Extracts from a Letter of Howard Fry, Mechanical Engineer (in charge of Motive Power of Philadelphia and Erie Railway, a branch of Pennsylvania Railway), to W. W. Evans, dated 11th February, 1880.

"There are points of difference between locomotives such as are generally turned out of English and American shops. Generally English engines have frames made of iron plates; these plates, if the engine is a heavy one, are of such size that out of England they are difficult to procure, so that in the colonies the breaking of a frame is a serious matter. In an American engine the frames are usually iron bars. They can be made in any country where bar iron can be bought, and if broken can be welded up as good as new in any shop where a blacksmith's fire can be rigged. Driving wheels in English engines are generally of wrought-iron, and can only be made by smiths specially trained to the work and with suitable appliances, so that if new ones are needed in any country but England it is necessary to import them. But the American wheels are cast, and do not require exceptional skill to mould, so that a superintendent of American engines is under no more necessity to import driving-wheels than axle-boxes. It is generally considered American practice to use steel fire-boxes, and in English practice copper, but many exceptions can be found in both countries. Copper fire-boxes are, I believe, more often put in in America than steel in England. Possibly English steel plates cannot be trusted for this purpose as well as American. The cab in English practice is generally made of iron, and if broken requires a skilled plate-worker to repair; while the American cab, being of wood, can be repaired or a new one built by a native carpenter. There is, too, a marked difference in the provision for comfort of the driver between an English and American cab. The English rarely provide seats, and in arrangement of windows and inside fittings appear to care nothing for the man in whose care the engine is to be. In Canada, where both English and American engines have been used, it has often been found that the company sustained serious loss from the inability of the men to remain on their engines. If stuck in a snow-drift to abandon their engines and let them get frozen on the road is a very serious matter, and when several nights have to be spent in a drift, with the mercury below zero, cushions to lie down on and curtains to keep out the cold, are more than luxuries. The locomotive superintendent in the colonies who buys an American engine finds that he can repair and, if he wishes, reproduce it in his own small shops, and it does not always follow that the superior material and form is worth its extra cost. . . . All this may help to explain why engines are built in America, in spite of high wages and excessive cost of material, cheaper than engines for similar work are built in England, and partially accounts for the popularity of American engines wherever they are tried, as in Canada, for instance, where the railways are all officered by Englishmen, who come to Canada with a strong bias in favour of everything English, but who have in every case adopted finally American types in their locomotive practice. I do not know where there are any English-built engines suitable for comparison with American. I never yet saw an English engine at all suitable for the average colonial or American service. All the English engines in Canada were completely unfit for the work they were designed for, and have so universally been condemned that England has lost the entire trade of this her nearest colony, and of the hundreds of locomotives ordered since the Grand Trunk Railway changed its gauge not one has been obtained from England. Now, this does not prove that English engines are worse than American, or that English firms cannot build engines to run on our lines; it simply shows that English firms have not done so thus far."

NOTE.—The writer of the above letter, Mr. Howard Fry, is an accomplished English mechanical engineer, of long experience in England, Canada, and the United States. He is well known among the engineers of the States as a man of marked ability and extensive knowledge of all things relating to railway machinery. His opinion carries weight with it among all American engineers, and I feel sure it ought to be respected wherever it is known, and I also feel sure that in writing and giving his opinions on railway machinery he is actuated by the same motives that govern me—namely, to be honest, and to do what in him lies to promote "railway progress" and "railway economy" throughout the world, without reference to vain nationalities, or stopping to consider who is knocked down or who is set up.—W.W.E.

Data from Letters of Vice-President Strong, I. A. Burr, Engineer, and G. Hackney, Locomotive Superintendent of Atchison, Topeka, and Santa-Fe Railway, in reference to the Baldwin Consolidation Engine "Uncle Dick," running on the Raton Mountain Division, March, 1879.

"DIMENSIONS, ETC., OF ENGINE.—Cylinders, 20 in. x 26 in.; total wheel base 22 ft. 10 in; rigid wheel base, 9 feet; weight on drivers, four pair coupled, 100,000 pounds; total weight, including 1,000 gallons of water, 115,000 pounds; diameter of driving-wheels, 42 inches; total heating surfaces, 1,377 square feet; gauge of road, 4 ft. 8½ in.; maximum gradient for 2½ miles, 1 in 16·5; minimum curvature, 360 feet radius. 'This engine has hauled, at 6 miles an hour, nine American cars, with 12 tons on each, over this maximum gradient, or 173 tons exclusive of engine. On 1 in 50 it has hauled 430 tons at 8 miles an hour. On 1 in 33·3 it has hauled 230 tons at 8 miles an hour. (Tons of 2,240 pounds.) The above loads are started from a standstill, without taking the slack of the train, and without slipping the drivers."

Extracts from the Paper of C. D. and F. Fox, No. 1,332, *read before the Institution of Civil Engineers in* 1874, *on Pennsylvania Railway, and the Discussion on same.*

Page 4. "The Messrs. Fox show that the net earnings of this great railway were, for thirteen years, a little over 12 per cent. per annum on the capital, and that from 1853 to 1873 the company have paid an average yearly dividend of 9·9 per cent., and a total in dividends of 234 per cent. in 20 years on the entire capital cost. This wonderful result, we are asked to believe, was accomplished by the use of engines and cars of miserable construction."

Page 8. "This railway has in use several different classes of engines. Much attention is paid to interchangeability in construction. An idea of the uniformity practiced is shown by the fact that, while 112 patterns are required for one engine, only 187 are required for all the seven classes. The trucks have chilled cast-iron wheels. Steel wheels have been tried, but it was found that they would not stand the severe work of guiding the locomotive over the sinuosities of the line. Solid cast wheels, with the running surface chilled, are the safest, especially in cold weather, a truck wheel of this kind rarely breaking, and one such wheel outliving at least three steel wheels. Again, the flanges of chilled wheels are soon made smooth and highly polished by wear; while the flanges of steel wheels soon become rough and torn, and in a short time two thin and sharp for safety. Chilled cast wheels are used for the rolling-stock, steel tires having been tried for the passenger cars, but quickly became dangerous from rapid wear."

Mr. F. W. Webb (Mechanical Engineer of the London and North-Western Railway) said, "He had spent a good deal of time on the Pennsylvania Railway. The locomotive had much smaller driving-wheels. Since his visit to America he was running some of the fastest express trains, including the 'Flying Scotchman,' with locomotives having driving-wheels of 66 inches in diameter."

Mr. T. W. Worsdell (Second Mechanical Engineer on the London and North-Western Railway, who was in service on the Pennsylvania Railway for some years) said, "During his connection with the Pennsylvania Railway the company began the manufacture of steel boilers. He had been engaged in the construction of 120 steel boilers and 250 steel fire-boxes. When the copper-fire boxes were worn out thin crucible steel was substituted. He knew from experience that cast-iron valves lasted longer than the brass valves in common use in England. A valve was seldom broken, although the area was large. The Pennsylvania Railway Company were the first to make driving-wheels with hollow spokes and rim. He had never known one of the hollow-spoke wheels to be broken, except in cases of collision or 'jumping the track.'"

Mr. J. Fernie said, "Contrasting the English complicated wheel with the simple American chilled wheel, he was induced to think the Americans were in advance of this nation. From the humblest wagon to the most sumptuous Pullman car, all were fitted with the simple chilled wheel. In his travels through the United States, what he saw in regard to mechanical-engineering work was of the very best kind. All appeared to aim at perfection, and no expense was spared in arriving at that result. Many revolutions in mechanical engineering had been introduced in this country from America."

Extracts from a Paper, No. 1469, *read before the Institution of Civil Engineers, in January,* 1877, *by Alexander McDonnell, on the Repairs and Renewals of Locomotives.*

Page 20. Mr. McDonnell gives some of the statistics of the Reading Railway of Pennsylvania, furnished to him by the General Manager, Mr. Wootton. As this railway has much the heaviest traffic of any railway in the world, moving