SMALKALD, a town of Germany, in Franconia, and in the county of Henneberg; famous for the confederacy en- tered into by the German Protestants against the emperor, commonly called the *league of Smalkald.* The design of it was to defend their religion and liberties. It is seated on the river Werra, twenty-five miles south-west of Erford, and fifty north-west of Bamberg. Long. 10. 53. E. Lat. 50. 40. N. It is subject to the prince of Hesse-Cassel.

SMALL Key, a small island in the Eastern Sea. Long. 247. 16. W. Lat 10. 37. N.

SMALT, a kind of glass of a dark blue colour, which when levigated appears of a most beautiful colour; and if it could be made sufficiently fine, would be an excellent succedaneum for ultramarine, as not only resisting all kinds of weather, but even the most violent fires. It is prepared by melting one part of calcinated cobalt with two of flint powder, and one of potash. At the bottoms of the crucibles in which the smalt is manufactured, we generally find a regulus of a whitish colour inclined to red, and extremely brittle. This is melted afresh, and when cold, separated into two parts ; that at the bottom is the cobaltic regulus, which is employed to make more of the smalt; the other is bismuth.

SMEATON, John, an eminent civil engineer, was born on the 18th of June 1724, at Austhorpe, near Leeds, in a house built by his grandfather, and where his family have resided ever since.

The strength of his understanding and the originality of his genius appeared at an early age. His playthings were not the playthings of children, but the tools which men employ ; and he appeared to have greater entertainment in see- ing the men in the neighbourhood work, and asking them questions, than in any thing else. One day he was seen on the top of his father’s barn, fixing up something like a wind- mill ; another time, he attended some men fixing a pump at a neighbouring village, and observing them cut off a piece of bored pipe, he was so lucky as to procure it, and he ac­tually made with it a working pump that raised water. These anecdotes referred to circumstances that happened while he was yet in petticoats, and most likely before he attained his sixth year.

About his fourteenth or fifteenth year, he constructed for himself an engine for turning, and made several presents to his friends of boxes in ivory or wood very neatly turned. He forged his iron and steel, and melted his metal; he had tools of every sort for working in wood, ivory, and metals. He made a lathe, by which he cut a perpetual screw in brass, a tiling little known at that day, which was the invention of Mr. Henry Hindley of York, with whom Mr. Smeaton soon became acquainted, and they spent many a night at Mr. Hindley’s house till day-light, conversing on those subjects.

Thus had Mr. Smeaton, by the strength of his genius and indefatigable industry, acquired, at the age of eighteen, an extensive set of tools, and the art of working in most of the mechanical trades, without the assistance of any master. A part of every day was generally occupied in forming some ingenious piece of mechanism.

Mr. Smeaton’s father was an attorney, and desirous of bringing him up to the same profession. Mr. Smeaton therefore came up to London in 1742, and attended the courts in Westminster hall ; but finding that the law did not suit the bent of bis genius, he wrote a strong memorial on that subject to his father, whose good sense from that moment left the youth to pursue the bent of his genius in his own way.

In 1751, he began a course of experiments to try a machine of his invention to measure a ship’s way at sea, and also made two voyages in company with Dr. Knight to try it, and a compass of his own invention and making, which was rendered magnetical by Dr. Knight's artificial magnets. The second voyage was mode in the Fortune

sloop of war, commanded at that time by Captain A1exan- der Campbell.

In 1753 he was elected member of the Royal Society. The number of papers published in their Transactions will show the universality of his genius and knowledge. In 1759 he was honoured by an unanimous vote with their gold me­dal for his paper entitled “ An Experimental lnquiry concerning the Natural Powers of Water and Wind to turn Mills, and other Machines depending on a circular motion.” This paper, he says, was the result of experiments made on working models in the years 1752 and 1753, but not communicated to the Society till 1759; before which time he had an opportunity of putting the effect of these experiments into real practice, in a variety of cases, and for various purposes, so as to assure the Society he had found them to answer.

In December 1755, the Eddystone lighthouse was burned down. Mr. Weston, the chief proprietor, and the others, be- ing desirous of rebuilding it in the most substantial manner, inquired of the Earl of Macclesfield, then president of the Royal Society, whom he thought the most proper to rebuild it; and his lordship recommended Mr. Smeaton. He accordingly undertook the work, and he completed it in the summer of 1759. Of the preparation for this extraordinary work, of its commencement and progress, Mr. Smeaton has given an ample and interesting description in a splendid folio volume which was first published in 1791. The same volume contains the history of the different buildings which have been erected on the Eddystone rock.

Though Mr. Smeaton completed the building of the Ed- dystone lighthouse in 1759, yet it appears he did not soon get into full business as a civil engineer; but in 1764, while in Yorkshire, he offered himself a candidate to be one of the receivers of the Derwentwater estate, and on the 31stt of December in that year, he was appointed at a full board of Greenwich hospital, in a manner highly flattering to himself, when other two persons, strongly recommended and powerfully supported, were candidates for the employment.

Mr. Smeaton having now got into full business as a civil engineer, performed many works of general utility. He made the Calder navigable ; a work that required great skill and judgment, owing to the very impetuous floods in that ri- ver. He planned and attended the execution of the great canal in Scotland for conveying the trade of the country either to the Atlantic or German Ocean; and having brought it to the place originally intended, he declined a handsome yearly sa1ary, in order that he might attend to the multiplicity of his other business.

The vast variety of mills which Mr. Smeaton constructed, so greatly to the satisfaction and advantage of the owners, will show the great use which he made of his experiments in 1752 and 1753; for he never trusted to theory in any case where he could have an opportunity to investigate it by ex- periment. He built a steam-engine at Austhorpe, and made experiments upon it, purposely to ascertain the power of Newcomen’s steam-engine, which he improved and brought to a greater degree of perfection, both in its construction and powers, than it was before.

About the year 1785 Mr. Smeaton’s health began to de- cline; and he then took the resolution of endeavouring to avoid all the business he could, so that he might have leisure to publish an account of his inventions and works, which was certainly the first wish of his heart; for he has often been heard to say, that “ he thought he could not render so much service to his country as by doing that.” He got only his account of the Eddystone lighthouse completed, and some preparations to his intended *Treatise on Mills;* for he could not resist the solicitations of his friends in various works; and Mr. Aubert, whom he greatly loved and respected, being chosen chairman of Ramsgate harbour, prevailed upon him to accept the place of engineer to that harbour. To their