The entire fixture was placed in a humidity chamber set for 200° F and 90% relative humidity. At that temperature, the chamber was only able to achieve a relative humidity of around 70%. After the fixture had been in the humidity chamber for three hours, the firing pin head protrusion was measured again. It was then measured twice daily for ten days.

**Fatigue fixture.** The fatigue fixture was similar to the creep test fixture. It also was constructed from a 710 receiver and parts with a shortened barrel. A threaded rod was turned down and screwed in place of the firing pin tip. A 45 lb/in spring was used to apply 50 pounds of preload as in the creep fixture. A 1 ¼" bore air cylinder was used to press cyclically on the threaded rod, lifting the firing pin head off the sear and letting it drop again. The fatigue test fixture may be seen in Figure 4.

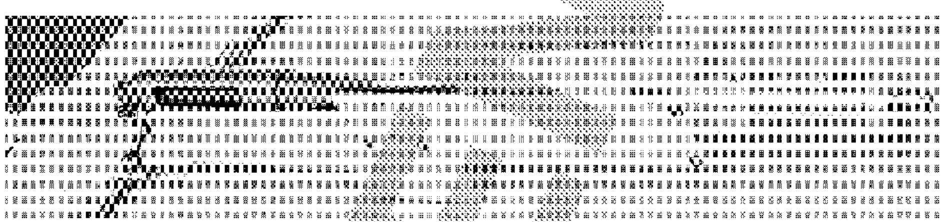

**Figure 4. Fatigue Test Fixture.**

Like the creep test fixture, the distance from the back face of the receiver to the back face of the firing pin head was measured with a height gauge. The firing pin head protrusion was measured before beginning the fatigue test. It was then measured every 1,000 cycles until 10,000 cycles were performed. The assembly was then disassembled and checked for wear and looseness. The receiver was reassembled with a different action and receiver insert and the test was performed again. This time, care was taken to rotate the firing pin until the firing pin head had seated completely before taking the measurement, something that had not been done during the first test. Seating the firing pin head each time caused the measurements to be more consistent. 10,000 cycles were placed on the new receiver insert, measuring every 1,000 cycles. Then, another 20,000 cycles were placed on the receiver insert and the firing pin head protrusion was measured again. The fixture was disassembled and the receiver insert and fire control parts were checked for wear.

## *RESULTS*

**ANSYS analysis.** The results from the ANSYS analysis may be seen in Figure 5. The loading in the ANSYS model was based on a constant firing pin spring force of 25.5 pounds. Considerably higher stresses could be expected to occur in the fatigue test from the peak load developed due to the impact between the firing pin and sear when the firing pin was allowed to drop back into place between cycles. Under static loading, peak stress occurred at the back end of the receiver insert and at the sear pin hole. Stresses there