

the author, "We can defy the flowing quicksand, water bearing materials, or even water, and hold it absolutely rigid until such time as we have completed our work. Ten-inch pipes were in this case lowered to the depth of 104 feet so as to form a circle proportionate to the size of the shaft, by using a jet of water under high pressure on the inside of the pipe. The lower end of each pipe was toothed with steel, like a trepanning instrument, and the upper end attached to a toothed wheel, into which two pinions were geared and driven by a steam engine. When these pipes were in position a smaller pipe 3 inches in diameter was placed within a larger pipe, which was then withdrawn, and again another pipe, 1½ inches in diameter, open at the bottom, was placed inside the 8-inch pipe for introducing the circulation freezing fluid, chloride of calcium in solution at a temperature of 35 Cent. or -31 Fahr. This fluid was cooled by means of a Linde refrigerator, in which anhydrous ammonia was employed, and was then forced by a circulating pump into the 1½-inch pipe, whence it rose to the cooling tank. Fifteen thousand gallons of this fluid were circulated through the entire system every 33 minutes, the flow being directed

into the stanópipes by a system of valves. When the frozen portion of the ground between the pipes had become frozen together into a solid mass, it took the form of a cone, owing to the fact that the fluid on emerging from the 1½-inch pipe was of a lower temperature than it was at the surface of the ground, and after it had done its work. Quicksand, when frozen in this manner, is temporarily converted into a

kind of sand stone, and requires heavy charges of dynamite to break it up. When the work was completed the ground took several weeks to thaw and to return to its normal temperature. The author is confident that this system will prove to be the method of the future, and that it has only to be widely known to be universally employed in water-bearing districts and in localities abounding in quicksand.

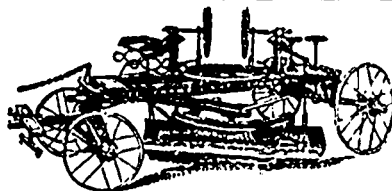
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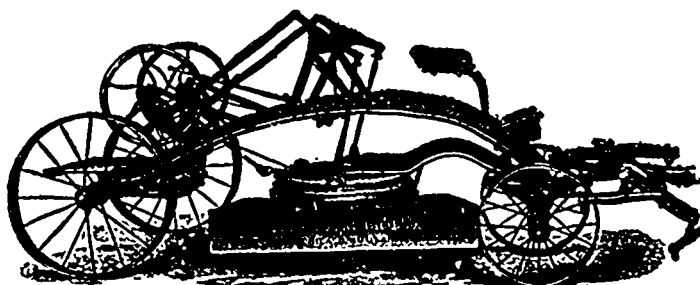
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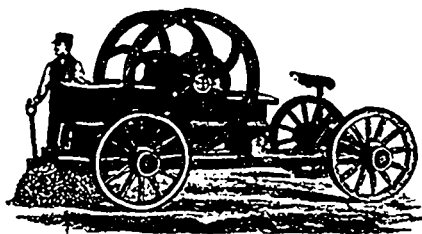


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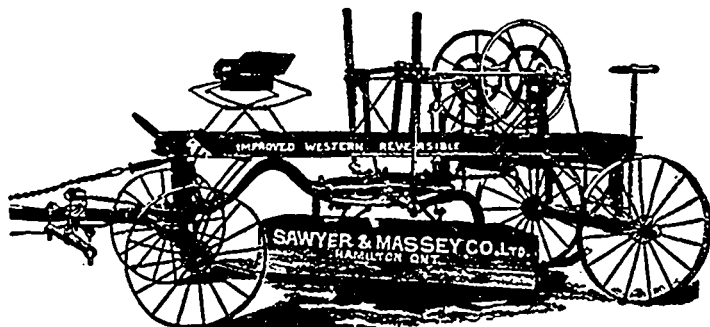
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