

RAILWAY MATTERS.

THE *Olley and Hiley Guardian* states that engineers, on behalf of the Great Northern Railway Company, are at present engaged in surveying between Hiley and Skipton, with a view of constructing a line by way of Bolton Abbey.

THE total length of all the Russian railways at work on the 1st of July last was 13,911 versts, or Russian miles, or 9,159 English miles. At the date of the last official return, 1244 kilometres of railway were being worked in Turkey. In both countries great progress is now being made in the making and opening of new roads.

THE total number of plans deposited in the Private Bill Office of the House of Commons up to eight o'clock on Saturday evening last, which is the latest time allowed by the Standing Orders of the House for the deposit of plans for private bills for the forthcoming session, was 241. Of these 42 were "provisional order" plans. Last session the total number was 280.

BARON DE SCHLEICHTER, whose appointment as resident representative of the Working Company of the Roumelian railways in its relation with the Porte, in succession to Mr. Coumamy, was recently mentioned, has arrived in Constantinople to enter upon the duties of his post. The Construction Company of the Roumelian railways will be locally represented by Baron James Hirsch.

ADVISES received from New York state that the Manchester (New Hampshire) locomotive works have again begun to work twelve hours. Some of the men who had been discharged have been taken back. The rolling mills of the Baltimore and Ohio Railway Company at Cumberland, Maryland, are working night and day. The Corrugated Iron Company, of Springfield, Massachusetts, are full of orders, and are running nine hours per day. Work at the United States Armory is also increasing.

A GENERAL order has been made by the Railway Commissioners, with the approval of the Lord Chancellor, to the effect that affidavits used in any proceedings before the commissioners may be sworn before any of the commissioners, their registrar, or officer, appointed by them (in these cases without the payment of any fee), or before any court, judge, justice of the peace, any person authorised to administer oaths in any superior court of equity, or a commissioner empowered to take affidavits. In any place out of the British dominions they may be sworn before a British Minister, Consul, Vice Consul or notary public, or before a judge or magistrate, his signature being authenticated by the official seal of the court to which he is attached.

M. LECOCQ, chief engineer of the proposed line of railway which the Government intends shall branch off from the Roumelian network and traverse the province of Albania to the seaboard of the Adriatic, has left Scutari to take charge of the staff of engineers who are making the preliminary surveys. These surveys will be carried on from two points at once, from Scutari and Pristina, and will thus, it is hoped, be completed during the winter, with the sole exception of some fifty miles of mountainous region in the centre, in which it will be impossible to commence operations until the spring. According to the *Levant Herald*, M. Lecocq and his staff will push their surveys across this chain of mountains, not from the principal valley of the Drin, but from some smaller valleys less exposed to inundations.

THE Uruguay Central and Hygueritas Railway Company of Montevideo announce that they are prepared to receive subscriptions for the issue of \$600,000 in mortgage bonds. Each bond is to be issued at \$85, the bond representing \$100. Subscribers will receive in addition, upon the delivery of each definitive bond, a fully paid-up ordinary \$20 share. The prospectus shows that a net profit of \$15 per mile will satisfy the interest on the bonds, the sinking fund, and the dividend of 7 per cent. on the preference shares of the company. The receipts for the six months to 30th June last, almost entirely from passenger traffic, amounted to £30 per mile, leaving, therefore, if it be continued, a sum of £15, per mile from which the ordinary shares, such as those given by way of bonus with the bonds, will be paid a dividend.

THE total number of net tons of iron and steel rails made in the United States in 1872 was 941,992, or 841,064 gross tons. This production was produced in sixteen States. Pennsylvania made 419,329 tons, or 44 per cent. of the whole. Ohio comes second in the list, taking the place which Illinois held in 1871. Illinois is the third State in the list, and New York the fourth. In the production of steel rails, the relative position of these four great iron producing States is almost the same. Pennsylvania produced 33,463 tons; Ohio, 22,000 tons; Illinois, 15,939 tons; and New York, 17,977 tons; total, 94,070 tons. No other States made Bessemer rails in 1872. This aggregate of production includes only such rails as are made for the use of freight and passenger railways, and excludes an ascertained production of 15,000 tons of street rails, and all mining rails made during the year. Adding these to the above aggregate, the total production of rails of all sorts in the United States in 1872 was undoubtedly one million net tons.

WE have had almost every conceivable kind of railway accidents this year, blundering accidents and accidents ingeniously refuted in their causes. Companies seem at times to have gone a long way out of their course to produce something really novel and sensational, but, as far as we are aware, we have not yet had the really straightforward crash of two trains meeting on the same line. However, we are not to be deprived of this feature, for it is announced in the *Pall Mall Gazette* of Tuesday that "There has been a terrible collision this morning on the Cornwall Railway, making the third this year. This time it is the 'enemy' that has been the righted and it is to say, the goods train have smashed into one another. The Cornwall Railway between Menheniot and St. Germans is a single line, and for nearly the whole distance it abounds with high viaducts. Early to-day a goods train was allowed to pass St. Germans station for Menheniot, and almost simultaneously, by some misunderstanding, an up goods train was permitted to pass Menheniot in a contrary direction. The result was the trains met point blank midway with terrific violence, crushing up nearly the whole of both, and injuring every man on each, some of them dangerously. Six of the company's servants are severely injured, principally by scalds and burns. They have been brought on to Plymouth and sent to the South Devon Hospital." What will the railway companies say to this?

THE men employed by the various railway companies are continuing their agitation in various parts of the kingdom, with a view to shortening their hours of labour. At Dundee a number of them have waited upon Sir John Ogilvy and Mr. Yeaman, the members for the borough, and submitted for their opinion certain grievances. The hon. members expressed their sympathy with the objects aimed at, but declined to commit themselves to any course at present. A deputation of Glasgow men recently waited on Messrs. Dalglisch and Graham, two of the city members, Mr. Anderson, the third member being in London. Mr. Thomas Hughes, M.P., was also present. The three hon. gentlemen advised the deputation to state their case to the new tribunal, namely the commission appointed in connection with the regulation of canals and railways, and they agreed to communicate with the boards of the three great Scotch railways, asking them to hold a conference with their servants to see whether the grievances complained of might not be amicably adjusted. At Sheffield the railway men held a meeting on Saturday night. Two goods guards said they had worked recently 103 and 106 hours respectively in one week, and from 70 to 100 hours per week appeared to be the common experience of this class of officials. A resolution was passed declaring the opinion of the meeting that the long hours which railway servants are employed are unsafe both to the public and themselves, and that, this being a question of public safety, the public should be requested to evince their sympathy at a public meeting to be called at an early date for that purpose.

NOTES AND MEMORANDA.

ACTUAL experiments show that water which remains overnight in lead pipes in New York contains 110 of a grain of lead to the gallon.

ACCORDING to M. Malenfant, by placing flowers in boiling water and collecting the distillate at once, a product much superior to that afforded by placing the flowers in cold water and raising the heat is obtained.

By comparing uranium compounds with those of tungsten and thorium, it is shown that the atomic weight proposed by Mendeleeff for uranium, viz. 240, is more probable than the old number, 120.

THE anthracite coal production of the United States for the present year, up to a week or two ago, shows an excess of nearly 400,000 tons over the product of last year. The bituminous shipments show an excess over last year of nearly 800,000 tons.

In the analysis of silicates it is customary to test the purity of the silicic acid by treating it after ignition with a concentrated solution of potassium or sodium carbonate. It has been found by C. Rammelsberg, that ignited silicic acid is partially insoluble in the carbonate, and it appears almost certain that under these circumstances the amorphous is converted into the crystallised variety.

It is an alcoholic solution of chlorophyll a few drops of solution of caustic potash or ammonia be added, no change occurs in its appearance or spectrum. When heated, however, especially with potash, the spectrum is fundamentally changed. The specific black bands of the red are doubled, while the other bands of chlorophyll disappear almost entirely.

To purify hydrochloric acid from arsenic, it is recommended by M. Engel to add to one litre of acid four to five grammes of potassium phosphite, allow to stand for some hours when the arsenic precipitates, and then distil. Chlorine is also removed by this process. The precipitation only takes place in the light, and is the more rapid the stronger the light. Heat also favours the reaction.

COTTON thread may be dyed in two or three colours by covering some parts with parchment paper, tightly wound, and thin tin or lead foil, holding the latter in place by binding threads. If tied sufficiently tight when the skeins are introduced into the dye bath, the protected parts remain white; and by protecting the dyed portion, and unwrapping the white portion, another colour may be applied.

DURING last autumn there were no less than seventeen companies engaged in extracting gold from the auriferous sand of Finland. The alluvial deposits at Toalo are said to be extremely rich in gold, the total production last season being estimated at 50,000 to 60,000 grammes, representing a total value of 60,000 roubles (£9500). One of these companies returned a dividend of 70 per cent.; the largest nugget yet found weighed forty grammes.

THE Romans used the large stone specus, or aqueducts, instead of ordinary pipes, because they could not depend either upon their leaden pipes or their terra cotta pipes to resist the force of such streams of water as they had to deal with. Nothing but the concrete stone was strong enough. At the present time we understand that cast iron pipes are frequently bursting in the streets of Rome. This seems to show that the old Romans knew what they were about.

COMMERCIAL benzole often contains quite a large proportion of petroleum, which leaves a disagreeable odour when the benzole is employed for the removal of grease. As a test for its presence a small piece of pitch is placed in a test tube and the suspected liquid poured upon it. Pure benzole will readily dissolve the pitch, forming a tarry mass, while adulterated benzole will be less and less coloured in proportion to the amount of petroleum contained in it. Coal tar will dissolve easily in pure benzole, but forms distinct layers when impure material is employed for the solution.

It would almost appear that birds, in some manner, become aware of infection in the air. Recent European journals state that at Munich, where several cases of cholera have occurred, the rooks and crows, which flew about the steeples and through the trees of the public promenades, have emigrated; and the same thing happened during the cholera seasons of 1836 and 1854. According to Sir Samuel Baker the same phenomena occurred at Mauritius, where the martins, which existed in immense numbers the year round, wholly disappeared during the prevalence of the cholera.

THE nitrate of soda trade of Peru has increased wonderfully within the last twenty-five years. In 1848, three vessels were sufficient to supply the demand, while now one hundred vessels are waiting for cargoes at the port of Iquique. A railway now connects the port with the saltpetre districts of the interior, and through its entire length is surrounded by manufactories. Thirty-one establishments, supplied with excellent machinery, are now in operation, and capable of producing 1250 tons a day. Twenty-one additional factories are being constructed, so that in a short time the production will amount to 19,000 tons a day, or 5,750,000 tons a year. The Peruvian Government have placed upon this article an export duty of 25 cents per quintal, and have limited the exportation to 4,500,000 quintals per annum.

M. VAN BASTELAER has published a method of separating free phosphorus, in toxicological investigations, from fatty matters, and obtaining the body pure. The agent used is liquid ammonia, which dissolves off the fatty matters, leaving the phosphorus. The suspected material is shaken three times, with an equal bulk of rectified sulphuric ether each time, and the solutions united; and, after addition of a small amount of water to protect the phosphorus which may be present from oxidation, the ether is allowed to evaporate spontaneously; a slight heating then suffices to melt the fatty matter and phosphorus, and the fatty lump is then treated repeatedly with ammonia of 21 deg. until only the phosphorus remains. The last traces of ammonia are removed from the phosphorus by washing, first with water acidulated with sulphuric acid, and then with distilled water.

A STATEMENT prepared by the United States Commissioner of Patents for the coming reports of the Secretary of the Interior shows that, during the year ending September 30, 1873, there were filed in the Patent-office 20,354 applications for patents, including reissues and designs; 283 applications for the extension of patents, and 519 applications for the registering of trade marks. Twelve thousand nine hundred and seventeen patents, including reissues and designs, were issued; 235 extended, and 955 allowed, but not issued by reason of non-payment of the final fee; 3274 caveats were filed, and 476 trade marks registered. The fees received during the same period from all sources amounted to 701,626.72 dols., and the total expenditure to 699,449.69 dols., making the receipts 2177 dols. in excess of the expenditure. The appropriation asked for the fiscal year ending June 30, 1875, is 693,500 dols. The expenditure included 40,000 dols. for the publication of the *Official Gazette*, 40,000 dols. for printing current drawings, and 60,000 dols. for the reproduction of old drawings. These items were unusual, and account for the absorption of most of the customary excess of receipts over expenditure. The cost of printing current drawings has heretofore been defrayed out of the Government printing-office appropriations. In regard to the reproduction of old drawings, the Commissioner considers the amount expended for that purpose a good investment, not only with reference to the intelligent advancement of the manufacturing interests of the country, but financially, as they are now being sold at two or three times their actual cost. The Commissioner again invites earnest attention to the great want of additional room for the proper transaction of the business of the office, stating that it is utterly impossible properly to classify the work of the office, in order to insure its being economically and well done, in the present crowded state of the files, records, and exhibits.

MISCELLANEA.

A HUGE steam roarer, consisting of three 15in. whistles, has been erected at the Sandusky (Ohio) steel works, which, when blown, can be heard fully fifteen miles.

THE *Pall Mall Gazette* Brussels correspondent states that the price of coal has fallen in the coal districts of the province of the Hainaut two to three francs per ton.

A NEW torpedo boat was lately launched with success at the Navy Yard, Brooklyn, N. Y. It is a double hull vessel, being built with two vertical sections and five watertight bulkheads, and will be furnished with a vertical wheel of peculiar construction, by means of which she will be guided as well as propelled. She is constructed wholly of iron, is 175ft. long, 28ft. wide, and 14ft. deep. On the bow she will carry a gun of 11in. calibre, and on either side and on the bow two torpedo booms will project. The torpedo boat has been building for two years, and she will not be finished until next year.

THE question of arming the Italian troops with a repeating rifle, which was agitated after the war as a means of more than counterbalancing the power of the Chassepot, seems again to be seriously entertained. A contract has been recently entered into for supplying eighty-four of the Vetterli rifles to each line regiment as an experiment. The Vetterli patent is that already adopted by the Swiss troops, who are now nearly all armed with it. It carries the spare cartridges in a long chamber underneath the barrel and can deliver twelve shots in succession without being taken down from the shoulder.

THE rebuilding of the Alexandra Palace, at Muswell Hill, is being carried on with great vigour by the contractors, Messrs. Kelk and Lucas, who have a large number of workmen busily engaged. The large arched roof for the central hall (386ft. long, 184ft. wide), the conservatories and the floor girders (about 500 tons in all) are being made by Messrs. Handyside and Company, Limited, of Derby and London. It is intended if possible to have the new building open to the public in May next. Mr. J. Johnson and Mr. A. Meeson, of Buckingham-street, Adelphi, are the architect and engineer.

A NEW map of the United States and territories has been prepared in the General Land Office, showing the extent of public survey, Indian and military reservations, railroads, and canals, all land grants, important features of topography, and many other details compiled from official surveys and other authentic sources, up to the 15th of August of the current year. This map corrects the numerous errors of all previous maps, and embodies a large number of results of the latest scientific research and exploration. Owing to the smallness of the appropriation available for its preparation, only a few copies of the map can now be printed, but it is expected that Congress will provide means for its wide distribution.

At a meeting of the South Staffordshire and East Worcester-shire Mining Engineers, at Dudley, on Monday, attention was called to the advisability of obtaining a hand coal-cutting machine, which could be carried about and worked by one man. Mr. Hughes said that there was a machine at Haden-hill, which worked well when the coal was close and in one lump, but when the coal was loose the teeth of the machine got choked. What was wanted was a hand machine, and the council was instructed to take into consideration the offering of a premium for the best machine of that kind. Some conversation also took place as to the French invention by which the miners are enabled to breathe in a noxious atmosphere by means of a charged knapsack. The secretary was instructed to write to the inventor.

WE have frequent applications for information concerning the demand for railroad men in South America. We, says the *American Railroad Gazette*, have made some inquiries of gentlemen interested in South American lines, and they tell us that no men are now required in Peru, as the works there are not being pushed rapidly forward. There are extensive works going forward in Chili, however, which require skilled labour, and our informant believes that a limited number of good masons, carpenters, and tracklayers, skilful and of steady habits, could find employment there. A first-rate tracklayer is at this time inquired for in New York, to go to Chili. Some important lines are under construction in the Argentine Republic, but we have as yet no information as to the demand for men there.

THE expectation that the Fantees might be able to make use of the bronze 4½in. howitzers, sent to the Gold Coast as part of the artillery of this expedition, has turned out incorrect, it being understood that they have been unfavourably reported upon in despatches from the seat of war, and they will be replaced by an additional number of 7-pounder mountain rifles. All the guns having to be worked by Englishmen, the simplicity of the bronze howitzers, which is their only recommendation, becomes of no value, and the use of such an imperfect weapon, with its antiquated spherical shell, as we pointed out in our number of Sept. 26th must be the case, is a source of vexation to the officers and men. The 7-pounder steel gun has, however, been found in every respect admirably suited to the purposes of the campaign, and as most of the fighting, up to the present, has been at close quarters, the most serviceable weapon has been found to be case shot, which scatters a shower of bullets over a broad area at a short range. An order has, in consequence, been received at the Royal Arsenal, Woolwich, for the immediate preparation and export of case shot in large numbers for the 7-pounder gun, but shrapnel shell has so many important advantages under almost any circumstances that may happen during the continuance of the war, that an additional supply is to be sent out at the same time, with a few shot and shell of other kinds. Some of the guns and a portion of the shot and shell will be taken out in the screw steamship Thames, now loading at Woolwich.

AN interesting series of experiments has been carried out in the Melway, off Chatham Dockyard, by the officers and men of the Royal Engineers, under the direction of Major E. D. Malcom, the head of the Torpedo Department at the School of Military Engineering, for the purpose of testing the merits of an invention by Mr. Mauldin Vintner for enabling divers when employed at any depth to hold conversation with those at the surface of the water. Hitherto an insuperable difficulty has been experienced by divers in being unable to communicate verbally with the attendants above, the principle usually adopted by divers being to give preconcerted signals by so many pulls on a signal line. This, however, appears to have been at length overcome by Mr. Vintner, in the invention submitted by him to the Government. In the trials just completed in Chatham Harbour, Corporal Falconer, an experienced diver of the Royal Engineers, equipped in the Siebe and Gorman improved diving apparatus (which has gained the prize medal at Vienna), made the descent, and during the whole time he was under water was enabled by means of the new apparatus to converse freely with those above, every word spoken by him being distinctly heard and understood. Mr. Gorman, who was present during the experimental trials, stated that the invention would be further improved upon, so as to facilitate its use in all diving operations connected with harbour works, and for laying stone blocks &c., in connection with subaqueous operations. The diver signals the attendant, who places his ear to a small cone at the top of the tube, whence a message can be distinctly heard. The diver has the apparatus completely under his control, and by placing his mouth to the mouthpiece inside the helmet, and then turning a cock on the outside, can communicate instantly with the attendant. The apparatus can, it is stated, be easily applied to any description of diving dress. The value of the invention will be readily understood and appreciated by everyone interested in the science of diving, from the simple fact of the great confidence a diver will gain from being in his isolated position enabled to speak directly to those in whose hands his life for the time being is literally placed.

