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### Dip of the Magnetic Needle.

It is known to those who have devoted attention to the dip of the magnetic needle, in surveying or otherwise, that there is a diurnal variation or disturbance of its action, as was clearly set forth in the letter which appeared on this subject in our columns last week. We find some very interesting information on this point in a letter recently read before the Royal Belgian Academy of Science, by the secretary, M. Quetelet, and received from him by the Swedish philosopher, M. Hansteen. The latter states in his letter that, from observations made in four summer months with a dipping needle and unifilar and bifilar horizontal needles, he has come to the conclusion that the diurnal variation, observable in magnetic phenomena, is produced by a feeble perturbative force which turns around the horizon from east to west in twenty-four hours. "When this force proceeds to the south, the horizontal intensity diminishes, the inclination augments, and the declination has its mean value (about ten hours before mid-day); when it proceeds to the north, the horizontal intensity increases, the inclination diminishes, and the declination assumes its mean value, which takes place about an hour before sunset; when it proceeds towards the west or the east, the respective declination augments or diminishes (one hour after mid-day, eight hours before mid-day or mid-night.)"

The regular inclination or dip of the needle, which is now decreasing, will reach its minimum, Hansteen thinks, in Western Europe in 1878, and it has already reached it in Siberia. It was at its maximum in Europe in 1678, thus indicating a period of two hundred years between the extremes in the dip of the needle. The decrease has proceeded at the rate of 2.316, or about two minutes and a third per annum.

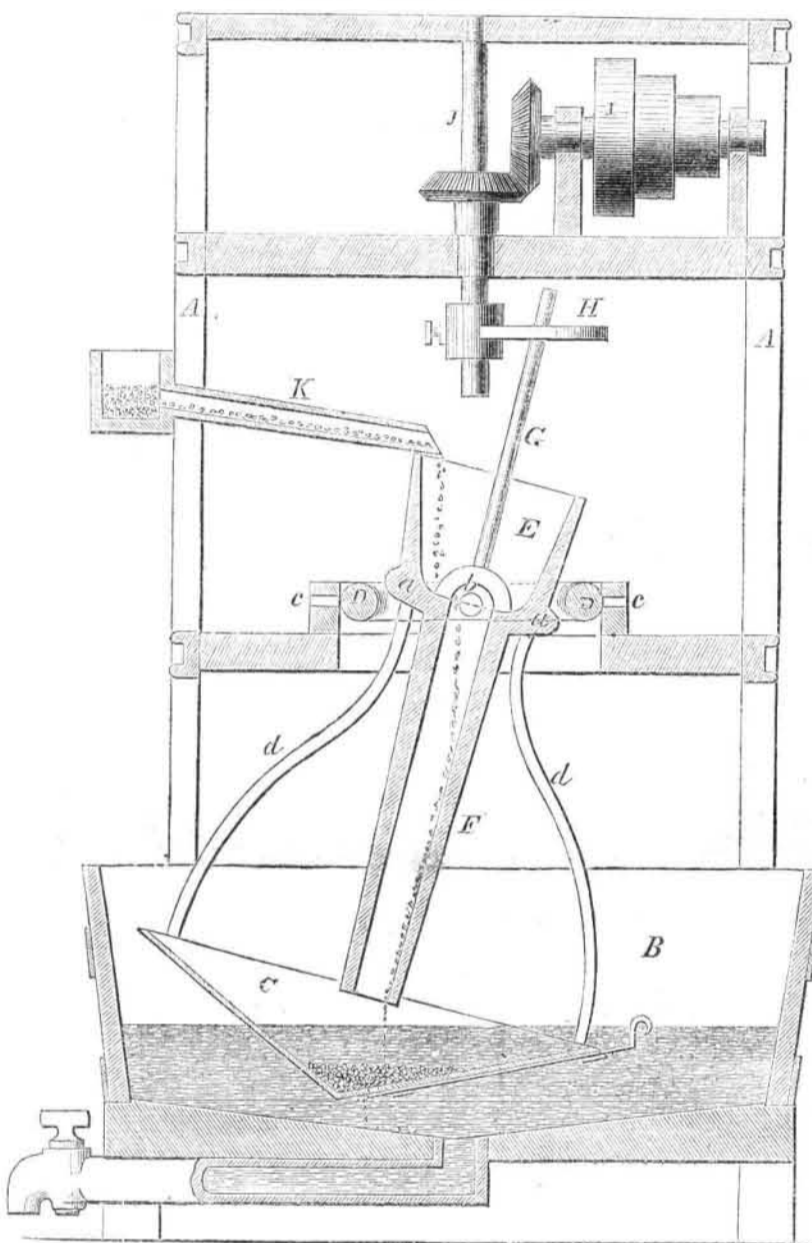
### Improved Furnace Bars.

In large steam boilers the furnace bars are generally put in separately, so that those which burn out can be readily removed, and new ones substituted. The removals are usually very frequent, and the supply of new bars forms quite an item of expense in the use of steam power.

The New York *Sun*, speaking of Van Syckel's patent furnace bars, says:—

"In our own experience in keeping up steam night and day, six days in the week, a set of ordinary bars, costing \$10 or \$15, burns out every six weeks or two months. The improved bars have been in constant use for about five years, and only now require to be changed. Of course, we could not be persuaded to give them up. Engineers and steamship proprietors may profit by our experience, if they like. Van Syckel's patents are now furnished by the Salamander Grate Bar Co., A. D. Melick, President, office, No. 30 Pearl street, New York."

## PAULL'S ORE-WASHER.



This improved ore-washer was noticed on page 51, present volume, of the SCIENTIFIC AMERICAN, and we now give an extended description, with an engraving showing a vertical section through the machine.

The invention consists in a peculiar arrangement for giving motion to a suspended basin, to which the ore or mineral is supplied, and which is immersed in water, whereby it is said that the ore or mineral is washed cleaner with a smaller quantity of water, and a larger quantity of it is saved from the rock or dirt, than by any machine at present in use.

A is the framing, in the center of the lower part of which is the tub, B, containing water, and having in it the ore-washing basin, C, partially or wholly immersed. C is suspended by three or more rigid bars, d, from a plate, a, that is secured to the center of the shaft, G, perpendicular to the basin, and to which the basin is concentric. This plate is provided with two trunnions, b, working in bearings in a gimbal ring, D, whose trunnions, c, work in fixed bearings supported in the frame, A. This arrangement of ring and trunnions is equivalent to a universal joint. The plate, a, carries a hopper, E, above it, and conducting tube, F, below it, leading from the hopper into the basin, C. The upper part of the shaft, G, passes through a hole in a crank, H, attached to an upright shaft, J, which derives

its motion through a pair of bevel gear wheels from the pulley, I. The rotary motion imparted to H gives the other portions rigidly connected with the basin an oscillating movement, and at the same time a revolving motion, for though they do not rotate upon their axes, every point of them moves in a circle.

The ore or mineral properly crushed is fed continuously to the hopper, together with a stream of water by a spout, K, and the tub, B, is kept filled to overflowing. The peculiar movement of the basin causes the ore and dirt with which it is associated to be violently agitated, and to undergo a constant transposition in the basin, and every particle to be brought in contact with the water, so that a most thorough washing is obtained. The ore, by its greater specific gravity, remains in the basin, while the dirt is washed into the tub, from which it is emptied by the pipe and stopcock represented in the engraving.

It is the invention of Joseph Paull, of Eagle River, Mich., and was patented by him October 13, 1857. Further information may be obtained as above.

### New Method of Bread Making.

A new system of making raised bread—the invention of Dr. Daughlish—is now carried out on a somewhat extensive scale in Carlisle, England. Hitherto all the improvements sought after in breadmaking have related to

the fermentation of the flour, or else the raising of it by effervescence—the gas developed by the decomposition of saleratus,—or some such salt mixed with the dough. By the new method the dough is charged with the raising gas. The flour is placed in a strong iron vessel somewhat similar to a Papin's digester, and moistened with aerated water from an adjacent condenser. Then, for the brief period of eight minutes, the dough is kneaded by machinery inside the vessel. The latter is then opened, and the gas contained in the water with which the flour has been mixed, liberating itself when the pressure is withdrawn, instantaneously expands the flour into five or six times its previous bulk; and the raising of the dough, so tedious and laborious by the old methods, is completed! The process is undeniably a rapid one, but the bread cannot be so sweet and pleasant to the taste as that made by regular fermentation. It is generally held, however, that about 10 per cent of the solid contents of the flour is lost by fermentation, all of which is saved by raising the bread by effervescence or gas.

### The Atlantic Telegraph Cable—Its Faulty Construction.

A correspondent—Wm. H. Danforth—writing to us from Salem, Mass., gives it as his opinion that the construction of the Atlantic telegraph cable is faulty, and that it is liable to failure independent of the best paying-out machinery that may be employed. He asserts that as the inside or conducting copper wires of it are small and laid parallel, while the outside protecting iron wires are twisted and laid on the top of a soft material, that when subjected to great strain, the latter wires will attenuate, and reduce the thickness of the cable, thus causing such a tensile strain to be exerted upon the inside small wires as to rupture them, because they cannot elongate in the same proportion as the twisted outside wires.

If such a result should occur, the cable might be laid, and yet fail to operate in conducting messages, because of the inside or conducting wires being ruptured while the outside wires remained intact. Mr. D. asserts that the inside strands should be of sufficient strength to withstand all the strain that may be brought upon the cable. Perhaps it was owing to the drawing out of the inside strands of the cable, during the former attempt to lay it, that the electrical current became feebler and feebler, as stated by Professor Morse, while the cable was being run out rapidly in deep water.

### Tobacco Manufacture.

There are fifty-six manufacturers of the staple in Richmond, Va., whose united capital amounts to four or five millions of dollars. More tobacco is raised in Virginia than perhaps in any other State in this country. It is here that the choicest specimens of the weed assume the shape which commends it to the regard of devoted chewers everywhere. Tobacco is put up in as many different ways almost as there are chewers. There is as much difference between the ideas of the Yankee and the Southerner on this question of taste as there is on any other matter. The former likes his "pigtail" plentifully sweetened, and liquoriced to a degree; the latter, the less sweetening you put in, the better the tobacco. Buyers congregate here who purchase for all parts of the globe. Foreign governments are supplied by agents who reside here for that purpose. With many citizens the road to wealth has been via tobacco.—*Richmond South.*