In the last two decades, successful space missions to Jupiter and Saturn provided important data bearing information about topography and internal structure of icy bodies in the outer Solar System. Some of these bodies contain subsurface reservoirs of liquid water in contact with an outer shell made of solid ice. One of the possibilities how to explain the observed topography of a moon is to use its thermal production as the energy source that produces deformation of the ice crust covering the body. In this study, we develop a simplified mathematical model of thermal-mechanical evolution of the ice crust including the effect of phase transition at its bottom boundary. The appropriate system of partial differential equations is coded in Fortran95 and used to study the surface features developed in response to heat flux anomalies imposed on the top of the subsurface ocean. The results obtained for Enceladus, Europa and Titan show that the observed topography of these moons can be explained only for a large grain size and the ice crust behaving elastically near the upper boundary.