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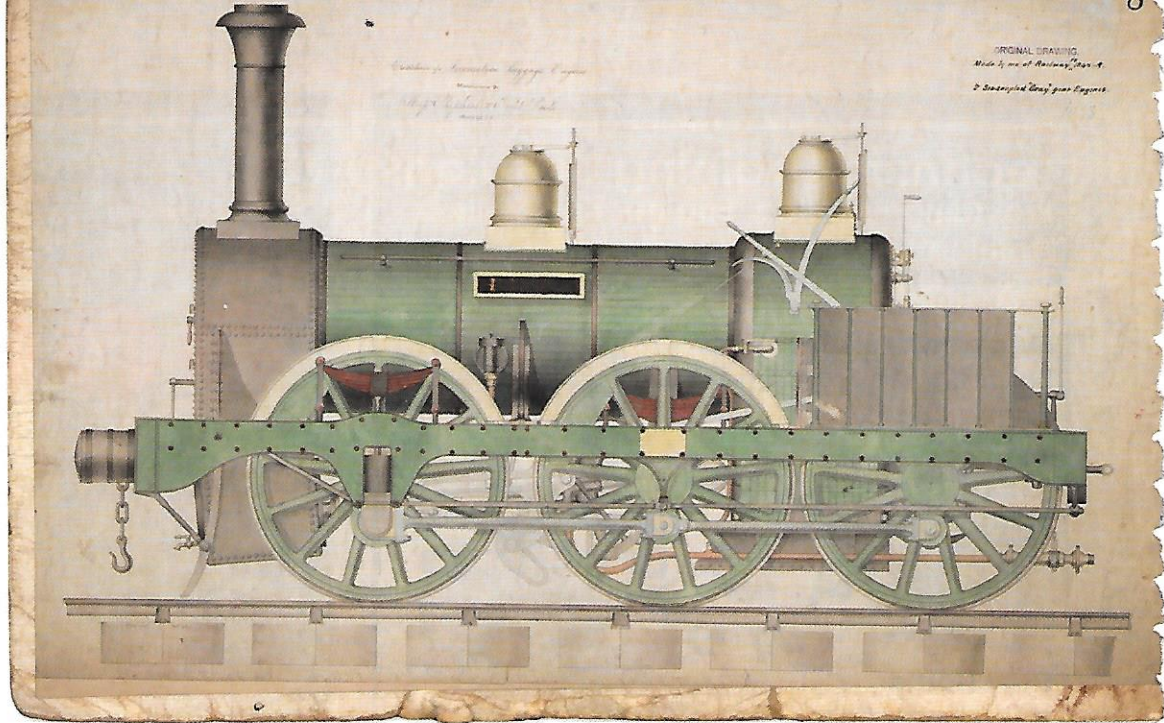
The 21st-century engineer can research and record ideas using handheld devices with internet capability and mobile camera phones. In the 19th century engineers carried notebooks and pencils to sketch designs on the move. One man who exemplifies the image of the Victorian engineer as artist is David Joy, who was born in Leeds in 1825.

As a child, Joy developed his sketches into models of ships and engines and he later studied mechanical drawing at college. He spent his formative years studying all the locomotives he came across, sketching them, making notes, interrogating their owners and crews and, if he could, getting rides on them.

In 1843 Joy began work as a drawing office apprentice at the Railway Foundry Works of Shepherd and Todd in Leeds. His talent for drawing plans led to a quick promotion to chief draughtsman and it was in this capacity that he is credited with designing the famous Jenny Lind locomotive. He also worked for E B Wilson and Company when it took over the works.

The Jenny Lind was built in 1847 for the London and

Above: David Joy's 1844 drawing of the Hercules luggage locomotive. Below: John Gray's valve gear



The Victorian engineer David Joy's gifts as a draughtsman led him to become a prolific inventor, writes IMechE archivist **Karyn French**

Brighton Railway by E B Wilson. It was so successful that the name was used for a whole class of locomotives, and 70 were built for various companies including the Midland Railway. It has often been cited as the first mass-produced locomotive type.

The Jenny Lind steamed freely and was economical on fuel. It was to this that its success was attributed, along with its increased boiler pressure. Credit is often given to Joy's suspension arrangements, which made it an extremely smooth-running and stable locomotive. It had a medium-sized boiler, with 800ft² (74m²) heated surface area, with a pressure of 120 lbf/in² (827kPa).

The engine had 15- by 20-inch (380mm x 510mm) inside cylinders and 6ft-diameter (1.83m) driving wheels. John Gray's 'mixed' frame had an inside frame for the cylinders and driving wheels, with inside bearings, and an outside frame for the 4ft-diameter (1.22m) leading and trailing wheels, using outside bearings. The inside

frame stopped at the firebox, so that the latter was as wide as the wheels would allow. By this means the overhang at each end was minimised.

Joy never stopped inventing, developing a compound marine engine, a steam reversing gear and a steam hammer. He also invented hydraulic organ blowers which were fitted to the organ at Leeds Town Hall. In the 1860s he started a business manufacturing steam hammers, and later a keen interest in marine engineering led to an appointment at the Barrow Shipbuilding Company.

He developed a radial valve gear and assistant cylinders. The success of these was demonstrated by their widespread use on British and foreign ships. In 1880 he presented his paper on "A New Reversing and Expansive Valve Gear" at the Institution of Mechanical Engineers.

In 1864 Joy was able to offer engineering assistance when, as a passenger on the SS Gladstone, headed south from Middlesbrough, the ship struck the SS London. Joy

gives a vivid account of the incident in his diary. His illustrated description recalls the bravado of the Gladstone's captain as he declares that he is going to beat the SS London, regarded at that time as the fastest steamer on the east coast. Unfortunately a small boat crossed the bow of the Gladstone, sending it off course and into the SS London.

Joy describes the stunned fear of the passengers and the panic of the sailors as they scrambled to safety on the other ship. It was possible to repair the Gladstone as it was light but if it had been loaded it would have sunk within an hour. Joy offered his services to the chief engineer, finding that this helped him to keep his composure during the panic; he even took the time to sketch the ship's damage.

Joy died at his home in Hampstead, London in 1903. ■

A collection of Joy's drawings and his diary are held by the IMechE Archive. These are online in our Virtual Archive at: <https://archives.imeche.org/archive/railways/david-joy>

