The same ingenious gentleman has invented a ſelf-regiſtering barometer, upon the ſame principles with his ſelf-regiſtering thermometer. We have had the pleaſure of seeing both ; and are convinced that they will fully gratify the wiſhes of all who are engaged in meteorological ſtudies. He is alſo in expectation of being ſoon able to produce an air­-thermometer free from the defects of those which were formerly made, as he has found out a way of preventing it from being affected by the pressure of the atmoſphere.

Μ. De Luc has deſcribed the beſt method of conſtructing a thermometer, fit for determining the temperature of the air, in the menſuration of heights by the barometer. He has alſo ſhown how to divide the ſcale of a thermometer, ſo as to adapt it for aſtronomical purpoſes in the obſervation of refractions.

Mr Cavallo, in 1781, propoſed the conſtruction of a thermometrical barometer, which, by means of boiling wa­ter, might indicate the various gravity of the atmoſphere, or the height of the barometer. But as he does not ſay that the inſtrument has been tried with the desired ſucceſs, we forbear to deſcribe it. Thoſe who wiſh to know his ideas reſpecting it may conſult the Philoſophical Tranſactions, vol. lxxi. p. 524.

The thermometers hitherto deſcribed are very limited in their extent; they indeed point out to us the loweſt degrees of heat which are commonly obſerved even in cold climates, but they by no means reach to thoſe degrees of heat which are very familiar to us. The mercurial thermometer extends no farther than to 600 of Fahrenheit’s ſcale, the heat of boil­ing mercury ; but we are ſure that the heat of solid bodies, when heated to ignition, or till they emit light, far exceeds the heat of boiling mercury.

In order to remedy this defect, Sir Iſaac Newton, whoſe genius overcame thoſe obſtacles which ordinary minds could not approach, attempted by an ingenious experiment to ex­tend the ſcale to any degree requited. Having heated a maſs of iron red-hot, and expoſed it to the cold air, he ob­ſerved the time which elapſed till it became cold, or of the ſame temperature with the air ; and when the heat ſo far decreaſed that he could apply ſome known meaſure (as a thermometer) to it, he obſerved the decrees of heat lost in given times ; and thence drew the general concluſion, that the quantities of heat loſt in given ſmall ſpaces are al­ways proportional to the heat remaining in the body, reckoning the heat to be the exceſs by which it is warmer than the ambient air. So that taking the number of mi­nutes which it took to cool after it came to a determined point in an arithmetical progreſſion, the decrements of the heat of the iron would be continually proportional. Ha­ving by this proportion found out the decrements of heat in a given time after it came to a known point, it was eaſy, by carrying upwards the ſame proportion to the be­ginning of its cooling, to determine the greateſt heat which the body had acquired. This proportion of Sir Iſaac’s was found by Dr Martine to be ſomewhat inaccurate. The heat of a cooling body does not decreaſe exactly in propor­tion to that which the body retains. As the result of many obſervations, he found that two kinds of proportion took place, an arithmetical as well as the geometrical propor­tion which Sir Iſaac Newton had adopted ; namely, that the decrements of heat were partly proportional to the times (that is, that quantities of heat are loſt in equal times), as well as partly in proportion to the remaining heat ; and that if theſe two are added together the rule will be ſufficiently accurate. By the geometrical proportion which Sir Iſaac Newton adopted he diſcovered the heat of metals red-hot or in fuſion.

This method, ſo ſucceſsfully purſued by Sir Iſaac, was ſufficient to form a ſcale of high degrees of heat, but was not convenient for practical purpoſes. Accordingly the ingenious Mr Joſiah Wedgwood, who is well known for his great improvement in the art of pottery, applied himſelf in order to diſcover a thermometer which might be easily managed. After many experiments recorded in the Phi­loſophical Tranſactions, but which it is Unnecessary to detail in this place, he has invented a thermometer which marks with much precision the different degrees oſ ignition from a dull red heat viſible in the dark to the heat of an air- furnace. This thermometer is extremely ſimple. It conſiſts of two rulers fixed upon a ſmooth flat plate, a little farther aſunder at the one end than at the other, leaving an open longitudinal ſpace between them. Small pieces of alum and clay mixed together are made of ſuch a ſize as juſt to en­ter at the wide end ; they are then heated in the fire along with the body whoſe heat we wiſh to determine. The fire, ac­cording to the degree of heat it contains, diminiſhes or con­tracts the earthy body, ſo that when applied to the wide end of the gage, it will slide on towards the narrow end, leſs or more according to the degree of heat to which it has been expoſed.

That this inſtrument may be perfectly underſtood, we have given a repreſentation of it in Plate DVI. fig. 9. ABCD is a ſmooth flat plate ; and EF and GH two rulers or flat pieces, a quarter of an inch thick, fixed flat upon the plate, with the ſides that are towards one another made perfectly true, a little farther aſunder at one end EG than at the other end FH ; thus they include between them a long converging canal, which is divided on one side into a number of ſmall equal parts, and which may be conſidered as performing the offices both of the tube and ſcale of the com­mon thermometer. It is obvious, that if a body, ſo adjuſted as to fit exactly at the wider end of this canal, be after­wards diminiſhed in its bulk by fire, as the thermometer pieces are, it will then paſs further in the canal, and more and more ſo according as the diminution is greater ; and converſely, that if a body, ſo adjuſted as to paſs on to the narrow end, be afterwards expanded by fire, as is the case with metals, and applied in that expanded ſtate to the ſcale, it will not paſs ſo far ; and that the diviſions on the side will be the measures of the expanſions of the one, as of the con­tractions of the other, reckoning in both cases from that point to which the body was adjuſted at firſt.

I is the body whoſe alteration of bulk is thus to be meaſured. This is to be gently puſhed or ſlid along towards the end FH, till it is stopped by the converging ſides of the canal.

Mr Wedgwood at firſt uſed clay for his thermometer pieces; but he ſoon found it impossible to procure freſh ſupplies of the ſame quality. He therefore had recourſe to an artificial prepa­ration. As the earth of alum is the pure argillaceous earth to which all clays owe their property of diminiſhing in the fire, he mixed ſome of this earth with the clay, and found it to anſwer his wiſhes completely, both in procuring the neceſſary degree of diminution and of increaſing its unvitreſcibility. The only way of aſcertaining the proportion of alum earth to be added is by repeated trials. Mr Wedgwood found that 10 hundred weight of the porcelain clay of Corn­wall required all the earth that was afforded by five hundred weight of alum. But as the clay or alum differs in quali­ty, the proportion will alſo differ. There can now, how­ever, be no difficulty in making thermometers of this kind, as common clay anſwers the purpoſe very well, and alum-earth can easily be procured. Those who wiſh to ſee a more par­ticular account of this ſubject may peruſe Mr Wedgwood’s