

IRON PILES.

One of the most important means adopted to secure firm foundation for bridge-piers and other structures on treacherous ground, is that of sinking piles to bear the superincumbent weight. These piles act either by transmitting the pressure direct through their length, to a firm bed below the unstable upper layer—or by the friction of this upper layer upon their sides—or by both. Where wood is plenty, long straight tree trunks, freed of branches and driven in top downwards, or squared timber, answer admirably, save that they are exposed to decay above the water line, and below it to the destructive action of the *teredo*, the *limnoria*, and other forms of animal life. These influences may be very largely counteracted by impregnating the pores of the wood with creosote, salts of mercury or of copper, &c.; and indeed piles have lasted under ground for hundreds and even thousands of years—as for instance the timber pieces “a foot and a half thick and two feet apart” of the famous bridge which Cæsar threw across the Rhine, and which were but recently discovered in the bed of that stream—and, even more remarkable, the piles which the lacustrine dwellers on Lake Leman, in prehistoric times, drove to support their semi-aquatic dwellings. One mode in which timber piles are frequently used in pier foundations is when they are driven down in a group and a masonry pier is built inside of a wooden (or iron) box or piersurmounting them, the space between the masonry and the bed of the stream being ballasted with stone, or, still better, filled with concrete.

The employment of iron for foundations is not very old; hardly going beyond 1834, when Mitchell invented the screw-pile; from which time, as piles, caissons or cylinders, iron began to be used quite extensively, not only giving the advantages of lower cost than timber, in many situations, but permitting the erection of structures otherwise almost unfeasible.

The lines of gradation between small caissons and large cylinders, and between small cylinders and large straight hollow piles, being distinct enough to permit of classification, we may confine ourselves under the head of iron piles, almost exclusively to screw piles.

CIRCULAR SAW GUIDE.

For protection of workmen against accidents with circular saws, M. Ganne has devised an arrangement in which the appearing part of the saw is covered with an envelope which leaves free that portion of the tool where the wood has to pass. This envelope is suspended rigidly from a small standard fixed on the bank of the machine, being connected therewith by a rack in large apparatuses—a simple rod with sleeve and screw in small ones; so that it can be rapidly raised and put aside when the saw has to be examined or removed; and in any case the arrangement serves to regulate the distance of the envelope from the table according to the thickness of the wood.

CHOKED FEED PIPES.

A correspondent in the *Scientific American* says:—I send to you by mail a $\frac{3}{4}$ inch nipple that was taken from the feed pipe of a ten horse-power portable thrashing engine. The engine was brought to the shop to have a new check valve put on, as the one that was on was badly worn. To remove the old one, we cut off this nipple close to the boiler, and were surprised to find that the pipe where it entered the boiler had been reduced in area to about 0.01 of a square inch, by deposits of lime.

The persons in charge of the engine said that they had had no trouble in keeping the boiler well supplied with water, and had used it several days this season, before bringing it to the shop, using the steam at 100 lbs. pressure.

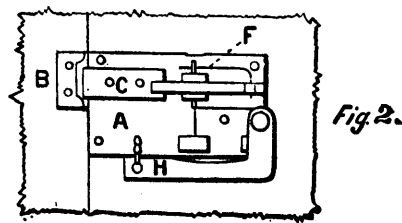
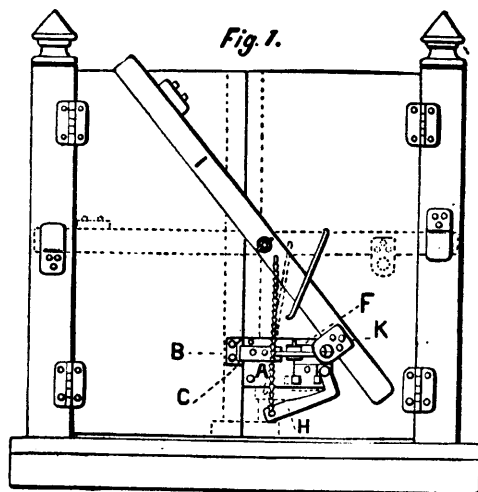
The pump plunger was attached to the cross head of the engine. Had the pump been driven by a belt they would have experienced much trouble in driving it.

Several months ago, a man owning a saw mill brought his force pump to be repaired. He said that he could not drive it with an eight inch belt, while it used to be driven easily with a four inch belt. After examining the pump, I told him that it was all right, and could do nothing for it, that the pipes from the pump to the boiler might be filled with lime (as the water passed through a heater before it came to the pump), thereby obstructing the passage of the water. He did not think much of the idea, but went home with his pump. The next day he returned with the pipes; some of them had become so filled with lime that the passage remaining was not more than one-tenth of a square inch in area.

Inventions.

IMPROVEMENTS ON GATES AND DOOR FASTENINGS.

We give an illustration, in the above cut, of a very ingenious device for fastening a double yard-gate in a very secure and at the same time easy way. The bar on the inside is raised or thrown down by the turning in the lock of an ordinary door key on the outside of the gate, and which entirely obviates the necessity of requiring a person on the inside of a yard to remove the bar and open the gate. *a* is the lock plate, *b* the catch on the opposite side of the gate over which the bolt *c* slides in the act of shutting. The rivets which attach the bolt to the plate slide in slots in the plate. *E* is a lever, having a bevelled end which is pressed against the bolt *C* by the spring *F*. *g* is a bolt which, upon being pushed back by the key, forces back the lever *h*, and the lever in descending draws down the bar of the gate *l*. *h* is a catch attached to the bar of the gate, and this catch is perforated with a hole so that it may pass over a knob on the lever *O*, and thus free the bolt *C* from the pressure of the lever *E*, which allows the gate to open. When the gate is closed the bar falls into its place and the bolt *g* is pressed by the lever tight up against the catch *b*.



This device will be found a very useful invention to those who, often requiring to pass out of a yard with a vehicle, desire to close and secure the gate after them. Mr. Jeffrey Hale Burland, of Montreal, is the patentee.

REPEATING MATCH.—A patent has been obtained for a repeating match, consisting of a stick composed of three parts of chlorate of potash and one part clay, the two substances being thoroughly mixed and formed into a thick paste by the addition of water, which is then moulded and allowed to dry, and placed in a chamber formed in a suitable case. Another stick composed of three parts of amorphous phosphorus and one part clay, prepared in the same manner as the previous one, is placed in a second compartment, and a scraper moves along a platform across the open ends of the two compartments, removing a certain quantity from each stick, and mixing them together, whereby they ignite.