

pipe are precautions no more necessary than at present with the best constructed valves, and might safely be dispensed with. The remaining parts and action of figure 2 are the same as figure 1.

Both plans represent the principle of a valve, the mechanical arrangement of which, however modified, embraces every advantage as to security, of a "locked valve," in frustrating any attempt to overload it, either by accident or design, through ignorance or will, without the usual attendant disadvantages of inconvenience, expense, &c., of a second valve, and liability to "stick" by corrosion of parts through *standing long unused*, &c.; a liability which the present form has not, as it is the engineers' frequent "working" safety valve, which is a *locked* and limited one, but possessing all the facility of regulating his pressure that he has now, though not allowed to exceed the fixed *extreme* safe point.

### *On the Duration of a Solar Spot.*

BY W. PRINGLE, ESQ.

It is stated by Dr. Dick and other writers that "no spot has been known to last longer than one that appeared in the year 1676, which continued upon the sun for seventy days." I am inclined to think that a large spot now going off the sun's disk (Nov. 21), has lasted still longer.

On the 19th of August last I observed a double spot, or two adjacent spots, near the sun's eastern verge, which as they advanced increased in size, and on the 23rd were visible to the naked eye as one spot. Their longest diameters were 27,000 and 31,000 miles respectively, being each about a third less in breadth, embracing the penumbrae. They were about 10,000 miles apart, though for the first two or three days they appeared to be linked together by a curved chain of minute spots or shallows at their northern extremities, but which became eventually absorbed into the penumbrae of the largest of the two. They were both of an oval form, and were followed till the 28th or 29th, when the nucleus of one had divided into several parts. They probably disappeared on the 31st of August.

On September 16, I remarked a large spot (at 4 p. m.) so far advanced on the sun's eastern limb as distinctly to exhibit several black nuclei within the edges of the penumbrae, but no great nucleus in the centre; and on the 17th, when it had come more round, this peculiarity became more apparent, the interior sides being studded with small dark spots, while the centre showed nothing but one vast clouded space or shallow. As I had been looking for the re-appearance of the two spots of August, it occurred to me that they might have become conjoined, the conjunction of the two penumbrae forming the central space of the spot now advancing. There being no other traces of them, I conceived I was justified in this conclusion. The smooth contour of the two oval spots had become since the contact a vast irregular polygon, as if by the concussion of two forces the penumbrae had been dashed or shaken into angular protrusions. The entire spot on the 17th measured about 50,000 miles in its longest dimensions. A very fair engraving of its outline appeared in the Illustrated London News of October 7th. Its size on the 21st was estimated at 60,000 miles: I made it somewhat more afterwards. It was quite percep-

tible to the naked eye for nearly a week after 'the 17th. On the 27th it was about half a digit from the sun's western margin, and probably disappeared the day after; but cloudy weather prevented it being followed.

About a fortnight afterwards, on the 13th of October, I descried a long lenticular-shaped spot about a quarter of a digit advanced on the sun's eastern limb. This I had little doubt was the spot on its return; and, as it came on, the general resemblance confirmed its identity. It was, however, much contracted in dimensions, measuring about 44,000 miles when near the sun's centre. The irregular pointed outline was still prominent, though the projections were less than on its previous appearance.

On the 26th of October, I saw it as a very dim dot or line, scarcely distinguishable from the line of circumference of the sun's western limb.

On the 9th of November, at some distance north of the point of Mercury's entering the disk, a faint depression, having the appearance of a spot of some size, was visible. This being the very time when the spot of October might be expected to return, I felt confident it was the same; and its further progress confirmed the identity. It was again contracted much in size, being somewhat triangular in shape.

If the inferences above stated be well founded, the spot will have lasted about ninety-five days. Whether it will yet make another revolution, or half a one, remains to be seen; but I shall not probably have it in my power to make observations at the period of its next appearance. It may be looked for on the 4th or 5th of December.

In many respects this spot was a remarkable one, and in all likelihood did not escape the observation of the illustrious author of the Cape Observations, whose chapter on solar spots is so interesting.

I should be happy if you think this worth noticing in your journal as a report of some particulars to which my attention was directed, and which more profound observers may have overlooked.

The opinion of Dr. Dick, author of *The Sidereal Heavens, &c.*, to whom I submitted the observations of August, September, and October, that in all probability the spots were identical, according to the grounds stated, has the more emboldened me to address you.

Edinburgh, Nov. 21, 1848.

Lond., Edin., & Dub. Phil. Mag., Dec., 1848.

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### *On a Simple and Ready Way of Producing Tools for Grinding Lenses.*

BY N. S. HEINEKEN.

If you think the following simple and ready way of producing tools for grinding lenses likely to be of service to any of the readers of the *Philosophical Magazine*, you will oblige me by making it known. I was led to employ this method in consequence of an injury done to a lens, for the re-grinding of which I had no corresponding brass tool. Rather than take the trouble of making a set of brass gauges and also a set of grinding-tools, I took a cast of the *lens itself* by pressure upon the cooling surface of some fusible metal contained in a frame of card. On this tool, thus readily formed, I re-ground and polished the lens; and where great accuracy of figure is not required, have found the method to answer very well. Hoping