RAILWAY NOTES.

SINCE the building of the Mount Washington Railway eight similar roads have been constructed in Austria and Switzerland. The engines for these roads were first built with vertical boilers; next with boilers that were level on an average grade; now they are built with horizontal boilers like ordinary locomotives. Various methods have been devised for enabling the locomotives to work by adhesion of their smooth wheels, as well as by means of their cog-wheel drivers, and by means of either at will. No one of these has been permanently successful, however, so that the proper construction of a double engine of this sort is still a matter of experimental inquiry.

THE Prussian Government railroad management is making great efforts to reduce the expenses of the state railroads. The principal reforms are said to be as follows: First, the construction of tunnels on new roads for a single track only. Hitherto, when a road was built, though with a single track and a very remote prospect of needing another, the tunnels on it were made wide enough for two tracks. Second, the use of steel rails exclusively, and the adoption of an iron superstructure (the Hilf system) instead of wooden cross-ties. Not much credit is claimed for the adoption of steel, the price being about the same as that of iron, but the iron superstructure is hailed in Germany as a forward step, and also likely to be a good thing for the German iron works. Third, the abandonment of optical signals for sections of the road between stations. This simply makes the Prussian practice like that of the greater part of the rest of the railroad world, in Europe as well as in America. The change is said to have been without any injurious effects, while there has been a considerable saving in the army of road guards who have been accustomed to stand along the roads and salute the trains as they pass—a saving which has been re-enforced by substituting women for men to attend the crossing gates found at short intervals along every road. Fourth, the introduction of central interlocking switch and signal apparatus, of the Saxby & Farmer or similar patterns. Not only, it is said, has this resulted in greater safety, but also, by substituting a mechanical apparatus worked by one man to set a large number of switches and signals, the number of switchmen has been considerably reduced, even at small stations. Fifth, the introduction of continuous brakes. These have been put since 1878 on nearly all the passenger trains of the government roads, pretty much all kinds being used—the Westinghouse, Smith (vacuum), Heberlein, and Steele. Experiments have been made with the Heberlein brake on freight trains, and it is said with prospects of success in economizing the number of brakemen as well as increasing safety. Sixth, the reduction of the cost of switching service by arranging sorting tracks on inclined planes, where the movement is generally made by gravity alone, without the use of an engine. This has been the practice at a few great yards in Germany for a number of years, with very excellent results, it is said. Horses have been used instead of engines in switching cars, also with economy. Seventh, the adoption of regulations for working roads with light traffic without all the precautions and appliances which are made necessary only by frequent, heavy, and fast trains.

AN act, introduced by the Minister of Public Works, for the amendment of the Canadian railway act of 1874, as regards railway bridges and bridges over canals and rivers, provides that, in all bridges hereafter to be erected over railways in Canada, there shall be seven feet clear of space between the lower beams of the bridge and the top of the highest freight cars; and any railway company adopting higher cars than those in use at the time of building any bridge shall be compelled to raise such bridge at their own cost and charges. It is also provided that no railway shall be allowed to pass over any navigable river or canal without first having built such proper flooring under and on both sides of the track as shall be deemed sufficient by the Minister of Public Works to prevent anything falling from the railway into such river or canal, upon boats or vessels navigating it.

THE Springfield *Republican* reports that the new 42 inch railroad car wheel is disappointing the confident expectations it awakened. Out of 80 tested on the Boston and Albany road, 22 have broken, and the expenses of the fast train which runs on them are greater than last year, when the old 33 inch wheel was used. The 42 inch wheel weighs 850 pounds, and the 33 inch wheel 450 pounds. Vice-President Reed, of the Southern road, does not think favorably of the big wheel. Possibly if the manner of manufacture could be altered, there would be less breakage. At all events, says the *Republican*, the idea will not probably be given up without further trial of at least six months.

THE Sacramento (Cal.) *Bee* reports that in the shops of the Pacific road in that city 25 new style sleeping cars for emigrants are being fitted up. The new cars are provided with upper and lower berths, somewhat after the manner of caboose cars. The upper berth swings freely on iron rods, and when not in use can be hung up on the roof of the car, where it is not in the way. The lower berths are formed from the seats, which are made up after the manner of the present sleepers, by turning down the backs, etc. Slats are then placed crosswise, and when laid out the berths are exceedingly neat and comfortable. This will be a great convenience to persons traveling third-class, as heretofore they have been compelled to sit up or make shift as best they could.

TOUCHING the recent steel rail controversy, Mr. Wm. A. Sweet, an American steel manufacturer, asserts that the steel rails made in England and rolled on two high trains are better for wear—the chemical constituents of the steel being the same—than the rails made in this country and rolled on a three high train; not because the train is a three high or a two high train, but because the rail, when it is finished, is colder, and is left in a more condensed condition, and therefore better prepared to receive the wear of wheels. In other words, it is stronger and tougher. Mr. Sweet claims to be able to prove the correctness of this assertion, and that any steelmaker can test it for himself in a few hours. He claims also that if the American rail is rolled until the scale is set, the rail will be better than the English.

THE *Journal* of the German Railroad Union gives a list of the European railroads on which the Pintsch system of gas lighting is used, and the numbers of cars on each to which it is applied. The total shows 22 roads in Germany, 1 in Austria, 3 in Russia, and 2 in England, besides a sleeping car company, 2 imperial court trains (German and Russian), and 2 cars for the Crown Prince of Germany. In all, application has been made to 3,600 cars and ordered for 705 more. There are 42 locomotives that have been provided with the apparatus. It was first introduced ten years ago on the Lower Silesia and Märk road.

THE *Railroad Gazette* finds a statement of some of the long distance grain rates from Russia and Austria to Germany in a complaint that the rates from Russia are so excessively low that the Austrian producers have no fair chance to compete. The rates are for a car load of grain (22,040 lb. = 367 bushels of wheat) from the Russian station Brody to Leipsic, a distance of 658 miles, $99.40, which is at the rate of 45 cents per 100 lb.; from the Austrian station of Debreczin to Leipsic, 654 miles, the rate is $116, or 52·6 cents per 100 lb. It is years since the rate from Chicago to New York, nearly one half further (911 to 980 miles, according to route) has been as high as 45 cents on grain, and for two or three years it has probably not averaged more than 25 cents, going at times on a few shipments as low as 15 cents. The roads west of Chicago, which are often charged with "extortion" and which do usually make a profit on their grain traffic, do not get anything like the Russo-German rates. From Kansas City to Chicago, about 500 miles, the highest winter rate has been 25 cents for wheat and 20 cents for corn. On the basis of the Brody-Leipsic rate they would be about 34 cents. The Chicago-New York rate on that basis would be, by the shortest route, 61½ cents per 100 lb.

AT the regular monthly meeting of the Engineers' Club, of Philadelphia, March 15, C. E. Buzby exhibited a model of Travers' iron railroad tie, which is being tried on the Philadelphia and Baltimore Central road, near Lamokin. The device dispenses with all spikes, bolts, nuts, or fish plates, and drilling or punching the rails, avoiding fractures from such causes. The iron tie, it is claimed, will outlast twelve renewals of the ordinary tie at one half the cost to keep in repair. Each tie is recessed under its rails, and along the bottom of the recess wedge-shaped pieces are cast transversely. At the sides of each recess are creosoted blocks, which form a cushion and fulcrum for two clamps, which grasp the flange and web of the rail above, bearing upon opposite faces of the wedge below. The weight of the train forces the clamps upon the wedge, spreads them at the bottom, and grips the rail. The first cost is somewhat greater than the wooden tie, but it is said to offset this in durability.

DISCUSSING the wearing qualities of steel rails at the meeting of the American Institute of Mining Engineers in Baltimore, Mr. R. W. Hunt said: "I am convinced that more rails have been broken by the treatment which they received before leaving the rolling mill than from any other cause. I allude to the injury inflicted upon them in the cold straightening press, where each blow of the gag forms a wedge of the particles of steel pressing upon the surrounding ones, and thus serving to rend the rail asunder. I am certain that of all the broken steel rails that I have seen, fully 75 per cent have been ruptured at the gag mark. So well recognized is this cause of breakage that the Troy Works and others have spent large sums in introducing machinery to more perfectly hot straighten the rails, and thus leave less work for the cold press. While I admit that Dr. Dudley's physical analyses show a difference in the broken and crushed and the unbroken and uncrushed rails, I am not prepared to accept these results as coming entirely from the chemical properties of the metal. If I mistake not, 7 of the 25 samples are from crushed rails. May not these failures have been caused by mechanically imperfect bars, piped ingots, or some other mechanical defect? Then, again, the possibility of the steel having been overheated in the rail rolling mill must not be ignored. For it is well known that the same steel worked at different temperatures will afterward yield widely differing physical results. We, who have to encounter the difficulties of manufacture, know how many and vexatious they are in their physical as well as chemical forms."

INTERLOCKING switch and signal apparatus is becoming the rule rather than the exception on many English roads, being used not at important points only, but elsewhere. The London and Northwestern has apparatus at 2,888 places, and has between 17,000 and 18,000 levers. The Chairman, Mr. Richard Moon, at a recent half yearly meeting, said that the total expenditure for interlocking and the block system had been between £800,000 and £900,000—say something more than $4,000,000.

DISCUSSING the practical superiority of the American locomotive for the rough and ready requirements of ordinary railways, a writer in *Harper's Magazine* says:

"It is to the American we must turn to learn what are the requirements of the modern railway, and to get some suggestion of its future. More than this, the moment the English locomotive is taken from its island line it exhibits defects and a certain want of pliability that completely unfit it for a Continental railway. But if the English road and the English engine are the best in the world, why are they not the best for the world? Simply because they do not pay. There can be no higher reason than this. Anything that does not pay is useless, because it does not meet a human want. The cost of any operation is the measure of its value to human beings, and if the road does not pay, of what good is it? Now a a railway, to be cheap, must follow the face of the country; that is, the line must go up and down hill, pass around abrupt curves, according to the lay of the land, and without much attempt at a straight line or level bed. It is upon this idea that American railroads have been built, and all Continental lines are likely to be built in the future. If a railroad can thus follow the face of the country, it will not cost so much, there being no high bridges, deep cuts, and tunnels. Of course there is a limit in this direction, and even the American engine cannot climb up the side of a house, or turn a right angle in its own length; but within certain broad limits it may be said that the future locomotive must follow lines that run up hill and down dale, and get around very remarkable corners. This being the case, what of the English locomotive? Can it travel in safety over crooked lines that wander in astonishing freedom over hill and dale through all the sinuous lines of a winding river valley? There is no need to say it ought, or it may, for it never did. It has been tried again and again, and the end of it all is, the engine is in the ditch, and the unlucky stockholders are clamoring for American engines, or at least engines built on American plans."

A TIME schedule of the special train ordered by the National Democratic Committee to bring Hon. John Whitaker, Congressman-elect from San Francisco, to Washington, in time to take part in the organization of the House, shows that the whole distance was made in 4 days 14 hours and 30 minutes actual running time. The speed of the train averaged thirty-one miles per hour between San Francisco and Ogden, and fifty-one miles per hour between Cheyenne and Sydney. The whole time is the quickest ever made between the Pacific and Atlantic.

The World's Product of Iron and Steel.

In his report on the iron and steel display at Paris, Commissioner Morrell gives the following statement of the present annual production, based on the latest statistics:

Country.	Cast and Pig Iron. Year.	Production. Tons of 2,240 lb.	Per ct. of Total.	Steel. Year.	Production. Tons of 2,240 lb.	Per ct. of Total.
Great Britain	1878	6,300,000	45·63	1878	1,100,000	39·70
United States	1878	2,301,215	16·67	1878	735,000	26·53
Germany, including G. Duchy of Luxemburg	1876	1,816,672	13·16	1876	384,159	13·87
France	1878	1,417,073	10·26	1878	281,801	10·17
Belgium	1876	562,086	4·07	1877	100,000	3·61
Austria and Hungary	1876	443,689	3·21	1876	113,152	4·08
Russia	1875	420,035	3·04	1875	12,730	·46
Sweden	1876	346,955	2·51	1876	23,692	·86
Other countries	1877	200,000	1·45	1877	20,000	·72
Total		13,807,725	100·00		2,770,524	100·00

Mr. Morrell observes that a significant fact illustrated at Paris was that (owing to the marvelous increase in the production of Bessemer steel) the manganiferous and non-phosphoriferousones of Spain, Algeria, and Italy have been largely drawn upon for supplies to Bessemer works in countries rich in other varieties of ores. Of still greater significance was the large and varied collection of Bessemer products exhibited. The revolution which the Bessemer process has wrought in the iron trade was made strikingly manifest in a survey of the contributions of European countries, but to an American who remembered the wonderful development of the Bessemer industry in his own country, which sent no Bessemer products to Paris, these contributions were more impressive and more suggestive than they could be to any European. The Paris Exhibition showed that the progress made during the past two or three years in the manufacture of Bessemer and open hearth steel is so great that statistics fail to give any proper conception of its magnitude. The London *Times* remarks that "the Bessemer process has ruined the manufactured iron trade." Mr. Morrell says: "It has done more than this—it has distributed among many countries the manufacture of Bessemer steel, and thus enabled them to supply more fully their own metallurgical wants, and the metallurgical wants of other countries, in lieu of their own previous partial dependence upon Great Britain for both iron and steel products. It has thus aided not only to ruin the manufactured iron trade of all countries, but to ruin that of Great Britain particularly, and it has placed a limit upon the Bessemer steel industry of Great Britain itself. Here is a new revolution, or a new revelation, in connection with the world's iron industry which was reserved for Paris to make clearly manifest through the abundant proofs there furnished of the wide distribution of the Bessemer process and the wide substitution of Bessemer products for those of iron and other steel processes. And what has been said of the Bessemer process and of the injury it has inflicted upon the British iron trade is applicable also in a large degree to the Siemens-Martin process and its modifications."