It was the count's desire to use European mining techniques to improve on the crude and wasteful method of pit mining followed by washing the ore through rockers then in vogue in the United States. He was confident that gold could be systematically extracted from the (then considered) great depths of 200 and 300 feet.

With the aid of his experts he made many improvements on the techniques of mining and milling the ore. For example, the use of extensive underground timbering to support the walls of the shafts and tunnels (figure 7) and the use of steam power for ventilating and pumping out the shafts were introduced under his management.[85] In 1832 a steam engine with a 6-inch cylinder was positioned over the engine shaft of the Rudisill mine, which had been sunk to a depth of 80 feet, to work a pump of 5-inch bore. The pump was capable of discharging approximately 50 gallons of water per minute.[86]

By leasing the property of the St. Catherine Mills - the mills still being powered by water - the Count was able to process the ores that came from the mines.[87] His innovations here included improvements to the European stamp mill (figure 8) and the substitution of the Mexican arrastra for the Chilean mill.[88] Rivafinoli improved Bissel's stamp mill by redesigning its mortar or base. He secured raised dies (blocks) of wrought or cast iron to the mortar of the mill so that the stamp heads would fall on the raised dies instead of falling upon flat mortars. This resulted in a more efficient stamping action since the already crushed ore would fall off the dies rather than accumulate under the stamp heads.[89]

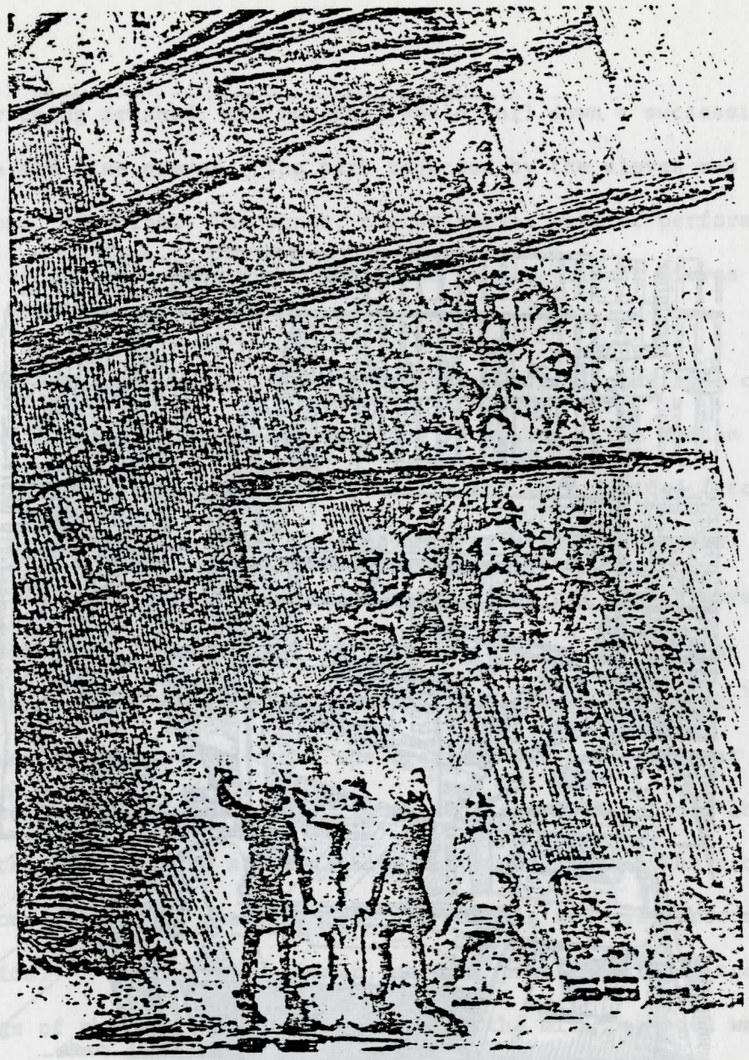

Figure 7. Typical use of stull timbering in a mine of the Rudisill type. (Hibernia Mine, circa 1850).
Howard and Lucille L. Sloane, A Pictorial History of American Mining (N.Y., N.Y.: Crown Publishers, Inc., 1970), 30.