

too low to obtain the necessary lift. The first steam engine for raising water was the invention of Newcomen, an ironmonger of Southampton, and was laid down with the help of Savery at a Staffordshire pit in 1712, when, in two lifts, the water was raised to a height of 153 ft. By 1716 the 'fire-engine' pump had been established at a large number of mines and one of the great problems of mining was in a fair way to be solved.<sup>1</sup>

The second great difficulty of mining—explosions—was not experienced to any considerable extent in the early days of the industry owing to the smallness and shallowness of the mines. The first recorded accident took place in 1378 and was not connected with fire-damp but with water.

It was not, indeed, until the seventeenth century that fire-damp explosions began to present a real obstacle to working, and the first clear account of an explosion is that given by Mostyn in the *Philosophical Transactions* for 1677.<sup>2</sup> It was as the result of this accident, which he there describes, that the first 'fireman' was employed by the colliers in North Wales to go down before them, dressed in rags, to creep along with a lighted candle on the end of a pole and set fire to the 'damp.'

<sup>1</sup> Mr. Galloway in his *Annals of Coal Mining* informs us that "previous to the erection of the steam engine, more than fifty horses were employed in raising water at Griff Colliery, at an expense of not less than £900 a year; whereas the annual cost of the engine never exceeded £150."

<sup>2</sup> One of the first recorded explosions took place at Gateshead in 1621.