ACCESSION NR: AP5013787

UR/0128/65/000/005/0001/0002

621.74.042:669.14.018.85

AUTHOR: Volkovitskiy, G. I. (Candidate of technical sciences); Plyatskovskiy, O.A. (Doctor of technical sciences); Yuferov, V. M. (Candidate of technical sciences); Dzyuba, M. I. (Engineer); Khokhlov-Nekrasov, O. G. (Engineer)

TITLE: Centrifugal casting of large tube blanks from OKh10N20T2 steel

SOURCE: Liteynoye proizvodstvo, no. 5, 1965, 1-2

TOPIC TAGS: centrifugal casting, austenitic steel, high-strength tube, corrosion resistance

ABSTRACT: Procedures employed in centrifugal casting of 3700 mm long tube blanks with internal diameters of 160, 145 and 120 mm and external diameters of 490, 450 and 365 mm are described. The tubes were cast from austenitic precipitation hardening OKh10N20T2 steel (≤0.08% C, ≤0.80% Si, ≤0.03% P, 10-12% Cr, 18-20% Ni, 1.5-2.5% Ti, ≤0.60% Al). The cast tubes were then machined externally to a tolerance of 10-12 mm and internally to a tolerance of 20-25 mm. All of the specimens exhibited

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L 56680-65
ACCESSION NR: AP5013787

a primarily columnar structure. The mechanical properties of the finished rolled and heat treated tubes were as follows: σ_b>70 kg/mm^2, σ_s>40 kg/mm^2, σ=25% and ψ=40%. It is determined that the cost of tubes prepared by this method is 25-30% less than that of those prepared from forged blanks.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 003 OTHER: 000

Card 2/2

L 05794-67 EWT(m)/EWP(t)/ETI/EWP(k) IJP(c) JD/HW

ACC NR: AP6030546 SOURCE CODE: UR/0413/66/000/016/0017/0017

INVENTOR: Plyatskovskiy, O. A.; Khokhlov-Nekrasov, O. G.; Umerenkov, V. N.; Starodvorskiy, V. S.; Grigor'yev, L. F.

31
B

ORG: none

TITLE: Method of rolling pipe. Class 7, No. 184790

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 16, 1966, 17

TOPIC TAGS: metal rolling, rolling mill, pipe, pipe rolling, mandrel

ABSTRACT: An Author Certificate has been issued describing a method for rolling pipe on a graduated mandrel (see Fig. 1). To ensure the potentialities of rollint the thin-walled pipes and pipes with a graduated diameter, the mandrel, freely moving in rollers together with the pipe, is fixed with regard to one of the ends of the rolling sleeve pipe, such as the flange, or it is moved periodically in a definite plan. The mandrel has a flange at one end, the diameter of which is greater than the inside diameter of the sleeve but is smaller than the outside diameter of the pipe, while the diameter of its other end is smaller than the inside

Card 1/2 UDC: 621.774.3

L 05794-67

ACC NR: AP6030546

diameter of the pipe. Orig. art. has: 1 figure. [Translation]

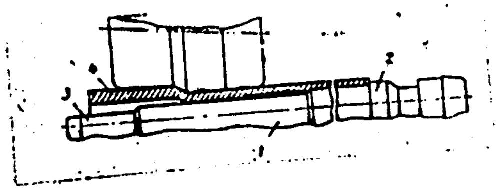

Fig. 1. Pipe rolling mandrel.
1—Mandrel; 2—flange;
3—end with smaller diameter;
4—sleeve pipe

SUB CODE: 13/ SUBM DATE: 02Sep63/

Card 2/2

PLYATSKO, G.V.

Thermal stresses in a hollow cylinder taking the changes in basic coefficients into consideration. Nauch.zap.IMA AN URSR. Ser. mashinoved. 7 no.6:150-155 '60. (MIRA 13:8)
(Thermal stresses)

ACCESSION NR AM4029020 BOOK EXPLOITATION S/

Vatkin, YAkov Leybovich; Plyatskovskiy, Oskar Aleksandrovich; Vashchenko, YUriy Ignat'yevich

Seamless tubes; a handbook (Besshovny*ye truby*; spravochnoye rukovodstvo dlya rabochikh), Moscow, Metallurgizdat, 1963, 179 p. illus., biblio. Errata slip inserted. 2,700 copies printed.

TOPIC TAGS: seamless tube, pilgrim mill, continuous mill, extrusion, cold rolling, drawing, reduction mill

PURPOSE AND COVERAGE: The book considers the various methods of producing seamless tubes in a broad assortment. Handbook data are given on the technology of fabricating tubes on automatic, pilgrim, and continuous mills and also by extrusion, cold rolling, and drawing. Information is given on setting the grooves of various mills and the basic characteristics of the equipment. The various types of defects and methods of eliminating them are noted. There is a description of safety measure in tube rolling shops and examples of automation of certain equipment are given. The book is intended as a manual for workers and foremen of tube shops and can also be useful for students in metallurgical technicums when studying rolling.

Card 1/3

HARGITTAI, Janos; POCZE, Laszlo

Flow velocity determination of gases in pipe systems by radioactive method. Energia es atom 17 no.5:240-244 My '64.

1. Central Material Testing and Radioisotope Laboratory, Csepel Iron and Metalworks.

KHEYFITS, L. A.; GURA, Yu.; PODBEREZINA, A. S.

"Sintez dushistykh veshchestv na osnove tetrametiletilena."

rpt submitted for 35th Intl Cong, Industrial Chemistry, Warsaw, 15-19 Sep64.

S/133/61/000/002/006/014
A054/A033

AUTHORS: Plyatskovskiy, O. A.; Candidate of Technical Sciences; Pavlovskiy, B.G, Engineer; Karpenko, L. N., Engineer; Starobinets, Ya. S., Engineer

TITLE: The Rolling of Thick-Walled Hollow Billets in Stretch-Reducing Mills

PERIODICAL: Stal', 1961, No. 2, pp. 147 - 151

TEXT: After replacing the piercing units of pilger mills by piercing presses and stretch-reducing mills, the pilger-process became the most economic method for medium and large diameter tube-production. To determine the power and other parameters necessary to design the old type pilger mills and to design new equipment, the UkrNITI and the Chelyabinskiy truboprokatnyy zavod (Chelyabinsk Tube-rolling Plant) made a study of the operation of the piercing unit of the ЧТПЗ (ChTPZ) type pilger equipment. The conventional tube rolling tool of the piercing unit was replaced by working and guide rolls of new design, (Figure 1). Diameter of the working rolls: 730 mm; diameter of the guide rolls: 440 mm; incline angle of the forming cone:

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V

S/133/61/000/002/006/014
A054/A033

The Rolling of Thick-Walled Hollow Billets in Stretch-Reducing Mills

$3^{o}30'$; angle of feed: 4^{o}; dimensions of mandrels: L = 487 and 530 mm R_1: 330 and 380 mm; A = 267 and 310 mm. The hollow billets processed in the stretch-reducing mills had the following dimensions:

576 x 350 x 1600 mm
572 x 300 x 1500 mm
636 x 390 x 1500 mm.

To investigate the laws of changing wall-thickness during the rolling-out process some billets were bored in such a way, that their axis was displaced in relation to the center of the machine. As a result of this billets were obtained with wall-thichnesses deviating by 25%. The torsion during rolling was determined by longitudinal grooves (15 mm wide, 10 mm deep) made in the billets. The metal flow was observed by fitting in holes drilled into the billet walls 20X (20Kh) type steel screws and welding them at the contact places on to the external surface. The metal pressure on the working roll

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The Rolling of Thick-Walled Hollow Billets in Stretch-Reducing Mills

and mandrel rod, the torque on the engine axis were registered by several pickups. The oscillograph indicating the torque also registered the current intensity of the engine, and a special device indicated the rotation speed of the rolls. The actual volocity of axial displacement of the billet was measured by the path covered by the front part of the billet during a given time, while the focus of deformation was filled in with metal. The tangential velocity was defined by the recorded rotation number of the front and rear part of the billet. When calculating the coefficients of tangential slip, the theoretical speed of tangential displacement of the billet, V_t, was determined with the formula:

$$V_t = \frac{\pi D_x n}{06} \sqrt{\cos^2\alpha \cos^2\omega + \sin^2\omega}$$

(D_x = roll diameter in the sector investigated, in mm, n = roll rotation speed, rpm; α = feed angle, °; ω = angle (°) formed by the horizontal plane passing through the axis of the roll in the given roll-section and by the straight line passing at the same time through the center of the given section and the assumed point of application of the vector of peripheral speed

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S/133/61/000/002/006/014
A054/A033

[illegible]

[illegible]
flange (30 mm high) of the roll and the mandrel. The change in wall thick-ness during rolling was indicated by the change in the transversal rings carved into the billets along their entire length and it was observed that for billets, the wall-thickness of which varied between 17 and 25%, the wall-thickness was reduced about 1.5-2.0 times. However, rolling billets, with a wall-thickness not changing more than 8-10%, - showed no modification in this respect. The main deformations of the circular screws fixed in the billet walls took place during processing in the stretching-reducing mill in axial direction with a simultaneous torsion in tangential direction. The peripheral layers flow more quickly in these directions than the internal ones. This

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The Rolling of Thick-Walled Hollow Billets in Stretch-Reducing Mills

also went to show the inequality of deformation of the hollow billet wall-thickness. The angle of pitch of the torsional line varied between 12 and 36°, indicating the irregularity of the process in time. For the coefficients of axial and tangential slip the following values were obtained:

Dimensions of the initial and the rolled tube blank (mm)	576x350 / 478x330	572x300 / 478x330	636x390 / 558x386
Elongation coefficient	1.75	2.0	1.55
Average values of the coefficient of axial slip	0.45-0.55		0.47-0.56
and of tangential slip			
at the input section of the roll	1.10	1.075	1.074
at the [illegible] of the flange	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

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A054/A033

The Rolling of Thick-Walled Hollow Billets in Stretch-Reducing Mills

The power coefficients of elongation and piercing showed that it was possible to apply the piercing units of pilger mills to double-roll stretch-reducing (elongating) mills. Both processes were characterized by the increase in the ratio of metal pressure on the roll at the input side of the roll to the metal pressure at the output. There are 3 figures and 3 tables.

ASSOCIATION: UkrNITI and Chelyabinskiy truboprokatnyy zavod (Chelyabinsk Tube-rolling Plant)

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S/133/61/000/002/006/014
A054/A033

The Rolling of Thick-Walled Hollow Billets in Stretch-Reducing Mills

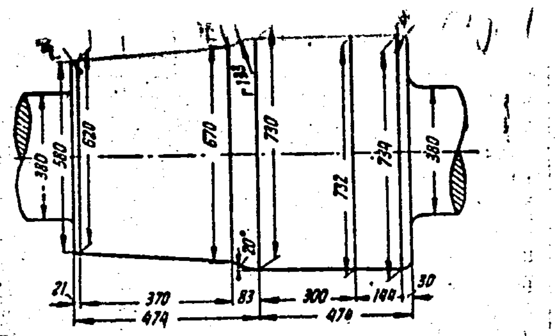

Figure 1

Calibration of the working roll of the stretch-reducing mill

Fig. 2

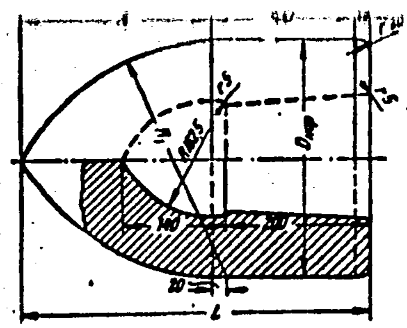

Figure 2

Calibration of the mandrel of the stretch-reducing mill

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S/133/61/000/002/006/014
A054/A033

The Rolling of Thick-Walled Hollow Billets in Stretch-Reducing Mills

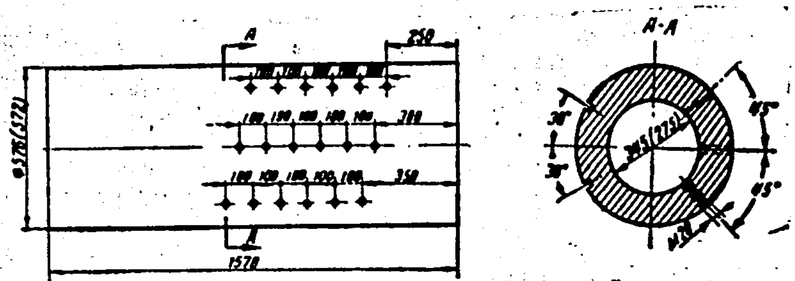

Fig. 3

S/133/61/000/002/006/014
A054/A033

Figure 5

Change of the wall-thickness of the billet, retarded in the stretch-reducing mill

wall-thickness, mm

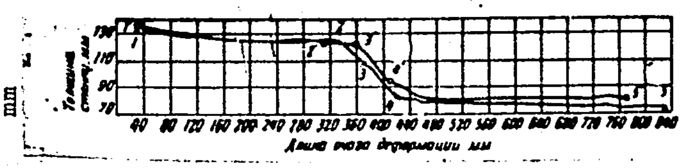

Fig. 5

length of the deformation focus, mm

1-2 (1'-2')-working sectors of the entering cone
2-3 (2'-3')-idem, of the flange, without mandrel
3-4 (3'-4')-idem, for flange and mandrel
4-5 (4'-5')-idem, for the polishing sector of roll and mandrel

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	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1 Коэффициент вытяжки	1,48	1,75	2,0	1,9	1,87
2 Диаметр оправки, *мм*	220	325	375	425	425
3 Скорость вращения валков, об/мин.	34,0	31,5	28,5	27,5	27,5
4 Температура металла, °C	1130	1130	1140	1130	1130
5 Среднее давление металла на валки, *т*:					
$P_{вх}$ максимальное	150	155	170	240	165
$P_{вых}$ максимальное	168	150	120	110	138
P_{Σ}:					
максимальное	318	305	290	350	303
среднеквадратичное	223	229	213	219	205
$P_{вх} : P_{вых}$	0,90	1,05	1,53	1,63	1,20
6 Среднее максимальное давление на оправку, *т*	—	46	60	54	44
7 Средний крутящий момент на валу двигателя, *тм*:					
максимальный	23,5	42,5	41,0	53,5	36,0
среднеквадратичный	14,5	21,6	25,0	26,0	25,0
8 Средняя расходуемая мощность, *квт*:					
максимальная	1945	3430	3000	3810	2550
среднеквадратичная	1150	1820	1785	1750	1750

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S/133/61/000/002/006/014
A054/A033

The Rolling of Thick-Walled Hollow Billets in Stretch-Reducing Mills

Table 3:

Characteristics of the process of piercing on the piercing mill ChTPZ (roll diameter: 730 mm)

A - Indices,
B - Billet dimensions and the dimensions of the tube blank formed, mm (numerator/denominator);

1 - Elongation coefficient;
2 - Mandrel diameter, mm;
3 - [illegible]

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A054/A033

The Rolling of Thick-Walled Hollow Billets in Stretch-Reducing Mills

Table 3: (continued)

at the flange, at the output.

Bored billets.

Abstractor's note: subscript "in" is the translation of the Russian вх (vkhod), subscript 'out' is the translation of the Russian вых (vykhod)

Table 3 cont.

9 Средние коэффициенты скольжения:					
осевого на выходе	0,78	0,64	0,71	0,64	0,50
тангенциального:					
на входе	1,03	1,028	1,04	1,04	1,00
у пережима	0,91	0,94	0,94	0,98	0,945
на выходе	1,02	1,02	1,05	1,075	1,058

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[illegible]

L 30055-65 EWT(m)/EWP(w)/EWA(d)/T/EWP(t)/EWP(k)/EWP(b) Pf-4 MJW/JD/HM

ACCESSION NR: AP5002974 S/0133/65/000/001/0049/0052

AUTHOR: Plyatskovskiy, O. A. (Doctor of technical sciences); Yuferov, V. M. (Candidate of technical sciences); Pavlovskiy, B. G. (Engineer); Vorona, V. M. (Engineer); Lezinskaya, Ye. Ya. (Engineer); Vovnina, A. D. (Engineer); Chemerinskaya, R. I. (Engineer); Karpenko, V. B. (Engineer); Kukarskikh, V. N. (Engineer)

TITLE: Mastering the production of 1Kh15N9S3B steel pipe

SOURCE: Stal', no. 1, 1965, 49-52

TOPIC TAGS: steel pipe, pipe rolling, austenite steel, martensite steel, stainless steel, stainless steel pipe, steel phase transformation / steel 1Kh15N9S3B

ABSTRACT: Phase transformations of austenite into martensite in 1Kh15N9S3B stainless steel during cold deformation has been taken into consideration in developing the technology of hot-and cold-rolled pipes. The martensite point M_d for the deformation of this steel lies around 150C and the range of reversal from martensite to austenite is between 500 and 700C. Mass production of thinwalled 1Kh15N9S3B steel pipe is quite possible if the raw material is free of nonmetallic impurities (nitrides and carbonitrides). The above steel type (=EP302) differs from 1Kh18N9T by having a 3% lower Cr content substituted by 3% Si. It shows interesting proper-

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L 30055-65
ACCESSION NR: AP5002974

ties: thus, its ductility changes during hot deformation and the breakdown of unstable austenite into martensite takes place during cold deformation. Tests on the hot rolling of forged 90 mm diameter billets are described in great detail. Great accumulations of nitrides were observed. Cut-out samples were subjected to tensile strength tests at various temperatures and the content of the ferro-magnetic alpha-phase was determined. On the basis of these tests, the following procedure was recommended: first passes of cold rolling are to be done at 150C. Ready pipes are heat treated at 1050-1100C. This steel has a tendency to be hardened considerably by cold working but heat treatment later removes this hardness nearly completely. Despite martensite formation, cold rolling was satisfactory up to 60% deformation. Cold drawing was also satisfactory except for cracks where there was considerable accumulation of nitride impurities. "G. N. Syusin and B. N. Kuznetsov participated in the work." Orig. art. has: 6 figures and 2 tables.

ASSOCIATION: VNITI; Novotrubnyy zavod ("Novotrubnyy" plant)

SUBMITTED: 00 ENCL: 00 SUB CODE: MM

NO REF SOV: 000 OTHER: 000

Card 2/2

S/137/61/000/006/044/092
A006/A101

AUTHOR: Plyatskovskiy, O.A.

TITLE: Some peculiarities of metal deformation during the rolling of pipes in a three-roll flattening mill

PERIODICAL: Referativnyy zhurnal. Metallurgiya, no. 6, 1961, 35, abstract 6D287 ("Byul. nauchno-tekhn. inform. Ukr. n.-i. trubn. in-t", 1959, no. 6 - 7, 58 - 68)

TEXT: The author investigated the nature of metal flow during rolling of pipes on a three-roll flattening mill by the method of screws and a coordinate network. It was established that non-uniform deformation occurred over the wall thickness, and metal warping in the longitudinal direction. The magnitude of warping decreased considerably at a greater angle of the roll feed; this is connected with a larger pace of the sleeve to be deformed per $\frac{1}{3}$ turn, a decrease in the coefficient of axial slip, and changes in the correlations of magnitudes of the peripheral force components, which act in the direction of rotation and of the axial motion of the metal. Warping increases at a greater height of the roll peak. Changes in the peripheral speed of the rolls do not considerably

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affect the magnitude of metal warping. In all cases the direction of warping of pipes in the mill coincides with the direction of roll rotation. The optimum permissible ratio of the wall thickness to the diameter was determined by experimental means. The relative speeds of axial shifts of the sleeve, the pipe and of the mandrel, and the coefficient of tangential slip were determined.

Yu. Manegin

[Abstracter's note: Complete translation]

PLYATSKOVSKIY, O. A.

(40)

PHASE I BOOK EXPLOITATION SOV/6044

Rokotyan, Ye. S., Doctor of Technical Sciences, Ed.

Prokatnoye proizvodstvo; spravochnik (Rolling Industry; Handbook) v. 2. Moscow, Metallurgizdat, 1962. 685 p. 8500 copies printed.

Authors: P. A. Aleksandrov, Doctor of Technical Sciences; V. P. Anisiforov, Candidate of Technical Sciences; V. I. Bayrakov, Candidate of Technical Sciences; N. V. Barbarich, Candidate of Technical Sciences; B. P. Bakhtinov, Candidate of Technical Sciences [deceased]; B. A. Bryukhanenko, Candidate of Economic Sciences; N. V. Vasil'chikov, Candidate of Technical Sciences; A. I. Vitkin, Doctor of Technical Sciences; S. P. Granovskiy, Candidate of Technical Sciences; P. I. Grudev, Candidate of Technical Sciences; I. V. Gunin, Engineer; N. Ya. Dzugutov, Candidate of Technical Sciences; V. G. Drozd, Candidate of Technical Sciences; N. P. Yermolayev, Engineer; G. M. Katsnel'son, Candidate of Technical Sciences; M. V. Kovynev, Engineer; M. Ye. Kugayenko, Engineer; N. V. Litovchenko, Candidate of Technical Sciences; Yu. M. Matveyev, Candidate of Technical

Card 1/14

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001341320020-5"

N. V. Melnov, Engineer; V. D. Nosov, Engineer; [illegible] Candidate of Technical Sciences; O. A. Plyatskovskiy, Candidate of Technical Sciences; Engineer; I. S. Pobedin, Candidate of Technical Sciences; I. A. Priymak, Professor, Doctor of Technical Sciences; M. M. Saf'yan, Professor [deceased]; A. A. Protasov, Engineer; N. M. Fedosov, Professor; Candidate of Technical Sciences; I. N. Filippov, Candidate of Technical Sciences; S. N. Filipov, Engineer [deceased]; I. A. Fomichev, Doctor of Technical Sciences; M. Yu. Shifrin, Candidate of Technical Sciences; E. R. Shor, Candidate of Technical Sciences; M. M. Shternov, Candidate of Technical Sciences; M. V. Shuralev, Engineer; I. A. Yukhvets, Candidate of Technical Sciences; Eds. of Publishing House: V. M. Gorobinchenko, R. M. Golubchik, and V. A. Rymov; Tech. Ed.: L. V. Dobuzhinskaya.

PURPOSE: This handbook is intended for engineering personnel of metallurgical and machine-building plants, scientific research

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(40)

Rolling Industry; Handbook SOV/6044

institutes, and planning and design organizations. It may also be used by students at schools of higher education.

COVERAGE: Volume 2 of the handbook reviews problems connected with the preparation of metal for rolling, the quality and quality control of rolled products, and designs of roll passes in merchant mills. The following topics are discussed: processes of manufacturing semifinished and finished rolled products (the rolling of blooms, billets, shapes, beams, rails, strips, wire, plates, sheets, and the drawing of steel wire), hot-dipped tin plates, lacquered plates, floor plates, tubes made by different methods, and special types of rolled products. Problems of the organization of rolling operations are reviewed, and types of rolled products manufactured in the USSR are shown. No personalities are mentioned. There are no references.

TABLE OF CONTENTS: [Abridged]:

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ACCESSION NR: AP4041868

S/0133/64/000/007/0628/0630

AUTHOR: Plyatskovskiy, O. A., Yevteyev, D. P.

TITLE: Production of pipes from continuously teemed metal

SOURCE: Stal', no. 7, 1964, 628-630

TOPIC TAGS: pipe, pipe production, steel pipe, rolling mill, continuous teeming, teemed steel, pilger mill, broaching press, continuous casting, seamless pipe, hot rolled pipe, end crack

ABSTRACT: The article describes a method for obtaining high-quality pipes from continuously-teemed metal on pilger mills encorporating broaching presses in their production line. In order to determine the suitability of a continuously cast blank for pipe production, a consignment of square ingots (250 tons) was cast into a 150 x 150 mm crystallizer at the Novotul'skiy metallurgicheskiy zavod (Novotul'sk Metallurgical Plant), with the rate of continuous teeming varied from 1.2 - 1.8 meters/minute. The bars were then shipped to the "Jednosc" plant (Poland) for pilger mill machining and the determination of the optimal technological parameters of the rolling process for pipes of different sizes, along with a study of the quality

ACCESSION NR: AP4041868

of the finished product. The equipment used at the "Jednosc" plant for the production of hot-rolled seamless pipe from 89 to 21 mm in diameter with a wall thickness of 2.75 mm and above is described in detail in the article. The equipment described operates on a blank in the form of square blooms, 110 - 150 mm, cut into 450 - 750 mm lengths by means of Pelz shears. The test bars (146 X 146 mm), sorted by melt, were cut into blanks 620 mm in length. During the process of cutting, on almost half of all the blanks, 5 - 25 mm deep end cracks formed along the diagonal seams of the solidification boundaries of the heart metal of the blanks. The probable causes of these cracks are discussed in the article, and the changes instituted in the technological process for the purpose of eliminating them are described. The heating temperature, for example was reduced from 1280-1300 to 1250C. Modifications were also introduced in the extension mill. The entire lot of metal (2280 blanks) was rolled into pipes 89 X 3.25 (4.5) mm, which were then reduced to 60 X 3.75 and 60 X 4.5 mm in a reduction mill for the purpose of a more thorough study of the metal quality. The technological parameters and equipment dimensions during the rolling process are examined in the text. The test indices applied in the evaluation of the quality of the pipes are considered and it is noted that all piping satisfied the assigned technical

Card 2/3