

the immediate future is too familiar with all to bear repetition, but it may not be out of place to observe that even the most advanced type of locomotives of the present day retain the essential characteristics of those which held the field at the commencement of the era to which I have referred. The important features common to both included the water-surrounded furnace chamber—the multitubular boiler—the wheels mounted either on crank or on straight axles, whether single or coupled, driven by a pair of horizontal or inclined cylinders, the smoke-box and the steam blast to intensify the draught.

As time went on, great improvements, it is true, have been effected in most, if not in all, constructive details, whilst the progressive increase of traffic called for a corresponding augmentation of the power necessary to haul the trains.

Hence we find that locomotives of the present day possess, as a rule, at least four times more steaming power coupled with six-fold weight than those of the class represented by Messrs. Robert Stephenson and Co.'s engine, the "Planet," the approved type of the period from 1832 to 1836.

The "Rocket" class had before this period proved too deficient in power for conveying the regular traffic.

Contrasting the two types, we see that the approximate comparison as regards weight is as $7\frac{1}{2}$ tons to 45 tons; as to fire-grate area, as 7 square feet to 20 square feet; as to heating surface, as 300 square feet to 1,400 square feet.

The successive changes and improvements from time to time effected have not only served to enable our traffic managers to cope with the ever-increasing volume of traffic, but have also been the means of procuring great economies in the conduct of it.

I may refer to a few out of the many instances in which a marked and enduring influence has been exercised.

In the article of fuel a great saving was effected on the Liverpool and Manchester Railway by an improvement in construction of the slide valves. This, by permitting the free discharge of steam after its work in the cylinders had been done, relieved the engines of a resistance which theretofore had absorbed and neutralized a large portion of their power. The alteration throughout the stock could only be carried out gradually as the engines came in for repairs, or as new engines could be built in the company's workshops to gradually replace such as did not admit of alteration. The result, in great measure attributable to the change in question, was that whereas 12,600 tons of coke were consumed in the service of the traffic in the year 1839, only 3,100 tons, or one-fourth that quantity