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| Workings with the Patent. | | | | Workings without the Patent. | | | |
| Date. | Time. | Period of day. | Pounds of Coal used. | Date. | Time. | Period of day. | Pounds of Coal used. |
| Sept. 25, 1838. | 5 h. 15 m. | P.M. | 560 | Sept. 25, 1838. | 5 h. 15 m. | A.M. | 812 |
| — 26, — | 5 - 15 - | A.Μ. | 449 | — 26, — | 5 - 15 - | P.M. | 812 |
| — 27, — | 5 - 15 - | A.Μ. | 612 | — 27, — | 5 - 15 - | P.M. | 812 |
|  | Average,. |  | ....558 |  | Average, |  | ....812 |

For the same time, then, an<l for the same amount of work done, the consumpt of fuel, as shewn by the above table, is in the ratio of 812 to 540, or as 100 to 66, thus indicating a saving of about 33 per cent.

By the admission of steam into the furnace in this way of consuming smoke, the draught is prodigiously increased ; hence the absolute necessity, when applied to furnaces hav­ing tall chimneys, of resorting to means to counteract it. It is remarkable that the damper in common use has compa­ratively little or no effect. The means found to answer best are the admission of cold air into the chimney, by apertures, which can be varied in size, according to circumstances ; or when this is found not to be sufficient, to have covers to the ash-pit, by which the draught up through the bars may be prevented ; for it is only when the draught is properly checked, and a due quantity of air admitted above the fuel, that none flows into the ash-pit. In furnaces to be erected for the purpose, the draught can be sufficiently checked, by making the chimney much narrower and shorter than those now in use. In fact, were it not for the necessity of having a vent to carry off the gaseous products, the chim­ney might be dispensed with, as the steam of itself creates sufficient draught to carry in air for the combustion. Hence one very great advantage, in addition to the many others, to be derived from this mode; as, independently of economy in fuel, there must be an immense saving in the outlay in con­structing furnaces ; the application of the steam-tube with its distributor costing very little.

Different opinions are entertained with regard to the *rationale* of this process. Some suppose that the steam merely acts mechanically, by carrying along with it a suffi­cient quantity of air to maintain the combustion ; and that that air flowing *over* the fuel, not only carries on its con­sumption there, but, acting on the smoke, causes its combus­tion also, by which of course there is an additional supply of heat. Besides, as the upper part of the furnace is free from smoke, the radiation from the fire must have a more powerful effect on the bottom of the boiler, and those parts of it exposed in the flues being also free from soot, will more easily transmit the heat. If, however, we place reliance on the results of the trials stated above, and the names of the scientific gentlemen by whom they were conducted is a proof of their accuracy, it is difficult to conceive how so large a result should be obtained, were there no further ac­tion than the consumption of the fuel. It is generally ad­mitted, that were the whole of the heat from coal under­going combustion rendered available, about fourteen pounds of water would be evaporated on an average by each pound of coal. But this cannot be done, because part of the heat must necessarily pass off by the chimney ; but even with this waste, the quantity of water evaporated by Scotish coal was in some trials beyond fourteen pounds. This has given rise to the idea, that the steam, in addition to its me­chanical action of carrying air into the upper part of the furnace, acts also chemically, that in fact it is decomposed and consumed. It has been long known, that when steam is passed through tubes stuffed with incandescent carbon, it is decomposed, and resolved into gaseous products. In a paper published by Dr. Fyfe in the *Edinburgh Phil. Jour­nal,* 1837, it is shewn, that these gaseous products are not carbonic acid and carburetted hydrogen, as at one time sup­posed, but carbonic oxid and pure hydrogen. Now a simi­lar decomposition may be effected on the steam in the Ivison process ; for when it is brought into contact with the carbonaceous matter of the smoke, as given off at a high temperature from the coal on the charring-plate, it may be decomposed, and give, by its action on the smoke, carbonic oxid and hydrogen ; and these being freely supplied with air, will be burned, and by their combustion give out an ad­ditional supply of heat, and it is well known that the heat given forth by hydrogen is very great. If this explanation be the correct one, (and it is strengthened by the fact, that when the coal is thrown far back in the furnace, so as to be beyond the influence of the steam, it is not consumed), then the smoke is not burned by the direct action of the air, but by first getting oxygen from the steam, so as to form car­bonic oxid, and which oxid then receives oxygen from the atmosphere. An additional quantity of oxygen is thus re­quired ; and hence most probably the additional amount of heat evolved by the process.

*Smoke-Silver.* Lands were held in some places by the payment of the sum of sixpence yearly to the sheriff, call­ed *smoke-silver* ( Par. 4. Edw. VI.) Smoke-silver and smoke-penny are to be paid to the ministers of divers parishes as a *modus* in lieu of tithe-wood ; and in some manors for­merly belonging to religious houses, there is still paid, as appended to the said manors, the ancient Peter-pence, by the name of *Smoke money.* (Twisd. *Hist. Vindicat.* 77.)

SMOLENSKO, a circle or government of the eastern side of the Russian empire. It was formerly a part of Lithuania, and being gained by Russia in 1654, was then called White Russia. It is 10,980 square miles in extent, and contains 1,031,860 inhabitants, who are a mixture of Russians, Poles, and Jews. The city from which the province takes its name, stands in a valley, watered by the river Dnieper, which runs from east to west, and which is navigable for barges. The city, which has been rebuilt since the war, is now said to contain 15,000 inhabitants. For this popula­tion there are upwards of twenty churches. It has a cathe­dral for both Catholic and Greek Christians, an ecclesias­tical seminary, and a gymnasium or high grammar school. It is a frontier and fortified town, and is remarkable for the great battle fought under the walls of the city, on the 16th of August 1812.

SMOLLETT, Tobias, whose writings have conferred distinguished honour upon the literature of his country, was descended from a family of considerable antiquity and opu­lence in the county of Dunbarton. His grandfather, Sir James Smollett of Bonhill, married a daughter of Sir Aulay Macaulay of Ardincaple, and by that lady had four sons, of whom Archibald, the youngest, was the father of the nove­list. Archibald, who had been bred to no profession, died at an early age, leaving his family, consisting of a widow and three children, one of whom was an infant daughter, solely dependent on the bounty of his father. Smollett was born in 1721, in the old mansion-house of Dulquhurn, now a ruin. It is situated near the village of Renton, in the parish of Cardross. He was baptized Tobias George. The