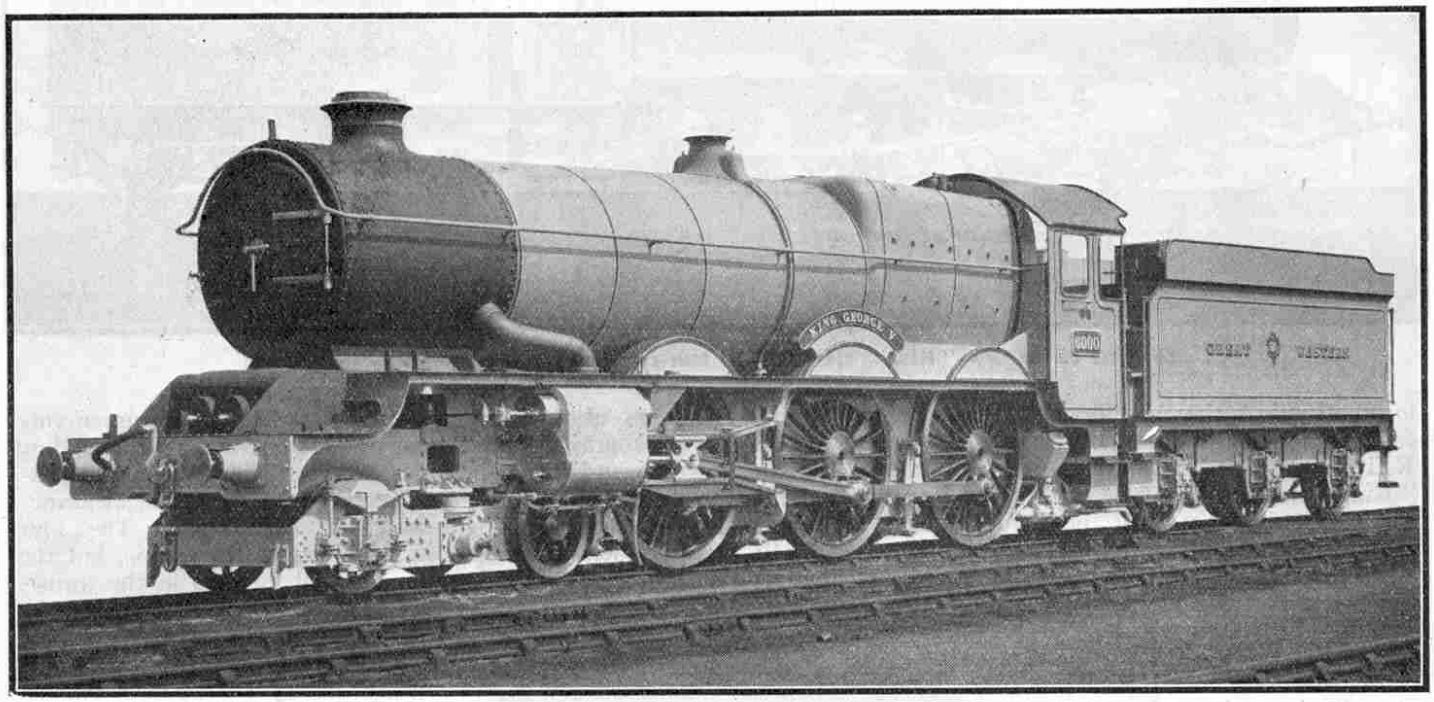
Britain's Mightiest Locomotive

G.W.R. "*King George V.*"—Our Most Powerful Passenger Engine



IN no department of engineering has there been a greater advance in the past century than in the design and construction of railway locomotives. Generally speaking the main development during recent years has been in the direction of power rather than speed. Many of the early locomotives could and did attain very high speeds. Going back as far as the Rainhill trials we find that Stephenson's "*Rocket*" attained a speed of 30 m.p.h. and on other occasions it almost certainly exceeded this speed, although there appears to be little foundation for the claim that it once achieved 60 m.p.h. Coming to later days, some of the "singles" of Daniel Gooch attained an authentic speed of a trifle over 78 m.p.h., and one of Mr. Pearson's 9 ft. "singles" reached a speed of over 81 m.p.h. down Wellington Bank on the Bristol and Exeter line.

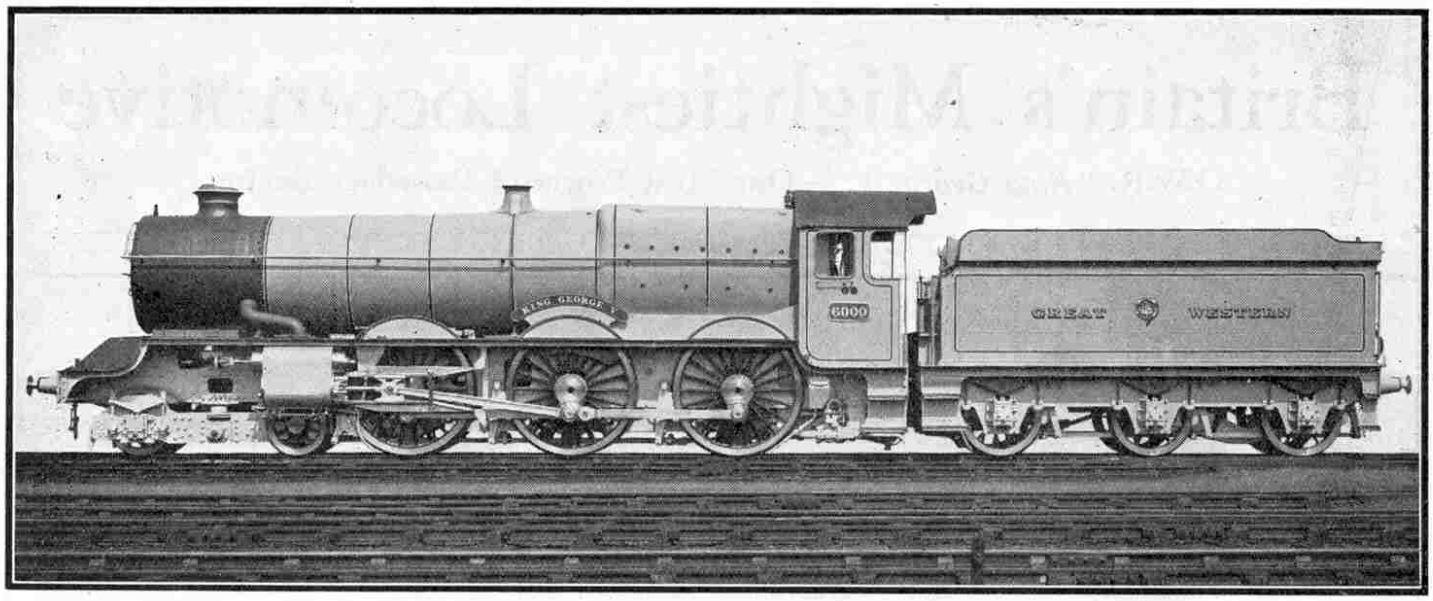
From these figures it will be seen that the single-drivers had great capabilities for fast running, but their hauling power was very limited. The average weight of trains increased steadily and it soon became obvious that these locomotives were not capable of dealing efficiently with heavy loads. The principle became established that as many wheels as possible must be coupled together in order to achieve the best results, and the singles thus gradually disappeared.

The increase in tractive effort obtained in the past few years has been very remarkable. For example, let us take the "*Great Bear*" built by the Great Western Railway in 1908. This was the first locomotive of the "Pacific" type to be built in this country, and for some time it was the largest and most powerful express passenger engine in the British Isles, its tractive effort being 27,800 lb. At the time it was built many people thought the "*Great Bear*" was about the "last word" in British locomotive development, but its performances have already been surpassed by several locomotives. Among its successful rivals may be mentioned the famous Great Western 4-6-0 "*Caerphilly Castle*," with a tractive effort of 3,825 lb. more than the "*Great Bear*," and the more recent 4-6-0 "*Lord Nelson*" of the Southern Railway, which exceeds the tractive effort of the "*Caerphilly Castle*" by 1,875 lb.

Cylinders (four)	
Diameter	16¼ in.
Piston stroke	28 in.
Wheels	
Bogie, diameter	3 ft.
Coupled	6 ft. 6 in.
Boiler Pressure	250 lb. per sq. in.
Barrel length	16 ft.
,, diameter (outside) ...	6 ft. and 5 ft. 6¼ in.
Firebox length (outside)	11 ft. 6 in.
Heating Surface, total	2,514 sq. ft.
Grate Area	34.3 sq. ft.
Tractive effort at 85 per cent. B.P. ...	40,300 lb.
Weight of Engine in working order ...	89 tons
Weight of Tender in working order	46 tons 14 cwt.
Total weight	135 tons 14 cwt.

The "*Lord Nelson*" deprived the Great Western Railway of the honour of possessing the most powerful express passenger locomotive in the country and great curiosity was felt among railway enthusiasts as to what the reply of the Great Western Company would be. The reply has now been made in the shape of the "*King George V.*," which exceeds the tractive effort of the "*Lord Nelson*" by the astonishing figure of 6,800 lb. This remarkable locomotive has been designed and produced by Mr. C. B. Collett, Chief Mechanical Engineer to the G.W.R.

"*King George V.*" is the first of 20 express passenger

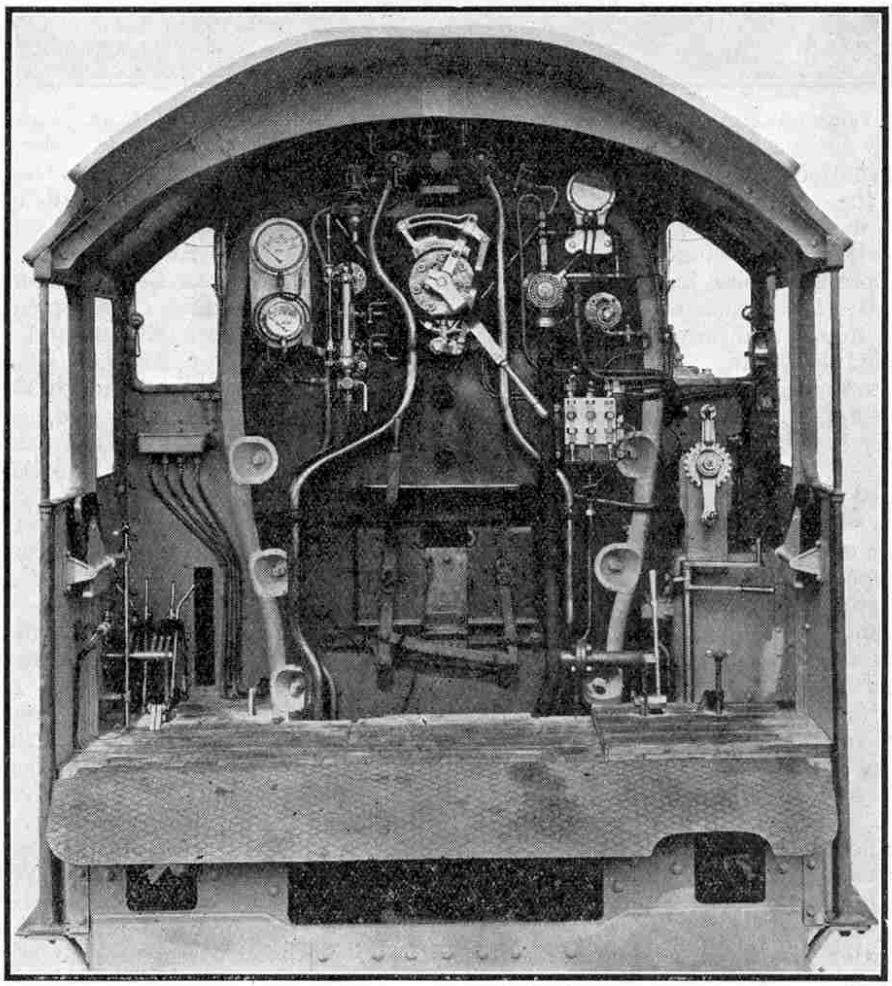


The first of the new "King" class G.W.R. four-cylinder, 4–6–0 type express locomotives

locomotives of the 4-cylinder 4–6–0 type now under construction at the Swindon Works of the Great Western Railway. These locomotives will be known as the "King" class and named after the Kings of England. They will be the most powerful express passenger locomotives in this country, their tractive effort, 40,300 lb. at 85 per cent. of the boiler pressure, being considerably higher than that of any others in Great Britain.

Distribution of the adhesion weight is effected by an equalised arrangement on the six coupled wheels, the aggregate being 67 tons 10 cwt., and the weight on the bogie 21½ tons. The total weight of the engine in working order, without tender, is thus 89 tons. The tender is of the standard Great Western six-wheeled pattern and it is equipped with water pick-up apparatus. It has a coal capacity of six tons and a water capacity of 4,000 gallons. The tender weighs when full 46 tons 14 cwt., and therefore the total weight of engine and tender in working order is 135 tons 14 cwt.

The bogie, which is spring controlled, is of unique design and presents features of outstanding interest. As the accompanying photographs show, it has outside bearings on the leading axle and inside bearings on the trailing axle, this arrangement being necessary in order to obtain clearance between the bogie and the cylinders. The four cylinders are not set in a line across the engine, but the two inside cylinders are set well forward in the frames and drive on to the leading coupled axle, while the outside pair drive on to the middle coupled wheels.



The spacious and well-equipped cab

Steam is supplied to the inside cylinders by piston valves operated direct from the Walschaerts' gear placed between the frames, the valves for the outside pair being operated by rocking levers from the inside gear. The inside connecting rods have forked big ends fitted with gib and cotter; the outside rods have solid bushed ends.

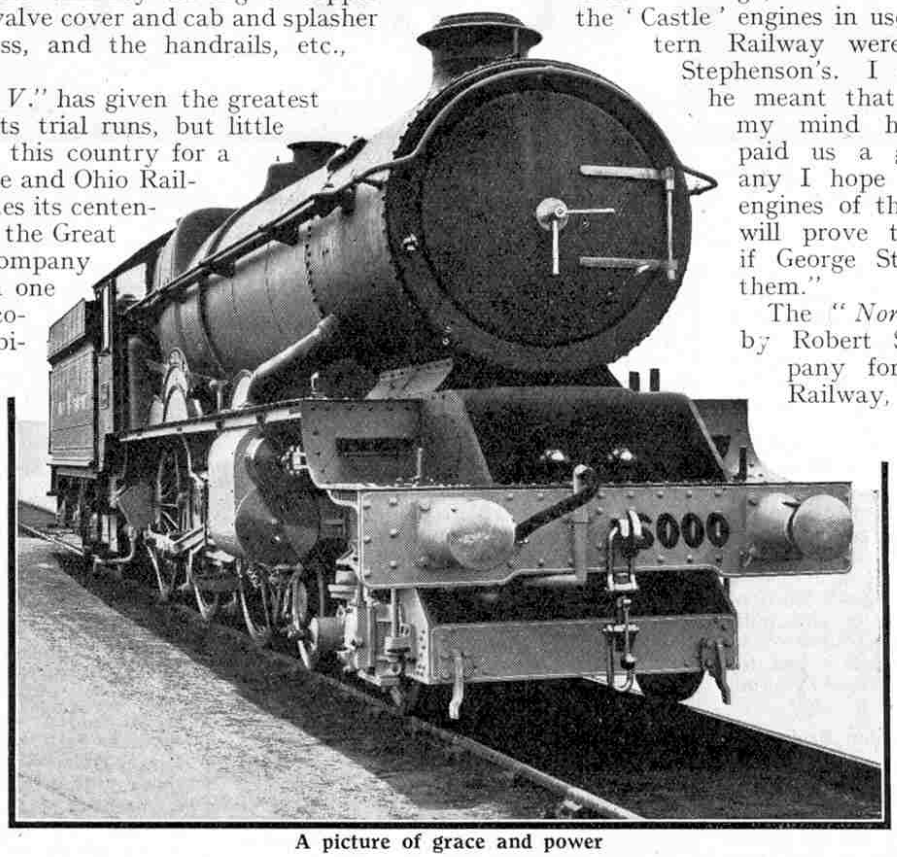
The-high pressure superheater boiler is pressed to 250 lb. per sq. in. and is built with conical barrel and Belpaire firebox with no dome. Steam is taken from an open pipe at the highest point over the firebox and the safety valve is mounted on the barrel. The

inside firebox is of copper stayed entirely by direct steel and copper stays to the outside casing. The superheater is of the standard Swindon 16-unit type. The boiler is fitted with top feed, the water being fed through pipes in the safety valve casing. Vacuum brakes, equalised on all the coupled wheels, are fitted.

The cab is spacious and well protected and gives the driver an excellent view forward. Audible signal gear is fitted for use over sections of the line that are equipped for automatic train control.

The locomotive is finished in the same style as that adopted for other Great Western Railway express passenger engines, the chimney having a copper top while the safety valve cover and cab and splasher beadings are in brass, and the handrails, etc., are polished.

The "*King George V.*" has given the greatest satisfaction during its trial runs, but little will be seen of it in this country for a while. The Baltimore and Ohio Railroad, U.S.A., celebrates its centenary this autumn, and the Great Western Railway Company were invited to send one of their latest locomotives for an exhibition to be held at Baltimore. "*King George V.*" has been selected for the purpose and by the time these lines appear in print will either have arrived in America or be on its way. It will be accompanied by the reconstructed "*North Star,*" which was exhibited at the British Empire Exhibition at Wembley. In regard to these two locomotives an interesting letter from Mr. C. B. Collett to Sir Felix J. C. Pole, General Manager of the G.W.R., appears in the "*Great Western Railway Magazine,*" and we quote the following extracts :—



A picture of grace and power

"You asked me the other day if I would write you a line for the Magazine in regard to the design of the new engines of the "King" class. I should like to say that any credit there may be in connection with their design and construction should be shared by the whole of my staff. . .

"With regard to my own feelings, if I may say so without presumption, my ambition has been to follow, even if a very long way off, very humbly in the footsteps of the great George Stephenson, and it is remarkable how events have sometimes associated our efforts at Swindon with his name.

"It is only a short time ago that you yourself were good enough to give me an excellent bust of him, and you will remember that when our "Castle" engines were produced and it was thought that one might be sent to the Wembley Exhibition, you remarked on what a shame it was that George Stephenson's '*North Star*' had been scrapped, and you asked me to get together some of the pieces and rebuild it. It was remarkable how these pieces came together; some of the principal parts, including the crank axle and wheels were found to be still in the works—no one had had the heart to cut them up—and people from different places sent us many other parts, including the nameplates and some of the buffers, one of which was in use as a music stool in a house at Bath, and so Swindon was proud of being able to reproduce the original '*North Star.*'

"Coming to the present engines, at a meeting of the Institution of Mechanical Engineers in London a little while ago, the Chairman remarked that the 'Castle' engines in use on the Great Western Railway were just like George Stephenson's. I do not think that he meant that for praise, but to my mind he could not have paid us a greater compliment, any I hope and trust that the engines of the new 'King' class will prove to be also, just as if George Stephenson had built them."

The "*North Star*" was built by Robert Stephenson & Company for the New Orleans Railway, U.S.A. As the result of certain financial conditions this locomotive was not delivered, and was bought by the Great Western Railway in 1837. It had a working pressure of from 50 to 60 lb. per sq. in. and a tractive effort from 2,000 lb. to 2,400 lb. —a striking contrast to the mighty "*King George V.!*" Brunel was highly pleased with the "*North Star*" and wrote of it in 1838 :—"We have a splendid engine of Stephenson's, it would be a beautyfull ornament in the most elegant drawing room."

As originally built, this fine old engine was fitted with cylinders of 15 in. diameter by 18 in. stroke and was equipped with what was known as "Gab" motion. A dome was fitted on the boiler and two separate safety valves were provided, one locked and one spring loaded on the barrel. About the year 1854, however, the boiler was lengthened some five inches, the dome removed and the safety valves combined and placed together on the existing manhole on the fire-box. At this period "Gooch" expansion gear was also fitted and the diameter of the cylinders was enlarged by one inch. The driving wheels were 7 ft. in diameter—a size much favoured at that period by the old broad gauge railways. The leading and trailing wheels were 4 ft. in diameter and the engine had a total heating surface of 724.8 sq. ft. It worked until 1870 and covered 429,000 miles!

"*North Star*" appears to have been a favourite name with the firm of Robert Stephenson & Company, for an engine bearing the same title was built by them in 1830 for use on the Liverpool and Manchester railway.