$$\frac{\partial v}{\partial t} + u\frac{\partial v}{\partial r} + \frac{v}{r}\frac{\partial v}{\partial \theta} + w\frac{\partial v}{\partial z} + \frac{uv}{r} = F_2 - \frac{1}{\rho r}\frac{\partial P}{\partial \theta}$$
$$+ \nu\left(\frac{\partial^2 v}{\partial r^2} + \frac{1}{r}\frac{\partial v}{\partial r} + \frac{1}{r^2}\frac{\partial^2 v}{\partial \Theta^2} + \frac{\partial^2 v}{\partial z^2} + \frac{2}{r^2}\frac{\partial u}{\partial \Theta} - \frac{v}{r^2}\right) \tag{14b}$$

$$\frac{\partial w}{\partial t} + u\frac{\partial w}{\partial r} + \frac{v}{r}\frac{\partial w}{\partial \Theta} + w\frac{\partial w}{\partial z} = F_3 - \frac{1}{\rho}\frac{\partial P}{\partial z}$$
$$+ \nu\left(\frac{\partial^2 w}{\partial r^2} + \frac{1}{r}\frac{\partial w}{\partial r} + \frac{1}{r^2}\frac{\partial^2 w}{\partial \Theta^2} + \frac{\partial^2 w}{\partial z^2}\right) \tag{14c}$$

where the nomenclature is

u,v,w . . . radial, circumferential, and longitudinal velocities, respectively, of fluid within bore of pressure pot, in/sec

F_1, F_2, F_3 . . . radial, circumferential, and longitudinal body forces per unit mass, respectively, acting on fluid in bore of pressure pot, lb/slug

If the condition of constant temperature is invoked, the coefficient of kinematic viscosity is a function of pressure only, that is

$$\nu = \nu(P) \tag{15}$$

From Figure 8, we see that the coordinate system is oriented such that there will be flow in the z-direction only, thus for axisymmetrical motion

$$u = v = \frac{\partial^2 w}{\partial \Theta^2} = 0 \tag{16}$$

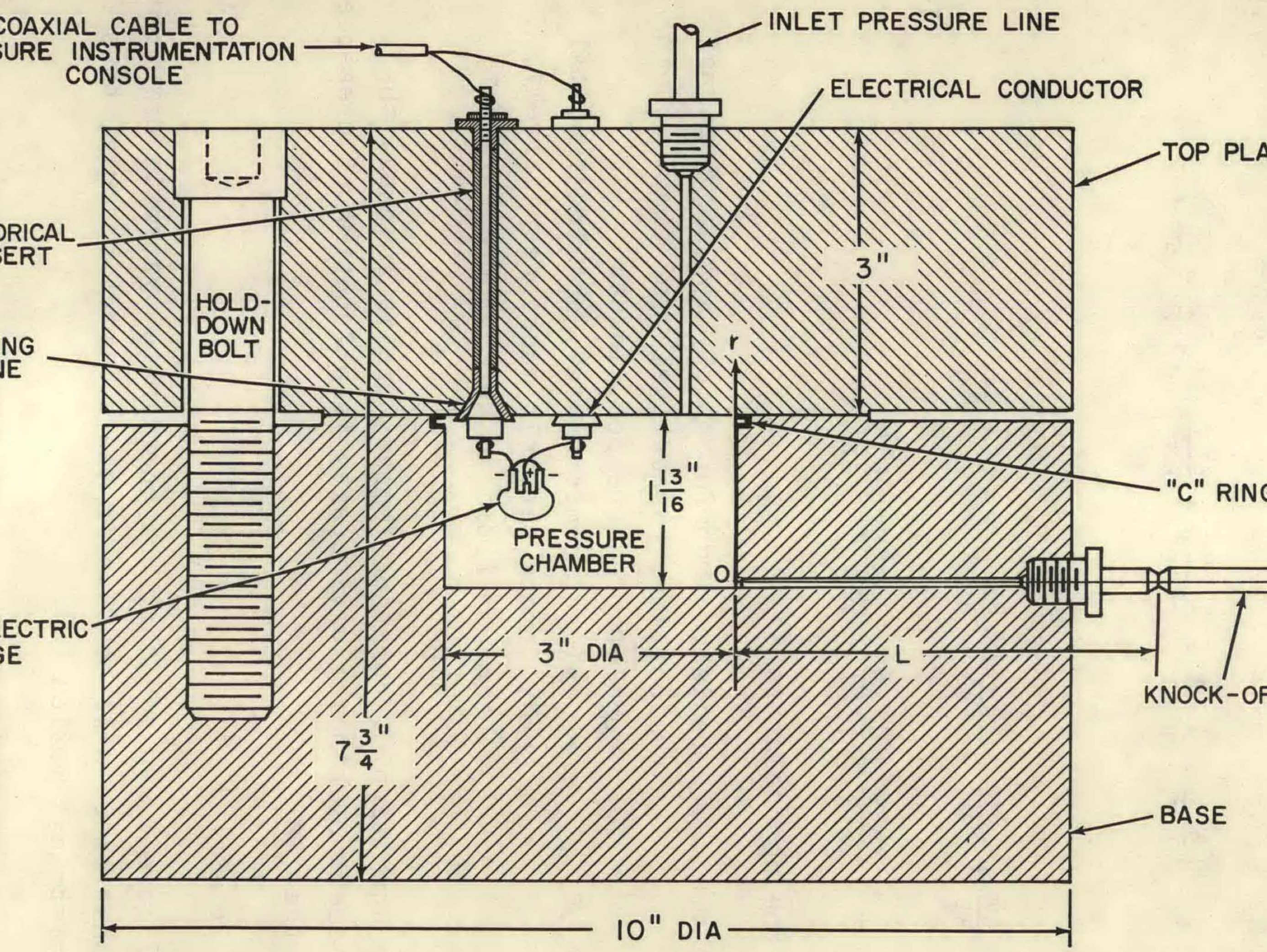

FIG. 8 CROSS-SECTIONAL VIEW OF PRESSURE POT