degrees of heat as uſual. The upper part of the tube above the mercury is filled with ſpirit of wine; the ball C is al­ſo filled with the ſame liquor almoſt to the top of the capillary tube. When the mercury rises the ſpirit of wine is alſo raised, and falls into the ball C, which is ſo made that the liquor cannot return into the tube when the, mercury sinks ; conſequently the height of the ſpirit of wine in the ball, added to that in the tube, will give the greateſt degree of heat to which the thermometer has pointed ſince laſt obſervation. When a new obſervation is to be made, the inſtrument muſt be inclined till the liquor in the ball cover the end of the capillary tube.

In this thermometer it is evident that the mercury muſt be affected by the weight and elaſticity of the ſpirit of wine, and therefore it will not correſpond to any of the common mercurial thermometers.

The thermometer for ſhowing the greateſt degree of cold is repreſented in fig. 4. by the crooked tube ABCD. This inſtrument is filled with ſpirit of wine, with the addition of as much mercury as is ſufficient to fill both legs of the ſyphon, and about a fourth or fifth part of the hollow ball C. We are not told what the proportion of mercury was to that of ſpirit of wine. The degrees of heat are ſhown by the rise or fall of the mercury in the leg AB. The ther­mometer marks the greateſt fall by means of the hollow ball C. When the mercury in the longer leg sinks by cold, that in the ſhorter will rise and run over into the ball C, from which it cannot return when the mercury subſides in the ſhorter and riſes in the longer leg. The upper part of the ſhorter leg will therefore be filled with a column of ſpirits of a length proportional to the increaſe of heat ; the bottom or lower ſurface of which, by means of a proper ſcale, will ſhow how much the mercury has been lower than it is ; which being ſubtracted from the preſent height will give the loweſt point to which the mercury has fallen. That the thermometer may be fitted for a new obſervation, the mercury muſt be made to run back from the ball into the ſhorter leg, by inclining the tube and heating the ball.

In 1782 Mr Six propoſed another ſelf-regiſtering ther­mometer. It is properly a ſpirit of wine thermometer, though mercury is alſo employed for ſupporting an index. *ab* is a thin tube of glaſs 16 inches long, and 5/16ths of an inch caliber : *cde* and f*gh* are ſmaller tubes about 1/20th of an inch caliber. Theſe three tubes are filled with highly rec­tified ſpirit of wine, except the ſpace between *d* and *g,* which is filled with mercury. As the ſpirit of wine con­tracts or expands in the middle tube, the mercury falls or riſes in the outſide tubes. An index, ſuch as that repre­ſented in fig. 6. is placed on the ſurface, within each of theſe tubes, ſo light as to float upon it. *k* is a ſmall glaſs tube 3/4ths of an inch long, hermetically ſealed at each end, and incloſing a piece of ſteel wire nearly of its own length. At each end l, *m,* of this ſmall tube, a ſhort tube of black glaſs is fixed, of ſuch a diameter as to paſs freely up and down within either of the outſide tubes of the thermometer *ce* or fh*.* From the upper end of the index is drawn a spring of glaſs to the fineneſs of a hair, and about 5/7ths of an inch long ; which being placed a little oblique, preſſes lightly againſt the inner ſurface of the tube, and prevents the index from deſcending when the mercury deſcends. Theſe indexes being inſerted one into each of the outſide tubes, it is eaſy to underſtand how they point out the great­eſt heat or cold that has happened in the obſerver’s abſence. When the ſpirit of wine in the middle tube expands, it preſ­ſes down the mercury in the tube *hf,* and conſequently raiſes it in the tube *ec ;* conſequently the index on the left hand tube is left behind and marks the greateſt cold, and the index in the right hand tube riſes and marks the great­eſt heat.

In 1790 a paper was given into the Royal Society of Edinburgh, deſcribing two thermometers, newly invented, by Dr John Rutherford of Middle Bailiſh ; the one for regiſtering the higheſt and the other for regiſtering the low­eſt degree of heat to which the thermometer has riſen or fallen during the abſence of the obſerver. An account of them may be found in the third volume of the Tranſactions of the Society.

A new ſelf-regiſtering thermometer has more lately been invented by Mr Keith of Ravelſtone, which we conſider as the moſt ingenious, simple, and perfect, of any which has hitherto appeared. Its ſimplicity is ſo great, that it requires only a very ſhort deſcription to make it intelli­gible.

AB is a thin glaſs tube about 14 inches long and 3/4ths of an inch caliber, cloſe or hermetically ſealed at top. To the lower end, which is open, there is joined the crooked glaſs tube BE, ſeven inches long, and 4/10ths of an inch caliber, and open at top. The tube AB is filled with the ſtrongeſt ſpirit of wine, and the tube BE with mercury. This is properly a ſpirit of wine thermometer, and the mercury is uſed merely to ſupport a piece of ivory or glaſs, to which is affixed a wire for raiſing one index or depreſſing another, according as the mercury riſes or falls. E is a ſmall conical piece of ivory or glaſs, of ſuch a weight as to float on the ſurface of the mercury. To the float is joined a wire called the *float-wire,* which reaches upwards to H, where it terminates in a knee bent at right angles. The float-wire, by means of an eye at *a,* moves eaſily along the ſmall harpſichord wire GK. LL are two indexes made of thin black oiled ſilk, which slide upwards or downwards with a force not more than two grains. The one placed above the knee points out the greateſt riſe, and the one placed below it. points out the greateſt fall, of the thermometer.

When the inſtrument is to be prepared for an obſervation, both indexes are to be brought cloſe to the knee H. It is evident, that when the mercury riſes, the float and float wire, which can be moved with the smalleſt force, will be puſhed upwards till the mercury become ſtationary. As the knee of the float-wire moves upwards it will carry along with it the upper index L. When the mercury again ſubsides, it leaves the index at the higheſt point to which it was raised, for it will not deſcend by its own weight : As the mercury falls the float-wire does the ſame ; it therefore brings along with it the lower index L, and continues to depreſs it till it again become ſtationary or aſcend in the tube ; in which case it leaves the lower index behind it as it had formerly left the upper. The ſcale to which the indexes point is placed pa­rallel to the slender harpſichord. wire. It may be ſeen more diſtinctly in fig. 8. That the ſcale and indexes may not be injured by the wind and rain, a cylindrical glaſs cover, cloſe at top, and made ſo as to exactly fit the part FG, is placed over it.

The ingenious inventor has another improvement in con­templation, which, if upon trial it be found to anſwer, will make this thermometer as perfect as can be deſired, provi­ded there do not ariſe ſome errors from the variable preſſure of the atmoſphere. He proposes to adopt clockwork to this thermometer, in ſuch a way as to regiſter with the utmoſt preciſion the degrees of heat and cold for every month, day, and minute in the year. The principles on which this clockwork is to be formed we ſhall forbear to deſcribe, hoping that the author himſelf, after his experiment has met with the ſucceſs which we ardently wiſh, will favour the world with his own account of it.