SCIENTIFIC MUSEUM.

Agricultural Science.

On the Application of Lime to Grass Land.—When we consider the vast quantity of lime that is removed by a crop of grass, it seems reasonable to suppose that some means ought to be taken to restore that element to the soil, if the soil does not already contain a sufficient amount. Two tons of red clover will carry off 130 lbs. of lime—two tons of rye grass 33 lbs. This is from an analysis by Professor Johnston, whose high authority cannot be doubted; and from analysis we find all grasses to contain lime in large proportions, especially clovers and lucerne. Although the quantity of lime appears a great deal carried off by these crops, yet very small when compared with the weight of the soil, as one cubic foot weighs about 80 lbs.; and the presence of a much greater quantity of lime is necessary to be present in the soil than what is actually required by the various crops, as the roots of feeding organs do not come in contact with the hundredth part of the soil. The clear glassy part of the stems of grass is composed of a silicate of potash or a silicate of soda; and in the absence of either of these substances lime in contact with sand or flint will render it sufficiently soluble to enter into the organism of plants, and will also set at liberty matters that have been taken up in the soil, and quite unfit in that state for the food of the plants. If grass is not carried away in the shape of a crop of hay, but is used as a pasture for milk cows or growing stock, still a great amount of lime is removed by those animals; 100 pounds of bones contain above 57 lbs. of lime. Milk, too, carries off carbonate and phosphate of lime in great abundance. Yet it must be remembered that there is a marked difference between the full grown animal and a young or growing one; the former excretes carbonate and phosphate of lime in its liquid and solid excrements, whereas nature has so organized the young animal, that the greater part of the lime eaten in its food is assimilated for the growth and extension of its bones; if such were not the fact, how could bones possess the immense quantity of lime in their composition? So, even by this means, the soil becomes deficient of lime, if all the excrements of such young animals were returned to it; if such soil did not contain a sufficiency of lime, which there is much reason to doubt, as crop after crop removes lime, and lime is seldom applied as a dressing for grass land; and certain it is that we cannot arrive at anything like accuracy in the absence of analysis; and practical experimenters and farmers will do well to consider this.

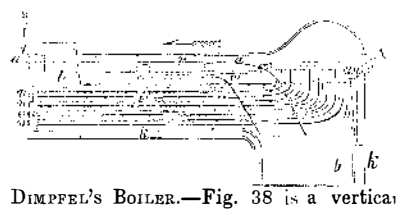
A Mr. Wetherly, an English farmer, who has experimented largely with lime, states that the fall is the best time to apply lime to land, as it exercises its most beneficial influence in the winter months. That which contains the greatest amount of the pure carbonate of lime, is the best. About three tons are applied to the acre. It is slacked and spread evenly over the land as quick as possible. Its use should be regulated as to the kind of crops. Potatoes are much benefitted by its use; 9 tons, with their tops will take from the soil 270 pounds of lime—45 tons of turnips, with their tops, will carry off 140 lbs. of lime; hence the benefit arising to turnip crops from the use of bones, from the fact of their supplying lime, in addition to the organic constituents.

Relative Value of Lime, Ashes, and Guano.—To the friend at Alexandria, who asks us to state "our opinion as to the relative value and effects of 100 bushels of ashes, the same of lime, and of 400 weight of guano, on an acre of land," we reply, that these manures are different in their natures and properperties,—the two first being mineral, and the latter animal manure—that the effects of the two former would be more lasting, the letter more active and productive of immediate good results, though not so permanent,—that the two former, however, would have to be aided by organic manures of some kind, as neither could, of itself, furnish the nutritive food to the plants. If the soil, however, abounded in vegetable and animal remains, they would render them available by decomposing and preparing them to be imbibed as food by the plants.

To produce immediate and lasting effects, it would be well to mix 200 lbs. of guano, and 1 bushel of salt, intimately together, per acre, broadcast, plow the mixture in, harrow, then spread 50 bushels of ashes per acre, and harrow in. Except the price of the additional labor, the cost will be about the same as for 400 pounds of guano, while its good effects would be much more permanent.—[American Farmer.

On Boilers.---No. 19.

Fig. 38.



Dimpfel's Boiler.—Fig. 38 is a vertical longitudinal section of the locomotive boiler of F. P. Dimpfel, of Philadelphia, and patented on the 16th July, 1850. *a* represents the external shell of the boiler, which may be of any desired form, and *b* is the fire chamber. Within the shell is arranged a series of water tubes or pipes, *c*, which are secured at the back end to a vertical plate, *d*, which plate is at such a distance from the end plate or head, *e* of the boiler, so as to have a space, *f*, for the free admission of water to this end of the tubes or pipes.

The other ends of the said tubes or pipes are curved or bent upwards, and attached to the roof or crown plate, *g*, which runs back to, and is connected at the back end with the plate, *d*, before described, and at the front end with a vertical plate, *h*, or lining of the furnace, and at the sides with the upper edges of a plate, *i*, within the boiler, and at such distance from it as to leave a water space all around, and communicating with the space, *f*, at the back end, and with the water space, *k*, surrounding the furnace. This plate, *i*, together with the roof or crown plate, constitutes the fire-flue, which leads from the furnace to the chimney, *l*, so that the flame and other products of combustion, in passing from the furnace to the chimney, act first on the curved or bent-up part of the tubes or pipes, and then, in passing towards the chimney, act on and impart heat to external surface of all the water tubes or pipes, the most intense heat being applied to the curved or bent ends of the tubes which first receive the action of the heat. The products of combustion also heat the plate, *i*, which is the inner shell of the water space surrounding the flue, and which constitutes the water bottom. The tubes being bent or curved upwards, as the water in them is heated and rarified, it will tend to rise in the curved end, and thus establish a rapid circulation through the entire length, and as their other end is connected with the body of water at the back, and where the water is not heated to so intense a degree, the circulation in the tubes or pipes will be fully supplied. The water space between the plate, *i*, and the outer shell of the boiler, as well as the space, *f*, at the back, are closed at the top from the back to the space, *k*, around the furnace or fire-box, and the crown plate or fire roof to which the bent-up ends of the tubes are attached, is surrounded by a rim, *p*. Two or more tubes, *q*, form communcations between the space above the crown plate and the lower end of the space, *k*, around the fire-box; and this space, *k*, in turn communicates with the space which constitutes the water bottom.

The effect of this arrangement will be that, as the water above the crown plate or fire roof cannot pass down the side or back spaces, it will run down the tubes, *q*, to the bottom or lower part of the spaces, *k*, surrounding the furnace or fire-box, and thence through the water bottom to the space, *f*, to supply the circulation in the tubes. The current thus supplied to the space, *f*, which cannot rise above the covering of the said space by reason of its being closed up at top, will effectually supply the tubes, for if the said space were open at top, and not connected with the water bottom, the heat which the plate, *d*, receives from the impingement of the products of the combustion in passing through the flue, would have the effect to repel the water from the surface of the plate, and to induce an upward circulation in the said space, *f*, so rapid as not to give an adequate supply of water to the tubes.

And as the curved and bent up ends of the tubes are either directly over or nearest the fire chamber, they will be more highly heated than the rear ends, so that the water, by its circulation through the tubes or pipes will move in a direction the reverse of the current of heat, as it passes from the fire chamber to the chimney, thus increasing the absorption of heat by the water.

The bent-up ends of the tubes are extended above the roof or crown plates, as at *m*, which will induce a more rapid circulation, and avoid the agitation of the water on the surface of the roof around the tubes.

The shell of the boiler at the horizontal end of the tubes or pipes may be perforated as at *n*, with a series of holes, corresponding with the bore of the tubes, for which one large hole for the whole series, covered with a plate in the manner of a man-hole, may be snbstituted, for giving access to the tubes or pipes, for cleansing or repairing them.

A short distance above the top flue-plate there is a cylinder or case, *r*, provided with a reciprocating piston, the rod of which passes through the head of the boiler, that it may be connected with any moving part of the engine or any other first mover, to give it a reciprocating motion. The said cylider is provided on one side with two induction valves, one at each end, and on the other side with two eduction valves discharging into a pipe leading down into one of the outer spaces. It will be obvious from this, that the reciprocating motion of the piston will produce a current of water down the water space in which the pipe is located, and that this will induce a circulation through the boiler, to return the water to the induction valves of the cylinder, and in this way establish a circulation of the water over the heating surface of the boiler with a velocity dependent on the capacity of the cylinder and the motion of the piston.

Experiments at Washington.

Some experiments at the Washington Navy Yard have been made, which would seem to establish the unfitness of iron as a material for the hulls of vessels of war. A condemned iron vessel was procured, an eight-inch shell was fired at her from a 56-pounder gun, at a distance of three hundred and fifty yards.—The shell went clear through both sides of the vessel tearing large ragged holes, much larger than the diameter of the shell, and too irregular for plugging, and scattering small and jagged fragments of iron, which, in an action, would be likely to prove more dangerous to her own crew than the shot from an enemy's battery. Another shell fired at her wooden bulwarks made only a clean round hole.—[Exchange.

[The Washington experiments are certainly two years behind the age. The unfitness of iron for war vessels was fully proved two years ago in England by experiments made at Portsmouth, (see page 368, Vol. 5, Scientific American.)

Source of the Nile.

At the last meeting of the Bombay Geographical Society, a paper was read by Mr. John Smith, on the discoveries made by the East African missionaries of what appear to be the sources of the Nile. This mysterious river is said to arise from two lakes, one of which is of great dimensions nearly under the Line, and they seem fed by the melting snows of the gigantic range, which rises to the altitude of 22,000 feet at least, close by. The description of this long-looked-for locality coincides exactly with that given by Ptolemy 2,000 years ago.

Cure for Hiccups.

Dr. Pretty, an English physician, appears to have found a very simple means of arresting the hiccup. It is sufficient to squeeze the wrist, preferably that of the right hand, with a piece of string, or with the fore-finger and thumb of the other hand.—[Philadelphia Bulletin.

[If this is true, it is a most valuable discovery.

Railroad Items.

The Martinsburg (Pa.) Gazette, says the Baltimore and Ohio Railroad are rapidly progressing with their new building, at the depot in that place. This building, when completed, will be one of the largest connected with the road. The Chattanooga Advertiser learns from Mr. Grant, Chief Engineer on the Nashville and Chattanooga Railroad, that the track laying is proceeding at the rate of a mile and a half per week, on the western division. He is confident in the opinion that the road will be open for through travel by November next—connection being made at the river by steamboat. A connection has been secured at Knoxville, Tenn., between the East Tennessee and Virginia railroads. At a railroad meeting held in Lexington (Ky.), recently, Gen. Leslie Combs and John Norton, Esq., delegates to the late Railroad Convention at Nashville, reported, as the result of their mission, the assurance of the certain and speedy construction of a railroad line from Danville to Nashville.

If we suppose the mean depth of the ocean to be two miles, the cubic contents of it will be 290,000,000 cubic miles.

LITERARY NOTICES.

Graham's Elements of Chemistry—Blanchard & Lea, of Philadelphia, have just issued part 1 of the revised edition of this great and eminently distinguished work. The science of chemistry is so progressive, that every elementary work becomes obsolete in two or three years, hence the necessity of new editions every second year or so. This work is now written up to 1852, and is greatly enlarged. Chemistry is a practical science—it is an accumulation of facts developed by experiments; and the knowledge it affords is useful to every man and woman in our land. It is no dry system of sounding inferences, but truthful, needful information for all. We therefore recommend this work heartily and sincerely to our people: it has no superior. It is to be completed in two parts, and is for sale by A. S. Barnes, No. 57 John st., this city.

The American Whig Review, for April, contains an excellent portrait of Hon. A. H. H. Stuart, Secretary of the Interior. It contains the conclusion of an able article on "Journalism and Journalists in Paris," biographical sketches of eminent Whigs, and several literary articles. The Review is ably conducted by Champin Bissell, and is devoted mainly to the promulgation of political views suited to the party whose name it bears. Terms $3 per annum; 120 Nassau st., N. Y.

North American Miscellany, published monthly by Angel, Engel, & Hewitt, No. 1 Spruce street, New York—It is published at $1 per annum, and is decidedly one of the most sterling productions now issued. The second volume commenced with the March number. The same concern also issue the "Household Words," a weekly, at $2.50 a-year, conducted by Charles Dickens, an English author of world-wide celebrity.

We have received from the publishers, Dewitt & Davenport, an auto-biography, entitled "The Life and Adventures of Capt. Armstrong," in which the author gives a detailed and interesting account of the fortunes and misfortunes through which he has passed. Price 25 cents.