what some of these gentlemen said, thought, and urged; but the soil on which they sowed their seed of belief and faith never produced any good fruit. Some twenty-seven years since I undertook to sow some American locomotive seed of this kind in England, but was promptly met with the assertion that we in America were all wrong and they were all right. If that was really so, why did they in Canada alter all their first English locomotives to American patterns, and then order a vast number more from the United States, paying a large duty on every one they received, and have continued their orders ever since. Why have other English colonies, Victoria, New South Wales, Queensland, South Australia, New Zealand, &c., sent to America for locomotives. Surely no Englishman in his senses would send to America for engines unless he had some pretty positive proof that he was going to get something superior in utility and economy to what he could get at Home. I have never heard of any American manufacturer soliciting their orders. I have received and executed some of them, but I have never solicited them or expected them. I felt that there was no use in any American builder asking for orders, as they stood no chance of getting any. This was the case when a Canadian company asked for proposals for the Great International Bridge over the Niagara River. No American firm proposed. Finding there was no American proposal put in, the Canadians sent to Clarke, Reeves, and Co., asking for a proposal. They put in one, and got the work, not through any favour, but because their bid was much the lowest. This bridge is a master-piece of engineering. At the time it was built it had in it the largest "Draw"—360 feet—ever put in a bridge. It stood all the severest tests, some of them under the eyes of Captain Sir Henry W. Tyler, R.E. (It has carried a very heavy traffic for years.) Since then this firm of bridge-builders have built all the long-span bridges for all the railways in Canada, simply because they can do the work cheaper than others, and pay a heavy duty besides.

Mr. Maxwell draws a comparison between two engines, showing cost and tractive power (I have shown that he makes a huge error in quoting cost). He says the tractive force of American to English, of the two he compares, is as 60 to 93. This is the calculated or theoretical force, but what is the relative powers of these two engines when at work? Which can utilize the greatest percentage of its power—which consumes the largest percentage in frictions—which can traverse the curves the easiest—which is the steadiest engine in running—which is the easiest on the track—which requires the least repairs? All these are elements that the practical *professional man* will ask for. I cannot give them, but Mr. Maxwell, being on the spot, could and should have got and given all this data. It would, if favourable, have strengthened his argument, and it would, if unfavourable, as it was very likely to be, have knocked his argument all to "flinders." As I have not the New Zealand data of work, &c., actually done, I beg to mention some data of engine trials on a Government railway built under my direction in Chili, South America, in 1859. This railway, running from Santiago, the capital, to the south, had easy gradients and curves. Two engines were ordered from England and two from the United States, one goods and one passenger from each country, with the understanding that they were to compete with each other. Before the trials took place the Minister asked Mr. Bailes, the English engineer of the Valparaiso Railway, to calculate, from dimensions an weights, the theoretical powers of these engines; that is, what they ought to do.

Mr. Bailes was the cleverest mechanical engineer that had ever been on the west coast; he made a correct and accurate calculation of the powers of each engine, and compared them relatively. He showed that the English engines had theoretically the advantage in cylinder, tractive power, and in power due to adhesion of over 12 per cent. He shows the relative heating surfaces, and then winds up his report to the Government with the following passage: "Thus we see that, in addition to the superiority of tractive power of cylinders, and the tractive adhesion to the rails possessed by the English engines, their ability to sustain that power by the generation of steam exceeds by about 50 per cent. that of the American engines."

Now, having got through with the theoretical part, let us look at the practical part—the dimensions and the work done; the part the *professional man* would be likely to ponder over:—

Goods Engines.		—	Passenger Engines.	
English, by Hawthorne.	American, by Rogers.		English, by Hawthorne.	American, by Rogers.
28·60	28·11	Weight in gross tons	27·61	27·78
64081	39160	Weight on driving-wheels in pounds	46122	39576
6	4	Number of driving-wheels	4	4
54	54	Diameter of driving-wheels in inches	62	66
16½ x 24	16 x 24	Dimensions of cylinders in inches	15 x 22	14 x 24
1188	912	Fire surfaces	1204	783
586 v 335	587	Gross tonnage (cars v. loads)	288	291
35 v	35	Number of 8-wheeled cars in train	15	15
88. m's.	41. m's.	Time to summit, 11⅜ miles...	37½ m's	26½ m's
$20,001	$19,249	Cost of engines erected in Santiago	$19,881	$19,129
$7,247	$2,701	Cost of extras in Santiago	$6,782	$2,801
		Maximum gradient, 1 in 168		
		Minimum radius of curves in feet, 6,562		
		Limit of steam-pressure agreed upon, 115 lb.		
		All had copper fire-boxes and brass flues.		
		Cost of carrying each of these engines over the mountains from Valparaiso to Santiago, over common road, was about $5,000.		

The English goods engine having failed to carry the 35 cars with 586 tons beyond the third mile, was backed to station and tried with 130 pounds; failed a second time; was backed to station and tried with 20 cars, having 335 tons; got stalled twice, and got to the summit in 88 minutes.

The cars were all long, 8-wheeled, and each loaded with 10 tons of railway bar iron. The four days of trial were fair, with light winds, the rails dry and in good condition. Mr. Bailes, the mechanical engineer before-named, was on the footboard of each engine during the trials. The officers of the road—secretary, locomotive superintendent, stationmaster and foreman—were all Englishmen. The only Americans were the two that drove the two American engines, and they had English firemen. I must in justice say that the two English engines were about as badly designed, as badly balanced, and as stiff and clumsy affairs as I ever saw. They were what "Zerah Colburn" graphically called four- and six-legged beasts.

I will send to New Zealand a detailed account of these trials, so that Mr. Maxwell and other *professional men* may have something to judge by. The *Engineer*, in referring to these trials and giving much of the data, went into a laboured argument to prove that the duty recorded as being done by the American goods engine must be false, as no engine of its dimensions had ever, or could ever, perform such duty. I need only say, in reference to this, that Mr. Bailes was there with his eyes open, and that his notes agred with mine exactly.

It may be interesting to some *professional minds* to know that, in the trials of passenger engines, with trains behind them of *five times* the average weight of express trains of the London and North-Western Railway (*see* Ed. Wood's Private Reports), the American engine run some of the miles in 75 seconds, while the quickest mile of its competitor was 105 seconds.

Mr. Maxwell refers to Mr. Zerah Colburn as "an American engineer of *considerable eminence, and a most able writer*," and quoted from his Paper, No. 1230, on American Locomotives, read before the Institution of Civil Engineers, to show that steep gradients in the States were rare.

If Mr. Maxwell had looked down the page from which he got his quotation he would have seen that Mr. Colburn says the engineers in the States were the first to adopt long inclines of 1 in 45 and 1 in 90, and then goes on to give instances of engines working on gradients of 1 in 28·7, 1 in 16·5, 1 in 10, 1 in 18, 1 in 27, and 1 in 14, as far back as 1836. Surely,