Consider a strictly convex set $\Omega$ in the plane, and a homogeneous, stationary magnetic field orthogonal to the plane whose strength is $B$ on the complement of $\Omega$ and 0 inside $\Omega$. The trajectories of the particle are straight lines concatenated with arcs of circles of Larmor radius $\mu$. We examine the dynamics of such a particle and call this system inverse magnetic billiards. If the boundary is sufficiently smooth and $\mu$ is smaller than the minimum radius of curvature of the boundary we show that the resulting map is a twist map, with all the consequences regarding periodic orbits, etc. ensuing. Other comparisons to known standard billiard results will be made. (Received December 19, 2018)