Concerns about automation typically focus on the consequences for existing, displaced workers, but the possibility that automation might eliminate a large fraction of routine jobs that provide young adults a pathway into the workforce poses risks of employment hysteresis, labor force detachment, and even political and social dislocation. We study one of the largest automation shocks to affect young workers in U.S. history: the automation of telephone operation. In 1920, telephone operation was one of the most common jobs for young American women, but between 1920 and 1940, over half of U.S. telephone exchanges were mechanized with dial service. Following a city's adoption of dial, we find that the number of young women in subsequent cohorts working as telephone operators immediately and permanently drops by around 50-80% -- equivalent to roughly 2% of employment for the age group. However, the shock did not reduce future young cohorts' overall employment, nor cause substitution into education, marriage, or child-bearing. The decline in demand for telephone operators was instead counteracted by growth in employment in other middle-skill white-collar jobs like secretarial work, as well as lower-skill service-sector jobs.