long delayed, was promptly commenced, the arch and tow path could be finished, and the tunnel thrown open to the navigation within 30 months.

It was long hoped that arching this work might either be dispensed with entirely, or at the most, that a short arch at the portals would be sufficient; but such is the character of the material, the absence of coherence between the strata, and so extensive the falls of rock from the roof, which are continually taking place, that having carefully watched this work from its very inception, I have come to the decided conviction that a thorough arch is indispensable to the safe and uninterrupted transit of boats.

As it has been imagined by some that the arching would require a long time, it may be as well to give an outline of the plan upon which I have long contemplated proceeding with this portion of the work, and by the execution of which I have entire confidence that, with a heavy force, this formidable arch, though 3,118 feet long, and requiring about three and a half millions of bricks, can be constructed in a single year: the bricks being prepared before hand and delivered at the portals.

By the experiment, of Col. Pasley, of the Royal Engineers, of Mr. Brunel and others, the cohesive power of cement has been demonstrated to be so great, that from 20 to 30 bricks, with their longest dimension vertical, have been stuck out horizontally from a wall, by adding successively a brick at a time as soon as the cement joint of the preceding one had set.

Acting upon the principle of cohesiveness here developed, possessed, as it is in an eminent degree by the hydraulic cement of the Potomac, which I contemplate using in the arch at least, without any admixture of sand, in order to procure a quicker set and firmer bond, I propose,

1—With a strong force, to raise both side walls up to the springing line of the arch.

2—In sections of, say 500 feet, by reverse moulds and without centring, to carry up the arch on both sides to the angle of repose, and bringing into play the coherence of the cement, even above it, say to an angle of 40 or even 45 degrees, as may be determined at the time.

3—By a system of detached centres, framed to leave open about 30 degrees of the crown, each supporting three feet lineal of the arch, and leaving an interval of four or more feet to be sustained by the cohesive power of the cement, to