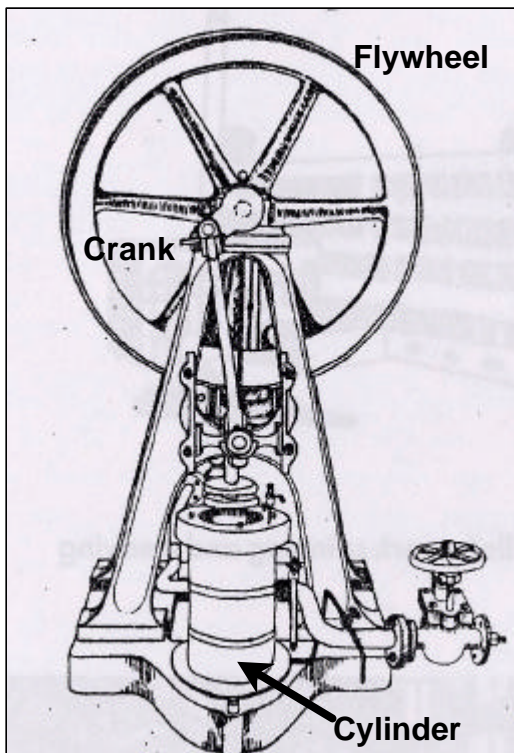


## Chadwick Single Cylinder Vertical Engine

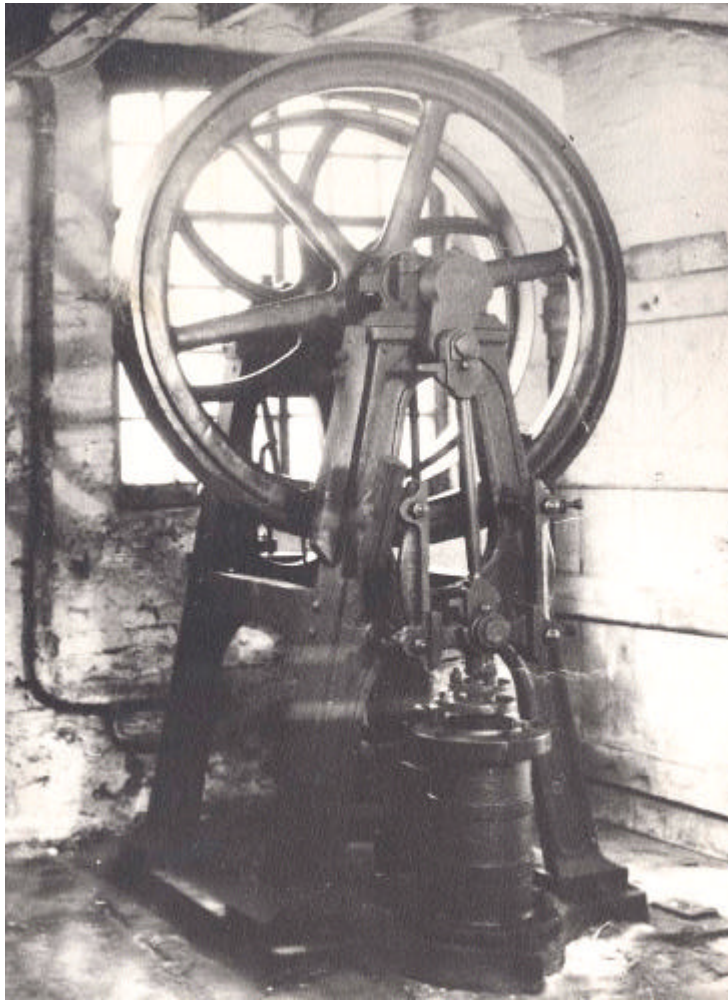
The Chadwick single-cylinder vertical engine was built in around 1860 and worked at Simplex Circlume in Salford. It is called a true vertical engine because its steam cylinder is set vertically on the floor beneath an overhead crankshaft. This type of steam engine was developed to meet the demand for an engine that was simpler and more compact than the beam engine. Its relatively small footprint made it popular for small factories, although some large and powerful vertical engines were made for winding lifts in the Durham collieries. The Chadwick vertical engine has a simple cast-iron A-frame supporting the crankshaft bearing. Earlier vertical engines had classical column supports, sometimes with elaborate fluted designs.



The working cycle of the engine begins when steam from a boiler is alternately admitted and exhausted from the top and bottom of the cylinder in turn, under the control of a slide valve. When steam enters from the bottom of the cylinder it forces the piston inside upwards. When it enters from the top of the cylinder it forces the piston downwards. This up-and-down reciprocal motion, is converted to rotary motion of the flywheel by the beam and crank. The slide valve is controlled by a connecting rod from an eccentric on the main shaft. The speed of the engine is controlled by a centrifugal governor, which is driven by a belt from the main shaft. The governor varies the amount of steam admitted to the piston cylinder. If the flywheel rotates too fast, the spheres on the governor are thrown outwards by centrifugal action. This cuts off the steam from the boiler via a linkage to a steam valve, hence slowing the engine down.

### Technical Data

|                     |  |
|---------------------|--|
| Engine type         | Single cylinder vertical engine                |
| Manufacturer        | John Chadwick, Manchester.                     |
| Date of manufacture | c. 1860  |
| Operator            | Simplex Circlume, Salford.                     |
| Rating              | 5 horsepower                                   |
| Speed               | 50 rpm   |
| Cylinder            | 7½-inch (190-mm) bore; 14-inch (355-mm) stroke |
| Steam pressure      | 30 p.s.i.                                      |
| Valve type          | Slide valve                                    |
| Flywheel            | 48-inch (1220-mm) diameter                     |



The engine in situ at Simplex Circlume.

*For more information:*

*Read* Hayes, G. *Stationary Steam Engines*. Princes Risborough, UK, Shire Publications, 2003.

*Visit* The Science Museum, London.

Northern Mill Engine Society, Chorley Old Road, Bolton.

How Steam Engines Work: [www.mgsteam.btinternet.co.uk](http://www.mgsteam.btinternet.co.uk)

How Stuff Works: [www.howstuffworks.com](http://www.howstuffworks.com)