

A.P. Potapenkov ⁽¹⁾, professor, d.t.s.

S.S. Pilipenko ⁽¹⁾, manager by a department, k.t.s., associate professor

Yu.G. Serebrennikov ⁽¹⁾, senior teacher

K.V. Kireev ⁽²⁾, deputy of director

D.S. Markov ⁽²⁾, chief of department

V.K. Tarasov ⁽³⁾, associate professor, c.t.s.

PERFECTION OF TECHNOLOGY OF CUTTING OF FOLIAS CATHODE NICKEL

⁽¹⁾ *Federal public higher budgetary educational institution
«Norilsk industrial institute», Russia,*

⁽²⁾ *OAS «Mining-metallurgical combine «Norilsk nickel», Russia,*

⁽³⁾ *Zaporozhe state engineering academy, Ukraine*

Rational technology of the single-operational cutting for sheets of cathode nickel on rectangular platen has been worked out. Theoretical researches have been carried out and the tests of new arrangement of cutters, confirmative efficiency of the offered technology have been realized.

Keywords: cathode nickel, plate, cutting arrangement, rectangular platens, cutting mechanism

Modern technology of treatment for cathode nickel foresees application of cutting process, which provides his delivery as sheets, stripes or of small size rectangular plates.

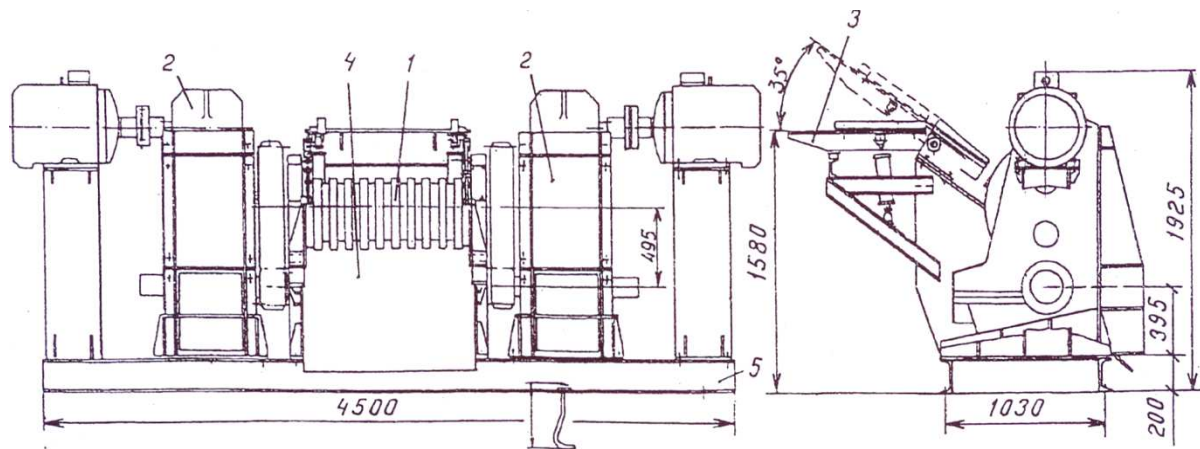
As basis of existent production lines for the receipt of plates of cathode nickel two operating principle of work has been fixed, which foresees cutting out of sheets on stripes and their subsequent cutting on plates [1]. Considerable quantity of equipment and also warping of stripes of cathode nickel, after the first operation of cutting do these lines is ineffective.

The task of work is perfection of existent technology for cutting of cathode nickel sheets on rectangular plates.

Influence of the above-stated defects can be taken to the minimum at the use of principle of the single-operational cutting. At this connection authors are offered a single-operational cutting device, containing a dead knife with cutting part as a manifold and co-operating with him knives of the revolved drum [2].

Efficiency of principle for the single-operational cutting has been determined on the laboratory apparatus, allowing to carry out cutting of cathode nickel sheets with thickness of 1.5 mm on plates by sizes 25 x 25 mm. The results of laboratory researches served basis for development and making of experienced-industrial cutting device, providing the receipt of cathode nickel sheets measuring 50 x a 50 mm from a sheet of thickness to 10.0 mm.

A single-operational cutting device (figure) consists of mechanism of cutting 1, double-ended drive 2 and loading device 3, mounted on a frame 4, which is fastened to foundation 5.



Picture is the general kind of single-operational cutting device

A cutting mechanism is executed as a separate knot, the working elements of which are a cutting drum, knife-manifold and pressure-catching, consisting from two lever-spring sections, rider manifold block and two fisting disks.

A knife-manifold is the double-tee welded beam on the upper berth of which rectangular chases and ledges are executed. Near foundation of chases and on ledges the knives of the same construction, as well as knives, set on the ledges of temporary disks are envisaged. For aligning of upper plane of knives angular-manifold, fastened on a beam with possibility of adjusting at a height is foreseen. Above knives on springs a pressure manifold, entering in the complement of pressure-catch, is set. Size of gap between knives and pressure manifold, and also position of knife-manifold in relation to a cutting drum, regulate through screw-bolts.

In working position the ledges of large disks are included in the rectangular chases of knife-manifold, and the ledges of less disks join to the ledges of knife-manifold, here the working plane of knife-manifold is inclined to the horizontal plane under the angular of 35° , that provides the given of free sheet of cathode nickel in the zone of cutting under the action of making force of weight.

A lever, which leans against a vertical bar, envisaged on the corps of bearing of cutting mechanism, and also on a fist disk, set on the billow of cutting drum enters in the complement of every lever-rider section. On cantilevered part of lever to help bearing assembly compound rod traction which passes the applicable slots in a knife-manifold and closed by plate-type springs. There is a periodic turn of lever at the rotation of fist disk that, in the total, provides getting up and lowering of pressure manifold. At down movement a pressure manifold holds the sheet of cathode nickel, at her getting up a sheet freely moves in the zone of cutting.

A temporary disk has four ledges with depth by 50 mm, on which knives fasten as rectangular platens with centrings lateral ledges are envisaged. The reciprocal angular orientation of ledges and splinted chases is different for every disk; at place

of disks to a torsion ledges are situated by a spiral line with angular correction $\Delta\varphi = 50^\circ$.

Charging device 3 consists of turn-table and two pneumocylinders. The sheet of cathode nickel is laid on a turn-table, when the last is situated at horizontal position. At including a pneumocylinders table turns to an angular 35° and the sheet of cathode nickel under the action of gravity moves on his bevel surface to the mechanism of cutting, an overhead plane of knife-manifold for which is continuation of plane of turn-table.

A bilateral drive, which consist of two asynchronous electro motors ($N = 55 \text{ kW}$, $n = 1480 \text{ min}^{-1}$), two vertical reducers ($i_p = 90$) and two open gearings ($Z_1 = 14$, $Z_2 = 46$, $m = 16$), provides the rotation of cutting drum with frequency by 5 min^{-1} .

The productive tests of the offered device allowed educing and removing two defects:

- it is undercut of contiguous platens in angular points; he is removed by the increase of angular shift of knives for contiguous disks, here this size is necessary to determine not only the coefficient of dents but also coefficient of notch;

- it is adhesion of platens to the abutting plane of knives and carry over of them iteratively to the zone of cutting; he is removed by placing of the specific scraper device, permitting to stave adhesion of platens to the surface of knives.

Conclusions. The use of the twooperating cutting of sheets for cathode nickel, foreseeing their cutting out on stripes and subsequent cutting with the receipt of rectangular plates, is ineffective from warping of stripes after the first operation of cutting. A single-operational cutting device, allowing substantially to simplify technology of cutting of sheets for cathode nickel and eliminate warping of stripes, is offered.

LIST OF LITERATURE

1. Потапенков, А. П. Способы обработки катодного никеля [Текст] / А. П. Потапенков, Ю. Г. Серебренников, В. М. Чернобай // Мин-во образования Рос. Федерации, Завод-втуз при Норильском горнометаллургическом комбинате. Норильск, 1990. – 13 с. – Деп. в ЦНИИцветмет экономики и информации 27.06.90, № 1920-90.
2. А. с. 1655670 СССР, МПК В 23 Д 31/00. Устройство для вырезки деталей из листового материала [Текст] / Потапенков А. П., Данилов Л. И., Притыкин Д. П. (СССР). – 4363279/27 ; заявл. 13.01.88 ; опубл. 15.06.91, Бюл. № 22.