rage number of revolutions, 24 per minute; average pressure of steam, 45 lbs., using Stevens' cut-off, and admitting steam 6 ft. 6 in. of the stroke. Best speed, 20 miles per hour. She has two boilers, 28 feet long, 6 feet 6 inches diameter of shell, and fronts of the same width; two furnaces in each boiler, 34 inches wide and 7 feet long, with rising flues and single return; a steam chimney on each boiler, 32 inches inside diameter, 8 feet 6 inches high, with a steam space of 8 inches outside. The consumption of anthracite coal is 2000 lbs. per hour; the boilers are supplied with air for combustion from two blowers, 54 inches in diameter, and 24 inches wide, which discharge into an air-tight fire room, and from thence to the ash pit, and are capable of making 70 lbs. of steam for 10 hours, the engine cutting off at $6\frac{1}{2}$ feet.

This boat may be considered a superior specimen of work, whether we examine the machinery or the hull. The former was built by Messrs. H. R. Dunham & Co., of the Archimedes Works, in New York, and the boat is named after their engineer, Mr. Belknap. The hull was built by Colyer, the same that built the "America;" his models are well known for speed.

B.

Translated for the Journal of the Franklin Institute.

On the Method by which the Phosphate and Carbonate of Lime is introduced into the Organs of Plants.

M. J. L. Lassaigne, at the meeting of the Academy of Sciences of Paris, of the 15th January, presented a memoir upon this subject, showing by experiments that the phosphate and carbonate of lime are introduced into plants in solution in water containing carbonic acid, which had before been shown as to the phosphate by M. Dumas, and has long been known as to the carbonate.

We note this memoir for the purpose of saying that the first person, to our knowledge, who endeavored to call public attention to the important agency of carbonic acid dissolved in water in procuring food for plants, from otherwise insoluble salts, was the late Mr. Charles Roberts, of this city, who in the year 1839, suggested the experiments made in the laboratory of Prof. Booth, in which it was shown that the green sand of New Jersey (silicate of potassa and protoxide of iron) was thus dissolved. Oxalic acid was also shown to be an excellent solvent for this usually refractory substance, which rarely yields entirely even to nitro-muriatic acid, except by a prolonged digestion.

F.

On the Explosion of Fire-damp which occurred in the Eaglesbush or Eskcyn Colliery, Neath, South Wales, on the 29th of March, 1848. By
JOSHUA RICHARDSON. *M. Inst. C. E.*

This paper first detailed the frequency of these occurrences in some parts of South Wales, and more particularly in this colliery, where the tender and friable nature of the coal peculiarly induced in the working, or excavation, the formation of fire-damp and explosive gas. This had been shown

experimentally, by Sir Humphrey Davy, when, on breaking up large coal under water, he collected a quantity of fire-damp at the surface.

It then gave a description of the colliery workings; the state of the mine before the explosion occurred; the condition in which it was found at the time of the inspection—a fortnight after the accident; the probable causes of the catastrophe, and the best known means of preventing a recurrence of such events.

The seam of coal was described as being about four feet in thickness, of a highly bituminous and friable nature, and worked by an inclined adit, or entrance, with a main gallery, whence the stalls were worked on either side—horses being employed to draw out the coal in trams, which were conveyed direct to the vessels in which it was shipped for exportation to the extent of thirty thousand tons annually. The ventilation was effected by a down-cast and an up-cast shaft, between which an air course was arranged so as to extend throughout the active workings, with a chimney at the exit, through which the air should have been expedited by a furnace, which, however, had been rarely lighted; and the air course, which was one mile and five furlongs in length, was in places of unequal and inadequate areas, so that, in certain states of external atmosphere, the air in the mine became very sluggish, and even at times oscillated to and fro instead of regularly traveling onwards in an uninterrupted current. This was so much the case, that the colliers employed fans to drive the gas from them into the proper channels. Great negligence appeared to have existed, both in the general system of working, and in the use of the Davy lamps, which were frequently used without the wire gauze guards.

The usual state of the mine could not be judged of by an inspection *after* an accident, as all the falls and incumbrances had been removed; the destroyed door and stoppings had been well replaced, and general precautions had been adopted, which evidently had not previously existed; but there still remained evidences of want of precautionary measures. Candles and open lamps had been constantly used, although the general fiery character of the mine was notorious; and, after the explosion, two Davy lamps were found without their wire gauze guards.

The temperature in various parts of the mine was so near that of the external atmosphere, that it was evident spontaneous ventilation could not have proceeded regularly; and it was shown that the slightest change of the density of the air, even from the sun breaking out, would have sufficed to render stagnant the whole system of ventilation; especially as the furnace, which should have accelerated the current by exhaustion, had been allowed to fall into a ruinous condition, and had seldom been used, and the velocity of the current had rarely exceeded five feet per second, which was totally inadequate to supply the requisite quantity of air for such an extent of workings.

The cause of the accident was therefore very apparent, and might be attributed to a want of general good system of ventilation, permitting accumulations of gas and fire-damp, and the careless use of open lights, or unserviceable Davy lamps; and the consequence of this was the sudden death of twenty men, and several horses, with great injury to the mine.

The means of prevention were, evidently, a complete revision of the system of ventilation—the enlarging of the air course to uniform and ade-

quate dimensions—the proper division of the air into several columns—the construction of proper doors and stoppings in convenient positions—strict regulations for the use of Davy lamps, or other means of lighting, and better general superintendence, by educated men, who would enforce precautionary measures.

Due credit was given to the proprietors for their anxiety to afford every means of inspection, and for adopting all suggestions calculated to prevent the recurrence of such an event; and it was stated that they had since erected one of Mr. Price Struve's ventilating apparatus, of the working of which an account was promised in a future communication.

In the discussion which ensued, the various systems of working and of ventilation, in all parts of England, were noticed; and it was shown that, in general, every means was adopted to prevent accidents; but that up to the present time, the mines in the West were not as well managed as those in the North, or the midland district. Every day, however, introduced better measures and better men, of education, for carrying into effect the most approved systems, and that, as the mines became more extensively worked, so these accidents would and did become less frequent.

—*Proc. Insti. Civ. Engineers.*

Prac. Mech. Jour. April, 1849.

Translated for the Journal of the Franklin Institute.

Use of Colored Glasses to Assist the View in Fogs.

The following curious observation is made by M. Luvini, of Turin, in a letter to the editor of *L'Institut*, at Paris. If it be verified, it may prove to be of importance to geodetical operations, as well as in observations at sea.

“When there is a fog between two corresponding stations, so that the one station can with difficulty be seen from the other, if the observer passes a colored glass between his eye and the eye-piece of his telescope, the effect of the fog is very sensibly diminished, so that frequently the signals from the other station can be very plainly perceived, when, without the colored glass, the station itself could not be seen. The different colors do not all produce this effect in the same degree. The red seems the most proper for the experiment. Those who have good sight prefer the dark red, those who are short-sighted like light red better. The explanation of this effect seem to depend upon the fact that the white color of the fog strikes too powerfully upon the organ of sight, especially if the glass have a somewhat large field. On the contrary, by placing a colored glass between the eye of the observer and the eye-glass of the instrument, the intensity of the light is much diminished by the interception of a part of the rays; the observer's eye is less wearied, suffers less, and consequently distinguishes better the outlines of the object observed.”

L'Institut, Jan. 4, 1849.

New Material for Printing Types.

On Saturday last, (May 26,) a new invention, which is called the apyrotpe machine, was submitted for inspection at a meeting of the Royal