## THE PROVINCIAL.

from whose source the comprehensive digits of notation have issued forth, commonly called the Arabie numerals, but which in fact they learned from the Persians who were revenue collectors in India in the ninth century. He might illustrate the system by the Abarus where the indicators, whether horizontally or perpendicularly placed, gradually superseded the use of the group signs. The Romans, though styled the masters of the world, were lamentably deficient in raising up men at all celebrated as mathematicians; their system of using letters or symbols of calculation was quite unsuitable for carrying out lengthened calculations. It would be something to exercise the patience of our schoolmasters, as well as their scholars, to multiply MXDCCCLXXVII by MIXCLXXXVIII, using the Roman numerals a'l through the process; while any child who had been but a very little time at school would be able to give the answer directly by using the Arabie numerals.

Our cyclopean friend the blacksmith, whitesmith, and bell-hanger, has in iron an inexhaustible theme open before him, whether as regarded in its commercial or agricultural importance. Its use has been known from the carliest ages, and though bountifully spread over all parts of the globe, yet nowhere found in a state fit for the manufacturer, but has to be purified in the fire before it can be put to general use. He is, no doubt, acquainted with the texture of iron, and of its various kinds, and though he may not be acquainted with the theory of Fuchs, yet by breaking pieces of different kinds of iron and shewing their fracture through a magnifying glass, he might show that it is capable of resuming two different crystalline forms, the *teperal* and *rhombohedral*. Malleable iron belongs to the former and cast iron to the latter. Fuchs supposes that the rhombohedral variety predominates in hard steel, and the teperal iron approaches closely to cast iron. The two kinds of iron in steel may be regarded in a constant mutual polarity, which is possibly the cause why steel retains imparted magnetism while soft iron does not. With regard to the alteration which mallcable iron sustains when exposed to prolonged vibration, percussion, or tortion, causing it to assume a granular fracture, Fuchs supposes that it consists in the passage of the iron from the fibrous crystalline to a granular crystalline state, an alteration in the mode of aggregation, not an essential metamorphosis. When iron passes from the fibrous to the granular state the molicular cohesion is diminished and by the aggregation of the atoms into rounded groups, a heap of distinct particles is produced resembling what mineralogists call granular minerals. The cohesion of the mass is thus to some extent destroyed, and the greater the number and size of these particles the greater is the decrease in tenacity. The original condition of iron thus altered cannot be restored by heating to redness and forging, but only by exposure to a welding heat. I have entered the more fully into this classification, as I consider it accounts satisfactorily for the brittleness produced in chains when they have been used for any length of time in hoisting heavy weights by cranes

374