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PLANETARY PRECESSIONAL TRANSMISSION

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Goal:

Increase in load-bearing capacity and mechanical efficiency, as well as a widening of the kinematic and functional possibilities.

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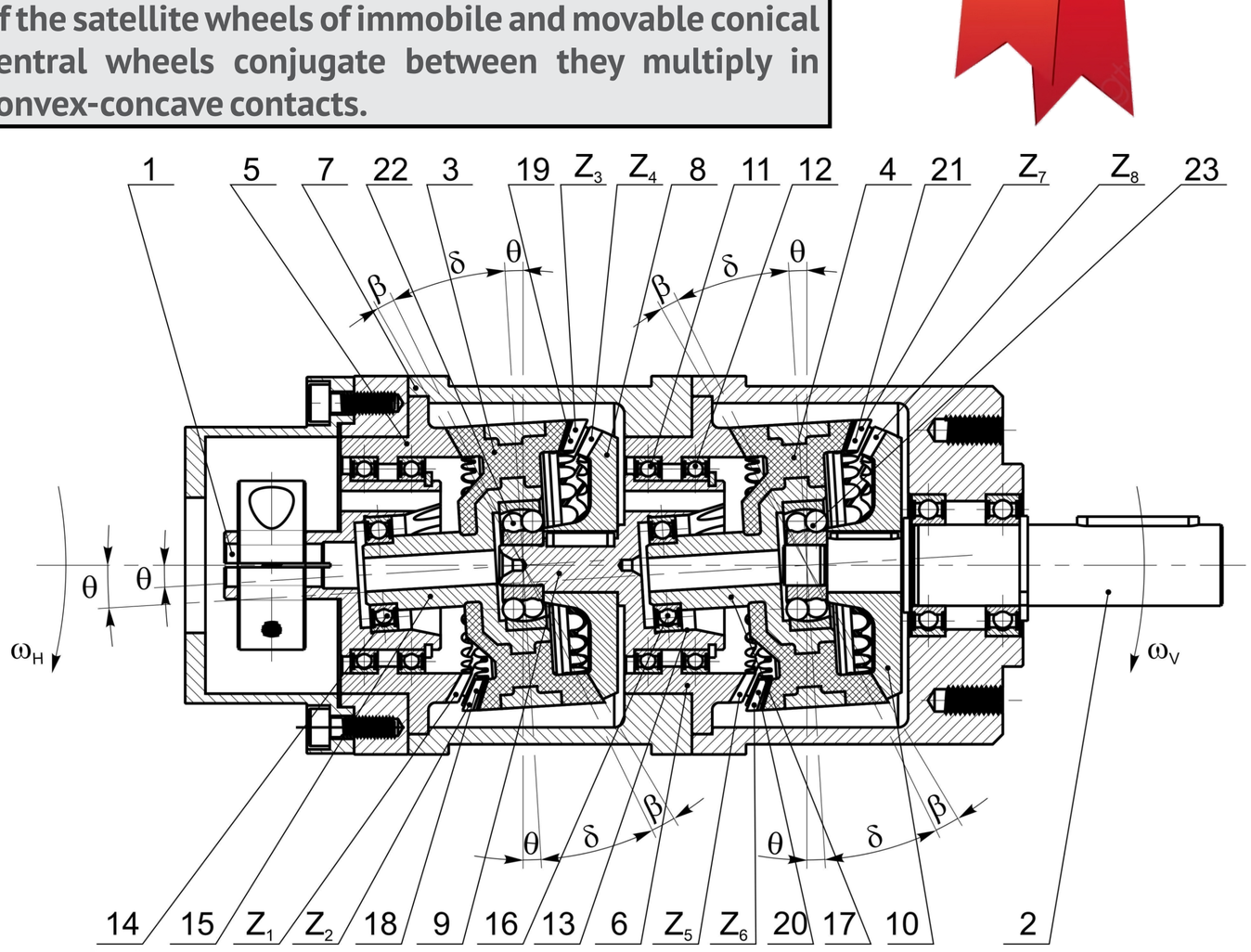
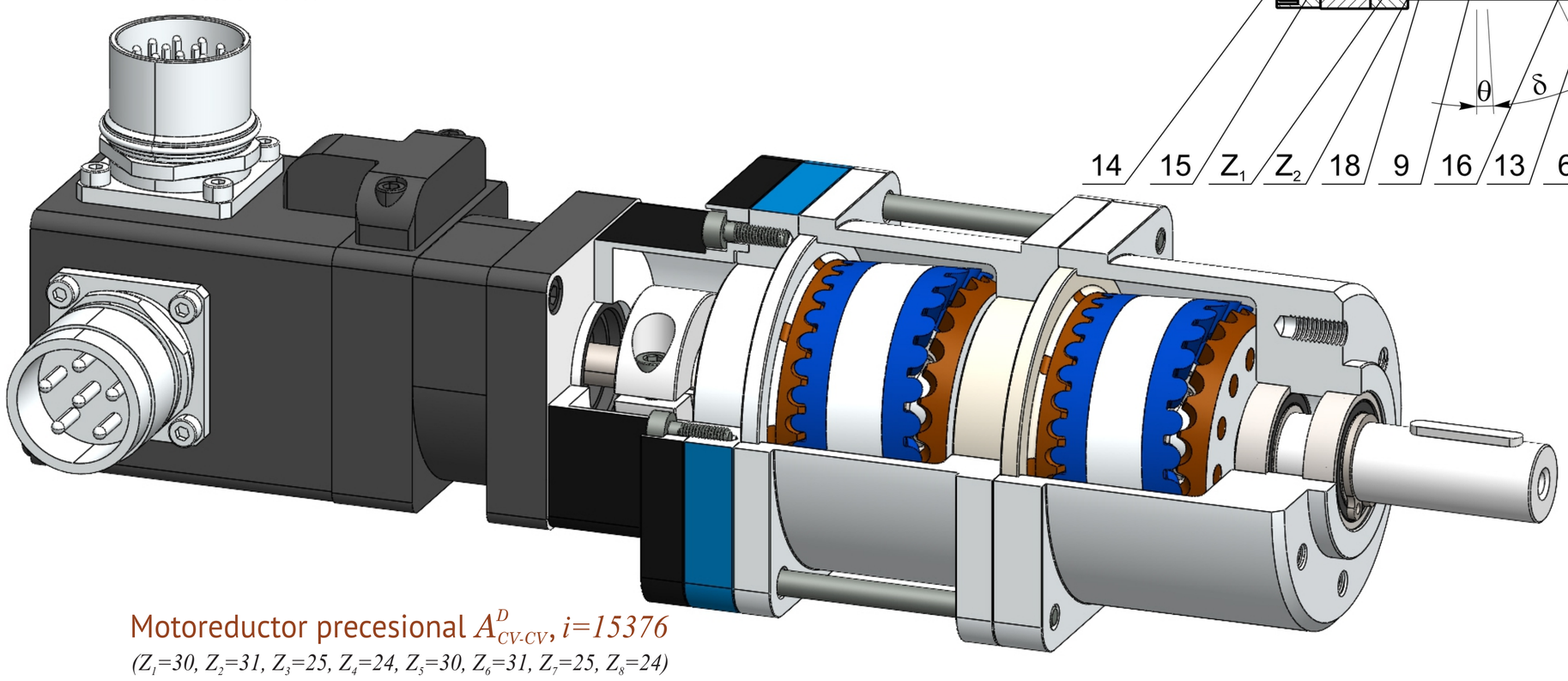
Solution:

Transmission with pre-gearing which includes a housing, crankshaft and coaxial driven shaft, two gear wheels with toothed crowns, movable and immobile central conical wheels, characterized in that the transmission consists of at least two kinematic satellite wheels connected consecutively by at least one intermediate crankshaft installed on the bearing bracket in the housing and which is fitted laterally with a notched offset from the notation angle q to the common axis of the center wheels, at the same time the first satellite wheel by means of a bearing mounted on the end of its half-axis is kinematically coupled to the crankshaft, and the second satellite wheel by means of a bearing mounted on the end of its semi-axle is kinematically coupled to the intermediate crankshaft housing offset from the notation angle q to the common axis of the central wheels and conical crowns of the satellite wheels of immobile and movable conical central wheels conjugate between they multiply in convex-concave contacts.

The transmission includes crankshaft 1, driven shaft 2, at least two consecutive 3 and 4 satellite wheels consecutively joined together, stationary bevel gears 5 and 6, fixed in the housing 7, movable bevel gear 8 mounted on the intermediate crankshaft 9 and the movable central conical wheel 10, mounted on the driven shaft 2, in which the conical crowns of the satellite wheels 3 and 4, the teeth of the immobile central wheels 5 and 6, the movable 8 and 10 conjugate each other in convex-concave contacts of the teeth with the minimum difference in the curves of the flank profiles at their points of contact.

Two satellite wheels 3 and 4 are connected by an intermediate crank 9 installed console on the bearings 11 and 12 in the housing 7, which is equipped laterally with a seat offset 13 from the notation angle q to the common axis of the central wheels 5 and 6, the first the satellite wheel 3 by means of a bearing 14 mounted on the end of its half-axis 15 is kinematically coupled to the crankshaft 1, and the second satellite wheel 4 by means of a bearing 16 mounted on the end of its half-axis 17 is kinematically coupled to the offset 13 of the intermediate crankshaft 9 offset from the notation angle q to the common axis of the immobile central wheels 5 and 6.





Motoreductor precesional $A^{D}_{CV\text{-}CV}$, *i=15376*
(Z_1=30, Z_2=31, Z_3=25, Z_4=24, Z_5=30, Z_6=31, Z_7=25, Z_8=24)

Precessional transmissions with two consecutively coupled semi-crank satellites *($\pm 3600 \le i \le \pm 12.96 \cdot 10^6$)*

$$i = \frac{Z_2 \cdot Z_4}{Z_1 \cdot Z_3 - Z_2 \cdot Z_4} \cdot \frac{Z_6 \cdot Z_8}{Z_5 \cdot Z_7 - Z_6 \cdot Z_8}$$

Advantages:

- Increasing the load-bearing capacity of the transmission by engaging the teeth in contacts with the convex-concave geometry and the minimum difference in the curvatures of the mating flanks;
- Increasing the mechanical efficiency by changing the tooth shape, reducing the pressure angle between the flanks and at the expense of increasing the rolling share of the engaging teeth by decreasing the relative frictional sliding between the flanks with a reduction in the frontal overlap degree and a compensatory increase in the longitudinal overlap degree with pure rolling of teeth in the sphero-spatial interaction of the mating wheels with the nutation angle θ;
- Extending the kinematic and technological possibilities.

Stage:

Technical project, industrial prototype.

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