THE WHITMORE TURBINE WHEEL.

The essential feature of the invention represented in the annexed engravings consists in the arrangement of the gates, which are placed in pairs on opposite sides of the wheel, and so controlled that the pairs open successively. This construction is claimed to be much more advantageous than that in which all the gates are worked simultaneously to present larger or smaller apertures, because an equal force is at once applied to both sides of the wheel at the same angle, derived from the power of a solid body of water of the full dimension of the gate opened.

The guides are secured in the usual manner between the plates. The pivot bolts of the gates, A, Fig. 1, pass up through the upper plate and have attached to them adjustable levers, B, Fig. 3, by means of set screws, as shown. The ends of the levers, B, are provided with friction rollers which enter slots or cam grooves, C, in the under side of the cam wheel, D. The arrangement of these cam slots is such that, by turning the wheel, D, by means of the rack and pinion represented, the gates numbered 1 (Fig. 3), on the opposite sides of the wheel, will be first opened, and pairs 2, 3, and 4 will follow successively.

In Fig. 2, the wheel is represented without the casing, and, as will be seen, is made in the form of a cone. This shape, it is claimed, adds to the strength and secures the best possible natural discharge, as it obviates downward pressure.

The manufacturers inform us that the apparatus is in successful operation in many localities. They state that they find that a 30 inch wheel, under a 14 foot head, uses, with all gates open, about 100 inches of water, but that with the gates half closed, requiring but 50 inches of water, the same speed is obtained, sufficient to operate a run of burrs and the machinery of a grist mill. The object of the large wheel is to use the water down to a head of 7 or 8 feet in case of drouth; and in the instance where it has been applied, it is stated that three bushels more of grain, per hour, are ground than was formerly done with the overshot wheel, for which the Whitmore turbine was substituted.

The gates may be readily adjusted in case of leakage; and in event of one becoming obstructed, the rest may be closed until the difficulty can be removed. The wheel is built as represented in our engraving in sizes under 10 inches; above this, the difference lies in the position of the set screw, which is arranged in the gate instead of in the levers, B. Each turbine, we are informed, is carefully constructed of the best materials, under the immediate supervision of the inventor, Mr. Titus Whitmore. For further particulars address the manufacturers, Messrs. N. A. Beebe & Co., Waterloo, Iowa.

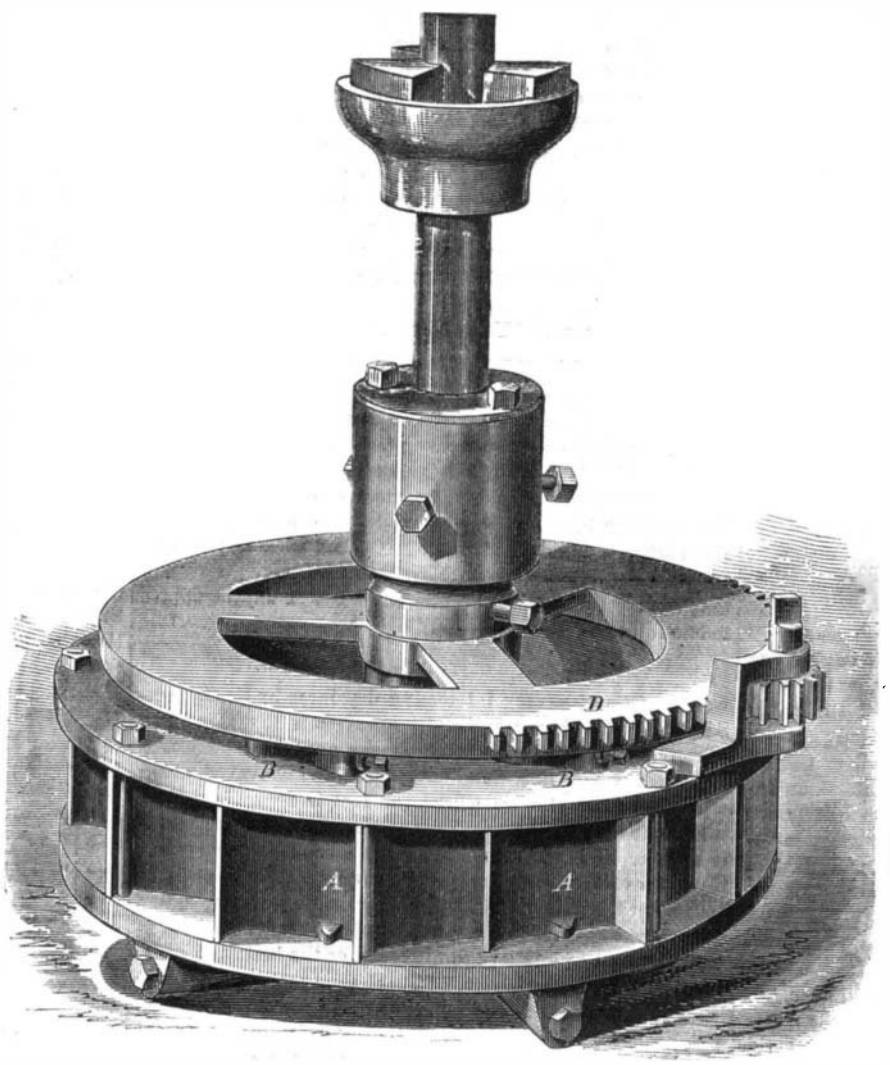


Fig. 2

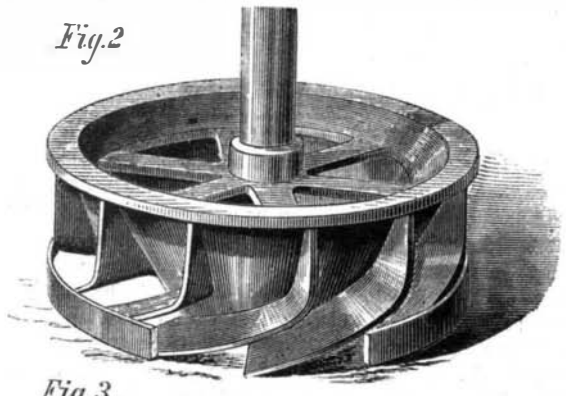
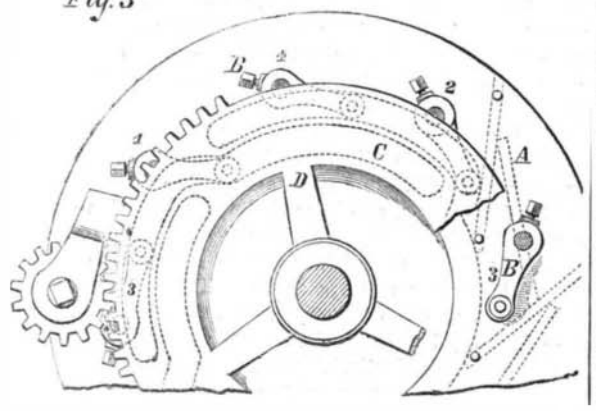


Fig. 3



Underground Telegraph Lines.

Mr. George B. Prescott states that the system of underground lines in England is both extensive and well constructed, embracing 3,000 miles of wire and nearly 100 miles of iron piping.

The conductors usually employed for underground lines consist of No. 18 copper wire, covered with gutta percha to the gage of No. 7. In order to keep the gutta percha from the atmosphere, the exposure to which would cause it to crack and decay, and thus destroy the insulation, it is tarred and then covered with linen tape and tarred again. The preparation of tar through which the gutta percha and taped wire is drawn, is composed of one quart of raw linseed oil to two gallons of Stockholm tar, and is applied warm.

The wires, when thus prepared, are cut into lengths of four hundred yards, and as many as are required to be laid in one tube are made into a loose cable, and tied together with tape at distances of six feet apart. When the wires are drawn into the tubes the tapes are removed and the wires permitted to lay loosely in the pipes.

The tubes into which the wires are drawn are cast iron socket pipes of two, three, and four inches diameter—the size employed depending upon the number of wires to be laid down, the two inch pipe holding 25 wires; the three inch, 70 wires; and the four inch, 120 wires. The pipes are laid down under the flagstones at an average depth of twenty inches, and the joints are filled with lead.

The cost of laying down three inch cast iron socket pipe for underground wires is 90 cents per yard, or $1,650 per mile. This includes the cost of the pipe and jointing with lead, the taking up of the pavement, putting the pipe in place and re-paving.

The cost per wire for drawing in the pipes depends somewhat upon the number of wires. The average cost of putting 60 wires in a pipe, including jointing and all other incidental work, is $280 per mile.

The cost of conducting wire for underground lines, consisting of copper wire of No. 18 gage, covered with gutta percha to No. 7 gage, taped and tarred, is $85 per mile.

The total cost per mile for sixty underground wires is $7,030, or $117.06 per mile of wire.

The underground system in England gives comparatively little trouble, and is more favorably regarded than the overhouse plan, the great defect in which is imperfect insulation.

For tunnels, copper wires, insulated with gutta percha, and then tarred, taped, and again tarred, are laid in a wooden trough and attached to the wall. The trough has a cover, coated with zinc, and fastened with tie wire, instead of nails, to prevent injury to the wires.

In addition to the underground lines in the large towns, several others have been laid down between London and the chief commercial and manufacturing towns in England.

Utilization of Certain Offal.

Professor A. H Church, in a paper published in the transactions of one of our agricultural societies, refers to certain waste refuse matters, for the purpose of showing the economical products that may be obtained from them. According to this, fresh blood contains 3 per cent potential ammonia, 5 per cent potash, and 1 per cent phosphoric acid. Dry blood is five times as rich. Blood may be utilized as a manure by mixing with dry peat, or by coagulation with 3 per cent of quicklime, and then drying. Flesh, fish, hair, and wool are best prepared for manure by heating with steam under pressure. Horn, when gently roasted, may be powdered. Glue refuse is a slimy matter, containing in the fresh state 1·75 per cent nitrogen, and when dry 3·8 per cent. "Trotter-scutch," a refuse of skin and hair from tanneries, is a cheap manure, containing in the fresh state 3·58 to 7·60 per cent of potential ammonia.

Refuse hops from breweries contain when fresh 1·91, and when dry, 4·20 per cent potential ammonia. They are best added to compost heaps. The deposits from fermenting liquors are always highly nitrogenous. Sugar boilers' scum contains both nitrogen and phosphates; the scum from beet root sirups appears the most nitrogenous, containing when dry 4·6 per cent potential ammonia. The liquors obtained by "retting" flax and hemp are nitrogenous, the solid contents yielding 2·7 to 4·0 per cent potential ammonia.

GARDNER'S IMPROVED WHEEL.

The novel form of vehicle wheel represented in our engravings is so constructed that, when broken or injured, any part may be easily removed and replaced, or the entire device may be taken apart and packed for shipping or other purposes. By suitable means below described, shocks and jars are, it is claimed, prevented from coming upon the spokes; and in fine, while a lighter and more graceful appearance is given to the wheel, its durability is considerably increased.

Fig. 1 is a perspective view of the device. Between the outer tyre and the inner and stronger tyre of iron, is placed a felly, A, of wood, india rubber, or similar elastic material, in order to form a cushion between the rims, and thus to relieve the spokes from shock. The latter are fastened by their outer screw ends into the inner rim, or may be driven into sockets on the same. Their inner ends are socketed in the hub, which is constructed of three sections (Fig. 2) or rings, one central, B, and two outer ones, C. The central ring, Fig. 3, is provided at both sides with semicircular grooves, of which those on one side are placed intermediately between those of the other side, so that one half the spokes may be socketed on either face. The outer rings, C, are provided with semicircular grooves corresponding exactly to those of the central ring, embracing thereby the spokes, and giving to them a firm support. All the rings are placed upon a box, D, and are firmly bound together by the screw nuts, E.

The hub is placed over the axle and protected against the entering of dust by suitable clasps or covering. Any injured portion of the wheel may be taken out and a new piece replaced by detaching the screw nut, E, the balance of the wheel remaining unharmed, being thus rendered still useful.

For military purposes, for mounting artillery, it would seem that this wheel is especially suitable. There is no shrinking or swelling, we are informed, and the heaviness and strength may be increased or diminished by suitable construction, as circumstances may demand.

Fig. 1

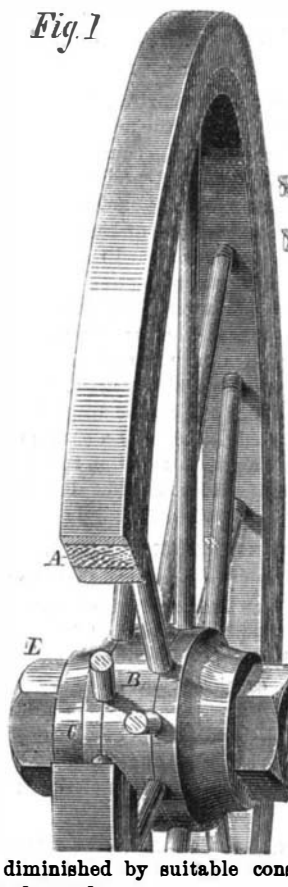


Fig. 2

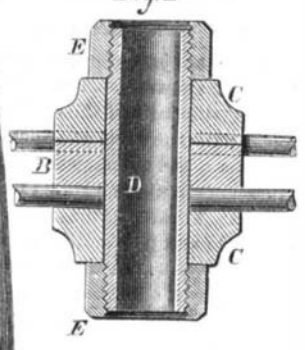
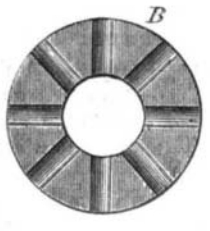


Fig. 3



Patented through the Scientific American Patent Agency, March 24, 1874. For further particulars address the inventor, Mr. Stephen C. Gardner, Eagleville, Tolland county, Conn.

PRIZE FOR AN ESSAY ON STEEL.—The Academy of Sciences of Berlin offers a prize of $200, payable in July, 1876, for the best essay recording experiments as to whether changes in the hardness and friability of steel are due to chemical or physical causes, or to both. Papers, in German, Latin, English or French, are to be sent in before March, 1876.