"I, the undersigned, carefully weighed the coals, and placed them under Mr. Perkins's generator: and certify, that 42 lbs. wt. of coals only, was used per hour. I also certify, that what is stated by the above engineers respecting the work done, is true." W. HERNE.

Mr. Perkins is of opinion that the two low pressure engines could not have been worked up to their full power, although they used the full quantity of coal, three and a quarter bushels per hour; but admitting they worked at only two thirds of the power, there would be a saving of about three fourths of the coal consumed in low pressure engines, by the employment of Mr. Perkins's new principle.

[*Newton's Journal.*]

On the new High-pressure Steam-engine, constructed by JACOB PERKINS, Esq. Civil Engineer, London.

THE Editor was highly gratified on Wednesday, the 10th ult., (July) by witnessing the performance of this engine at the St. Catherine's Docks, where, as Mr. Hornblower, (a nephew of the celebrated Mr. Hornblower,) the intelligent engineer and superintendent of it, informed him, it had been incessantly at work, night and day, from 12 o'clock on the Friday night preceding, and had, alone, kept the excavations free from water, although the river had once made an entrance to a very considerable extent.

At the time the Editor saw it, it was working two pumps; but, owing to its having got the water so completely under, it was then drawing air mixed with the water.

Mr. Hornblower stated, that it was then working at a pressure of about 270 lbs. upon the square inch, it not being one-third of its full power; and that it only consumed at the rate of one bushel of coals per hour; but that it ordinarily did the work of a 12-horse engine.

Its motion was exceedingly rapid, and indeed it was necessary to abate its velocity by the introduction of a pinion, fixed upon its main-shaft, working into a larger toothed wheel upon the crank-shaft which actuated the pumps; and, owing to its working with so great a velocity, one of the great advantages of working high-pressure steam, the engine itself is of a very light construction, not requiring such massive shafts, &c., to be employed, as in the ordinary cases of the low-pressure steam-engines.

Mr. Hornblower stated, that another engine employed to drain the excavations, consumed two and a half bushels of coals per hour.

[*Gill's Technological Repository.*]

Remarks on the phenomenon in the emission of Steam, discovered by M. Clement, and on its influence upon Safety Valves. BY J. PERKINS, Esq.

TO THE EDITOR OF THE LONDON JOURNAL OF ARTS, &C.

SIR—Seeing in your Journal the report of a paper, presented by M. Clement, to the Royal Academy of Science, in Paris, on a newly

observed phenomenon connected with steam valves, (see p. 97) I have thought it desirable to request your insertion of the following remarks upon M. Clement's discovery, consisting of my own views on that subject, and of, I think, a satisfactory explanation of the phenomenon, which, by the general tenure of his paper, appears not to have occurred to M. Clement.

M. Clement, in his communication to the Royal Academy of Science, in Paris, on some singular results observed by him, connected with steam, observes, that when steam is greatly compressed in a boiler, so that a strong current is made to blow out through a small orifice, on a metal plate, or disc, being presented at a little distance from the orifice, it is forcibly repulsed; but if it is brought near, and pressed, so as nearly to close the orifice, and cause the steam to escape in a radiant direction, or star-like form, round the outside of the disc, an external pressure will be found to act upon the disc, and it can only be set at liberty by forcibly raising it.

The phenomenon in steam, observed by M. Clement, is very curious, and at first sight appears unnatural; but nevertheless it is truly philosophical. In experimenting on high steam, particularly on the phenomenon of its rushing from the stop cock at so much lower a temperature than when in the generator, I observed that a strong current of air was constantly rushing into the stream of steam, and passing off with it, which was proved not only by its taking into its current atoms of dust, but also by its drawing, at a distance of six or eight inches, the flame of a candle from its wick. This current of air would, of course, cool down the steam, and that in proportion to its velocity. Knowing this fact, it is easy to understand the cause of the disc being pressed so strongly against the aperture.

The steam passes off horizontally in every direction, as M. Clement observes, in a star-light form; now as a strong current of air will be created by the velocity of the steam, and pass off with it, the surrounding air will follow, and in its course it will impinge on the disc and cause a pressure, and that in proportion to the height or velocity of the steam. When the safety valve is so constructed, which is sometimes the case, as to allow the steam to pass off in a horizontal direction, the pressure will be much greater than when the valve is conical, which gives a different direction to the steam, making it more difficult for the air to impinge on the valve. The valve placed on the generator of the high pressure safety engine is so small, and so nearly cylindrical, that the stream, when it issues from the valve, causes the molecules of steam immediately to join and form one volume, carrying the current of air upwards, as the steam passes nearly perpendicularly. No air can, of course, come in contact with the valve, and probably a partial vacuum would be made immediately over it. This evil may be very easily remedied, by obliging the steam to rush into a tube rising twelve inches, or more, above the valve. In fact all steam boats are provided with a steam box, into which the steam rushes, which necessarily prevents the current of air from acting on the valve. The steam issuing from the safety

valve would then pass off perpendicularly, and prevent the admission of the atmospheric air, which created the pressure on the disc, observed by Mr. C. Mr. Penn, of Greenwich, has a valve affixed to his high pressure boiler, and it is so constructed as to have the steam pass off horizontally. Mr. P.'s son informed me, that he has observed the mercury to indicate an increase of from 80 to 100lbs. per inch, after the steam began to escape from the safety valve; it was undoubtedly from the above-mentioned cause. Science is much indebted to M. Clement for his discovery, for although this phenomenon has been observed in strong jets of water rushing from a fountain, as well as in strong currents of air rushing from the blower of a blast furnace, yet M. Clement is, undoubtedly, the first who observed it in steam, and also the first who has warned the public of the danger of using this kind of safety valve.

I am, Sir, yours, &c.

J. PERKINS.

Fleet-street, London.

ENGLISH PATENTS.

Wass's Patent Improved Furnace for rendering the smelting of lead ores, and other mineral substances, innocuous to the surrounding neighbourhood; and by which the volatile products are condensed and preserved.

MR. JEFFREY of Bristol obtained a patent for a very effectual mode of condensing the deleterious vapours arising from the smelting of metals, in which contrivance it is, however, necessary to have a constant stream or shower of water from the top of the chimney shaft. But as a sufficient current of water can be obtained in comparatively few situations, the improved arrangements of the patentee (Mr. Joseph Wass, of Ashover, Derbyshire,) become especially deserving the attention of persons engaged in smelting works generally: for in addition to the advantage of obviating the injurious effects upon vegetable and animal life within the range of the metallic vapours, there results, from the adoption of this improved construction of furnace, a considerable profit; which arises from the product obtained by the condensation of those volatile and deleterious particles that are usually allowed to mix with the atmosphere. In the specification before us the patentee says, and we believe with perfect truth, that—"By the employment of this improved apparatus, smelting and calcining furnaces are divested of their pernicious effects, and such works may in future be erected in any convenient situation, either near to dwelling houses, or by the side of public roads, or on the banks of navigable rivers, or canals; and thus, in many cases, produce a very great economy in the expense of carriage. The saving effected by this apparatus in preserving a quantity of valuable