

SCOTTISH MATTERS.

At a meeting held on Thursday evening, in last week, at Dunfermline, for the purpose of promoting a railway from Dunfermline to Edinburgh by the Queensferry, Mr. Baugh, C.E., described the route of the line. In the first place he said, the promoters had taken running powers over the Edinburgh and Glasgow, from Waverley station to a point between Edinburgh and Corstorphine where the lines commence. It then goes by Corstorphine and Kirkliston, where there will be stations, to Queensferry. They then take powers to make a complete ferry. Then, starting from North Queensferry, the line passed through Inverkeithing to Dunfermline, and so on to its junction with the Edinburgh, Perth, and Dundee at Sheepsheewell. It thus placed Dunfermline on the main line—giving the best possible accommodation. Mr. Baugh entered into a variety of details, showing the superiority of the proposed line in curves and gradients to the other projects. But it was not, he said, in engineering features alone that it was superior. There was one principle which had actuated Parliament for a long time, and that was, wherever they gave a company compulsory powers to take lands for railways, when they considered it necessary to have a line at all, they took care that it should be in the hands of those who had a direct interest in working it to the public advantage, and it was not likely that Parliament would allow those other companies to invade and take private property for the purpose of making a line, which, when completed, the public would not be permitted to use.

Yesterday week, as a Scotch mail train was on its way to London, a carriage got off the line in consequence of the tire of one of the wheels breaking, and one of the passengers was severely injured.

The Glasgow Town Council have determined to proceed with the laying out of the South Side Park. The sum of £4,000 is to be expended this year, according to Mr. Carr's plan.

The *Ayrshire Express* has the following observations in regard to frozen meters—"Nothing has shown more strikingly the intensity of the frost during the past few days than the number of meters that have ceased to do their duty. It has been no uncommon thing to see the 'old candle' supplying the inhabitants with light. Many have been put to the greatest inconvenience by the extinguishing of their gas, and of course various expedients have been resorted to with the view of restoring the 'candle' to them, however, either ineffectual or fraught with danger. The application of heated materials has, in some cases, led to explosions and destruction of property. Another plan has been suggested and adopted with success in several instances. When the meter is wrong, a quantity of crude spirits of wine—which is not costly—poured in as we would water, will be found safe and effectual; and when the meter is not affected by the frost, but the service-pipe has got stopped up, a quantity of warm water spilt externally on the pipe, will remove the obstruction. The application of the wine is only effectual for the time, but it may continue to operate for a whole season, and thus prevent the trouble which frozen meters so often occasion. The plan we have thus suggested will doubtless be generally adopted when its simplicity and efficiency become known."

Last week's shipments of pig-iron were moderate, but were slightly in excess of those of the corresponding week of last year, the totals being 5,202 tons and 4,812 tons respectively.

"Purpinks trusts in Scotland appear to be in a bad way. We learn from a recent return that of the 24 trusts, 33 were in Aberdeenshire, 28 in Perthshire, 22 in Lanarkshire, 17 in Ayrshire, 17 in Fife, 15 in Banffshire, 12 in Roxburghshire, 10 in Berwickshire, the remainder being distributed over the remaining counties in unequal numbers, from Stirling, which has 9, to Kirkcudbright, Nairn, and Caithness, which have only one each. The total income of all the 24 trusts for the year ending Whitsunday, 1858 was £25,859 10s. 7d.; and the total expenditure, £25,026 8s. 11d. The bonded or mortgage debts were £1,579,351 18s.; the floating debts amounted to £25,941 0s. 7d.; the unpaid interest to £798,961 3s.; and the balance due treasurers on the amount for the year 1857-8 £25,093 16s. 4d. The total debits of the trusts amounted to £2,429,347 17s. 11d., and the total assets to £154,106 11s. 7d."

Messrs. Napier, who applied for recommendation for two months in the Victoria Harbour, Greenock, to have the machinery put on board the steam ran Black Eagle, have been informed that every facility will be afforded them for that purpose.

A correspondent of the *Scotsman* writes—"For some days past much agitation prevailed in several of the more important of the mining districts. Meetings have been held in Glasgow, Kilsyth, Wishaw, Kilmarnock, Stevenson, Irvine, &c., and much uneasiness is felt in other places. The excitement has been caused by the report that many of the chief proprietors of the mines in Lanarkshire and Ayrshire have refused to comply with the terms of the New Inspection Act in so far as it relates to the payment of wages and the weighing of materials. The terms the employers offer to the men are the same as the latter had previous to the passing of the act—namely, the proprietors to make deduction from the men's wages for fuel, medicine, medical attendance, school fees, house-rent, friendly societies, &c. The men refuse these terms on the ground that they are not consulted in the appointments, and ought not to be compelled to pay. They insist on having their money, that they may have their own choice. Last week, in the Wishaw district alone, nearly 1,000 men refused to work. On Saturday evening of the same week proprietors complied with the men's demands, but the principal masters still hold out. It should be mentioned that in nearly all the collieries the masters have met the requirements of the act in regard to fencing off the fly-wheels, gauges, double chains, &c., and have offered locked lamps for the use of the men. In regard to the rules for safety there is no dispute. In Ayrshire the men in some of the districts have gone to the sheriff for advice in the circumstances."

THE FROST.—On Friday a large brass bell at Woolwich Arsenal, cast in 1669, was found seriously cracked. The severe frost on the previous night is supposed to have caused the injury.

THE RANGOON CABLE.—A portion of this unfortunate cable originally destined to be laid between England and Gibraltar, which was subsequently ordered for Rangoon and Singapore, and finally destined for Malta and Alexandria, is now, according to the latest information, abandoned, with the vessel in which it was placed, to the underwriters. The whole history of this undertaking is a chapter of accidents and disasters. Soon after it was put on board the Queen Victoria, symptoms of heating in the cable were manifest, and the insulation was found to be imperfect. Then came an injunction from the Court of Chancery to restrain the ship from going to sea, on the ground that the cable was coiled round some form of the reel or core in the hold of the ship, which was claimed to be the invention of a rival cable maker; and that apparatus for paying-out the line was provided, which was also held to be an infringement of patent rights. At length, released from the Court of Chancery, by dissolving the injunction upon one of the grounds on which it was granted, and ordering accounts to be taken with respect to the other point, the cable was wrecked in smooth water, in broad daylight, when leaving Plymouth Sound. Every exertion was made to get the vessel off, but all their efforts had been unavailing, and the accounts on Friday state that the water in the hold has increased, the mainmast is gone, and is only kept from falling by the rigging; the mainyard and topmast were hanging up and down the mast, and the mizenmast was broken short off in the bonnet. The stores are lodged in the great fore and aft Decks, and the vessels have been brought alongside to receive the electric cable. There is too much reason to fear that the injuries which will be caused to the cable from the mechanical process of removing to other vessels, and again transshipping it before sending it to the Mediterranean, may seriously interfere with the insulation and efficiency of the cable. The weight of the cable is about 1,200 tons.—*Observer*.—[The Victoria was the property of Messrs. Palmer Brothers, of Jarrow, and was chartered by Messrs. Glass, Elliot, and Co., the submarine cable manufacturers.]

OCEANIC CURRENTS.—With the view of ascertaining the average number of days during the year that the N.E. trade winds of the Atlantic operate upon the currents between 25 deg. N. and the equator, log-books containing no less than 380,284 observations on the force and direction of the wind in that ocean were examined. The data thus afforded were carefully compared and discussed. The results show that within those latitudes, and on the average, the wind from the N. is in excess of the winds from the S.W. only 111 days out of the 365. During the rest of the year the S.W. counteracts the effect of the N.E. winds upon the currents. Now, can the N.E. trades, by blowing for less than one-third of the time, cause the Gulf Stream to run all the time, and without varying its velocity either to their force or their prevalence? Sir John Herschel maintains that they can; that the trade-winds are the sole cause of the Gulf Stream; not, indeed, by causing "a head of water" in the West Indian Seas, but by rolling particles of water before them somewhat as billiard balls are rolled over the table. He denies to evaporation, temperature, salts, and sea-shells, any effective influence whatever upon the circulation of the waters in the ocean. According to him, the winds are the supreme current-producing power in the sea. This theory would require all the currents of the sea to set with the winds, or when deflected, to be deflected from the shore, as billiard balls are from the cushions of the table making the lateral angles of incidence and reflection equal. Now, so far from this being the case, not one of the constant currents of the sea either makes such a set, or is deflected in that manner. The Gulf Stream, as it comes out of the Gulf of Mexico, and for hundreds of miles after it enters the Atlantic, against the trade-winds; for a part of the way it runs right in the "wind's eye." The Japan current, "the Gulf Stream of the Pacific," does the same. The Mozambique current runs to the south, against the S.E. trade-winds, and it changes not with the monsoons. The ice-bearing currents of the north oppose the winds in their course. Humboldt's current has its general direction to the north, but it is not the force of the west winds that blow with almost, if not with quite the regularity of the trades, but with double their force. And this current, instead of setting to the S.E. before these winds, flows north in spite of them. These are the main and constant currents of the sea—the great arteries and jugulars through which its circulation is conducted. In every instance, and regardless of winds, those currents that are warm flow towards the poles, and those that are cold set towards the equator. And this they do, not by the force of the winds, but in spite of them, and by the force of those very agencies that make the winds to blow. They flow thus by virtue of those efforts which the sea is continually making to restore that equilibrium to its waters which heat and cold, the forces of evaporation, and the secretion of its inhabitants are everlastingly destroying. If the winds make the upper, what makes the under and counter currents? This question is of itself enough to impeach that supremacy of the winds upon the currents which the ordinary philosopher, with whom I am so unfortunate as to differ, travelled so far out of his way to vindicate. The "bottles" also dispute, in their silent way, the "supremacy of the winds" over the currents of the sea. The bottles that are thrown overboard to try currents are partly out of the water. The wind has influence upon them; yet of all those, and they are many, that have been thrown overboard in the trade-wind region of the North Atlantic, or in the Caribbean Sea, and the Indian Ocean, not one has been found to have drifted with the wind; they all drift with the current, and nearly at right angles to the wind. That the winds do make currents in the sea no one will have the hardihood to deny; but currents that are born of the winds are as unstable as the winds; uncertain as to time, place, and direction, they are sporadic and ephemeral.—*The Physical Geography of the Sea, and its Meteorology*. By M. F. Maury.

BISULPHURET OF CARBON IN GAS—DISCOVERY OF A PROCESS FOR ITS REMOVAL.—Five or six years ago we called public attention to an improvement in the purification of coal gas by means of clay, used in addition to the ordinary purifying materials. By that process all the ammonia, much tar, cyanides, and sulphur cyanides were removed from the gas with perfect ease and simplicity, and the carbonaceous clay converts into other compounds. This process has spread widely over the country, and many thousand tons of the saturated clay, used as manure, have demonstrated that a plague has been turned into a profit. The author of this plan of purification is the Rev. W. R. Bowditch, of Wakefield, who has at length succeeded in discovering a practical process by which all the bisulphuret of carbon removed from gas, and thrown away, may be recovered as harmless as oil or candles. By one of those remarkable coincidences which so often occur in the history of science, while some of our best chemists, who know most about gas, were giving evidence on the Metropolitan Gas Bill before a select committee of the House of Commons, and declaring the removal of bisulphuret of carbon an impossibility—a desideratum which the present generation must leave for posterity to accomplish—a chemist, in his laboratory in Yorkshire, has solved the intricate problem, and has actually devised a simple practicable process, which can be worked with facility in any gas-works. On Thursday, December 6th, a paper on this subject, by the discoverer, Mr. Bowditch, was read at a meeting of the Royal Society, and we have pleasure in giving a brief outline of the new process therein described. Common slaked lime has been used in gas purification since 1806, when it was introduced by the late Dr. Henry, of Manchester. Its function was the removal of sulphuretted hydrogen and carbonic acid, and every trace of sulphur removed from gas. Over the other sulphur compound—bisulphuret of carbon—it could exert no power, and consequently, this passed on with the gas, and formed the only valid objection to its use. When burnt it produced sulphurous and sulphuric acids, and did all the damage to books, gilding, draperies, and health, of which so much has been said and written. This compound is formed by the union of 6 lb. of carbon and 32 lb. of sulphur, which (though solid and indolent) unite to form a fluid like water, but offer the offensive odour than rotting cabbage. The presence of this body gives ordinary gas its offensive smell; indeed, it was the smell which led Mr. Brande to infer its presence in gas in 1820, long before chemists knew of any tests by which it could be detected. There are now three tests known, one by Liebig, one by Dr. Hoffman, and one by Mr. Bowditch. It appears that in the course of his investigations Mr. Bowditch put the matter thus—Sulphur in purified gas is irremovable, because it is united to carbon, and in this form of combination refuses to be separated by gas companies, who they cannot abstract from the gas. Suppose, however, that this sulphur were united to hydrogen instead of to carbon, then every manager in a gas-works can remove it altogether by the ordinary means which he uses daily. Can the sulphur be thus transferred from carbon to hydrogen? After years of research the transfer has been perfectly accomplished, and, remarkably enough, by using lime, the very substance which for fifty years has been employed in gas-works without avail. The lime used hitherto was cold and dry, in which state it absorbs sulphuretted hydrogen, and is indifferent to bisulphuret of carbon. If, however, the same lime have all the water dried out of it, except so much as it can retain at a temperature of between 212 deg. and redness, and gas be passed through it while warm, the sulphuretted hydrogen has no effect upon it, but the bisulphuret of carbon is decomposed, and is converted into sulphuretted hydrogen and carbonic acid, which are removed by the ordinary and known means. Dried slaked lime, heated to about 300 deg. Fahr., converts the irremovable bisulphuret of carbon into removable sulphuretted hydrogen, and the process is difficultly in supplying gas fit for combustion in well furnished drawing-rooms than there is in sending it out free from compounds which every well-managed company has been in the habit of removing. Several of the most eminent chemists of the day have investigated the question, and have borne out the statements of the discoverer, so that we may regard the question of sulphur in gas as settled. In the legislation of last session it was allowed to be in gas, because the concurrent testimony of chemists agreed with that of Dr. Letheby, who said, "but not a particle of sulphur, and no trace of sulphuretted carbon out of gas." In reply to another question the same eminent chemist said, "With regard to bisulphuret of carbon, it ought to be understood that if in the progress of science means were invented for getting rid of it, those means should be adopted." He now says that the process made known in Mr. Bowditch's paper removes it perfectly, so that the impossibility being removed, it remains for the gas companies and their customers to settle how long the present nuisance shall continue; or, perhaps, for an Act of Parliament to forbid its continuance.—*Mining Journal*.

PROFESSOR WHEATSTONE'S UNIVERSAL TELEGRAPH.—Facility and speed in communication become every day of more and more importance. The present telegraph companies have created wants which they by no means supply. Public bodies, manufacturers, and merchants, are becoming more and more alive to the necessity of having their own private telegraphs. Thus, for instance, the Queen's printers have found it greatly to their advantage to have telegraphic communications of their own between their printing establishment and the Houses of Parliament. The London Dock has not only its own electric communication between its own offices in the dock, but also between the dock-house in the City and the Commercial Sale-rooms in Mincing-lane. The police stations throughout the City are now also placed in instantaneous communication with each other. Such important results as these have been brought about principally by the perfection to which Professor Wheatstone has brought his Universal Telegraph. This instrument is so simple in its construction that any person who can read and write can be taught in half an hour to send it with certainty. In a few days' practice a considerable rapidity can be acquired in sending messages. Without such an instrument as this a trained establishment of clerks would be necessary to work the telegraph. By its aid the owner of the telegraph, or any person of ordinary education, can use it with scarcely any training. Some idea of the speed with which this automatic printing telegraph can forward messages may be estimated when we state that a column of newspaper print, such as that of a particular register, can be transmitted 200 miles in about twenty minutes. We are rejoiced to see that Professor Wheatstone, who took such a distinguished position in the first introduction of the telegraph, still keeps foremost in the race of telegraphic progress.—*Daily News*.

ACADEMY OF SCIENCES.—At the last sitting a letter was read from the M. S. of State, informing the Academy that in consequence of the death of the 6th inst., the institute would henceforth have to correspond directly with him. Father Secchi sent in a copy of his new catalogue of double stars, the fruit of five years' labour, and founded in 7,600 complete observations of those stellar systems taken at the Roman Observatory. It contains the measures of 1,321 double or multiple stars, compared with the former ones of Struve, Marsden, and other astronomers, in order to ascertain whether and to what extent, they have changed their former places. Father Secchi has also completed the reduction of the magnetic observations made at Rome during the last two years, and has come to the conclusion that the station of Rome must be placed among the number of equatorial ones. (It is well known that the magnetic equator is by no means the same as the terrestrial equator, but on the contrary, is a curve cutting the latter at various points.) He also shows that there does exist a connection between the variations of intensity in the vertical and horizontal forces of terrestrial magnetism and great atmospheric changes. The glow of the late M. Faraday sent in various mathematical papers left by her husband, which he had intended to submit to the Academy. A commission was appointed to examine them. M. Demeaux, the discoverer of the antiseptic properties of coal-tar, sent in a paper on a new application of that substance, under the form of an emulsion. It is prepared as follows:—Dissolve equal weights of coal-tar, soap, and alcohol by the solution of the sulphur in the alcohol, and mix the whole with the consistency of soap, and dissolves readily in water, forming an emulsion therewith. Three kilogrammes of this compound cost about 8fr., and this quantity will yield about 100 litres of the emulsion, each litre containing about 10 grammes of coal-tar. It may be usefully applied in hospitals, dissection-rooms, or large manufactories, to prevent the evil effects of certain noxious emanations. As it is soluble in water, it does not stain the clothes or linen. It may be used in baths as a cure for certain diseases of the skin, and also under the form of lotions and fomentations.

SCIENCE AT THE BOTTOM OF THE SEA.—Dr. C. Wallich, who accompanied the recent expedition to survey the projected North Atlantic Telegraph route between Great Britain and America, has brought back some important notes of new facts in natural history which he has ascertained. His main object was to ascertain the depth to which animal life extends in the sea, together with the limits and conditions essential to its maintenance. He has proved that at a depth of two miles below the surface animal life exists. Here, where the pressure is calculated to amount to at least 14 ton per square inch, and where it can hardly be conceived that the most attenuated rays of struggling light can penetrate, Dr. Wallich has not only discovered the minute infusorial Foraminifera, whose organisation is of the simplest kind; but he has obtained from a sounding, 1,200 fathoms deep, a number of star fishes (genus Ophiocoma) adhering to the lowest 50 fathoms of the deep sea line, which must have rested on the bottom for a few minutes, so as to allow those star fishes to attach themselves to the rope; so that it is now established that in these regions of water desert and utter darkness there exists a "highly organised species of radiate animal, living, containing, and flourishing, with its red and light pink tints as clear and as brilliant as its congeners which dwell in shallow and comparatively sunshiny waters. Others doubtless exist; but this is but a first inquiry so conducted, and in time we may come to hear of a new submarine fauna, peeping these dark abodes, and preparing this subaqueous floor, just as the land on which we now walk, once submerged, is believed to have been prepared. It is said of Dr. Wallich's researches that science is now where its friends and enemies would alike wish it to be—at the bottom of the sea.—*Lancet*.

SCIENTIFIC JOTTINGS.—Aniline is a vegetable base which is obtained both from indigo and coal-tar, two strangely dissimilar substances. Mr. Phipson has now discovered it in the colouring matter of certain mushrooms of the genus *Boletus*, which have the remarkable property of assuming a different colour when cut open. This is especially the case with the *Boletus annosus* and the *Boletus variabilis*, which, under the circumstances alluded to, assume a fine indigo tint. Their colouring matter has all the properties of aniline, being soluble in alcohol, difficult of combination with water, and apt to become resinous on exposure to the air.—A curious method of destroying slugs and snails has just been announced by M. Commaudeur, of Paris. Some time ago he accidentally left in his garden a pot, in which he had been making experiments with starch and glue, and which had been partly covered with a bit of board, remained exposed to heat and rain for the space of three weeks. At length one morning attracted M. Commaudeur's attention, and upon examining it, he was surprised to find it occupied by dozens of snails and slugs, which, it seems, had congregated there from every corner of the garden. The experiment was continued, and it became apparent that the emanations of iodine will attract these creatures from a considerable distance, when they may be destroyed by hundreds.—When, as last year, the state of the weather prevents the farmer from getting in his hay in a perfectly dry state, the best means of preventing it from sprinking is to sprinkle salt in the proportion of about two pounds of salt to one hundred pounds of hay.—Wood may be rendered incombustible by impregnating it with a solution of silicate of potash, commonly called liquor of flint. The liquor is first laid on with a brush in a highly diluted state; this being repeated two or three times, letting the wood get dry each time, common whitewash is applied, and this again, when dry, is fixed by the concentrated solution.—A French chemist burned a piece of iron, and extracted a substance from it which he contained in the liquid, and had it made into a finger-ring, which he wore in memory of his friend—at least the *Scientific American* says so.