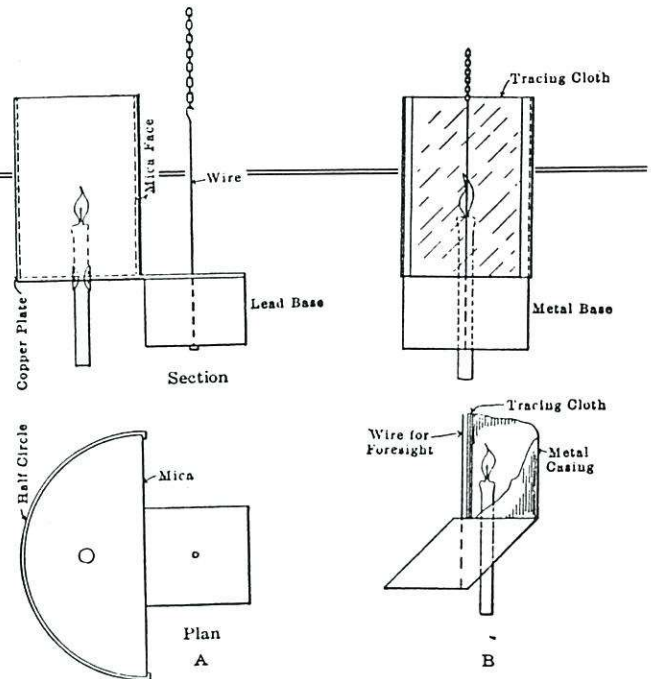


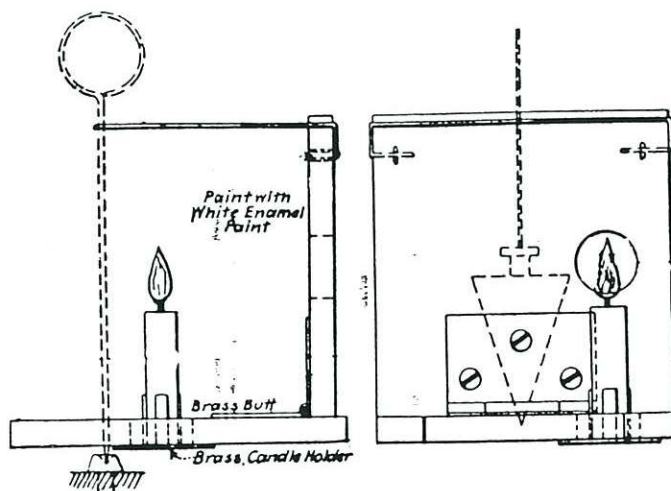
# UNDERGROUND SURVEYING ILLUMINATING THE PLUMB LINE

by Tony Moon  
2763 E. Willow Wick Drive  
Sandy, Utah 84093

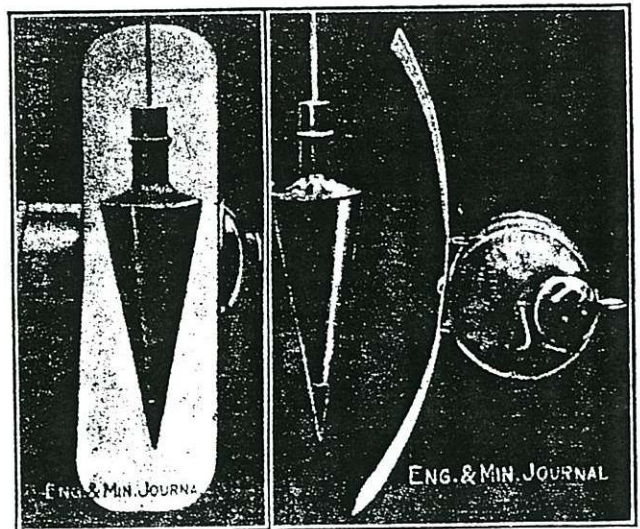
Previous articles in the MAC have detailed various lamps that provide targets for underground surveying, where the flame itself is sighted through the transit. Most underground surveying used an ordinary plumb bob hung from a station in the back (or roof) but this required that the plumb bob string be illuminated. Early pictures show both candles and oil wick lamps being held behind or to one side of the string, and the carbide lamp was used for the same purpose. However, a 1912 article<sup>1</sup> describing the virtues of the "new" acetylene lamp for surveying describes the inherent hazard of using flame lighting to illuminate a string: "The lamp offers one real disadvantage for work around a transit. The intensely hot jet of flame, accidentally licked across the plumb bob cord cuts it instantly. This helps neither the plumb nor the transit." One can imagine the expletives that rang down the tunnel as the plumb bob headed toward the floor!



**Figure 2.** Candleholders known as "Butte backsights," designed to illuminate a surveyor's plumb line. (From L. M. Trumbull's *A Manual of Underground Surveying*, 1910)



**Figure 1.** Candleholder for illuminating a surveyor's plumb line. (From E. B. Durham's *Mine Surveying*, 1913)



**Figure 3.** Simmons-made reflector to adapt to a Baldwin cap lamp for plumb bob illumination. (From *Engineering and Mining Journal*, 1914)