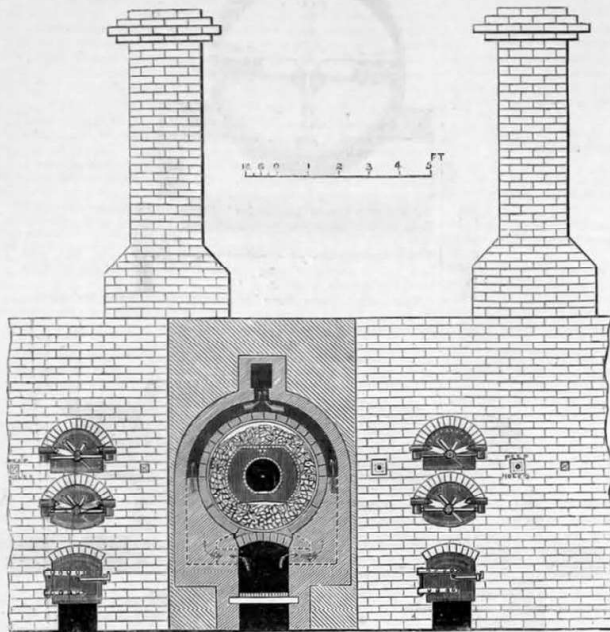


GRIFFITHS' PATENT OIL GAS RETORTS.

(MANUFACTURED BY MESSRS. ASTBURY AND SON, BIRMINGHAM.)



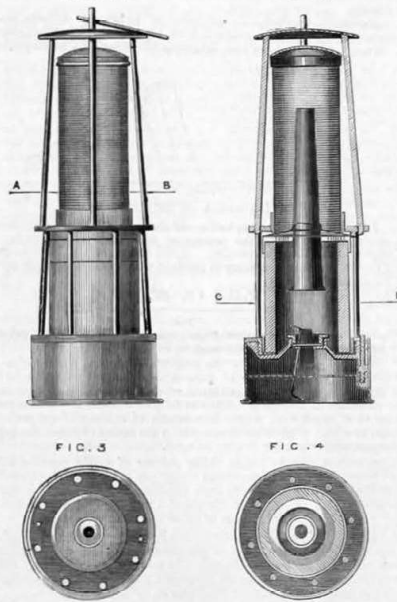
In the annexed engraving we illustrate a retort and furnace now extensively used in Wales in the extraction of oil from shale, and in other parts of the United Kingdom in the manufacture of paraffin from cannel coal. It has been designed by Mr. Griffiths, the inventor of the popular form of the screw propeller, and has proved so successful that about 500 retorts are now in actual use. The apparatus is so simple that little explanation is required to make its construction and mode of action perfectly clear. It consists of a cylindrical cast iron retort cased in fire-brick, and built within an oven in such a way that the fire completely surrounds it on its way to the chimney. In making coal oil it is necessary that the heat applied should be moderate yet sufficient. The oil is first given off as a gas, which is subsequently condensed into the liquid form on cooling; but if the gas is overheated a chemical change takes place, it becomes permanent, and is no more be condensed than air. Mr. Griffiths found, however, that in practice the top of the retort was usually the hottest place, yet to the top the gas always found its way, thanks to its levity; and therefore a considerable percentage assumed the permanent condition and was wasted. In order to avoid this he inserts the internal iron cage, shown both in the transverse and longitudinal sections, and as this cage is placed in the centre of the mass of shale or cannel being volatilisied, the gas finds its way to the interior with the greatest possible facility. The locality of greatest heat exists close to the retort walls, but from these the gas escapes all round to the centre, which is the coolest place, and thereby the danger of overheating is avoided. The following advantages are claimed to be obtained from this system of construction:—Firstly, that the oil is produced of a lighter specific gravity and in greater quantities than by any other retort; secondly, that the retorts are not liable to fracture, numbers of them having been worked, in many cases severely, for more than three years without a single instance of fracture from any cause; thirdly, the coke which accumulates on the bottom is easily removed without stopping the operation of the apparatus; fourthly, the workman can charge and discharge these retorts much more easily in consequence of the free circulation of air, the cold air entering at the lower door and escaping at the upper; and, finally, it is claimed that these retorts cost less at the beginning and last longer than others. How far these claims are borne out in actual practice we cannot, of course, pretend to say with strict precision, but it is sufficiently clear that the apparatus has been designed on correct scientific principles, and the fact that it now enjoys a large sale is tolerably good evidence that it really deserves the character which it has received.

The retorts are made 3ft. 6in. in diameter and 10ft. long, the inside cage having a diameter of 2ft. 6in. the whole length of the retort. At one end there are two doors, one for charging the other for discharging; at the other end is the exit pipe for carrying off the gas to the condensers. The detailed dimensions can be obtained from the scale annexed to the engraving.

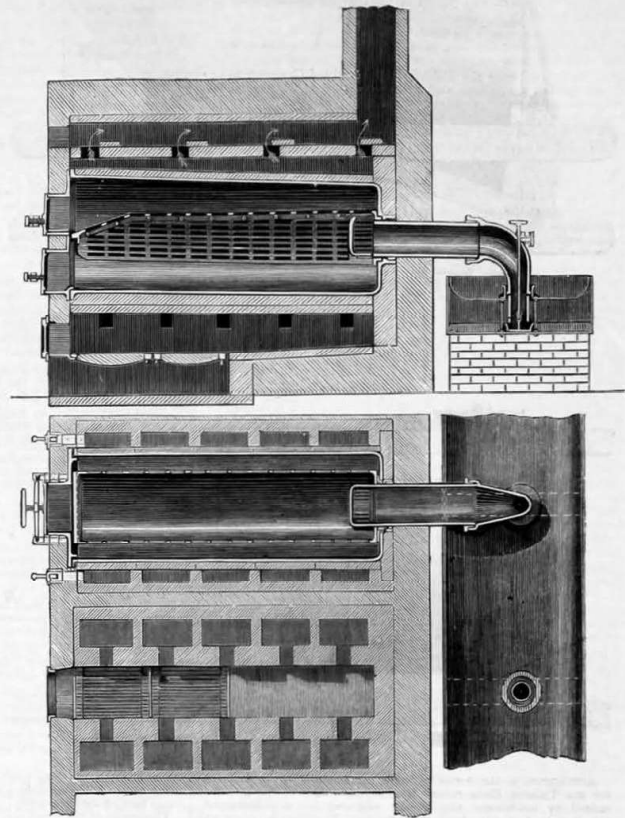
THE MUESLER SAFETY LAMP.

In the course of different descents we have made down coal-pits, we have always been painfully struck with the very indifferent light given by the Davy lamp. Now amongst the thousand or so men annually killed in the collieries of this country, we feel little doubt that many of these lives are indirectly lost through the bad light by which the men are obliged to work. Working colliers complain of the poor light they are obliged to work by, and more than one have expressed their surprise to us that the lamp has not been improved. But inventors have not really been backward, though, as a rule, colliery owners have not given them much encouragement. At the Museum of Practical Geology in Jernyn-street there are more than twenty different specimens of safety lamps, most of which are safer and afford a better light than the Davy. Amongst these is a specimen of the Mueseler lamp, which is very extensively used on the Continent. In the report on the Belgian coal mines, lately addressed by one of our *chefs d'affaires* at Brussels, Mr. Egerton, to the Government, we read that the Belgian law "renders the employment of safety lamps compulsory in all mines where fire-damp is known to exist. In accordance with the police regulation each workman on entering the pit is furnished with his own lamp locked, and the key kept by a man specially charged with the care of the lamps. Thus no collier is now able to open his lamp himself. This was found to be necessary, as the labourers, in order to get a better light to work by, were in the habit of taking the tops off their lamps, utterly regardless of the consequences which might result from their foolishness. The Davy safety lamp was, up to the year 1840, the only lamp used; but about that time a Belgian engineer, M.

Mueseler, brought out the lamp which bears his name, and which has now almost entirely supplanted Sir Humphry Davy's invention in the pits of that country. The objections urged against the Davy lamp were these:—First, that it was not always to be depended upon against every explosive combination of atmosphere; secondly, that an enlargement in one of the meshes of the iron network was sufficient to cause an explosion where fire-damp existed in any quantity; thirdly, that when the lamp was exposed to draught, or moved rapidly, the flame might pass through the meshes and communicate with the explosive gas; fourthly, that a drop of oil, or a mixture of oil and coal-dust, adhering to the outside of the lamp, might become heated and ignite in the midst of fire-damp; and, lastly (and this, perhaps, is the gravest objection to the Davy lamp), that its light, which is at no times good, becomes almost totally obscured, after being some hours in the pit, from the meshes being choked with coal-dust. M. Mueseler's invention, though constructed on the principle of Sir Humphry Davy's lamp, is said to be so far free from its disadvantages that it is perfectly



safe under all atmospheric combinations, even when its wire network is enlarged or broken; that it gives a light equal to that of two Davy lamps, that it burns less oil, and that it goes out when the flame is brought into contact with carburetted hydrogen, thereby giving warning of the danger. On the other hand, it is heavier than the Davy lamp, and is apt to go out when placed on a slant or carried out of the perpendicular. This latter objection made the Mueseler lamp unpopular with the pitmen, especially in mines where the seams are irregular and on an incline, for the workman was at any time liable to be left in the



dark, even where fire-damp did not exist. Notwithstanding this fault, the Mueseler lamp, on account of its superior safety qualities, is now generally used in the Belgian collieries, and, we may add, also in the collieries of the north of France.

The accompanying cuts will render its construction easily intelligible. The wick-holder and the hook for trimming the wick are generally arranged in the same way as with the Davy lamp, but a thick cylinder of glass takes up about two-fifths of its entire height. A conical tube serves as a chimney to conduct outside the products of combustion, and it passes through a diaphragm of wire gauze to which it is fixed. The cylinder of wire gauze is furnished at the top with a cap of copper-plate, and below with a short cylinder of the same material, which last is made with a horizontal rim, by means of which it can be fixed to the glass cylinder. The air required for the combustion passes gradually through the cylinder and the wire gauze, disc or diaphragm, until it reaches the annular space between the chimney and the glass cylinder; coming in contact with the wick, it effects the combustion, rises up the centre of the lamp, and streams through the meshes and the holes of the top, and also through the topmost meshes of the wire cylinder.

The framework of the lamp is made at the bottom of eight vertical rods, which protect the glass cylinder; the wire gauze cylinder is protected with only four rods, which are somewhat inclined to the axis of the lamp. All the rods are rivetted together to a ring, so that the screwing down of the upper framework into the oil-holder keeps the whole together, and all the joints tight.

Mueseler's lamp weighs about two pounds, which is rather more than the weight of the Davy. But the ratio of illuminating power is said to be as 2.8 : 1. By protecting the flame the glass cylinder nevertheless actually effects a saving in the oil burnt, especially when the lamp is employed in a current of air. The saving of oil is said to be from one-eighth to one-sixth as compared with the Davy. An objection is the shadow thrown down by the ring in the middle, as also the circumstance that, as the chimney must be kept very near the wick in order to separate the ascending heated current from the descending air which is to be burnt, the zone of light it gives is narrow.

Its mode of construction affords it the great security of the Stephenson, or "Geordie" lamp, as, when placed in fire-damp, the flame lengthens out, and at once gets extinguished. As the air required for combustion comes from above, should the fire-damp which may get into the case get inflamed, the products of the combustion have no time to escape up the chimney; they partly remain in the cylinder and mix with the fire-damp coming from the outside, so that the flame gets every moment less and less air to feed it. In the meantime the carbonic acid gas collects itself at the bottom of the cylinder, and puts out the flame as soon as it gets high enough. As observed by Mr. Egerton, this lamp is unfortunately liable to be extinguished when set in a slanting position. It is also subject to get extinguished in an up current of air, especially when the collier is coming down the pit ladders. Even with these various disadvantages the Mueseler lamp is undoubtedly preferable to the Davy. Its construction, *per se*, makes it safer; and, above all, its superior light must greatly add to the personal safety of the collier. The majority of the "accidents" occur through falls of the pit wall; and it must be evident that this danger is increased when the collier is working in a dim and uncertain light.

A GENERAL TELEGRAPH OFFICE.—It is said that measures will shortly be taken to place all the electric telegraph lines in the country in the hands of the Government postal administration, as is done in Switzerland and other places.