Abstract: In this thesis we study two stochastic models related to operation of a molecular motor. The first is a Brownian particle moving under the action of the highly unstable potential. It can describe fast processes related to individual steps of the motor. We study statistics of trajectories that by chance avoid the unstable region and do not diverge up to a long time. Conditioning on nondivergence gives rise to an effective force, which keeps the particles in the stable area of the potential. We present two stationary distributions which formally resemble the Gibbs canonical distribution with effective potentials and derive asymptotic behaviors of these potentials. The second is the minimal discrete model of the Feynman-Smoluchowski ratchet coupled to two thermal reservoirs. We investigate stationary values of the average steady state currents, activities, and motor efficiency. For the ratchet we construct the driven processes representing mean quantities conditioned on fluctuations of entropy production and show how the entropy production affects mean probability currents and activity.