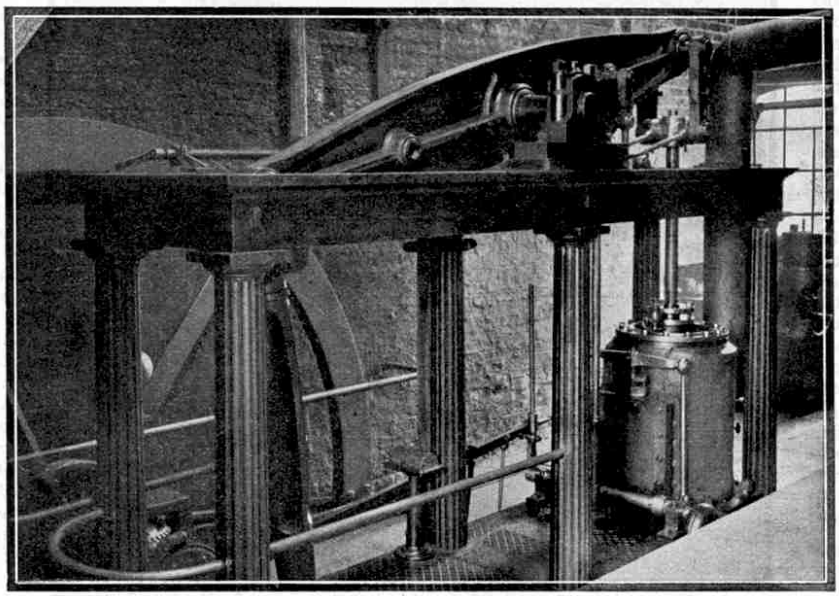
A Veteran Steam Engine

Eighty Years of Service Without a Breakdown

ONE of the most interesting relics of early stationary steam engines is to be seen at the Birkenhead Dock Yard. This is a beam engine that was installed by Messrs. George Forrester and Co., Vauxhall Foundry, Liverpool, somewhere about the year 1850, and it has been in constant use since that date for the purpose of driving lathes, saws, and other machinery in the workshops at the Dock Yard. This veteran is a single-cylinder beam engine of the non-condensing type, the bore of the cylinder being 18 in. and the stroke 3 ft. The maximum speed is 60 revolutions per minute, controlled by a simple conical pendulum governor as shown in the accompanying photograph.



A beam engine that has been continuously at work at the Birkenhead Dock Yard since 1850 without a single known breakdown.

A notable feature about this engine is the pressure at which it works. Originally the steam pressure was 40 lb. per sq. in., but in 1916 it was decided to replace the original boiler by one generating steam at a pressure of 65 lb. per sq. in., for use in operating steam hammers. Before this was done the engine was carefully examined, and calculations showed that it was capable of working under the higher pressure. The remarkable result is that, after nearly 80 years of service, without a single known breakdown, the engine is now working at a pressure more than 60 per cent. in excess of that for which it was originally designed!

The flywheel, which is of the built-up type, 14 ft. in diameter, is of cast-iron, in eight sections bolted to eight arms. These are bolted to the boss, which is secured to the crankshaft by four keys. The crankshaft and the flywheel have not been removed since the engine was installed. It is calculated that the engine is now capable of developing 120 h.p., although in all probability it was designed to develop only about 75 h.p. This is a notable increase in efficiency.

The few examples of early beam engines that are still in existence are of outstanding interest as examples of a type of steam engine that has almost disappeared. These engines take us back to the time of Thomas Newcomen, whose work paved the way for that of James Watt. Newcomen's engine, invented in 1705, was designed specially for pumping water out of the Cornish tin mines, work in which was seriously hampered by flooding. It was not really a true steam engine because the downward stroke of the piston—which was the working stroke resulting in the lifting of the pump rod—was effected by atmospheric pressure. The beam was a necessary feature in this engine. The use of water-packing for the piston required that the piston should move down in the working stroke, and a beam was needed to allow a counterpoise to pull the piston up and operate the plunger of the pump.

Watt produced an engine that operated solely by steam pressure, and his improvements made the beam no longer necessary. In spite of this he retained the beam type generally, and for many years it remained a favourite with the builders of large engines. The majority of the engines of this period were designed for pumping purposes, and the beam was a very suitable driver for pump-rods and valve-rods. Another point of importance was that engine-building methods in those days were somewhat crude, and the beam engine was easier to construct successfully than a direct-acting engine, in which the crankpin of the revolving shaft is connected directly with the piston-rod by means of a connecting-rod.

Mention of engine-building in those early days calls to mind the struggle of James Brindley with an engine he devised with the object of improving upon the Newcomen engine, especially in regard to fuel economy. Brindley made his cylinders of wood instead of iron, and used wood for the chains that worked at the end of the beam. He had to abandon his wooden cylinders, but as an alternative he surrounded the iron cylinders with a wooden case, with wood ashes as packing.

The quaint entries in Brindley's notebook, almost illegible and spelled in the weirdest manner, show that this engine gave him a great deal of trouble. It took him a year to construct his "engon," and when finished it seems to have proved very obstinate. Repeatedly Brindley reports "Bad louk (luck)." Then matters seem to have improved a little, for we find "Midlin' louk" for some days. Eventually the engine worked for a period of seven days, and Brindley was so excited that he wrote "Driv-a-Heyd (Drive-ahead)." The subsequent career of that ill-behaved "engon" is shrouded in mystery.