Engine Foundations.

There is not a detail in engine construction and operation that merits greater consideration, or is of greater importance to the successful working of an engine, than the foundation upon which it stands, and too much care cannot be accorded it, that it shall have ample spread, stiffness, unity, and adaptability to the movements and operation of the parts which it supports. It should be so bonded and tied that unequal settlement shall not take place, and the height, weight, and base should be of such proportion that when the engine is in full operation there shall be no swaying or twisting of the parts, no heating of the journals, no springing or tremor of the bed arising from an unsuccessful transmission of the strains. The higher the speed and revolution, the stiffer and more solid should be the foundation, and the greater the base contact with the supporting earth. A good foundation will often decrease the defects of a poor bed, provided, of course, that such engine bed be properly and thoroughly bolted to its foundation. When properly constructed, and tied together, the engine bed and its foundation should be portions of one complete whole, inseparable and undisturbed in their relationship by the movements of the engine parts while at their hardest work.

A good bottom of concrete of smooth upper surface laid upon a rock or solid earth bottom, upon which the main structure of brick is laid close and jointed with first quality of cement, and the whole capped with one or more large blocks of stone jointed and placed to suit the engine bed, and to distribute the weight over as great an area as possible, constitutes the best foundation. Where bricks are scarce the foundation above the concrete bottom may be all of stone, and the larger the stones the better.

Ordinary rubble work is not to be relied upon, the only capacity for retaining and uniting the structure as a whole being contained in the cement. The irregular shape of the stones forming the rubble masonry present, through their lack of contact with each other, rather a precarious and unreliable bond, and the cement is too thinly laid to fix them permanently in their position, in spite of the thrust and twist of engine operation. It is far better to mould a complete foundation of concrete, capping it, if possible, with the thick solid blocks already mentioned in connection with the brick foundations. The foundation completed and thoroughly set, the engine frame or bed may be placed in position and lined up, and the joints filled and packed with melted sulphur.

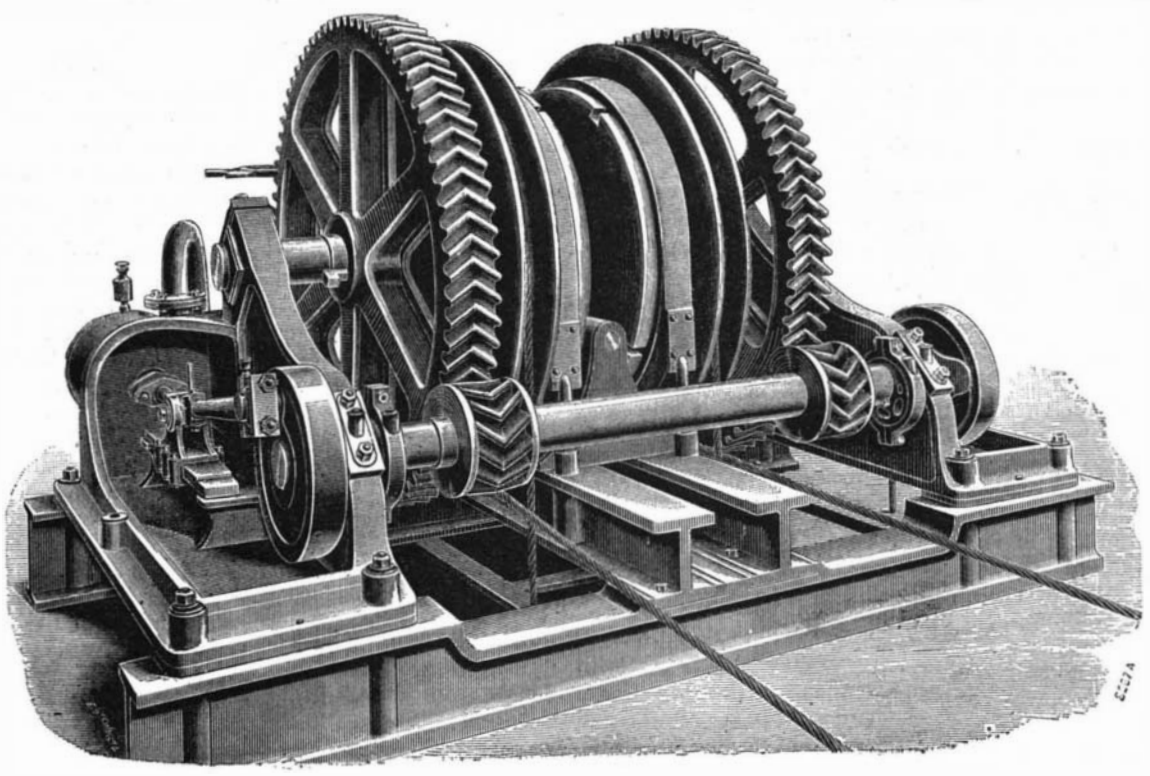
The actual nature of the soil or bottom upon which the engine and foundation is to rest, whether it be wet, soft, and elastic, whether it be dry, sandy, and solid, or whether it be a rock bottom, to which the bed might be immediately fastened with a mere leveling foundation between, determines the nature, extent and scope of the foundation, while the size, weight, and power of the engine determines its weight and bulk to prevent vibration or tremor.—*The American Engineer.*

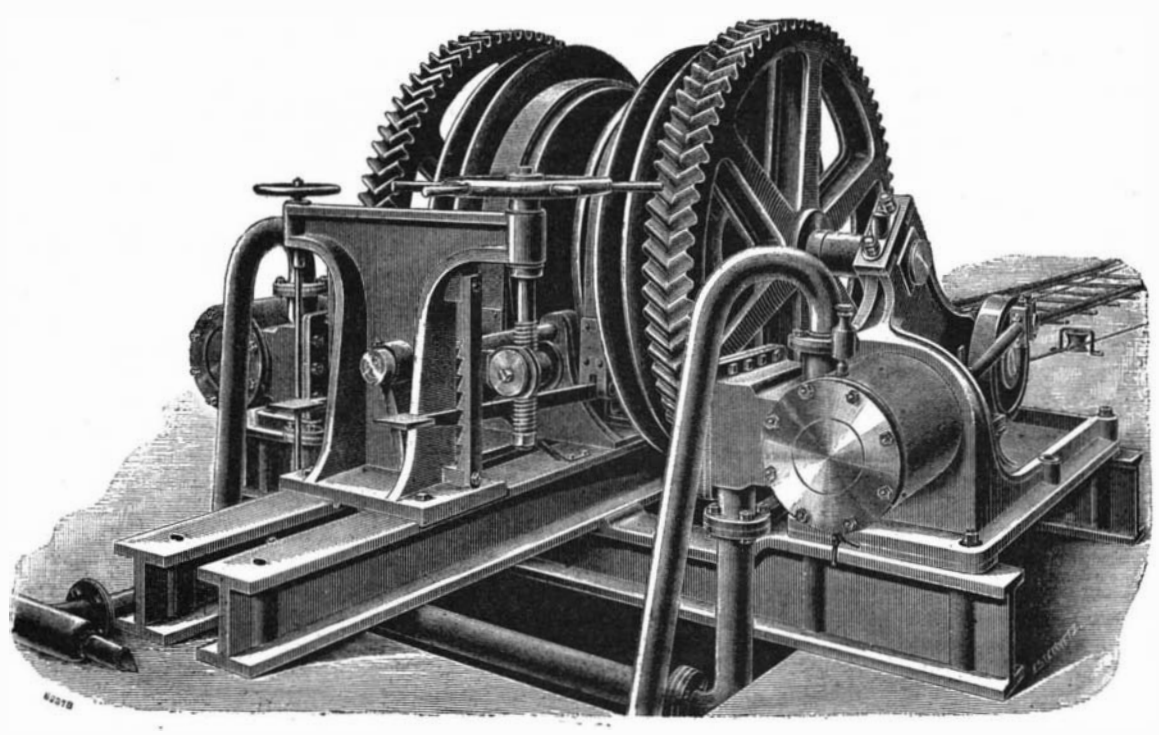
Clean up the Cellars.

The spring months, truthfully says a contemporary, are apt to be sickly in country places, partly because of confinement of people during the winter in ill-ventilated rooms over damp cellars filled with vegetables. Malarial fevers attack older people, while diphtheria is the scourge of the young, especially those kept mostly in the house. The common city plan of heating the house from the cellar by furnaces and registers avoids this evil by giving better ventilation from the cellar to the garret. It also precludes storing many vegetables in the cellar, as in a warmed air they will not keep. Confinement in bad air and drinking impure water result in poisoning the blood, thus aggravating nearly every form of disease. Where the water is suspected of being impure, boiling it destroys its poisonous elements. Western people have by long practice in fighting them learned much about malarial diseases. They consider coffee thoroughly browned a specific against malaria.

ENDLESS ROPE HAULING MACHINE.

Our engravings represent a front and back elevation of a hauling engine made by the Lowca Engineering Company. The cylinders are 10 in. in diameter, with a 12 in. stroke. The engine is compact, self-contained, and requires no foundation. The duplicate helical





IMPROVED ENDLESS ROPE HAULING ENGINES.

gearing is in the ratio of five to one. There are two driving drums 4 ft. in diameter, with a friction clutch between them, which can be thrown in and out of gear when the engines are running at full speed. Each drum is provided with a strap brake, which throws itself out of gear on releasing the brake lever. The drums are designed for endless rope haulage, and around these the rope is wound two or three times to obtain the requisite driving adhesion. The rope is kept taut by passing round a terminal tension pulley.—*Engineering.*

The Philadelphia System for Underground Electric Wires.

The town council have control of all electrical work, and some time ago they determined that all overhead wires should be undergrounded, which has been done. The engineer to the council, Mr. D. R. Walker, has just sent in his annual report to the mayor, describing the behavior of these underground cables, which are used for telephonic, telegraphic, and electric light service. There are four companies in Philadelphia now using Waring underground cables, viz., the Brush Company, the Keystone Company, the United States Company, and the Underground Electric Light and Power Company. The Brush Company are using sixty arc lamps in one of their circuits, which is five miles long, and is worked at a pressure of 2,800 volts, or about 45 volts per lamp. The lamps are generally placed at intersections of streets, and at a distance of about 500 feet apart. The cable for the Brush lamps consists of a seven strand 14 B. W. G., with insulation of from one sixteenth inch to three thirty-seconds inch, and protected with a lead covering one eighth inch thick. The same cable is used by the Keystone Company in a fifteen mile circuit at 2,000 volts, and no difficulty has been found in working it. Along Chestnut Street the electric light cables are laid side by side with telephone and telegraph cables in a cast iron duct 20 inches by 30 inches. In Broad Street the cables are laid in a wooden trough covered with a plank and close under the pavement. According to the report, nine tenths of the difficulties experienced with underground work were not in the cables themselves, but in the connections with the overhead portions. Mr. Walker also mentions an interesting case where lightning struck an overhead connection on an underground circuit, ran through three miles of cable, and burned the dynamo. The cable itself, however, was not injured.

The Black Hole of Calcutta.

The Iowa State Board of Health, in its April bulletin, concludes that few who have heard of the "Black Hole of Calcutta" know the terrible facts that have rendered the place famous and made it the synonym of all that is to be dreaded from foul air and overcrowding.

At eight o'clock on the evening of June 20, 1756, one hundred and forty-six prisoners, officers and men, black and white, and of different nationalities, were thrust into a room eighteen feet square—with two windows on one of the four sides heavily barred with iron—giving to each inmate forty cubic feet of space. In ten hours one hundred and twenty-three were found dead—only twenty-three being alive!

Another instance is where, in 1742, the High Constable of Westminster, London, committed twenty-eight persons to prison, where they were thrust by the keeper into a hole six feet square and five feet ten inches high—the windows being close shut. In a very short time four of the inmates were suffocated!

These facts show the poisonous effects of the human breath—or of respired air. Prof. Brown-Sequard has recently made some experiments that are not only highly interesting, but show why the expired air of man and animals is so deadly. From the condensed vapor of the expired air he produced a liquid so poisonous that when injected beneath the skin of rabbits it produced almost instant death. This poison he found to be not a microbe, but an alkaloid. His conclusions are that the expired air of all animals contains a poison more fatal than carbonic acid.

It is well for the people to understand these facts. They cry aloud for better ventilation and purer air—for less crowding in home and church and hall and school room.

GREAT are the wonders of the telephone. A physician reports to *Gaillard's Medical Journal* that he was saved a two mile ride through a driving storm the other night by having the patient, a child, brought to the instrument and held there until it coughed. He diagnosed false croup, prescribed two grains of turpeth mineral, and turned in for an undisturbed sleep during the remainder of the night. He found the patient in the morning doing nicely—under the care of another doctor.