SPIROID HOB WITH REVERSE TAPERED

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Abstract: *The paper presents the building properties of the spiroid hob used in processing spiroid wheels with reverse tapered. It is based on a real case met in a gearing with the transmission rapport i = 47, axial module m_a = 2,5 mm and axial distance A = 56 mm.*
Key words: *Hob, Hobing, Spiroid*

1. INTRODUCTION

One of the variants of spiroid gearing possible to be used is the application where an exterior conical worm gears with a wheel, which has an interior conical surface (Fig. 1). In the specialized reference this case is known as spiroid gearing with reverse tapered [5]. References specific to this case are few.

The processing of the spiroid teething with reverse tapered is made through the process of milling with a special spiroid hob using a specific kinematics on the teething machine of the type FD 500 UM-Cugir.

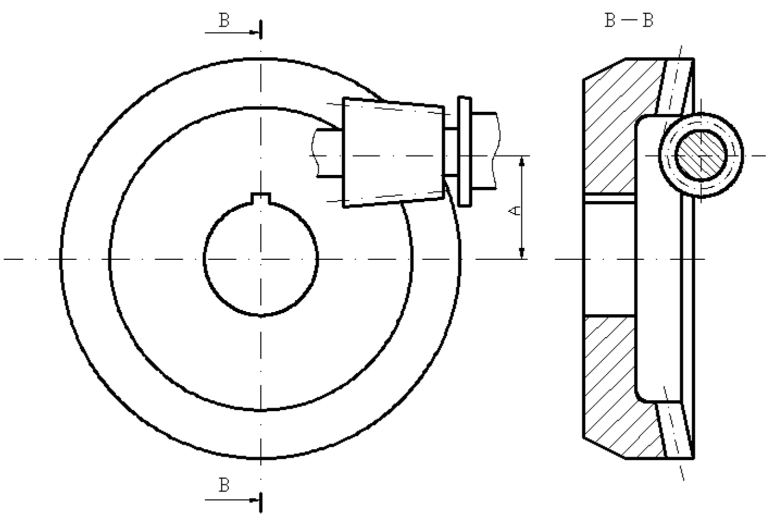

Fig.1 *Spiroid gearing with reverse tapered*

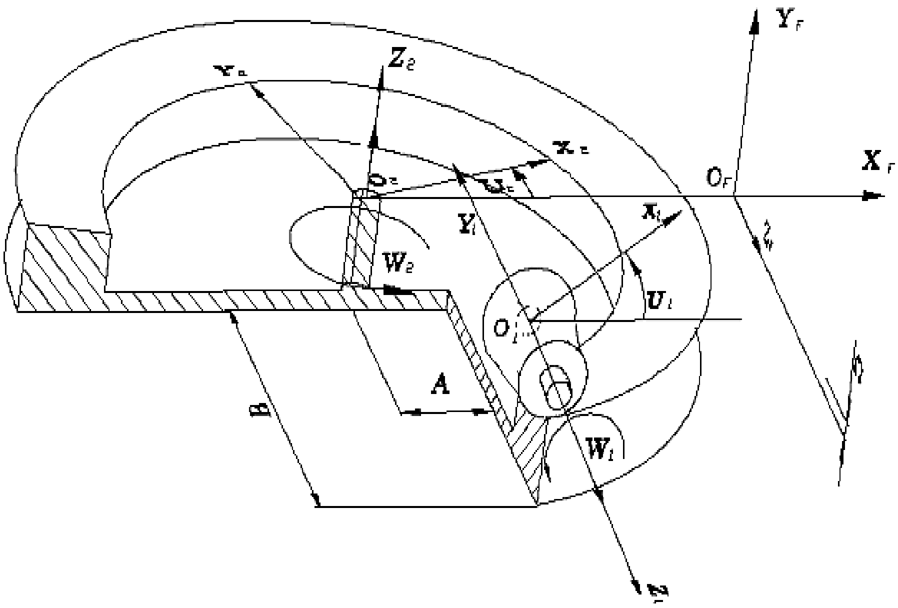

Fig.2 *The kinematics of the production of the spiroid wheel with reverse tapered*

Using the notations and kinematics elements from paper [4], the worm sides of the spiroid hob in the system $O_1X_1Y_1Z_1$ are defined through the mathematical relations:

$$\bar{x}_{1k} = \begin{Vmatrix} x_{1k} \\ y_{1k} \\ z_{1k} \\ 1 \end{Vmatrix} = \bar{x}_{1k}(p, v) = \begin{Vmatrix} -\sin v \cdot [r_0 - h \cdot v \cdot tg\delta - g_0 \cdot (2k-3) \cdot \sin\delta + p_k \cdot \cos(\delta + \alpha_k)] \\ \cos v \cdot [r_0 - h \cdot v \cdot tg\delta - g_0 \cdot (2k-3) \cdot \sin\delta + p_k \cdot \cos(\delta + \alpha_k)] \\ [g_0 \cdot \cos\delta + p_k \cdot \sin(\delta + \alpha_k)] \cdot (2k-3) + h \cdot v \\ 1 \end{Vmatrix} \quad (1)$$

The sides of the teeth of the processed spiroid wheel, in the system $O_2X_2Y_2Z_2$ are defined through the mathematical relation:

$$\overline{X}_{2k} = \begin{Vmatrix} \cos u_1 \cos u_2 \cdot x_{1k} - \sin u_1 \cos u_2 \cdot y_{1k} - \sin u_2 \cdot z_{1k} - \\ - B \cdot \sin u_2 + A \cdot \cos u_2 \\ - \cos u_1 \sin u_2 \cdot x_{1k} + \sin u_1 \sin u_2 \cdot y_{1k} - \cos u_2 \cdot z_{1k} \\ - B \cos u_2 - A \cdot \sin u_2 \\ \sin u_1 \cdot x_{1k} + \cos u_1 \cdot y_{1k} - \left(C_o + c u_1\right) \\ 1 \end{Vmatrix} == \begin{Vmatrix} x_{2k} \\ y_{2k} \\ z_{2k} \\ 1 \end{Vmatrix} = \overline{X}_{2k}\left(p, v, u_2\right) \quad (2)$$

2. GEOMETRICAL ELEMENTS OF THE SPIROID HOB

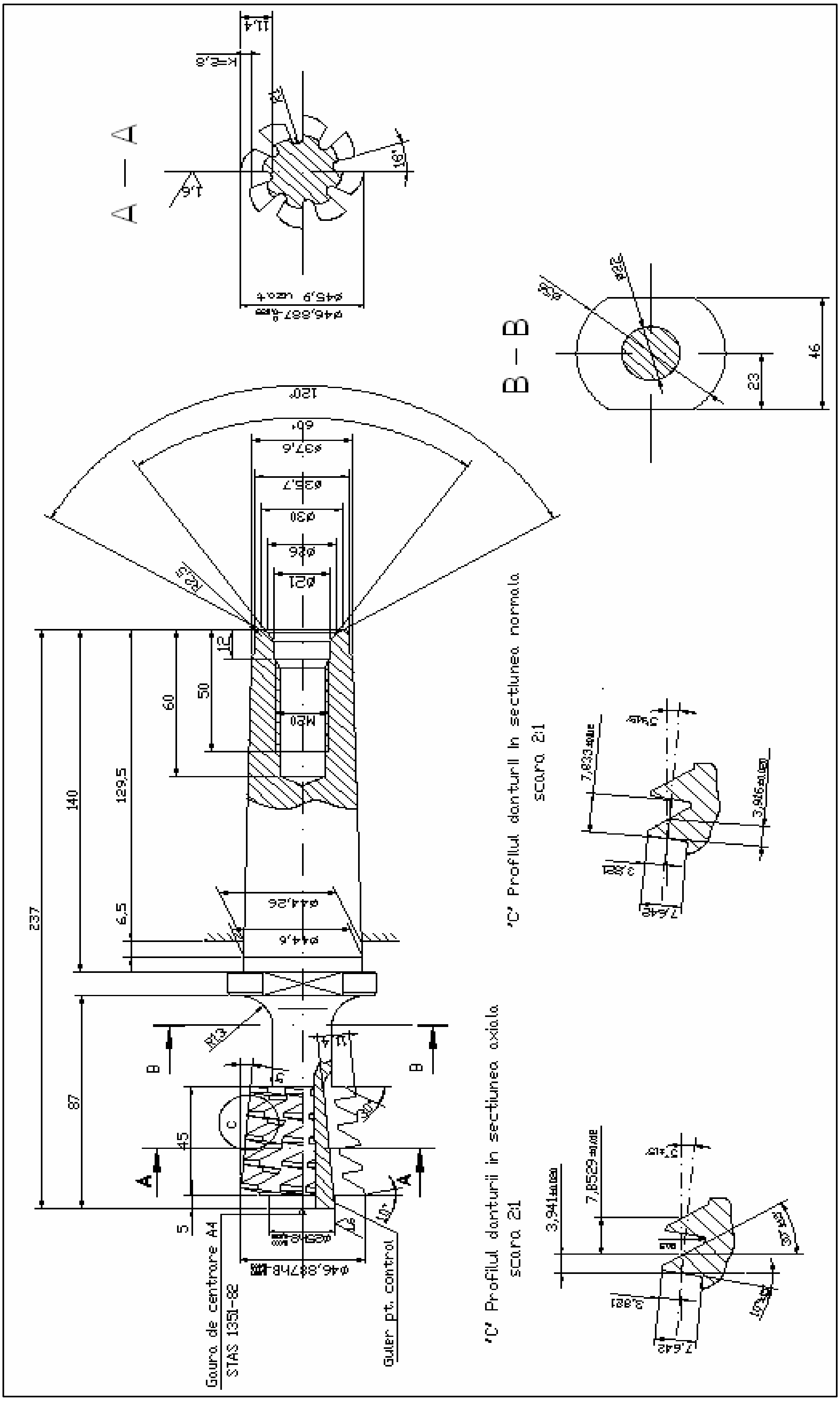

Fig.3. *Spiroid hob*

In order to point out the geometrical characteristics of the spiroid hob a tried and executed real case is presented (Fig. 3).

The spiroid hob presented in the paper was designed to process a wheel belonging to a gearing with the following characteristics: transmission rapport i = 47, axial module $m_a = 2,5$ mm, number of wheel teeth $z_2 = 47$, axial distance A = 56 mm, tooth height h = 7,642 mm, worm type archimedic, cone-shaping of the tool $\delta = 5^\circ$. The tool is made of rapid steel Rp3 STAS 7382-88 with a hardness of the splinting sides of 62-64 HRC. In finalizing the project a series of specific elements found in papers [1,2,3] were taken into account.

3. CONCLUSION

From the design, production and usage of the spiroid hob we can draw the following conclusion:

- The spiroid hob with reverse tapered works under heavy loading conditions with its teeth working at the same time;
- The position in the console of the active zone of the mill makes the rigidity of the tool suffer;
- The protection of the tool involves the use of some reduced splinting regimes, which makes the productivity at teething low compared with the processing of plane spiroid wheels teethed through the tangent advancement method.

4. REFERENCES

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