STEAM BOILER NOTES.

On January 9 the boiler of engine 167, on the north bound Illinois Central suburban train from Hyde Park, Ill., exploded as the train was pulling into Oakland Station. The end of the engine was blown out, and a stream of glass, splinters, and broken iron was sent into the car and upon the passengers. The engineer, John Glover, the fireman, Edward Scanlon, and a boy were badly burned and cut. The boiler was carried several hundred feet through the air, and came down through the roof of a workshop. It is a miracle that nobody was killed. The boiler was defective.

A boiler in Shaw Brothers' Tannery, at Jackson Brook, Me., exploded early Saturday morning, January 21, killing Thomas Lacy, the engineer. The exploded boiler was thrown fifty feet. Two other boilers were lifted from their bed. Two smokestacks were thrown down. The boiler house and furnace were wrecked.

The tug H. P. Farrington, the property of Cornell's Tow Line, was blown up at 7 o'clock P.M., January 23, while lying at Peck's Dock, Haverstraw, N. Y., and totally destroyed. The crew consisted of seven men, all of whom were on board at the time. Pieces of timber were scattered over the neighboring brickyards, and a coal-bunker deck ring was blown a distance of 300 feet or more. A dozen or so of the boiler tubes, which were 4 inches diameter and 9 feet long, were the only parts of the boiler that could be found in the vicinity, all else, with the boat itself, sank in the river and were soon covered with ice. The shock from the explosion was felt in many of the houses in the village, which is about one-quarter of a mile from Peck's Dock. The following persons were killed: Albert Hennion, second engineer, David Colton, fireman, and Lawrence Connelly, cook.

A boiler exploded in Cañon City, Cal., on Wednesday, January 25, resulting in the death of two men. The boiler was located at a shaft of the Cañon City Coal Company. The result of the explosion was the killing of a fireman outright and injuring a blacksmith so badly that he has since died. The engineer had a leg broken, and was badly scalded. The boiler was thrown a distance of 300 yards.

One of the boilers in the shade cloth factory owned by Irwin & Sloan and others, exploded December 27, before daylight in the morning. The middle of the building was demolished. Captain William Doran, night watchman, was instantly killed. He was the only person in the works at the time. The boiler had been shut off for cleaning on Christmas Day, and the steam stop valve had not been opened when the explosion occurred. The shock was terrific, and parts of the boiler were scattered over a large area. The boiler was under the inspection of an insurance company that had some $6,500 at risk. The loss on the building and machinery is about $15,000.

The boiler in the steam mill of the Kennebec Framing Company, at Fairfield, exploded, Jan. 28, with terrific force. A son of ex-warden Rice was killed, and John Avery, the foreman, Lemar, the fireman, and Isaac Farley, the engineer, were buried in the ruins. George McKeown and John Smith, a foreman, were wounded, and several others slightly injured. The underwork of the mill took fire. The accident is supposed to have been caused by a lack of water in the boiler. The explosion was accompanied by a deafening report, which jarred the houses all over the village and caused many to think an earthquake was taking place. The boiler, an old steamboat boiler, had been patched a number of times, and had been considered, it is said, very dangerous for months. The company was intending to put in a new one in the spring. The engineer says he had repeatedly told the manager of the great danger of an explosion. The management is greatly blamed by the citizens.

The boiler in the Belleville (Ill.) Nail Mill exploded, January 30, and almost totally destroyed the building. Several persons were seriously injured, William Davis probably fatally. Damage, $20,000; insured. Two hundred men and boys were thrown out of employment.

The Lalande Astronomy Prize.

At the annual meeting of the French Academy of Sciences February 6, the Lalande Astronomy Prize was awarded to Dr. Lewis Swift, of Rochester, N. Y.

The record of Dr. Swift as a scientific observer adds a new illustration to the truth, which students should never forget, that earnest and persevering efforts count for more than money and opportunity as elements of success. Most of Dr. Swift's work was done with the rudest appliances of his own making, used under anything but favorable conditions.

Movement of Cars on Brooklyn Bridge.

The report of the Bridge Committee on Transit recommends the circulating railway system for the Brooklyn Bridge. This system is operated by an endless wire rope, terminating in an elevated platform at the height of the elevated railroads in this city, and extending 600 feet from the terminus of the bridge. By this system the cars would be passed in one direction on one track and in the opposite direction on another track. The report of the committee concluded with a favorable opinion of the system by Engineer Roebling. The platforms, etc., would cost, according to the engineer's estimate, $268,980; engines, boilers foundation for machinery, sheaves, ropes, $73,439; boiler house and machine shop, $12,000; rolling stock, comprising thirty-four cars, having side doors, $4,125 each, making $99,000. The total cost of the circulating system would be about $500,000, including an estimate for contingencies

TEN YEARS' PROGRESS IN IRON AND STEEL PRODUCTION.

The advance sheets of the census report on the production of iron and steel, prepared by special agent James M. Swank, show an encouraging progress during the decade since the preceding census, both in the quantity of the product and in the efficiency and economy of the processes employed.

The report covers only productive establishments, such as turn out pig iron, rolled iron, steel in crude state, blooms, and bar iron. A comparison of the main items for the last two census years shows as follows:

	1880.	1870.	Incr. p. ct.
Establishments	1,005	808	24·38
Hands employed	140,978	77,555	81·78
Wages paid	$55,476,785	$40,514,981	36·93
Capital invested	230,971,884	121,772,074	89·68
Value of materials	191,271,150	135,526,132	41·13
Value of products	296,557,685	207,208,696	43·12
Tons produced	7,265,140	3,655,215	98·76

It will be noticed that the increase in quantity is much greater than the increase in cost, indicating greater economy in the methods employed. When the values have been reduced to a gold basis (the gold dollar of 1880 being worth nearly one-fourth more than the current dollar of 1870), it is found that the actual increase in wages was 68·8 per cent., while the gold value of the products was larger in 1880 by 76.4 per cent. The largest increase in quantity was in the various grades of steel, as will be seen from the following analysis of the products, the quantities being tons of 2,000 pounds:

	1880.	1870.	Incr., p. ct.
Pig iron and castings	3,781,021	2,053,521	84
Rolled iron	2,353,243	1,441,829	63
Bessemer steel	889,896	19,403	4,486
Open hearth steel	93,143	—	—
Crucible steel	70,310	28,069	151
Blister and other steel	4,956	2,285	117

The substitution of steel for iron in rails and other products caused a decline of 35 per cent. in the output of forges and bloomeries.

The great bulk of the product of iron and steel (nearly eight-tenths) is credited to Pennsylvania, Ohio, New York, Illinois, and New Jersey; and more than half of all was produced in fourteen counties, as follows:

Counties.	Tons.	Counties.	Tons.
Allegheny, Pa.	848,146	Mercer, Pa.	182,881
Lehigh, Pa.	324,875	Rensselaer, N. Y.	177,967
Northampton, Pa.	322,882	Montgomery, Pa.	168,628
Cambria, Pa.	260,140	Lackawanna, Pa.	151,273
Cook, Ill.	248,479	Milwaukee, Wis.	128,191
Dauphin, Pa.	223,676	St. Louis, Mo.	102,644
Mahoning, Ohio	219,957		
Berks Pa.	213,580	Total (fifteen) counties	3,783,673
Cuyahoga, Ohio	210,354		

The greatest advance during the decade was made in Cook County, Ill., which in 1870 produced only 25,000 tons of rolled iron.

In the five States named, where most of the iron workers are employed, the wages of skilled and unskilled labor in the various branches were:

	Pa.	Ohio.	N. Y.	Ill.	N. J.
Blast furnaces, S.	$1 64	$1 84	$1 77	$2 17	$1 75
Blast furnaces, U.	1 09	1 25	1 14	1 3	1 20
Rolling mills, S.	3 03	3 87	2 93	3 67	2 78
Rolling mills, U	1 17	1 32	1 22	1 25	1 22
Bessemer works, S	2 46	3 96	218	5 00	—
Bessemer works, U.	1 17	1 34	1 07	1 15	—
Forges and blooms, S.	2 43	—	2 48	—	2 24
Forges and blooms, U.	1 11	—	1 14	—	1 19
All works, S.	$2 32	$2 89	$2 43	$3 43	$2 32
All works, U.	1 13	1 30	1 18	1 27	1 21

The average wages of skilled labor throughout the country was $2.59, and of unskilled labor, $1.24.

Foreigners in our Cities.

The numbers, nationalities, and increase of the population of our principal cities are discussed in a recent census bulletin.

The first five in order of population are New York, with a population of 1,206,299; Philadelphia, 847,170; Brooklyn, 566,663; Chicago, 503,185; and Boston, 362,839.

In 1870, New York had a population of 942,292; Philadelphia, 674,022; Brooklyn, 396,099; Chicago, 298,977; and Boston, 250,526. During the past decade New York has added to its population more people than now reside in Cincinnati, and more than Boston had ten years ago. There are somewhat over 21,000 more women than men in the city, and 249,000 more natives than foreigners. The proportion of natives to foreigners in Philadelphia is much greater than in New York, or roughly three to one against three to two in New York. In Brooklyn the native proportion is somewhat more than double the foreign.

The second group of cities comprises St. Louis, 350,518; Baltimore, 332,313; Cincinnati, 255,139; San Francisco, 233,959; and New Orleans, 216,090.

In proportion of foreign population San Francisco ranks with Brooklyn; St. Louis and Cincinnati about with Philadelphia. In Baltimore the natives are nearly six times as numerous as those of foreign birth. Further south the native born overwhelmingly predominate.

Method of Purifying Arsenical Copper.

The author operates on a basic hearth of lime and tar, according to the process of Riley and Gilchrist, and at each operation he uses a false hearth of limestone mixed with peroxide of manganese. During the fusion of the ingots this false hearth is heated and gives off carbonic acid and a part of its oxygen. These gases traverse the mass of half melted copper. When the bath is sufficiently liquid the lime and the manganese oxide thus formed rise through the copper and dissolve the arsenic acid, which passes into the slag. To expel the last traces the copper is allowed to become pasty in a current of air, and is then remelted with the addition of basic fluxes till entirely purified.—*J. Garnier.*

Proposed Saving of Time in Atlantic Transit.

The time required for the conveyance of mails from New York to London is given as follows: New York Post Office to Sandy Hook light, 3h. 30m.; Sandy Hook to Queenstown (best average time 1881), 8d. 13h. 45m.; delay of mails at Queenstown, 1881, 3h. 30m.; Queenstown to London, 22h.; total, 9d. 20h. 45m.

It is proposed to better this time by means of swift steamers plying between the eastern extremity of Long Island and the new port of Milford Haven, in Wales. The time by the new route is estimated as follows: New York to Fort Pond Bay, via Long Island Railroad (110 miles), 2h. 30m.; transfer at Fort Pond Bay, 1h. 30m.; Fort Pond Bay to Milford Haven (southerly and lowest route 2,880 miles, at 18 miles an hour), 6d. 16h.; transfer at Milford Haven, 1h. 30m.; Milford Haven to London (322 miles), 8h.; total 7d. 5h. 30m. A speed of 20 miles an hour on the ocean, which Mr. Pearce, the English shipbuilder, offers to guarantee to vessels of his construction, would reduce the time to 6d. 13h. 30m. For seven years the construction of docks at Milford Haven has been going on, and they are now nearly ready to receive the largest steamships. They were designed by Sir E. J. Reed, late Chief Constructor of the British Navy. The dimensions of the docks are as follows: Total available dock area, 60 acres; lock 500 feet long by 70 feet wide; graving dock, 710 feet long, 96 feet wide; small graving dock, 270 feet long, 46 feet wide; depth over sills, high water spring tides, 36 feet, and at high water heaps, 27 feet; depth of water in docks, 28 feet. The cost of the docks has been about $2,650,000.

The Past Year's Work in the Patent Office.

The report of the Commissioner of Patents for the year ending Dec. 31, 1881, bears abundant evidence that there is no falling off in the activity of our inventors. The number of patents issued was 17,620, against 16,584 for the preceding year. The total number of applications requiring investigation and action was 30,242. Of these 26,059 were for patents for inventions, designs, and reissues, and 4,183 were caveats filed, applications for registration of trade marks, labels, etc. The total receipts of the office during the year from all sources were $853,665 89, and the expenditure $605,173 28. The total balance in the Treasury of the United States on account of the patent fund on January 1, 1882, amounted to $1,880,119 32.

The Commissioner urges upon Congress the pressing necessity of increasing the examining force of the office, and providing more room for the use of the office.

Census of the Oyster Industry.

For the first time the oyster trade has received appreciative treatment by a census bureau. The investigation of the industry was committed to Mr. Ernest Ingersoll, whose report has just been published, covering the history and present condition of all the oyster grounds from Canada to the Gulf of Mexico, besides those on the Pacific coast. In the census year of 1880 the capital invested in the oyster industry was $10,583,295. The number of bushels of oysters produced was 22,195,375. Their value to the producers was $9,034,861, and their value as sold was $13,438,852. The number of persons employed was 52,805, and there were used in the work 4,155 vessels and 11,930 boats, valued at nearly $4,250,000.

The total wholesale value of the oysters annually sold in Boston is $705,000; the value of the oysters produced in Narragansett Bay is $680,000; the value of those sold in New Haven Harbor is $480,000; in the East River and Peconic Bay, 708,000; on the south shore of Long Island, $400,000; in New York Bay, excluding New York city, $375,000; in New York city, $2,758,000; on the ocean shore of New Jersey, $310,000; in Delaware Bay, $2,425,000; in Philadelphia, $2,750,000; and in Virginia nearly $2,000,000, and about $125,000 will cover the value for the remainder of the Southern coast line, not including the Gulf line, where the value slightly exceeds $300,000.

Wine from Beets.

The loss of vines through the ravages of the phylloxera is forcing the wine makers of France to strenuous efforts to find a substitute. M. A. Delenil, a member of the Agricultural Society of France, insists that an acceptable substitute has been found in a variety of red beet root, which he describes as "unrivaled in the whole world for its incomparable qualities, which will in time replace all that we have lost in the vine. Beet root produces alcohol of superior quality; why, then, should not its pulp, treated like the must of the grape, produce an equally luscious beverage? In fact, this has been done; the very sweet red beet root produces by fermentation a wine quite as good as many of the *soi-disant* wines of our southern vineyards. It possesses the additional advantage of accommodating itself to all soils, and flourishes in most climates." All this may be true; yet we fancy that American wine users at least will prefer the juice of their own grapes.

Sir William Palliser.

Major Sir William Palliser, widely known for his inventions in ordnance and armor, is dead. Among his inventions are the projectiles which bear his name; the system of converting smooth bore cast iron guns into rifled compound guns; the screw bolts used in attaching armor to forts and iron clad vessels; and many improvements in the construction of heavy wrought iron rifled cannon. He was born in Dublin, in June, 1833.