Non-Circular Wheels from Congruent Arcs

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Closed flat curves are designed based on which toothed gears are called centroids. Their characteristic feature is the continuity of the transfer function. However, numerous engineering tasks require centroids with different transfer functions. Non-circular wheels can consist of any number of symmetrical arcs that intersect in pairs at right angles. Determined that the right angle is the minimum value of the angle at which the designed non-circular wheels can roll without jamming. Pairs of wheels have a characteristic feature: there is no sliding of surfaces when functioning. The result is the absence of friction forces, which leads to minimizing working surface wearing. In addition, there are devices for which transfer function type is not essential, unlike the number of complete revolutions of the wheel. Non-circular wheels are a pair of closed curves that rotate around fixed centers and simultaneously roll one by one without sliding. Non-circular wheels serve as centroids in designing cylindrical toothed gears with variable gear ratios. The method of construction of pairs of non-circular wheels, which consist of individual symmetrical arcs intersecting at right angles, is developed in the article. A quadratic polynomial is used to form the corresponding curves in the polar coordinate system. The construction of the wheels needs the initial data: the number of elements of both wheels (the drive one and the driven one).