

and size ( $\pm .001''$ ). The O-rings are teflon-coated Parker O-rings No. 2-342 made of Buna-N rubber with a 70 durometer hardness.

The projectile's weight is 1.1 kilograms. This limits the maximum velocity in the wrap-around breech to 0.6 mm/ $\mu$ s with nitrogen as the driver gas and 0.9 mm/ $\mu$ s with helium.

The impacting surface of the projectiles is lapped flat, and brought into square with the axis of the projectile, with a Lapmaster lapping machine. To check the impacting face for perpendicularity with respect to the axis of the projectile, the projectile is placed impacting-face down on a surface plate and rotated against a reference pin. A dial indicator measures any runout of the top with reference to the pin. The runout is kept within .0005''. This means the impacting surface is perpendicular to the axis of the projectile to within 0.1 milliradians. Any deviation is removed during the lapping process by eccentrically weighting the projectile.

#### F. Recoil and Catcher System

The most unusual feature of the gun compared to others of its type is that it is allowed to recoil freely until after impact has occurred; after impact the gun is decelerated by velocity-sensitive shock absorbers. The target is mounted rigidly on the muzzle room wall and is therefore stationary. This arrangement essentially eliminates all problems of vibration of the target prior to impact. Further, standard shock absorbers can be used to stop the gun with maximum forces which are much less than the maximum unbalanced force on the gun during firing. Two shock absorbers of 15,000 inch-lb capacity and 3'' travel bear against one of the barrel flanges and against a steel frame that transfers the momentum to the I-beam (Fig. 4).

The catcher tank consists of two sections. One section - the target chamber - is permanently mounted to the wall of the muzzle room (Fig. 4). This section is evacuated prior to the shot. The second section is mounted on casters and joins the first section by means of