From the separable Tammes problem to extremal distributions of great circles in the unit sphere - Part II

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A family of spherical caps of the 2-dimensional unit sphere $\mathbb{S}^2$ is called a totally separable packing in short, a TS-packing if any two spherical caps can be separated by a great circle which is disjoint from the interior of each spherical cap in the packing. The separable Tammes problem asks for the largest density of given number of congruent spherical caps forming a TS-packing in $\mathbb{S}^2$. We solve this problem up to 8 spherical caps and upper bound the density of any TS-packing of congruent spherical caps in terms of their angular radius. Based on this, we show that the centered separable kissing number of a 3-dimensional Euclidean ball is 8. Furthermore, we prove bounds for the maximum of the smallest inradius of the cells of the tilings generated by $n > 1$ great circles in $\mathbb{S}^2$. Next, we prove dual bounds for TS-coverings of $\mathbb{S}^2$ by congruent spherical caps. Here a covering of $\mathbb{S}^2$ by spherical caps is called a totally separable covering in short, a TS-covering if there exists a tiling generated by finitely many great circles of $\mathbb{S}^2$ such that the cells of the tiling are covered by pairwise distinct spherical caps of the covering. Finally, we extend some of our bounds on TS-coverings to spherical spaces of dimension > 2.