

50. The great obstacle to this extensive use of the steam-engine, is the prodigious expense of fuel. An engine having a cylinder of four feet diameter, working night and day, consumes about 3400 chaldron (London) of good coals in a year.

51. This circumstance limits the use of steam-engines exceedingly. To draw water from coal-pits where they can be stocked with unsaleable small coal, they are of universal employment: also for valuable mines, for supplying a great and wealthy city with water, and a few other purposes, where a great expense can be borne, they are very proper engines; but in a thousand cases, where their unlimited powers might be vastly serviceable, the enormous expense of fuel completely excludes them. We cannot doubt but that the attention of engineers was much directed to every thing that could promise a diminution of this expense. Every one had his particular nostrum for the construction of his furnace, and some were undoubtedly more successful than others. But science was not yet sufficiently advanced: It was not till Dr Black had made his beautiful discovery of latent heat, that we could know the intimate relation between the heat expended in boiling off a quantity of water and the quantity of steam that is produced.

Much about the time of this discovery, viz. 1763-4, Mr

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that, had it ever been carried into practice, the use of it would have been persevered in. Upon an accurate search at the different offices, it does not appear that any patent was taken out by Fitzgerald, nor have I any knowledge of the proposals mentioned in the text.

“On the application of the crank to produce rotative motions from the steam-engine, I shall treat more at length in describing the new engine.

“Some imperfect and unsuccessful attempts were made in the years 1767 and 1769, by Mr John Stewart, and Mr Dugald Clarke, to derive a continued rotative motion from Newcomen's engine, to be applied to sugar-mills in Jamaica; and something of the kind was attempted at Hartley colliery, near Newcastle. The apparatus of all of them appears to have been complex, liable to breakages and derangements, and not susceptible of regularity; in consequence of which these schemes were, I believe, soon abandoned.” W: