In this study, a stress analysis of a substrate coated by nanomaterials with a vacancy under uniform extension load is investigated. The behavior of the coated substrate is modeled with the behavior of a two-layered beam, in which one of the layers is elastic and described by the continuous medium and the second layer consists of a nanomaterial with damage of a vacancy. The extension of the coating is carried out by stretching of the first layer, which lies on the substrate and by the cohesive forces between the layers. It is assumed that vacancies do not vary along the width of the substrate. The constitutive equations of the first layer (i.e., an elastic substrate) are given in the framework of Hooke's law and the constitutive equations of the second layer; that is, the coating is carried out by taking into account discreteness of the nanomaterial with a vacancy. The expressions for the determination of the contact pressure and stresses of the substrate with a nanocoating that have vacancies are obtained. In addition, damage conditions for the substrate and nanocoating are determined. Finally, carrying out some computations, effects of the characteristics of a nanocoating with and without vacancies on the values of contact pressure and stresses of the coated substrate have been studied.