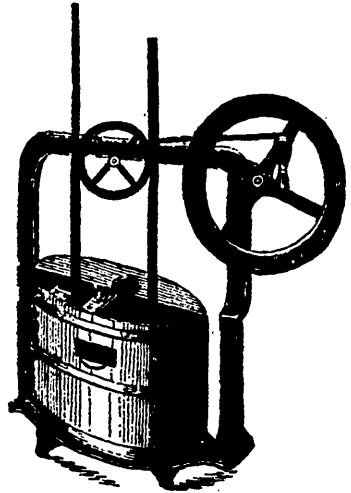


medium of their other ingredients as well as their nitrogen; and we might as well say, that because the seeds and seed vessels of plants owe their formation, in a large degree, to this element, it is, therefore, more essential to the properties of the vegetable organism than any other; and yet, we know that nitrogen enters into the composition of plants in much less quantity than either carbon or the elements of water.

When proper economy is observed in the department of manures, the soil ought to perpetuate the means of its own fertility; but of late years, a numerous order of artificial substitutes has been introduced, in the form of special compounds, or fertilizers, as they are termed. Of these, the most common are guano and bones. Guano is composed of the droppings and remains of sea fowl, and is brought from abroad. It is in the form of a coarse, brown powder, containing phosphates, urates, and other saline matter, and is applied either alone or along with other manures. Bones are reduced into the state of *phosphate of lime*, by solution with muriatic acid (spirits of salts), or, more commonly, in sulphuric acid (vitriol), in the proportion of two pounds of the former to one of the latter; or, if great economy be studied in conducting the process, three of bone to one of acid; but the former proportions—half their weight of acid—will yield the most satisfactory results. Guano yields most turnips, it is said, weight for weight, but the animal matter is not as durable element in the manure. Its phosphate of lime, which is its most valuable part, is more permanent. In the case of vitriolized bones, as this preparation is also sometimes called, it is different; the strongest effects will appear at first, but they are good for three or four years. All classes of plants benefit by them—turnips in a very remarkable degree. Land that had commonly yielded an ordinary average of twenty-five to thirty tons, has been known to give forty tons. In the case of the white crops they decrease in the weight of straw, and increase the weight of grain. If you suspect a crop of oats will grow too much straw, phosphate of lime will enable that which would have formed a bad quality of straw, to be elaborated into juices fitted to fill the ear with more gluten. When well applied to wheat land, the wheat will return almost twenty per cent. more flour, and of better quality; while meadow and grass lands, when regularly supplied with about a bushel of it to the acre, every spring, it is said, will actually bring animals to maturity a year sooner, and of better flesh.

The other general class of manures, those of mineral origin, we shall reserve for next lesson.

A Persian philosopher being asked by what method he had acquired so much knowledge, answered, "By not being prevented by shame from asking questions when I was ignorant."



DRUMMOND'S PATENT ANTI-METALLIC CHURN.

In reply to a correspondent whose communication appeared in the *Gazette* of November 29, respecting the above churn, we now beg to place before our readers a wood-cut of same, with the following description, which we take from the prospectus issued by the manufacturers, Messrs. C. D. Young and Co., Edinburgh:—

"It is in form an elliptic or oblong square, or nearly so, as shown in the foregoing wood-cut, and is divided in the middle, forming two chambers or compartments, but which communicate with each other by a series of holes perforated in this division at top and bottom. To each of these chambers belong a staff and 'dasher,' similar to those in the ordinary plunge churns, the staffs being peculiarly but simply constructed, to insure an infusion of pure air through the whole body of cream at every stroke. The churn is set into an iron stand, with an elliptic iron bracket attached, supporting two wheels—one a fly or driving, and the other oscillating, which latter acts between the upper ends of the two staffs, and is simply attached by means of two leather belts. To the fly-wheel is a handle, by which it is driven round, acting on the oscillating wheel by a connecting rod, effecting two hundred strokes per minute, with the most perfect ease, and without the least effort; so much so, that the whole operation of churning can be successfully and easily accomplished by a child.

"The one staff, as it is propelled downward, forces the cream through its dasher, and likewise through the division at the bottom into the other compartment, the other simultaneously forcing itself through the cream upwards, and in the same manner causing a cross action through the holes perforated at the top, and vice versa, thus consummating the most rapid and complete action without in the least—from its rapidity—deteriorating the quality, protected as it is from