The aim of this study was to develop flame retardant, crease resistance and air permeability properties of cotton fabrics by applying different polycarboxilic acids and Al₂O₃ nanoparticles. In the study, butanetetra carboxylic acid (BTCA) and maleic acid (MA) catalyzed by sodium hypophosphite were used to embed Al₂O₃ nanoparticles on the surface of cotton fabric. The fabrics cross-linked by polycarboxylic acids and treated with Al₂O₃ nanoparticles were tested to investigate flame retardancy, resistance against creasing and air permeability properties before and after repeated home laundering. The strength of the all treated fabrics was also investigated. The presence of Al₂O₃ nanoparticles on the fabrics and cross-linked cellulose structure were investigated by SEM and FT-IR spectroscopy, respectively. In conclusion, it was observed that flame retardancy of the fabric increased with increasing BTCA amount as it decreased with the increasing in MA concentration. After Al₂O₃ nanoparticles application, flame retardancy decreased compared to that of fabrics cross-linked. However, flame retardancy and also air permeability of the fabrics was increased with the increasing in Al₂O₃ concentration from 0.1% to 0.5%. 