of our cotton manufacture, the greatest apprehension seems to be on account of our relations with the Southern States. There is little doubt that we shall be able to obtain our supply of cotton at the market price, unless all the laws of trade are *nullified*." This is no doubt a sound conclusion, but it affords no satisfaction to any person. Cotton can always be obtained at the *market price*, It is stated that the value of the entire cotton manufactures of the United States in 1850 was $16,869,184, of which $57,134,760 was consumed at home and the rest exported; and of this amount the free States produced $52,502,853. About seven per cent. of this only is supplied to the fifteen slave States. Our foreign exports of cotton goods have increased rapidly. In 1850, they were valued at $4,734,424; the increase in ten years is $6,200,372.

A common opinion prevails that the increase of cotton machinery has kept in advance of the supply of cotton. Mr. Batchelder asserts that this is not the case. He gives some statistics of British manufacture in proof of this opinion. In 1856 the number of spindles in England and Wales was 25,818,576; looms, 275,590. In Scotland—spindles, 2,041,139; looms, 21,624. In Ireland—spindles, 150,502; looms 1,633. The increase of spindles in Great Britain in six years was about 30 per cent. At the present time it is believed that there are 33,612,260 spindles in England, Ireland and Scotland, allowing an increase of 20 per cent for the last four years. The increase of cotton machinery in England has been proportionally greater than in the United States. The average number of spindles to the loom in Great Britain is 84, or about twice the proportion of this country. More cotton is exported in the form of yarn, and the looms are driven with greater speed in England. But the whole increase of cotton machinery in Europe and America, from 1850 to 1860, is stated to be no more than 50 per cent, while the average increase of the cotton crop in the same period has been no less than 64 per cent. Instead of the machinery increasing beyond the power of the cotton crop to supply the spindles (as has been predicted for some years past), the supply of cotton has been increasing beyond the spindles. At the close of 1860 there were 403,000 bales of American cotton in Liverpool. Mr. Batchelder states that he had hoped to obtain from Washington some statistics from the census of 1860; but on application at the Census Bureau, the manufacturing statistics had not been made up so as to afford any information on the subject.—*Scientific American.*

THE CHEMICAL HISTORY OF A CANDLE.

BY M. FARADAY, D.C.L., F.R.S.

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LECTURE VI.—CARBON OR CHARCOAL—COAL GAS—RESPIRATION AND ITS ANALOGY TO THE BURNING OF A CANDLE—CONCLUSION.

A lady who honours me by her presence at these Lectures has conferred a still greater obligation by sending me these two candles which are from Japan, and, I presume are made of that substance to which I referred in a former Lecture. You see that they are even far more highly ornamented than the French candles, and, I suppose are candles of luxury, judging from their appearance. They have a remarkable peculiarity about them, namely, a hollow wick,—that beautiful peculiarity which Argand introduced into the lamp and made so valuable. To those who receive such presents from the East, I may just say that this and such like materials, gradually assume a change which gives them on the surface a dull and dead appearance; but they may easily be restored to their original beauty if the surface is rubbed with a clean cloth or silk handkerchief, so as to polish the little rugosity or roughness; this will restore the beauty of the colours. I have so rubbed one of these candles, and you see the difference between it and the other which has not been polished, but which may be restored by the same process. Observe, also, that these moulded candles from Japan are made more conical than the moulded candles in this part of the world.

I told you, when we last met, a good deal about carbonic acid. We found by the lime-water test that when the vapour from the top of the candle or lamp was received into bottles and tested by this solution of lime-water (the composition of which I explained to you, and which you can make for yourselves), we had that white opacity which was in fact calcareous matter, like shells and corals, and many of the rocks and minerals in the earth. But I have not yet told you clearly and chemically the history of this substance, carbonic acid, as we have it from the candle, and I must now take you to that point. We have seen the products, and the nature of them, as they issue from the candle. We have traced the water to its elements, and now we have to see where are the elements of the carbonic acid supplied by the candle: a few experiments will show this. You remember that when a candle burns badly it burns with smoke; but if it is burning well there is no smoke. And you know that the brightness of the candle is due to this smoke which becomes ignited. Here is an experiment to prove this: so long as the smoke remains in the flame of the candle and becomes ignited it gives a beautiful light, and never appears to us in the forms of black particles. I will light some fuel which is extravagant in its burning; this will serve our purpose—a little turpentine on a sponge. You see the smoke rising from it, and floating into the air in large quantities, and remember now, the carbonic acid that we have from the candle is from such smoke as that. To make that evident to you I will introduce this turpentine burning on the sponge into a flask where I have plenty of oxygen, the rich part of the atmosphere, and you see that the smoke is all consumed. This is the first part of our experiment, and now what follows? The carbon which you saw flying off from the turpentine flame in the air we have now entirely burned in this oxygen, and we shall find that it will by this rough and temporary experiment, give us exactly the same conclusion and result as we had from the combustion of the candle. The reason why I make the experiment in this manner is solely that I may cause the steps of our demonstration to be so simple that you can never for a moment lose the train of reasoning if you only pay attention. All the carbon which is burned in oxygen, or air, comes out as carbonic acid, whilst those particles which are not so burned show you the second substance in the carbonic acid, namely the carbon, that body which made the flame so bright whilst there was plenty of air, but which was thrown off in excess when there was not oxygen enough to burn it.

I have also to show you a little more distinctly the history of carbon and oxygen in their union to make carbonic acid. You have now a right to know this to a far greater extent than before, so I have