tent, and which he had erected at Vauxhall. While we have thus expressed our own opinion of the independence of their claims, we must not omit the opinions of others who lived nearer to the epoch of these rival candidates.

Dr Desaguliers, an eminent mechanist, and an experimental philosopher of considerable reputation, has given, in his *Course of Experimental Philosophy,* vol. ii., an account of the “fireengine,” and after adverting to the claims of the Marquis of Worcester, makes the following statement in regard to Savary :—“ Captain S.ιvary having read the Marquis of Worcester’s book, was the first who put in practice the raising water by fire, which he pro posed for the draining of mines. His engine is described in Harris’s *Lexicon,* (see the word Εngine,) which, being compared with the Marquis of Worcester's description, will easily appear to have been taken from him ; though Captain Savary denied it, and the better to conceal the matter, bought up all the Marquis of Worcester’s books that he could procure in Paternoster Row and elsewhere, and burn’d 'em in the presence of the gentleman, his friend, who told me this. He said that he found out the power of steam by chance, and invented the following story to persuade people to believe it, viz., that having drunk a flask of Florence at a tavern, and thrown the empty flask upon the fire, he called for a bason of water to wash his hands ; and perceiving that the little wine left in the flask had filled up the flask with steam, he took the flask by the neck and plunged the mouth of it under the surface of the water in the bason, and the water of the bason was immediately driven up into the flask by the pressure of the air. Now, he never made such an experiment then, nor designedly afterwards, which I thus prove : I made the ex

periment pur

posely with a

bout half a glass

of wine left in a

flask, which I

laid upon the

fire till it boiled

into steam; then

putting on a

thick glove to

keep the neck

of the flask

from burning

me, I plunged

the mouth of the

flask under the

water that filled

a bason ; but the pressure of the atmosphere was so strong, that it beat the flask out of my hand with violence, and threw it up to the ceiling. As this must also have happened to Captain Savary, if ever he had made the experi ment, he would not have failed to have told such a remark able incident, which would have embellish’d his story.”

We have performed the doctor's experiment frequently, with various results. If the mouth of the flask happens to be large and its neck short, the water very cold, and the flask very perfectly filled with steam, the effect is exactly what Desaguliers describes ; for the vacuum being suddenly and completely formed, the flask is first pressed down towards the basin, which the hand resists by sustaining the flask in the opposite direction, and just then the water rushes with great velocity up'into the vacuum, and striking on the bottom of the flask, now turned up wards, is apt to knock it suddenly out of the hand, especially when held merely by a soft glove. But if, on the other hand, the flask has a narrow mouth and long neck, and if, when inverted, its neck be allowed to rest on the bottom of the vessel, and if the water in the basin be

not very cold, it will rise slowly and gently, and the flask will be completely filled.

The doctor's inference is not, therefore, perfectly just to Savary, and allowing that Savary had read Worcester's book, he would not find in it any principle of this nature, hut an express exception from it, as we have already stated.

Stephen Switzer, author of a *System of Hydrostatics and Hydraulics* published at London in 1729, takes a different view of the matter. In the chapter “ On the Engine for raising Water by Fire,” he gives the following account of it :—“ Amongst the several engines which have been contrived for the raising of water for the sup ply of houses and gardens, none has been more justly surprising than that for the raising of water by fire ; the particular contrivance and sole invention of a gentleman with whom I had the honour, long since, to he well acquanted—I mean the ingenious Captain Savary, some time since deceased, but then a most noted engineer, and one of the Commissioners of the sick and wounded.

“ This gentleman's thoughts (as appears by a preface of his to a little book entitled *The Miner's Friend)* were always employed in hydrostatics or hydraulics, or in the improvement of waterworks ; and the first hint from which it is said he took this engine, was from a tobacco pipe, which he immersed to wash or cool it, as is some times done. He discovered that the water was made to spring through the tube of the pipe in a wonderful and surprising manner ; though others say that the learned Marquis of Worcester, in his *Century of Inventions,* (which book I have not seen,) gave the first hint for this raising water by fire.

“ It was a considerable time before this curious person, who has been so great an honour to his country, could bring this, his design, to perfection, on account of the awkwardness of the workmen who were necessarily to be employed in the affair ; but at last he conquered all difficulties, and procured a recommendation of it from the Royal Society, (*Phil*. *Trans.,* 252,) and soon after a patent from the Crown, for the sole making this engine ; and I have heard him say myself, that the very first time he play’d, it was in a potter’s house at Lambeth, where, though it was a small engine, yet it (the water) forced its way through the roof, and struck up the tiles in a manner that surprised all the spectators.”

“ About the year 1699, he wrote a small pamphlet or treatise concerning this engine which I have just now mentioned, wherein he has exhibited a draught of it ; but as that consisted of a double receiver, and a great many particulars not so easy for a learner at first sight to understand, I have, first of all, inserted that draught of it, and the account thereof, which Mr Bradley, in his new improvements of planting and gardening, has given us of that at Cambden House, it being an engine of Mr Savary's own invention, and which is the plainest and best proportioned of any that I have seen.

“ A the fire ; B the boiler, a copper vessel of a spherical figure in which the water is boiled and evaporated into steam, which passes through the regulator C, which opens to let it into D the steam pipe, of copper, through which it descends into E the receiver, which is a vessel of copper also, that at first setting to work is full of air, which the steam discharges through F the engine tree, and up the clack valve at K, and so the air ascends in L the force pipe.

“ After E is void of air, which is found by its being hot (with steam) all over, then stop the steam at C, and throw a little cold water on the outside of the hot receiver E, so as to cool down the steam in the inside, and so make it resume the condition of water, leaving E a vacuum, into which the pressure of the atmosphere will raise a column