

Scientific Items.

OUR English industrial exchanges are all faithful advocates of free trade, but recent events lead us to believe they do not favor, taking away all artificial restrictions of trade between nations, because it is morally just or philosophically correct, so much as because free trade is likely to benefit English manufacturers. There has been remarkable unanimity among them in denouncing their government for purchasing pumps for the Soudan pipe line from Worthington, our American company. Yet the British government was merely following the policy the press of that country are so ready in recommending to other nations. But even there it makes a difference whose ox is gored.

WHAT WILL BURST A GUN.—In bravado a young man placed the muzzle of his fowling-piece under the water and fired the charge. The result was the bursting of the barrel near the breech, and the mutilation of his hand. Another placed and held the muzzle of his gun square against a piece of plate window-glass, and fired the charge—powder and bullet. The glass was shattered, so was the gun-barrel. Another instance was that of an experimenter who had heard that a candle could be fired from the barrel of a gun through an inch-board. He drove a candle into the muzzle of the gun, fired, and the explosion split the barrel almost its entire length, and did not even drive the candle from the muzzle. Still another burst of a gun-barrel was caused by the use of wet grass for a wad, well rammed down over a charge of shot. But perhaps one of the most singular exhibitions in this line was a Colt's navy revolver, which some years ago was sent to the factory in Hatford, Ct. This was before the adaptation of these pistols to the metallic cartridges, and it is probable that in loading with open powder and ball only a small amount of powder got into the chambers, and the bullet was not propelled with sufficient force to drive it from the muzzle; at least the bullet did not go out, but lodged. As the shooter did not know whether the bullet escaped or not, but kept on firing until the barrel burst or bulged, and when it was sawed in two longitudinally there were found fourteen bullets wedged one into the other, and so much "upset" by the hammering of the successive explosions of the powder-charges that some of them were not less than one inch diameter, flattened discs instead of conical bullets.—*Manufacturer and Builder.*

Miscellaneous Notes.

A YOUNG man in Auburn, N. Y., has perfected an invention by which a load of from two to four tons of coal can be emptied into the cellar in about half a minute. The invention can be used, it is said, on any ordinary waggon, or on a coal car, and those who have seen it in use in Auburn say that it is a most useful contrivance.

THE royal commission appointed to investigate the subject reported that the quantity of coal remaining and available for future use in the United Kingdom, from the year 1880, at the depths of less than 4,000 feet, might be safely estimated at 185,288,613,038 tons. It appears, therefore, that with an output of nearly 147,000,000 tons per annum, supplies are yet insured for 920 years hence.

THE latest experiment in the organization of industry comes from Russia, where the employes of the large engineering works belonging to the firm of Struve & Co., have recently been planted in a complete settlement, somewhat like Pullman city, near Chicago. The workmen, of whom there are between 3,500 and 4,000, are all lodged in small cottages, most of which are made to accommodate two families only; while the public institutions of the colony include a refectory, a laundry, a hospital, a benefit society, but charity in any other form is quite unknown in the place, and the co-operative society pays a flourishing dividend.

—As illustrating the excessively low rates at which ocean freights are being carried, we quote the following story from an English contemporary: "A new and cheap way of conveying goods from Liverpool to London has been inaugurated by an enterprising firm of Transatlantic steamship owners. A Liverpool firm having 1,000 tons of rough freights for London, finding that 10s was the lowest rate quoted, made overtures to the managers of a transatlantic line, who accepted the goods at 6s

provided they were not tied as to delivery. The shippers, being in no hurry accepted these terms, and the route specified in the bill of lading was via New York. The goods would go out to New York as dead weight, and would there be transferred into a London-bound steamer."

It was discovered upon examination not long ago, that a chimney 80 feet high at a machine shop at Holyoke, Mass., was about 42 inches out of perpendicular. The method employed in righting was quite simple. A harness was located under the cornice, and two others below the first. Two lever jackscrews were placed under the girders of one of the harness on one side, and six jackscrews similarly on the other side. The earth was then carefully loosed about the chimney on the opposite side from that of its inclination, and water poured in, after which the jackscrews were turned gradually, and the earth again loosened and dampened with the hose. After this process had been several times repeated the earth was puddled, and the whole stands now properly righted.

FLOATING BREAKWATER.—A new form of floating iron breakwater is to be placed as an experiment at Eastbourne, England. Its general nature is somewhat like this: Two rows of iron pontoons filled with cork or otherwise constructed internally to remain buoyant when injured by collision or by acts of war, are run out to sea in parallel lines. The front facing the expected storm stress is wedge shaped, so as by dividing the mass of projected water to lessen the force of the impact and cause part of the water to ascend in a column of spray, which then falls back. The wave which rushes under the ponton has its velocity retarded by a lattice framing, carried 12 feet below the ponton. The framing also imparts stability to the ponton. Behind the wedge-shaped ponton is another ponton which serves as a wall, and in the intervening space the waves are intercepted. Two sorts of chain moorings secure the breakwater.

A GREAT railroad bridge 3,000 feet long, is to be built over the Hawkesbury River, in New South Wales, Australia. The soundings appear to show that the foundations for piers must be sent down to a greater depth than any ever sunk by man in the whole history of engineering, the water in some places being 77 feet deep, and in others, where the water is 45 feet deep, the mud and sand is 125 feet deep, making 170 feet in all to sink the piers below tide. This bridge is to be for double tracks, and will cost over \$2,000,000. Proposals to build this great bridge have been asked of the leading bridge builders of England, Europe and the United States. Sir Saul Samuel, of London, on the part of the Government, has named a board of engineers, to meet in London in June to examine and report on the plans and tenders sent in by the bridge builders. The board named consists of Sir John Hawkshaw, C. E.; Col. Douglas Galton and Mr. W. W. Evans, M.I.C.E., of New York. Mr. Evans is just recovering from an attack of pneumonia and cannot avail himself of the honor thus conferred on him. This is the first time that an American engineer has been asked to serve on such a board in England, and it is to be regretted that Mr. Evans is unable to act.

A CORRESPONDENT of the London *Times* sends the following as a complete list of the vessels now being built for the French Government: Ironclads—The 'Brennus,' 10,650 tons; the 'Neptune,' 10,600 tons; the 'Marceau,' 10,600 tons; and the 'Requin,' 7,200 tons, while the 'Amiral Baudin,' the 'Foudroyant,' the 'Caiman,' the 'Indomptable,' and the 'Terrible' have been launched and are now being armed; ironclad for duty along the coast, 'Furieux,' which is the only one of this class of vessel not finished; first-class iron-clad gunboats of 1,640 tons each, the 'Acheron,' the 'Cocyte,' the 'Phlégeton,' and the 'Styx'; second-class iron-clads of 1,050 tons each, the 'Flamme,' the 'Grenade,' the 'Mitraille,' and the 'Fusée'; cruisers, the 'Sfax' and the 'Dabourdien,' which have been launched but are not yet armed; cruiser torpedoed of 1,280 tons, the 'Condor,' the 'Epervier,' the 'Falcon,' and the 'Vautour'; torpedo ships of 320 tons, the 'Conlevrine,' the 'Dague,' the 'Dragonne,' the 'Flèche,' the 'Lance,' the 'Sainte Barbe,' and the 'Salve,' while the 'Bombe' has been launched and is now being armed; gun-boats, the 'Météore' and the 'Etoile'; first-class dispatch boats, the 'Fulton,' the 'Inconstant,' and the 'Papin'; second-class dispatch boats, the 'Jouffroy' and the 'Salmandre'; transports, the 'Durance,' the 'Meurthe,' the 'Aube,' the 'Eure,' and the 'Rance.' Thirteen torpedo boats are being built, as well as a large transport ship for New Caledonia, two frigates, and two sailing vessels to be used as training ships. The total amount to be spent on ship-building for the current year is £1,350,000.