PREFACE

AGRICULTURISTS! The method which I present to you, although not emanating from a chemical laboratory, is yet in harmony with the principles of chemistry, being the resultance of the meditations, reflections, and practical experiments, which I now lay before you. It is not, then, a theory founded upon probabilities more or less specious; I have practised, and I expose in good faith the processes of my invention, with the effects which they have produced. They are explained in a way so simple that they can be easily understood and put in practice.

I make no pretensions to having found any new element for manure; all my merit consists in having better observed facts which have either escaped the attention of other men, or of which they have not fully appreciated all their importance, and in having turned these observations to the profit of agriculture.

Agriculture is assuredly the most important art which man has discovered, either to supply his wants, or to smooth the cares which are inseparable from his existence. It is not, then, an exaggeration to maintain, that in default of all other inventions, the processes of agriculture alone would suffice for his preservation, and even for the embellishment of life.

It may also be asserted, that agriculture, in its broadest signification, is a very complicated science, which ties itself by a thousand threads to all other branches of human knowledge, but in its more restricted sense it consists in the tillage, and in the establishment of manures, in accordance with the wants of the soil and its products.

I know of no better way of urging the importance of manures than by quoting the following passage from an admirable work upon "The Nature of Manures, and the Manner in which they Act," by the illustrious Parmentier:—

"The scarcity of manures, and their unskilful employment, are the principal causes of the sterility of a country. In vain are united efforts to discover new modes of culture, to reform those already known, and to improve agricultural implements; if we neglect the first sources of fecundity, the crops will always be indifferent and uncertain."

Nothing can be said upon the subject of manures more just and profound.

Well, it is precisely this scarcity of manures which afflicts our country, and which is the greatest plague of our agriculture, rendered yet more sensible by their unskilful employment. But let us search a little into the probable causes of this scarcity.

At first, farmers, ignorant of the application of chemistry to agriculture, employ only manure from cattle and mineral amendments for their exhausted grounds, and of these there is always an insufficiency; for the quantity of cattle which they possess is ordinarily proportioned to the size of their farms, and everybody knows that the richest proprietor of cattle is far from having enough to satisfy the wants of his domains. It is true that pride sometimes induces them to say that they can produce enough from their cattle, but they only cheat themselves by the illusion. And as for the large quantity of mineral amendments which they employ by themselves, they are, so used, not only of short duration in the ground, but, unskilfully appropriated to soils and plants, are often more deleterious than useful.

It must, then, be admitted, that this facility to procure cattle manure and mineral amendments, the first coming of itself, and the second being bought ready made, is one of the principal causes of the scarcity of manure and the stagnation in the art of preparing it.

And furthermore, this scarcity of manure proves the negligence of the great number of farmers, and the little attention which they have given, up to this time, to the procurement and preservation of that which is of the utmost necessity to the culture of a farm. In a

great number of farms the manure is regarded as a merely incidental circumstance many of the elements of manure are suffered to waste, which this method would serve to combine; nearly everywhere the juices, or principal fecundating elements of the manure heap are dissipated or lost by the sole fault of the farmer. He does not dream of the utility o human excrements, as if these materials were not as valuable as the manure from cattle; in short, nowhere is there a manufactory for manures attached to a farm.

The little progress which the art of manures has made, is still further explained by the fact that the science of chemistry, which has done so much in other arts, has done the least in this. And why? Because few persons are fond of living in an infected atmosphere, to do which it is necessary to possess a certain strength of will, to overcome the repugnance which is excited by the sight, the smell, and touch of bodies, disorganized by fermentation.

In all branches of science, where they can make their experiments in the laboratory, there has been progress, but in the art of manures or fermentation, where credit can only be gained by the reunion of a mass of organized bodies which ought to disagree, there has been but little progress for centuries. As we read in Virgil and the Greek agriculturists, so let us descend to our own days, look into every work upon agriculture, ancient or modern, and we will find that the manures which we employ in a state of combination were used by them separately. We shall observe, that notwithstanding Oliver de Serre, Humphrey Davy, Maurice, Martin Rozier, Thaer, Puvis, Parmentier, Dombasle, Payen, Liebig, and others, whose works are in other respects admirable, there has not been established, before the present method, any real progress in the art of manures, because these authors have gone around the true question, which, with great sagacity, they had foreseen. The one who gave the first idea of this system was a practical farmer in the south of France, named Jauffret, but his method required improvements to render it useful to agriculture.

Thus it is established, as well by that which has preceded as by that which is to follow, that the art of manures was given up to chance, that it reposed upon no sure foundation, and that farmers of all countries made their manures according to circumstances, or rather at hap-hazard. From whence we should conclude that agriculture can not truly flourish until each farm shall have on it a systemized manure factory, and an intelligent man to direct it, so as to make the necessary manure, and to graduate it to the various soils and plants. Now this method gives the general rules of such a system, and puts every one in a way of accomplishing this object. It is nevertheless for you to act, to put your hands to the work, and be assured that this scarcity of manures will soon disappear, and this sore upon our agriculture will be healed for ever.

I have reason to believe that this method will be acknowledged throughout all the Union as of general utility; although the benefit will be more or less considerable according to the local position and degree of intelligence of those who may make its application.

The whole of the present method is divided into sections, and subdivided into articles.

PART FIRST.—The method in all its simplicity.

PART SECOND.—Explanation and analytical developments of the method. Solutions of manure qnestions of high importance, and supplementary articles consequent upon this system.

I earnestly recommend every one, before commencing operations, to read entirely through the two parts which constitute the whole of the method, and oftener if they have leisure. Withont this preliminary care, the system will not be well comprehended, because the two parts are linked together, feed and sustain each other, and form an inseparable whole.

As the question of manures, alone, gathers in its immense net nearly all the art of agriculture, I am very far from believing that I have closed the mine by this method: on the contrary, I have only opened it; and its progress, relying upon science and practice, will enlarge the art to fulness.

The appearance of my method gives the first idea—the first movement; and when this idea is well understood, and the movement has taken place, this art, which was stationary before the new impulse, will forthwith march with rapidity—will increase from tributes from our men of science and of genius—and will be improved by our intelligent agriculturists. In the mean while, I indulge the satisfaction of having created a system which has ripened under my

experiments, and from which every farmer can from this moment put his hand to the work under the full assurance that he will considerably augment his products by following my economical processes.

PROPRIETOR'S ADDRESS.

FELLOW CITIZENS:

I am happy to be able to offer you one of the most important agricultural improvements that has characterized the age. You do not need to be told that manure is indispensable for the successful cultivation of your farms; or that that system is the most desirable, which will secure the greatest amount of the best manure in the shortest time, and with the least expense. It is only necessary to satisfy you that these advantages do actually unite in Bommer's Mothod, to induce you to appreciate its importance and to avail yourselves of its advantages. If expedition in its production were the only advantage, we might suppose that what we gained in the saving of time, might be sacrificed in the expense or quality of the manure. But it is now demonstrated, by the clearest evidence, that this Method is capable of converting, expeditiously and economically, not only all vegetable substances, muck, peat, &c., but also common earth, into a rich and fertilizing manure, more efficient and durable in its effects than stable manure. The resources for making the manure are inexhaustible, consequently it can be made to any extent desired. Many of the ingredients to make the manure are universally attainable by every farmer, without cost, and the balance, so far as indispensable, can be procured at trifling expense. It is scarcely possible to enumerate all the advantages which the Method is capable of producing, if it should become generally introduced, and faithfully improved throughout our extended and favored country. I am aware that different sections may have their peculiar advantages and disadvantages connected with their particular localities, but I know of no section where Bommer's Method would be inapplicable and useless. Especially, wherever a plentiful supply of the best manure, with the least expense, is a desirable object, there should the Method be practically introduced with the least possible delay. Wherever domestic endearments and the sweets of home render it desirable that lands, which have hitherto administered to our support, should retain unimpaired their wonted fertility, and eventually descend to posterity as an evidence that they have been rendered better by our occupancy, there should this Method be regarded as indispensable; and where worn-out lands, which were once productive, are exhausted, and do not compensate for their tillage, in every such locality is this Method capable of converting the barren waste into a fruitful field.

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REVISION

This edition has been carefully revised, with a special regard to obviate every impediment to its being clearly understood, and easily put into practical use by every purchaser. To facilitate the object, care has been taken to employ a plain and familiar style of language, that would be easily understood by all.

There has been also a new classification of the various topics which are treated upon in the work, relating to the manufacture of manure; and these several topics are so arranged and stated as to leave a distinct impression, in order to prevent the omission of any particular which would be indispensable to ensure success, and also to instruct the operator how far he may safely vary and modify his course to accommodate his peculiar circumstances. Being confident that the Method is available by Planters, Farmers, and Gardeners of every grade, and that there are no exceptions wherever manure is wanted beyond present resources, the editor has employed his best endeavors to aid and prompt every cultivator of the soil so to use this Method that he may receive the greatest benefit from his work and investment.

INTRODUCTORY REMARKS

Object of the Method. Materials of which to make the Heap. Barn Yard Manure. The Peculiarities of the System. Cost of Ingredients. Labor Some of the Advantages of the Method.

Object of the Method.

THE principal object of this Method is to convert vegetable and earthy materials into rich, unctuous, and durable manure, *without waste, in a short time, and at small expense,* enabling the farmer greatly to increase his usual quantity of manure, almost entirely within his own resources, by making use of such materials as he finds upon his own premises, many of which are commonly wasted.

Materials of which to make the Heap.

The compost heap may be made from almost any kind of vegetable or mineral substances, such as all kinds of plants, green or dry; weeds, sea ores, rushes, swamp grass, briars, hassocks, mullins, dock, thistles, leaves and rakings of the woods; corn-stalks and stubble, reeds, flags, sugar cane, potatoe and pea vines; all kinds of straw, saw-dust, old tan, apple pumice, coal beds, hedge rows, ditch banks, peat, turf, muck or swamp mud, marl, slime from rivers, black earth, loam, common earth, &c.; in fact, almost every thing that will retain the lye, and serve to form a base or body, may be used to advantage.

Barn-yard Manure.

Barn-yard manure may be much improved in quality by this method and if composted with earth and other materials, the quantity also may be increased.

The Peculiarities of the System.

The peculiarities of this system consist in preparing a liquor or lye (a kind of artificial urine,) which, applied to a compost heap, causes a fermentation, and consequently the decomposition of the materials of which it is composed, in the short space of *fifteen to thirty days*, correcting all the acids, while it also fixes and prevents the escape of the ammonia and other valuable properties

There is something peculiar also in the construction of the heap, by which the *air* is made to contribute to the expedition of the process, and also to impart fertilizing qualities to the manure. Hence this manure is

found to be richer in all the essential properties of salts and gases. than barn-yard or stable manure.

Cost of Ingredients.

The cost of such materials as the farmer will need to *purchase*, usually amounts *to from ten to fifteen cents* for each ox cart load, or half-cord of the manure. These articles, it will be perceived, are *worth what they cost* to be used as a manure, *independent* of this method: hence, if double the quantity were required, there could be no loss in the purchase

The other materials are found on every farm, *without purchase.* The water, which is the base of the lye, *costs nothing*, and every thing concurs to render it economical.

Labor.

After the farmer is prepared with a vat and other conveniences, *the labor* of making manure by this method, consists simply in collecting together the materials, forming them into a compact heap, and in preparing and applying the lye.

It is not considered, by those who have had the most experience in the use of the method, that it requires more labor than is necessary in the usual mode of making compost; while many important advantage are secured by this process.

Some of the Advantages of the Method.

The advantages of the method are numerous, and should be well considered and fully investigated, in order that the operator may duly appreciate the worth of the system.

A few, only, of the most prominent advantages resulting from this method can here be presented.

1st. *This manure is made with little or no waste.*

The great desideratum, in converting vegetables and other materials into manure is, that, in the process, there should be no loss of the salts and gases which they contain, as *these* constitute the essential elements of manure.

It requires no argument to satisfy an intelligent man, that when manure lies exposed for several months to the action of the rains, the wind, and the sun, and especially in the summer season, as is usually the case in barn-yards, that great losses are occasioned by these influences, and also by the prolonged fermentation, when no material is used to absorb and fix the ammonia and other gases. It has been estimated by the best practical farmers and scientific men, that manure, thus exposed, loses, at least, one half of its strength. In many instances but little is left except the skeleton of manure: whereas, by Bommer's Method, we are able. not only to prevent the losses which have been alluded to, but,

by means of the *lye, the air, and the peculiar construction of the heap,* we *add much* to the valuable qualities contained in the materials of which the heap was composed.

In short, this method may be regarded as a kind of manufactory of the salts and gases, which constitute the most essential properties of manure, while the usual mode of making manure is but a manufactory for the *destruction* of these inestimable qualities. (Examine second part, from 31st to 35th pages.)

It naturally follows from the above reasonings, that, by this method, any given amount of straw or other vegetable material, shall make *a much greater quantity* as well as better quality of manure, than if decomposed by any other process; and the results of all the trials that have been made according to this method, have fully demonstrated that such is the fact.

2d. *It is made in a short time*

Whatever material the farmer may have on hand may be gathered up, and converted, in a few days, into the best of manure.

Thus the surplus straw, weeds, &c., of the present year's growth may be used as manure on the wheat crop sown in the fall. Heaps may also be put up in the spring, and used upon the corn and other spring crops. So the farmer gets his manure from these materials, *a year sooner* than he otherwise could, by following the old practice of making it in the yards. And what is better, he gets it in all its strength and freshness.

3d. *It will destroy the germ of all seeds in the heap.*

The high fermentation developed during the process, effectually destroys the vitality of all seeds in the compost heap. So this manure will not produce weeds in the field.

The lye thrown upon the manure heaps of the farm causes the same result, and the effect is to render cultivation clear and thorough.

4*th.* *It may be adapted to different soils and crops.*

This manure may be varied to suit different soils and crops, by using a greater or less proportion, as the case may require, of some of the lye ingredients. (See pages 38—45.)

5*th.* *It is durable.*

If made strictly according to the directions given in the Method, this manure is in its nature very similar to good stable manure, and several years of trial have fully demonstrated that it is *equally as durable* in its beneficial effects upon the soil, and in most cases when comparisons have been instituted, it has been proved to be even more lasting than the stable manure.

6*th.* *Manure may be made of Earth.*

This excellent article is peculiarly adapted to all purposes of top dressing, and is an excellent substitute for well rotted animal manure for

application to corn hills, and other purposes where a *short* or *fine* manure is necessary.

Those who have had the most experience in manufacturing *earth* manure, have regarded it as one of the greatest advantages of the Method.

7*th.* *It shows how hot beds may be revived.*

By this method, gardeners may reanimate their hot beds without changing their manure or litter; thus enabling them to obtain early produce much sooner than with the system now in use.

8*th.* *Dead Animals, &c.*

This Method presents the best means of turning to good account all feculent materials, such as dead animals, the offal of butcheries, fisheries, spoiled fish, &c. Such articles, though generally thrown away, contain the elements for making the most powerful manure that can be produced on the farm.

9*th.* *Guano, Poudrette, Bone-dust, &c.*

Those persons who choose to make use of these and other concentrated manures, would find it to their advantage to throw them into their vats and use them in connection with this method, as by so doing they would be equally diffused through the compost heap, and would have a more lasting effect than if sown broad-cast upon the field.

10*th.* *Purin.*

By this method a very fertilizing liquid called purin, may be manufactured for top-dressing at a mere trifle of expense.

Products from this manure.

The products obtained from this manure will, in general, be more substantial, and the grain heavier, because the manure, being well matured, combines all the necessary elements for the proper fertilization of the ground and the proper nourishment of the plants. (See note at the bottom of page 73.)

For proof of the practicability and cheapness of this system of making manure, and also for the correctness of the principles involved in the Method, we respectfully refer the reader to the hundreds of Testimonials which have been given in its favor, by the most intelligent and practical farmers and scientific men of our country; and, also, to the persons themselves who have had the longest experience in its use.

The public must acknowledge the superiority of making compost by means of our lye and humid fermentation, over the old method of preparing dry compost; a defective practice, which must shortly disappear forever

Union is strength. { METHOD. { To lose nothing is economy.

PART FIRST

SECTION FIRST

SATURATED WATER.—RESERVOIR OR VAT.—METHOD OF MAKING OR PREPARING SATURATED WATER.—TIME REQUIRED IN ITS PREPARATION.—OBJECT OF THE SATURATED WATER.—MEANS TO PREVENT UNHEALTHFUL EXHALATIONS.—PLACE OF OPERATION.

Saturated water

Saturated water, such as we desire, is simply water in which vegetable and animal materials have been suffered to decompose and rot. Pure water, in case of need, may serve your purpose; but as it is so easy to make this saturated water, and as it contributes so much to the decomposition and good quality of the manure, we recommend to farmers not to grudge the trifling labor required in its preparation, and always to use it in preference to pure water. It frequently happens that the farmer finds this saturated water already made. The stagnant and corrupted water in ditches and ponds on the farm or near it, and from all low places where water gathers and stagnates, will furnish a saturated water of excellent quality.

Liquor drained from the barn-yard is usually the best saturated water that can be procured; and as it commonly holds a vast amount of animal manure in solution, it will greatly diminish, and in most cases supersede, the necessity of adding human excrements or animal manure to the lye.

Reservoir or vat to contain the saturated water.

The first thing to be done is to prepare a convenient reservoir to contain a sufficient quantity of the liquid. We employ for this purpose, hogsheads, vats or small ponds. In case there are none of these at hand, a hole of sufficient size may be dug in the ground, and will answer every purpose, at least for the first operation. If the ground be naturally porous and will not retain the water, it may be made retentive by puddling it with clay. If, notwithstanding these precautions, the soil will not retain the liquor, an old cask, of the largest size, with one head knocked out, and buried to the brim, will answer for the small farmer to begin with.

Every farmer, however, will find it for his interest to establish per-

manent reservoirs,* the size of which should be determined by the quantity of manure to be manufactured, and the peculiar circumstances of each individual; and here it may be proper to apprise the farmer that he can scarcely have them *too large*, as his object should be not to see *how little* of the liquor or lye will answer his purpose, but *to see how great a quantity he can prepare*, inasmuch as the lye is of such immense value, and can be prepared at so trifling an expense.

These reservoirs should be so placed that the water may flow into them freely. (See page 45, also page 69.)

Method of making or preparing saturated water.

Having secured a quantity of water in the reservoir, let it be corrupted and made filthy, by throwing into it all easily decaying vegetable or animal materials, such as weeds growing upon the banks of ditches and around houses, the offal of butcheries and fisheries, hen dung, dove dung, dead animals, spoiled fish or provisions, urine, excrements, lye, soap-suds, greasy dish water, slops from the kitchen, sweepings of the house, and all similar residues.

You can hardly conceive the value of such materials as these, if used according to this method. You should never allow them to be carelessly thrown away, for they contain, in great abundance, the most essential properties of manure.

If none of these materials are at hand, a load or two of horse manure fresh from the stable, will answer the purpose.

Add to this liquor about a pint of quick lime† to every barrel of water. From time to time stir up the whole from its depth with a long pole,‡ and fermentation will soon commence.

Time required in its preparation.

The length of time required for this water to acquire its necessary properties, previously to preparing the *lye*, varies according to the quantity and nature of the materials which have been put into it, and according to the temperature of the air. It may arrive at this point in about eight days, while at other times three weeks or even a month are necessary. The only rule which you have to observe is, that the water shall be in full fermentation, and as highly charged as possible with the materials which have been put into it. If pure spring or well water be used, it will require a longer time for its preparation than rain or snow water

* There are various ways of preparing reservoirs or vats in order to make them water tight. They should generally be sunk in the ground, and floored and lined with plank, timber, brick, or stone, if the soil is porous and cannot be made retentive with clay.

† The lime should be carefully slaked in water previously to putting it into the vat, so as not to *drown* it. Observe this rule in all cases.

‡ For this purpose, a handle inserted in the half round of a little barrel head would make a convenient instrument.

The farmer should always have his reservoirs in readiness, that he may secure his supply of water in the rainy season, and let it remain on hand until it is required for use. The longer it remains the better it becomes.

Object of the saturated water.

Saturated water serves to temper the materials which compose the lye and to feed them; and although it is possible to operate with pure water, yet we recommend, by all means, to prepare the water according to the directions given above, unless you have secured the drainings of your barn-yards or other stagnant and filthy waters; and even these may be much improved by a similar course of treatment.

Unhealthful exhalations.

To prevent any baneful influence from unwholesome exhalations or vapors arising from these pools of stagnant water, you have only (as occasion may require) to throw into your vats a little quick lime, or ashes. This opinion has been fully sustained by several of the best physicians of the country who have been consulted upon this subject.

Plaster, charcoal, and dust and ashes from coal hearths, would also be serviceable in preventing the escape of any disagreeable or unhealthful effluvia from these waters.

For a classification of the different qualities of saturated water, see pages 46 and 47.

Place of Operation.

Wherever the farmer has made or found his reservoir, there also should be his manure heap, whether at the barn-yard or in the field. It is always best to have at least one reservoir at, or near the buildings, in order to secure the liquor running from the barn-yard, and the slops about the house, which are constantly going to waste.

Other reservoirs, if requisite, may be located at different points on the farm; regard being had to the facilities of obtaining materials of which to make the heap, and of an abundant supply of water. (See page 45.)

Thus the farmer might often save the expense of hauling manure to his distant fields, as by this method he can manufacture it at will, in the very field where he wishes to use it. And the farmer, also, who has a field upon a hill, or a side-hill, might turn this system to good account, by securing a supply of water at or near the highest point of elevation, and there manufacture his manure from earth, and such vegetable materials as can be procured upon the premises.

SECTION SECOND.

LYE VAT.—COMPOSITION OF THE LYE, ITS INGREDIENTS, VARIATIONS, SUBSTITUTES, QUANTITY, AND MANNER OF PREPARATION.

Lye Vat.

The small farmer, who has but *one* reservoir, can make it serve both for the preparation of the "saturated water," and the lye; but as the saturated water requires time in its preparation, and ought always to be secured beforehand in a sufficient quantity, it is convenient to have a reservoir for the "*lye*" *alone:* this should be so situated that the saturated water from the other reservoir may be conveyed into it without difficulty.

The utility and convenience of having two reservoirs or vats, one for the "saturated water" and the other for the "lye," will be more apparent to the farmer as he becomes better acquainted with the principles of the Method; and those who manufacture manure on a large scale will find such an arrangement almost indispensable.

Composition of the lye.

To make a good lye with thirty barrels of an ordinary quality of saturated water for the base, add the ingredients in the following table, as nearly as may be judged, without the necessity of carefully weighing or measuring.

If the ingredients can not be obtained, use the substitutes which follow

Table of Ingredients.

2 bushels of Quick Lime, (*Unslaked Stone Lime.*)
2 bushels of Chimney Soot. (*This article may be omitted.*)
2 bushels of Unslaked Wood Ashes.
4 pounds of Salt.
2 pounds of Saltpeter, (*in its rough or crude state.*)
5 bushels of Plaster of Paris, or Gypsum.
3 barrels of Human Excrements, or Night Soil, and
1 barrel of Leaven, (*which is fermented juice that has passed through manure made after this method, and is always omitted in the first preparation of the lye.*)

A lye thus composed is *superior to horse urine.* (See page 57.)

Variatians of the Table.

Under certain circumstances, this Table may be very much varied without serious detriment to the operation. (See pages 56 and 57.)

Saturated Water, 30 barrels, as before.

2 bushels of Lime may be reduced to 1 bushel, or augmented to 8 bushels.

2	"	Soot	"	0	"	"	5 "
2	"	Ashes	"	1	"	"	8 "
4	lbs.	Salt	"	0	lbs.	"	16 lbs.
2	"	Saltpeter,	"	0	"	"	100 "
5	bushels	Plaster	"	2	bushels,	"	15 bushels.
3	barrels	Excrements	"	2	barrels,	"	12 barrels.
1	"	Leaven	"	0	"	"	10 "

The substitutes may be varied in the same manner.

Substitutes

Substitutes may be used, when necessary, for a part of the ingredients in the above Table.

Lime.

Lime is one of the most essential ingredients in the lye, and could not be dispensed with, without seriously affecting the operation. Care should be taken, however, that it be not used in two great quantities, as in that case, it would be likely to throw off, or destroy, the valuable properties of the manure. (See pages 49 and 56.) *If the quantity of lime be diminished, it would be well to use the more ashes.*

Soot.

This article, though beneficial, is not indispensable, and may be wholly omitted. It can seldom be had in the quantity given in the Table, excepting near citiesand towns. It is a powerful manure, *and should never be thrown away*, but always employed, in any quantity that can be conveniently obtained.

As a substitute for soot, take six bushels of burnt earth and ashes from a clearing fire, if convenient.

Old plastering from ruins, and also the dirt and ashes from a coal hearth, might be used in place of soot.

If these substitutes are employed, however, it would be well to put them at once into *the heap*, and not into *the vat*, taking care that they be well distributed among the other materials. (See page 49)

Ashes.

In place of two bushels of ashes, take six pounds of potash, or of soda Leached ashes, and also coal ashes may be used; but in that case, the quantity should be doubled. (See page 50.)

If the ashes be diminished, increase the lime, and also the plaster.

Salt.

Salt should never be used in large quantities in the lye. A small quantity is very serviceable, while a large amount would prove injurious

to the operation. It may be dispensed with entirely; but as the cost is trifling, it would be well to use it. (See page 50.)

Old brine may be substituted for salt.

Saltpeter.

This article is found in abundance in stables, under old buildings, in caves, and under lime-stone rocks.

It will seldom be necessary to purchase saltpeter, as a few bushels of earth from under horse stables or old buildings, will answer the purpose better, even, than the purchased article. (See pages 50, 51.)

Plaster.

For five bushels of plaster, substitute six barrels of marl; or use swampy matter, or the mud from ditches, or the mold from the foot of the hill, or the dirt from the streets, or black earth from the woods, or slime from the river or sea shore; or common earth, if neither of the other substitutes can be had. (See page 52.)

If you use either of these coarse materials, it would be well to put a part, at least, into the heap, that the lye may not be incumbered with so much heavy and bulky matter.

Human Excrements.

For three barrels of night soil, take five barrels of horse, cattle or hog dung.

If you have a good saturated water drained from the barn-yard, or a water that has been well prepared according to the directions given on page 14, you may then safely omit the night soil, and also the animal manure.

The night soil should always be used in any quantity that can conveniently be had, and every care should be taken to prevent its loss. (See pages 52, 53, and also page 67.)

It may here be proper to suggest the propriety of having a water-tight sink or vat made under the *back-house*, and so constructed as that its contents may be removed with as little difficulty as may be.

A little quick-lime, ashes, or plaster, thrown into this vault from time to time, will prevent the unpleasant odor, and render this article so inoffensive, that it may be handled without difficulty.

Leaven.

Concerning the "Leaven" or fermented juice, which flows from the heap, it is evident that it can not be had in the first preparation of the lye, and, therefore, it would be well in the first trial to increase each of the other ingredients in the table, at least one-fifth. Afterwards, and as soon as the "leaven" and "saturated" water shall be well prepared, the proportions specified in the Table should be followed as nearly as may

he; and when the "saturated water" is nighly impregnated with decomposed materials, and the "leaven" is in great strength and quantity, the other ingredients may be diminished one-third without injuring the manure.

The fermentation which causes the decomposition of the materials, and which is the essential point in the operation, depends more upon the goodness of the "leaven," and of the saturated water, and the copious application of the lye, than upon the quantity of the other ingredients; and he who will attend to these three conditions, and who puts forth a little skill in the construction of his heap, is always sure of success.

Necessary Quantity of Lye.

The quantity of lye necessary in the operation, will depend very much upon the kind of materials used, and also upon the size of the heap.

If the heap be made of dry straw, clover chaff, &c., it will take more than double the quantity of liquor than if it were made of green weeds and other *wet* materials.

The *smaller, also*, that you make your heap, *the more lye* you will need in proportion.

You should not spare the lye. There should always be enough to wet the heap *thoroughly;* and this is the best rule that can be given upon the subject.

If your heap is small, and composed entirely of dry straw, or other dry materials, it would be well to prepare about thirty barrels of the lye to a ton of straw, and get it all into the heap if possible. If you should have a quantity left, it may remain on hand till the next operation.

A ton of dry straw, with no other addition except the lye, will make about four tons of manure, superior to stable manure; and two tons of green materials will make about the same quantity.

Manner of Making the Lye.

If you have two vats, one for the saturated water, and another for the lye, proceed as follows:

Stir well the saturated water, then draw off about one-third the quantity which you intend to use, into the lye vat; afterwards put in the quick-lime, having previously dissolved it in water, so as to make it of the consistency of white-wash; then the soot, if you have it, then the ashes, then salt and the salt-peter; *stir well these ingredients;* then throw in the ground plaster, the excrements, and the leaven, or whatever you may have substituted for them; mix them all perfectly, then add the remainder of the water.

If you have but one vat, you can not manage quite so conveniently, for, in that case, you will have the trouble of stirring a larger quantity of water in mixing the ingredients.

SECTION THIRD

PROCESS TO MAKE VEGETABLE MANURE BY FERMENTATION.

PREPARATION OF THE GROUND OR EXCAVATION.—GRATE.—PLAN OF THE LOCATION WHERE THE HEAP IS TO BE BUILT.—MANNER OF MAKING THE HEAP.—WATERINGS AND VIEW OF THE HEAP.—APPEARANCE OF THE MANURE WHEN COMPLETED.—FERMENTATION, ITS COMMENCEMENT, DEGREE, AND DURATION.—PUMP—GENERAL REMARKS UPON THE MANNER OF USING THE VARIOUS KINDS OF MATERIALS OF WHICH MANURE IS MADE ACCORDING TO THIS METHOD.

Preparation of the Ground, or Excavation.

The heap should be built upon some hard surface, and be so situated that the liquor which drains from it during the process of fermentation, may flow back again into the lye reservoir.

The hard surface of the barn-yard may answer this purpose, with no other preparation than the making of some little gutters, to direct the course of the liquor.

But it is always best to prepare for the foundation of the heap, by taking off the soil, forming an excavation in the following manner.

An oblong square spot of ground should be marked out, of a size suitable for the quantity of manure to be made.

This being done, throw the dirt from the inside of the lines, forming an excavation, the bottom of which should be *dishing*, and so much inclined towards the lye reservoir, as that the liquor may readily flow into that cistern.

The excavation, if made on level ground, should be from six to eighteen inches deep, and about four feet wider than the grate upon which the heap is to be built.

The dirt thrown out may be used in the compost heap, excepting enough to form a small embankment around the excavation and reservoir, so as to prevent the water from running in, in case of rains. As a further precaution to guard against any damage from this source, a small gutter should be cut out-side of this embankment, to direct the course of the water from the reservoir.

The surface of the excavation should be puddled or beaten, so as to prevent the loss of the drainings by filtration.

Around the excavation, and inside of the embankment, a small gutter may be cut leading to the vat, which will serve to conduct the liquor running from the out-side of the heap

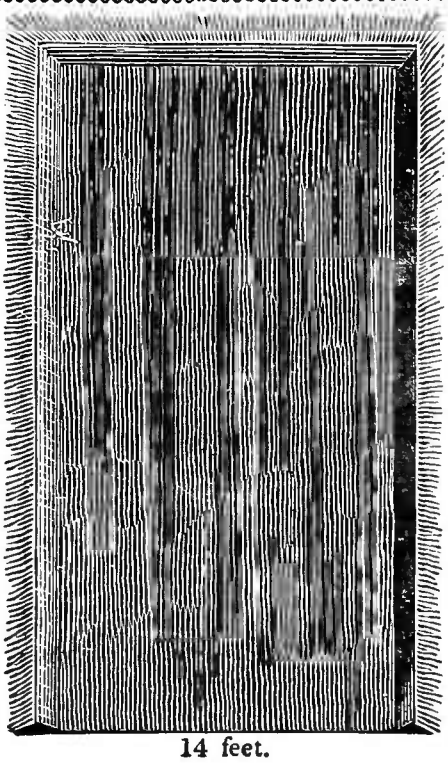


Fig. 1.

Figure 1, represents the excavation ready to receive the grate. It is twenty-four feet long, and fourteen feet wide; but every farmer must determine the dimensions himself, by the size of the heap which he intends to build.

The border on the outside represents the embankment spoken of above.

The black line next the embankment, represents the small gutter around the outside of the excavation.

The interior of the figure shows the *dishing* surface upon which the grate is to be laid.

Grate.

In order to give access to the air under the heap, and also to facilitate the flowing of the liquor from it, during the process of fermentation, it is necessary to build the heap upon some kind of a grate. (See p. 48.)

A good grate for this purpose may be readily and cheaply built of poles, the size and length of which will be determined by the weight and dimensions of the heap.

The Figure below represents such a grate, and is intended to fit the excavation represented above, by Fig. 1, and is four feet smaller each way than the excavation. It is made in the following simple manner.

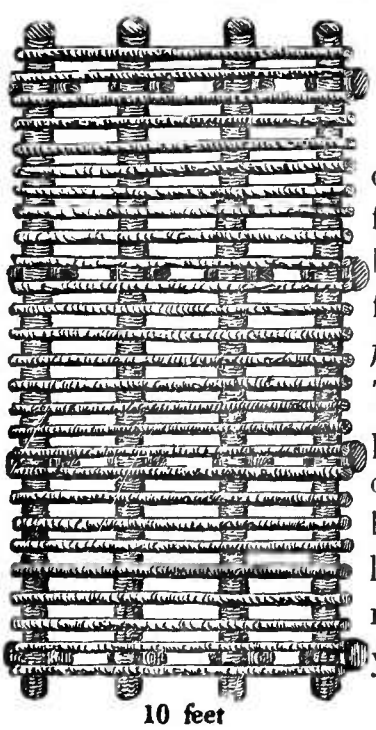
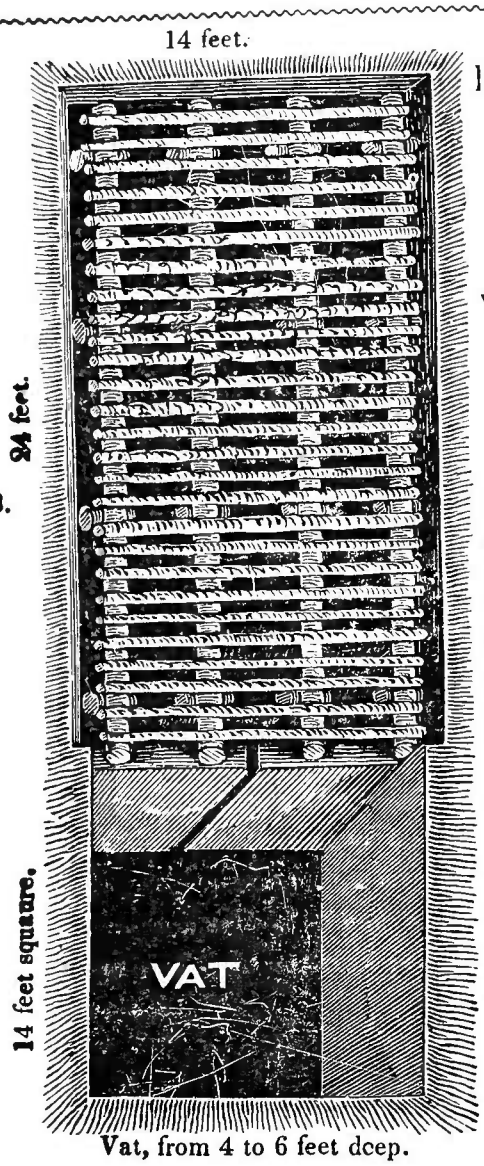


Fig. 2.

Grate, to be placed over the excavation.

First lay down four poles lengthwise of the excavation, at equal distances from each other, placing them upon blocks or stones, so as to prevent them from sinking into the ground, *and to afford access to the air under the poles.* The butt end of these poles should be placed next to the vat, and the inside ones should be laid upon the larger blocks, in order to bring them upon a level. This done, place other poles or rails, across the first, one foot apart, and your work is completed.



Vat, from 4 to 6 feet deep.

Fig 3.

The annexed plan represents the location where the heap is to be built

The grate placed over the excavation.

[It will be perceived that the grate is smaller than the excavation, leaving a space of two feet between the grate and the sides of the excavation, for the free admission of the air under the heap.]

The reservoir, in which the lye is prepared.

Manner of Making the Heap

The heap should be made as compact and solid as possible, and from six to ten feet high. It should be built up perpendicularly, and the corners kept as nearly square as may be; to accomplish this, always keep the outside of the heap a little the highest while packing.

Commence by putting upon the grate a portion of the vegetables to be converted into manure, making a layer of from one to two feet deep (observing to lay some of the coarser materials first upon the grate.) Tramp it down well so as to make it solid.

Then put on a light coating of earthy materials, some two inches deep, in order to make the heap more solid, and also to absorb the liquor and retain the gases.

Then water copiously with the lye,* observing to stir the lye well from

* In watering, it is convenient to have a pump; and those who manufacture large quantities of manure, will find it almost impracticable to do without one. A description of a very convenient and cheap pump for this purpose is given on page 26.

Those who only make small heaps can do very well with buckets, ladles, or tubs.

its depth before applying it. It would be well before the watering is made, to spread a light coating of straw over the earthy matter, in order to save traveling in the mud while applying the lye.

Then put on another layer of vegetable materials, and also a small quantity of earthy matter as before, and water again with the lye; and thus continue to do, until you have disposed of all the materials that are a hand to be converted into manure.

When the heap is finished, cover it with straw or weeds, forming a kind of roof to protect it from the rain and sun.* (See page 60.)

If you have used the full complement of Plaster in the composition of the lye, or have used Marl as a substitute, it will not then be necessary to use any earthy matter in constructing the heap; and if you wish to make the manure in as short a time as possible, you should use the Plaster instead of earth; for Plaster is of itself a powerful decomposer, when applied to a heap of wet vegetables,—and in connection with other materials which compose the lye, it facilitates the fermentation, and thus serves to expedite the process of decomposition; whereas earthy matter serves to retard the process, by preventing the fermentation. Plaster, also, is a better absorbant of ammonia than earth, and we recommend its use in all cases where its cost does not amount to an objection. In selecting earthy matter, avoid the use of that which is of a clayey quality, if you wish for a rapid decomposition.

Observe the following Rules.

1. If your heap is composed partly of corn-stalks, briers, or other hard and woody substances, they should in some way be broken or crushed before putting them into the heap, that the lye may penetrate them more readily. For this purpose, they might be first carted to the heap and left in such a position, that while carting the other materials, the teams might pass over them. Corn-stalks that have been fed out to cattle are generally well broken, and need no preparation.

2. Great care should be taken in making the heap *to have the materials well mixed, the coarse with the fine.* Observe also to put those most difficult to be decomposed into the middle of the heap. Avoid, as much as possible the crossing of corn-stalks, or other coarse materials, and let every layer be well trampled and well watered.

3. Every time the lye is used, let it be well stirred from its depth, and do not spare it in the waterings, as the success of the operation depends, in part, upon *its copious application.* If any part of the heap escapes being wet with the lye, it will turn white or mold, which would destroy its good qualities, and fermentation will not ensue to the extent desired, unless the materials are very compact and well soaked.

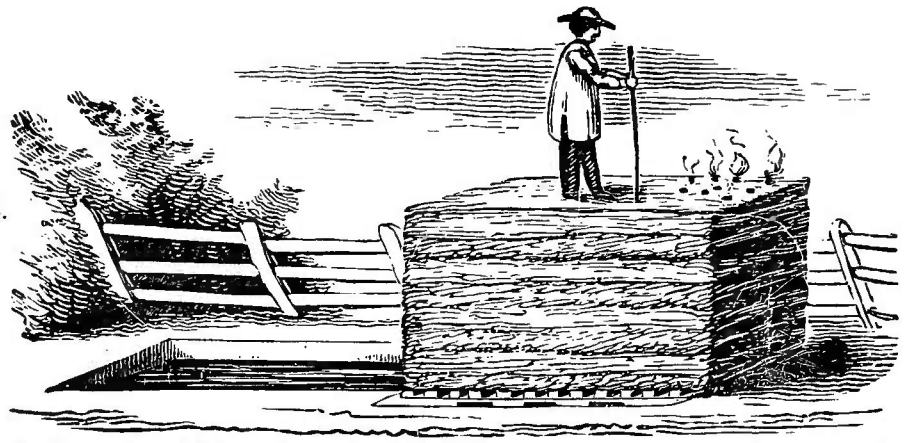
* A ladder will be found convenient in passing on and off the heap.

Waterings and View of the Heap.

The heap should be watered generally about three times after its construction; and that the lye may reach the bottom of the heap and be well diffused to every part, you should, before watering, throw off the top or covering, and with an iron bar, make holes over the whole surface, about eight or ten inches apart, and about three quarters of its depth, if it be very solid.

The following plan represents the heap, when the operator is in the act of making holes for the waterings.

Fig. 4.



The holes should be closed after the waterings, and the covering again placed upon the heap.

If there should not be lye enough for the waterings, a little more must be prepared; let it be well stirred with the sediment that remains in the bottom of the vat, and water copiously.

The first watering should be made about the fourth or fifth day after the heap is completed.

The second watering should be made in about four or five days after the first; and,

The third should be made in about four or five days after the second. At this watering, make new holes deeper than the first, that the lye may be well diffused.

Again, I repeat, that you should not spare the lye in the waterings, as a superabundance can do no sensible harm, and too little might prevent the complete decomposition of the materials.

The drainings of the heap, after the second and third waterings, constitute, what is termed the "leaven" of manure. It is very valuable and precious, and what remains should be preserved for a future operation.

After the last watering, the fermentation abates gradually, and the heap may remain some time before being used; yet, if it should remain a long time before putting it into the ground, give it another watering to maintain it in its freshness.

It will be fit for use in about fifteen or twenty days from the time of its erection, if you wish to apply it to strong clayey soil, or to plants that are a long time in the ground; but if you wish to apply it to light

and sandy soil, it should remain in the heap from seven to fifteen days longer.

Appearance of the Manure when completed.

The manure, if made of straw or other vegetable materials, will not be reduced to *a fine mold* in the time that we have given it, but will be what is termed a *long manure*, and in a state most suitable to apply to land broad-cast. (See Second Part, article on fermentation, from the 35th to the 38th page.)

It will generally be of a dark red or black color, and its smell and general appearance, will satisfy you that it is a strong and powerful manure; and what will surprise you most is, that you have so great a quantity from the amount of materials used.

All vegetable manure made after this method, should be covered with the plough immediately after spreading upon the field. (See pp. 81 82.)

Fermentation—its Commencement, Degree, and Duration.

If the heap be made of green materials, the fermentation will commence in about twenty-four hours after its completion; if composed of dry straw, or other dry materials, it will commence in two or three days.

The second day after fermentation has commenced, it usually attains bout 100 or 120 degrees of Fahrenheit.

The fermentation is the highest between the second and third waterings; during this period it usually attains 150 to 200 degrees.

Those who do not obtain these degrees of heat, may rest assured that they will succeed better in future operations, as they will have the aid of a good "leaven," and a well-saturated and corrupted water.

The fermentation always subsides a little immediately after the first and second waterings, but soon rises again higher than before; but after the third watering, it diminishes little by little till it finally subsides

It will be observed that these degrees of fermentation are fixed for heaps composed of *vegetable* materials, and it is proper to remark that if earth and earthy materials be used in connection with the vegetables, the heat will be much less; and if the heap be composed wholly of earth, there will be no perceptible fermentation.

The fermentation may be arrested at any time when it is desired, by a copious watering with pure water. This, however, is seldom, if ever, equired.*

* Persons who wish to ascertain precisely the progress of fermentation, can easily have an account of it by means of a the-mometer buried entirely in the heap, so that the bulb, or base of the tube, shall be fifteen or eighteen inches below the superficies of the heap.

Pump.

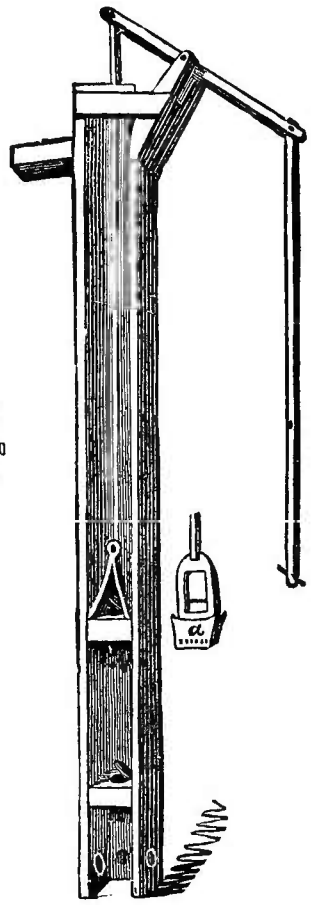


Fig. 5.

Farmers who manufacture large quantities of manure, will do well to make use of a pump to elevate the lye from the vat, instead of using buckets, ladles, or tubs, for that purpose.

Fig. 5 represents a pump which every farmer can make himself at a mere trifle of cost.

It is made of four pieces of pine plank 1 1-2 to 2 inches thick, 15 to 20 feet long, and wide enough to give the pump a diameter of about 5 inches square on the inside. It should be strongly fastened with 20 d. nails, driven about 4 inches apart; and it would be well to line the joints or seams before nailing with some old cotton cloth to make it water tight. The boxes or buckets are made of square blocks of hard wood with holes 2 1-2 inches in diameter, morticed with the grain. The valves are made of wood, lined on the bottom with leather, on which they hinge.

The upper bucket is made of a block about ten inches long, with a hole morticed through laterally above the valve in order to give that instrument room to play. The sides of this bucket are pared off above the valve in order to suffer the water to pass above it, and the bottom is lined with thick leather nailed fast at the lower end, but displaying outward, as seen in the picture.

Owing to the thickness of the water in which this pump is used, it is necessary that it be made about an inch larger at the top than at the bottom, so that the playing bucket may the more readily free itself when choked.

The lower bucket is stationary at about 15 inches from the bottom, and fitted so as to be water tight; the upper or working bucket is adjusted some two feet above this, and has sufficient play to be worked without difficulty.

The piston rod, by which the upper bucket is moved, may be made of either wood or iron.

The bottom of the pump is closed, and holes to admit the water are made between the bottom and lower bucket.

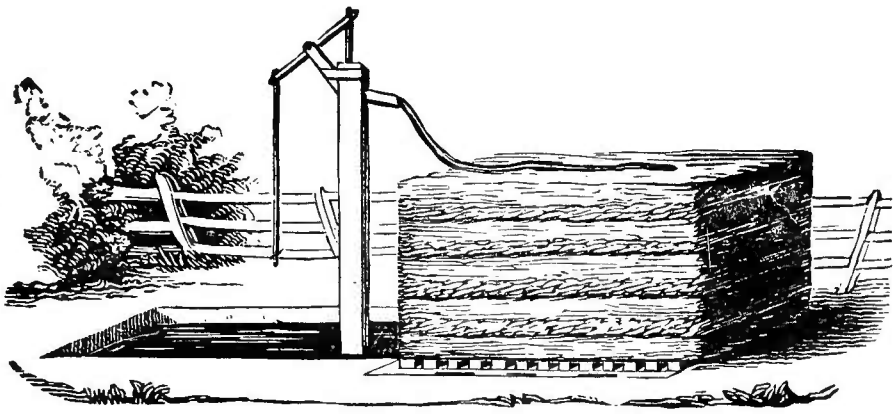
The other parts of the pump are clearly represented by the figure, and do not need a description.

To keep the pump in an upright position, let it be supported between two logs thrown across the vat.

A pump of this description may be used for wells and various other purposes.

The following figure represents the heap and the pump, with a piece of hose attached to the spout. Troughs, tubs or buckets, may be used instead of the hose, to convey the liquor to different parts of the heap.

Fig. 6.



GENERAL REMARKS ON THE MANNER OF USING THE VARIOUS KINDS OF MATERIALS OF WHICH MANURE IS MADE, ACCORDING TO THIS METHOD

Leaves, Cotton seeds, &c.

If these materials are used, they should be well mixed with other *vegetable* materials and placed in the middle of the heap, as they are hard to decompose and possess but little fermenting qualities. (See page 59.)

Old Tan, Saw dust, Apple pumice, &c.

Such materials as these, if used, should be mixed in small proportions with other *vegetable* substances as straw, weeds, &c. and placed in the middle of the heap. Tan and saw dust will not readily decompose, but they will be benefitted by the lye and fermentation. (See page 31, article on Dregs, Lees, &c.)

Corn stalks, Tobacco stalks, Cane, &c.

All coarse articles like these should be mixed with other *vegetable* materials, as the heap would not otherwise be sufficiently compact.

Peat, Turf Sods, Muck, Earth, &c.

These and all similar materials, may be used separately, or combined; or they may be mixed with vegetables. If used alone, but very little heat will be produced, yet a chemical action will take place, which will correct their acidity and render them a fertilizing manure.

Straw, Swamp grass, Weeds, &c.

It is on these and similar articles, that the highest degree of heat will be produced. They may be used separately or in connection with other vegetable or mineral substances. A *variety* of materials is always preferable in forming a heap.

Bone-dust, Plaster, Marl, Coal-hearths, &c.

These and similar materials may be used either in the heap or in the lye. When used in large quantities, it is preferable to put them into the heap, taking care that they should be well distributed among the other materials. (See page 55, article 12.)

Dead animals, Fish, &c.

If such materials as these can be obtained *at the time of making the manure*, cut them up and distribute them in different parts of the heap. They readily decompose, and are diffused by means of the lye and the fermentation throughout the whole mass. and on opening the heap, no traces of them will be seen except the bones.

If an animal dies when you are not fabricating your manure heaps, cut it up and throw

it into your basin of saturated water, always adding lime or ashes, and if convenient, plaster, and a little salt.

Persons living near the sea-shore, where large quantities of Herring, White fish, Sturgeons, and other fish can be obtained, should always use them in their compost heaps.

It is much to be desired that the farmer should overcome his repugnance to making use of dead animals and other feculent materials, which he may have on his farm, and which he now frequently throws away or neglects, not thinking how great an advantage it would be to him to employ them in this manner. He should suffer nothing to be lost on his farm. Nothing is small in farming—the most trifling details have their importance—and it is in the observance of these, that true economy is shown. (See pages 76, 77)

SECTION FOURTH.

VEGETABLE AND MINERAL COMPOSTS.

VEGETABLE AND MINERAL COMPOST, BY HIGH FERMENTATION.—EARTH MANURE, WITHOUT FERMENTATION.—MEANS TO AUGMENT AND IMPROVE THE MANURE OF THE FARM.

Vegetable and Mineral Composts, by high Fermentation.

This compost is prepared by combining vegetable materials, such as grass, weeds, straw, &c., with vegeto-mineral substances, such as peat, muck, sods, hassocks, swamp mud and all similar materials; using about the same quantity (in weight) of the vegetables as of the other materials.

It is not necessary to be very exact about the proportions of these materials, provided, always, that the vegetables shall compose at least one half of the heap in weight, as nearly as may be judged.

If the vegetables are coarse and hard, as corn-stalks, &c., they may be broken or crushed as before described, by driving the teams over them.

If the other materials are very wet, expose them to the air until they become nearly dry.

Process. *The lye for this compost should be composed in the manner prescribed for vegetable manure, page* 16, *but without the soot and salt, and increase the quick-lime one third.*

The heap should be built upon the grate, as before described.

You commence your heap by laying upon the grate a covering of boughs or coarse grass, about six inches deep, to prevent the dirt from falling through, and also to afford a free circulation of the air from the bottom.

Then put on a layer of the various kinds of materials which you design to use, both vegetable and earthy, in nearly equal proportions, mixing them as you throw them on, or lay a strata of each kind separately, if you please. If the sods, hassocks, &c., are in large pieces, after throw

ing them upon the heap, knock them about with your hoe or spade, and leave the larger pieces in the middle of your heap.

When the heap has attained a height of from one to two feet, water copiously with the lye.

Then put on another layer of the materials, mixing them as before, and water again with the lye; and thus continue to do till all the materials are heaped up.

When the heap is completed, cover it with straw, grass, or weeds, as directed in the former process.

Make three waterings, at intervals of about four or five days between each, and by means of holes, as before directed.

The fermentation will not be so high as though the heap had been composed entirely of vegetable substances, yet it will be sufficient to decompose the materials, so as to be fit for use in about four weeks.

Earth Manure, without Fermentation.

Under this head may be classed all composts which are made of common earth, loam, mud, muck, &c., and in which little or no vegetables are used.

Process. *Compose a lye by doubling the ingredients specified in the table.*

This compost may be prepared in different manners, and upon any part of the farm *withouta grate or excavation.* Heaps of any kind of earth may be thrown up and the lye conveyed to them by means of hogsheads, or otherwise; and thus you may make your manure upon the spot where you wish to use it, and save the cost of hauling.

Suppose you wish to manure a field with the earth manure.

You throw up heaps, about a load in each, at equal distances from each other, all over the field, leaving a large hole in the top of each heap. Into this hole, pour the lye in quantity sufficient to moisten the heap well, then close the opening by throwing in dirt from the sides.

Or, if more convenient, heaps of earth some two feet in height, and at equal distances from each other, may be thrown up in shape of windrows across the field. These should be opened at the top through their whole length, watered with the lye and closed up, as before directed.

But little, if any, heat will be engendered in these heaps of earth, yet a chemical action will take place, and in a few days, when it becomes nearly dry, this manure is fit for use, though it may remain for months, if desired.

These vegetable and mineral composts are admirably adapted to natural and artificial meadows, to Indian corn, tobacco, and to gardens.

Means to Augment and Improve the Manure of a Farm.

This is done by composting stable and yard manure with such vegeto-

mineral substances, as peat, muck, turf, sods &c., or with common earth, and saturating the whole with the lye.

If you use your manure in the spring, and wish to have it well rotted for corn-hills, gardening, or other purposes, proceed as follows:

Commence your heap upon the grate with a layer of stable or yard manure, then put on a layer of such earthy materials as you have designed to use, observing not to use a greater proportion of the earthy materials than of the farm manure. When the heap has attained a height of about two feet, water with the lye.

Then put on another layer of manure, then of earthy materials, and water again with the lye; and so continue to do until your heap has attained a height of from six to ten feet, observing to keep the heap as nearly level as may be while building, and when it is finished, cover it with straw or hay, as before directed.

One watering with the lye, made in about seven or eight days, will answer for this compost; yet, if three waterings were given at intervals of about four or five days, the manure would be much the better for it.

In fifteen or twenty days, this compost may be used, and you will find it a better article than yard manure alone.

If you do not use your manure in the Spring, but wish to preserve it for the wheat crop in the fall, take the following course:

Build your heap upon the ground, *without the grate*, either in the barn yard or in the field, as best suits your convenience.

Your object now is to prevent a rapid fermentation, hence you should mix a large quantity of earth with your manure.

Commence your heap with a layer of farm manure, some six inches deep; then put on a layer of earth, or swamp mud if you can obtain it then another layer of manure; then of earthy matter; and so on,—watering occasionally with the lye, until your heap has reached the height of from six to ten feet; then cover the top with *earth*, instead of straw, and let it remain in that state from spring till fall. In making these heaps, you may use all the corn-stalks, straw and other litter which remain on hand, and which you would wish to have converted into manure for the fall crop. Gather up, also, all the refuse materials about the premises, which contain the elements of manure, and mix them in with the other matters. If fish, or other animal matter, can be obtained without too much expense, do not neglect to use them in your heap.

About three weeks before taking out this compost, level down the top of the heap, and give it a copious watering with lye, by means of holes.

By this operation, you will find that you have at least doubled your quantity of manure, that you have equalized it all, and that it is far superior to yard manure. (See pages 78—82.)

SECTION FIFTH

MEANS TO PREPARE PURIN FOR TOP-DRESSING.—TO EMPLOY THE DREGS OR LEES, AND RESIDUES OF DISTILLERIES AND MANUFACTORIES.—HOT-BEDS FOR EARLY GARDENING; MODE OF REVIVING THE HEAT UNDER THE BEDS, WITHOUT CHANGING THE LITTER OR MANURE.

Means to prepare "Purin," a fertilizing Liquid for Watering.

In farms tha. are well kept, there is a ditch or cistern, which receives the purin that flows from the stables, the farm-yards, and the manure-heaps.

This precious liquid, always in too small quantity to satisfy our desires, is employed to water the manure heap, and afterward the meadows.

I do not deny its good effects; on the contrary, I will say, that it is our desire to obtain it in larger quantities, and to give it a more fertilizing and durable action.

Although I have always acknowledged that it is more advantageous to fix this liquid in the ground, or to make it serve for the fabrication of composts, which is demonstrated in the third section, article third, of the second part, (p. 68,) I have nevertheless by experiments arrived at an easy means to augment, and also to create this liquid manure at will, and improve its fertilizing quality, so as to enable persons who wish to continue this system to receive more profit than formerly

Th's plan consists simply in the employment of the lye of this method to which is added a certain quantity of water, and the flowings from a manure-heap.

For the preparation of one hundred barrels of this purin, use the various substances which enter into the composition of the lye, in double the quantities indicated in the table; then add ten barrels of the drainings from a manure-heap made after this method, or, for want of that, take twelve or fifteen barrels of the flowings from ordinary manure.

These various substances are mixed together in the manner already indicated, after which add eighty-five or ninety barrels of saturated water; if you have it not, pure water must answer.

Stir all the mass while you are adding this water, so as to produce a complete mixture, and cause the dissolution of all the materials.

It would be well to suffer this liquor to ferment for twelve or fifteen days; notwithstanding, if you are hurried, it can be used with success in about four or five days.

To employ the Dregs or Lees, and Residues of Distilleries and Manufactories.

All lees, and residues of distilleries and manufactories, can be reduced to manure by this method.

This is done by mixing them with vegetable materials, and passing the whole through the process by means of the lye.

It would be superfluous to enlarge upon the manner of reducing these materials to manure. Yet as some of the residues are not manure of themselves, and only become such, as retainers of the lye and ammoniacal gas developed during the process of fermentation, I ought to recommend the employment of these materials in their just proportions; that is to say, if you desire to act upon two tons of vegetables, you ought not to add to them more than two tons of organic residues, such as tan, or the lees of apples from the cider-mill, because these materials have been deprived of the greater part of their salts, alkalis, and fermenting properties, by anterior operations, and are nothing more than inert bodies. It is natural, then, that, unless you employ a great proportion of vegetables, the heat will not be sufficient to decompose the materials, or to enrich them with the gases developed in the fermentation.

If the residues are in a liquid state, throw them into the reservoir of saturated water.

Hot-Beds for Early Gardening.—Mode of reviving the heat under the Beds, without changing the Litter or Manure.

Gardeners, whose lively interest it is to produce properly graduated manure for their hot-beds, and to revive the heat under their beds, without changing the litter, should use the lye of this method in the following manner:

In order to introduce the lye so as not to wet the bed where the seeds are sown, make holes with a pointed stick, about a foot apart, all over the surface of the bed, and into these holes pour the lye, in quantity sufficient to saturate the litter, by means of a tunnel or otherwise.

The sides of the beds should always be supplied with warm horse manure, or that which is made by this method.

It is here that manure of a high gradation is necessary, since the fruits are wanted in advance of the season.

In the preparation of their manures, gardeners should employ largely the remains of animals, and give their heaps three or four extra waterings, in order to extract a large quantity of leaven, to be used upon the hot-beds of early vegetation.

By following these directions, gardeners will obtain results that will surpass their hopes.

END OF THE FIRST PART OF THE METHOD.

PART SECOND.

EXPLANATION AND ANALYTICAL DEVELOPMENT OF THE SYSTEM—SOLUTION OF MANURE QUESTIONS, AND SUPPLEMENTARY ARTICLES WHICH RESULT FROM THIS SYSTEM.*

SECTION FIRST

ARTICLE FIRST.—*Vegetable, compared to Animal Manure.*

QUESTION. The title of your method says, that your "vegetable manure is as good, and more durable than cattle manure;" yet it is acknowledged that cattle manure is the true natural manure, and consequently the most proper for the nourishment of the soil and plants. I should then think, that, since the animal principle only comes in as an element of the leaven in your liquid combinations, and in a small quantity, you have your manure composed almost entirely of vegetables. Now, it seems to me, that since your vegetable manure contains but little azote, it would be inferior to cattle manure, which contains a large quantity. What say you?

REPLY. Animal manure, properly so called, and according to the most common expression, is nothing more than a reunion of mucilaginous substances, decomposed by the ammonia which abounds in the animal kind, and which by fermentation becomes, in a few weeks, an unctuous putrefaction. As are the manures of cattle, so would also be hay or straw decomposed by urine, by horse-dung, and by feculent materials, if they should be applied in combination, in

* In order to render it perfectly clear, and within the reach of the meanest capacity, I have given the explanation of this method in the form of an agricultural dialogue, in which the advantages resulting from its use are developed, and some questions in regard to manure treated. Chemists, and other gentlemen of science, who may find in this work some passages which to them may not have the merit of novelty, should take into consideration that it is designed for practical men, to whom the plough does not give time to undertake a course of chemistry, or to study the treatises of our celebrated agricultural writers.

proportions sufficient to cause their fermentation and putrefaction in a seasonable time. Such is the common definition given by chemists to animal manure.

We will now examine, by sound reasoning, and endeavor to discover which of the two manures are richer in fertilizing substances, and see which presents the most advantages to agriculture; whether it be the manure from cattle, or that which is made after this method.

Cattle manure, uniformly decomposed, is excellent in its primitive state; that is to say, when fresh. Put into the earth in this state it will in general produce a good result. But everybody knows the obstacles which are opposed to the application of cattle manure in a fresh state, and they know also that such a system would be impracticable upon farms.

Cattle manure is only obtained little by little, and it follows,

1st. That its decomposition is always unequal and imperfect.

2d. Put into a heap, as it is taken from the stables and farm-yard, where it is suffered to remain from one season to another, putting layer after layer of vegetables upon it; trampled upon by the cattle, as is the custom on mos farms, this manure, by the slow and prolonged fermentation which it undergoes, by evaporation, the washing of rains, and drying of the sun, will sustain a loss of fertilizing substances which can hardly be calculated at less than one half.

You have, then, on one hand, its insufficiency, and, on the other, deterioration; whence it results that this manure is but a small help to agriculture. while our vegetable manure is not submitted to these inconveniences, its production not depending upon cattle.

Sec. 1. *First Advantage of the Bommer Manure over that of Cattle.*

After this method, any one may manufacture his manure at will, at any time he may want it, instead of obtaining it little by little from cattle, and suffering it to deteriorate in the air, or by an unlimited fermentation which produces the same effects as combustion, and leaves only some earthy residues for salt.

He may with certainty regulate his manures, that is to say, he may render them equally good, in all their parts, by means of the lye, which distributes its salts to its soluble parts, in a regular and uniform manner; it produces an equal crop in all parts of the field, while to this day, farm manure, being unequal in quality, some portions of the crop are poor, and others good, in the same ground

By the copious waterings of the manure with our lye, the heap is kept from becoming white, or mouldering, because an equal moisture is maintained in all its parts, forming a soft and blackish mass in which one part does not depend upon the other for either aliment or moisture, as is the case with cattle manure.

You can make manures much more durable in the earth, than those which you buy, or which are made with the aid of cattle.

You are aware that different substances, which are decomposed slowly and successively, having been intimately mixed together, and *disunited* by a liquid, are bound to form various aggregates, which the earth can only decompose slowly and in succession.

You may destroy, by a short, but lively and rapid fermentation, the germs of weeds, which always infest the materials of which manure is composed.

This Method gives rules for the composition of manures; it says to you—take so many parts of animal matter, so much salt, so much alkali, which may vary according to the soil and the plants you are cultivating: with it, the inconveniences resulting from the employment of cattle manure can no longer present themselves. Thus, the vegetable manure should be better than that of cattle, if you so desire it.

Sec. 2. *Second Advantage.*

If the cattle manure contains more azote than our vegetable manure, ours contains more carbon, a principle still more necessary to plants than azote, as carbon supplies the main structure of all vegetables.

Well, carbon predominates in our manure, and our lye renders it soluble, by a regulated fermentation, which it engenders in the mass of vegetables, and when the woody body becomes soluble by fermentation, the plant which is manured by it feeds upon this carbonaceous substance, through its nutritive organs.

If I wished imposing authorities to support me in this, I would cite Sir Humphrey Davy, the celebrated chemist, who says, page 280 of his treatise upon the art of preparing lands—"No substance is more necessary to vegetables than carbon; it ought to be dissolved in order to penetrate their organs." Thus, the manure which you administer to plants should contain carbon rather than azote, because plants, by their leaves, have no difficulty in imbibing azote from the air, which contains a large quantity of it, but very little carbonic acid gas.

Sec. 3. *Third Advantage.*

If I have said, at the offstart, that our vegetable manure is as good as cattle manure, it was, that I might not be exposed to the charge of exaggeration, by those who could not have proved it. But, in truth, in declaring that our vegetable manure is superior to cattle manure, I would but obey my convictions, because its effects in the ground have always been superior, and I here give the causes of its great power.

By the mixture of the materials which enter into the composition of our lye, the water, the heaped vegetables, the high fermentation, &c., there is produced a large quantity of the nitrate of lime, caustic potash, ammonia, and saltpetre, four principles, known by chemists as the most active manure which exists.

In regard to the first two materials, learned chemists have often analyzed the lye, and they have found that the first two prevailing principles which it contained, were nitrate of lime and caustic potash.

You may ask me, how are these two principles formed in my lye? But I will not undertake to say, I fear that I might be led astray. Nothing is more mysterious than the secrets employed by nature in her combinations. All that I know positively (and it is the most necessary to know), is the fact.

As to the two other materials, it is easy to conceive that ammonia and saltpetre should be found in our manure, in larger quantities than in ordinary farm manure—in fact, ammonia, being composed of azote and hydrogen, can form itself into a heap of manure. It is easy to judge, by the simple disposition of

my heap, raised above the soil six or ten feet, that the azote of the surrounding air, which is found in circulation in a heap of manure not matured, that is to say, before the sinking produced by fermentation, is not deficient in my operation, since the air contains 79 per cent. of azote. On the other hand, as water contains a large quantity of hydrogen, this is no more deficient than the azote, since my waterings are floods—thence it seems to me that ammonia forms in quantities, after a lively and rapid fermentation of different vegetable bodies and mineral salts, put into contact with volumes of hydrogen and nitrogen, which gases, besides, are found in quantities, not only in the air and water, but they compose a large part of the vegetables and minerals themselves, and especially green vegetables, which recent studies of our chemists have discovered to contain azote.

You see the reason why, when I stir my heap, it disengages an ammoniacal smell much stronger than stable manure, even when I do not employ feculent or animal materials.

It is impossible, with a fermentation of 160 to 210 degrees of Fahrenheit, and the collection of a large body of fermentous materials, and a considerable volume of surrounding air and water, that it should not form much ammonia.

The production of saltpetre is explained in the sixth chapter, upon "artificial nitres."

I hope that these data will enlighten you upon the causes which give strength to my manure, and enable you to render an account of its effects upon the ground, when you can employ it.

SEC. 4. *Fourth Advantage.*

All farmers accord in arranging into two distinct classes the various means of ameliorating lands, or of repairing the exhaustion which improvident cultivation has produced. These are—

First. Manures:

Second. Amendments.

Amendments are, in many cases, very proper to sustain the vegetation of plants, because not only vegetation consumes the manure, which will insure its prosperity, but it also exhausts those mineral substances which, although spread in the soil in small proportions, are not the less sustainers of the life, the sap, or the luxuriant growth of plants. It is for this purpose that people have introduced marl, lime, plaster, salt, &c., upon their farms; afterward, the product of vegetables decomposed by fire, as potash, soda, soot, ashes, &c.

But these substances are always employed without intermixture, although most plants for their success, and the most part of soils for their fertility demanded their mixture and their decomposition.

But if the mixture of these mineral substances in the soil produces a good result, how much could we improve all our lands by a composition uniting manure with the substances which constitute the amendment, especially in proportions suitable to the wants of the various soils and plants.

Without doubt, this composition, skilfully combined, will become the *ne plus ultra* of the amelioration of lands, since it at once unites all the means of stimulating and fertilizing the soil.

Well, such is the composition of my vegetable manure, and such are its effects, although without cattle, because, in effect, my manures contain, independently of the manure which is furnished by the feculent material, as animal decomposition, all the mineral amendments that you have seen in the table, and that you have judged useful to plants, since in your agricultural experience you have already employed either the one or the other. Is it not so?

Resuming your question. I believe that I have sufficiently demonstrated to you that my vegetable manure is not inferior to cattle manure, but that, on the contrary, it is superior, seeing that it contains principles of fecundity which cattle manure does not possess; that it is more natural than cattle manure, since air, water, vegetables, and minerals, are the base of its fabrication, and these are the substances which nature has designed for the nourishment of plants, rather than urine and the dung of animals.

Article Second.—*Fermentation.*

Question. The title of your method assumes, also, that any one can make your vegetable manure by fermention in fifteen days, and according to the nature of every farm and every family of plants. Now, to appropriate my manure to such or such kind of soil, or to such or such plants, should it ferment much, little, or not at all, how should I do?

Answer. This is the gravest question that you could make upon the subject of manures; and of a verity, without the aid of my method, I would not permit myself to treat upon a subject which has been discussed and debated by the most celebrated agriculturists without any definitive result. One says, "Yes it should be fermented:" the other says, "No, it should not be fermented."—I, apart from my new principle, to vary the manures, to manufacture it either without fermentation or with fermentation, graduated according to the soil and plants, say yes and no. In the arts, the medium course is sometimes the only good way. Perhaps I may approach nearer to the truth than all the others who have treated upon this matter.

English authors, French, German, and others who have treated upon this question, not only in theory but in practice, have all given facts, without ever having analyzed the kind of earth where they had buried the manures, fresh or decomposed, and equally without having announced what were the plants to which they had administered it. Even then the question is new. It has been discussed, and even disputed with violence, and every one has doubted of the truth up to this moment, seeing that the veil which covers it has never yet been lifted. I will quote the words of the greatest farmers, and you will pardon me a little longer in consideration of the importance of the subject.

OPINION OF AUTHORS.

An intelligent farmer, Mr. Pictet, expresses himself in these terms in Young's Annals:—

"I have always been in the practice of throwing the fresh manure from the

stables into a heap, and not carrying it into the fields unti after it shall have become decomposed. I began to doubt that this practice could augment its value. I had not doubted for a long while that it had lost in quantity, and that I had been at an increased expense. The first essay that I made of the application of fresh manure succeeded so well, that I not only resolved to abandon an old practice, but I also found a number of imitators among my neighbors, who, convinced by the evidence of the results, had not employed as much as they might their manure when fresh. An experience of more than seven years has convinced me of this truth, that it is profitable to employ manures as soon as they are taken from the stables."

The principal English and Scotch farmers consulted upon this subject by Mr. De Knobelsdorf, in the last few years, were unanimous. It is decided, they all say, by theory as well as by practice, that manure applied before fermentation, as it is making itself, with the mixture of excrements with litter, better manures soil destined for all kinds of grain and leguminous plants, and that its immediate application prevents the loss of more than one fourth of the mass.

The excellent practical farmer Schmaltz is of the same opinion, in his work, entitled, "*Observations dans le domaine de l'économie rurale.*" He expresses himself thus:—

"Manure much consumed, compared to that which has just entered into its decomposition, loses a large portion of its volume. It is difficult to spread it well, as it requires so much labor and care to separate it, and there are no means of insuring its equal division. I have always been struck in observing the very sensible effects attending manures the least consumed. When, for example, there has been put upon a field eight cart-loads of very rich short manure entirely rotten, and to another of the same size only six cart-loads of the same weight of fresher manure, but not so broken, not only the products of the second were very often much better, but the manure was more durable in its effects, although the six cart-loads of fresh manure would have made but five if it had been left to rot further. This observation I have not made only upon particular soils, but upon all kinds of lands. However, it was generally more evident in favor of manure a little consumed upon heavy than upon light and friable lands. The effect of manures thus applied was especially marked upon products which did not immediately follow the manuring."

Sir Humphrey Davy, Martin, Puvis, and others, are of the same opinion as Schmaltz, director of the royal institution of Wurtemberg. There are only a very few authors of a contrary opinion; but almost all farmers desire their manure to be very rotten—that is to say, science and intelligent practice are at complete variance with the popular practice What is more, whoever would undertake to persuade a farmer that manure much decomposed was not worth as much as that which has just come from the stable, and which is almost whole would be taxed with folly.

MY OPINION.

Well, it would be boldness in me to condemn either the one or the other Each is a little wrong; each has some reason upon his side. It goes to show

that nothing is absolute in arts, and that the present method is the master-key, by the help of which each one can enter the domains of reality.

It is then shown that one desires *fresh* manure, and the other *old*. Who will undertake to reconcile all these opinions without relying upon this method?

But see a remark which has never been produced; it is, that in the examination of the question, Should one ferment his manures? they do not draw a line of demarcation between manures that are fermented and those which are not. Thus, one may think proper to call that manure fresh which is just drawn from under he cattle. But have a care: this manure is already fermented, and often much fermented. It in some measure resembles that which is produced in my heap in about fifteen days: you may call this manure fresh, but you should say *warm*, for the man who extracts it is surrounded by a thick smoke. Now certainly this manure, ploughed in this state, is excellent, and that is not at all surprising. The litter enclosed in a warm stable, watered by the urine of cattle, when exposed to the air, will ferment rapidly in a few days; the more so that the cows and horses, in lying down upon it, communicate heat to the litter from the surface of their bodies, which are in contact with it. Thus, that is not *fresh* manure—it is matured manure. It is certainly less advanced than that which remains in a state of fermentation in the barn-yard for six months, but it is such as it generally should be for extensive farming.

Therefore has the question not been properly put, either by learned or by practical men. Before you can know whether fresh manure is preferable to fermented manure, it is necessary to commence by defining the two kinds of manure, in order to compare them. For want of this previous definition, this point has been discussed for an age without its being cleared up, without having advanced even a single step.

According to my view, the question should be thus put: "Ought the elements of manure to be ploughed in before having been attacked by fermentation?" or, "Should you plough them in their natural state?" Then had the question been defined, and the opinions of cultivators explained, because it should have rested upon incontestable facts; and I add, that it was the only means to discover, by experience, if it was more useful and more economical to cover in the elements of manure in their natural state, or after having been fermented. The solution of this point is of great interest, but this solution will always be relative; that is to say, according to the climate, the nature of the soil, and of the plants.

I will say, then, to those authors whose words I have cited, and who are for the employment of *fresh* manures, as well as to the others who are for having them much decomposed, you are all misled in proclaiming for truth the specious facts announced by you. You chemists proclaim principles which appear to be well founded, and which perhaps are so in theory, but you do not occupy yourselves with their execution. And it is because this execution is difficult in practice, that almost all agriculturists are for having their manures matured. Thus, go to any farmer who desires to convert his cornstalks, or other hard and ligneous bodies, and say to him that fermentation is dangerous in this way, that it will cause the loss of a part of the elements of manure, this man will listen to you, then he will smile, in saying, "Try, then, to make me manure out of

substances as hard as wood, without the aid of fermentation. You say that I will lose in causing these vegetables to ferment: that is possible but at least the greater part of them will be converted into soluble manure, while, in this state; with your principles, these vegetables are useless, and I lose all. And if you talk to me of straw manure (from litter), would you that every day it should be taken out from the stable, and carried into the field, especially when it is not the season to cover in manure? How prevent the inevitable fermentation which develops itself, if I put it in a heap—or the maceration, every bit as destructible, if I should spread my stable manure upon the ground?"

What reply have you to make, gentlemen chemists, to this strong argument? There is more or less loss. Without doubt, chemistry is right; but this science does not teach us to make it better. The straw itself, when it has not been broken down by fermentation, can not be used. I maintain, then, that fermentation, should it lose still more than chemists are willing to allow, is indispensable to break down and disorganize the vegetable body; at least in general, for there are some particular cases where fermentation will not be necessary, and where all authors are in the right.

It is certain that in soils which we call "voracious," nothing will be better than simply watering this barn-yard straw with a good lye of the method, and then ploughing it in, without previous fermentation. But, saving in this particular case, fermentation is indispensable, as it is a substitute for the mastication of animal food.

Thus, in resuming, we have on one side almost all the learned men, and on the other all the practical farmers. Science is right in principle—farmers are right in practice. As I am of the opinion of neither the one nor the other: it may seem dangerous to put forth my principles, but I only do so in obedience to my convictions.

ARTICLE THIRD.—*Application of my Manure according to various Earths.*

1st. Have you a light earth—warm—sandy—voracious? Do not ferment the vegetables, especially if they should be green; but, before covering them in, try to break them, and water them with my lye. If the earth is only light, without being voracious, employ the manure much decomposed, so as to unite the soil.

2d. Should your ground be cold or clayey, ferment by my process for a month, if you employ ligneous vegetables or other hard bodies, and only for fifteen days if you should use nothing but straw or grasses. Make four waterings of the lye for ligneous bodies, and only three for straw and herbaceous vegetables.

3d. Should your soil be intermediate between the two kinds which I have mentioned—that is to say, is it half sandy and half clayey, approaching a free soil—ferment the vegetables a little less than for cold grounds.

4th. If your soil is calcareous, or if you have previously used lime upon it, as is the custom of many farmers, you must not ferment it too much, because the

lime contained in the soil will assist in the decomposition of the materials of manure.

5th. If your soil is deprived of limestone, push forward the fermentation, and double the lime, or triple it, in the composition of the lye.

6th. In all soils where the ordinary manures develop weeds and noxious plants, you should give a vigorous strength to the fermentation, in order to destroy the germs of the seeds. These are my principles.

I now come to the exceptions which I make to the five rules given above

1st. I have said that for light, warm, sandy, or voracious earths, you ought not to ferment the vegetables, especially if they are green; but for that, for such lands, it is necessary to put in the manure before winter, in order that the ligneous bodies may have time to soften and to ferment by the aid of the rains of that season. Thus, this rule, which I believe to be good in most cases, would be worth nothing to the gardener. To him I would say, always have old manure for the soil of which I speak; prepare it in advance. Old manure contains less ammonia, but in compensation it contains more salts, and this rich manure will unite a light earth; it will be good also as an amendment; it will diminish the porosity of a soil which is too accessible to the influences of the air, and which dries too quick. On the other side, this rich and old manure, by means of the salts which it contains, and which attracts and preserves its moisture, will keep the roots of the plants in a state of freshness very favorable to the prompt development of the plant. But if you are a cultivator of grain, it is evident that you ought to choose manure of longer duration, because you sow in autumn. Now, in the spring, when your plants shall want nourishing principles, to operate for the reproduction of the grain (a phenomenon in which nature develops all her forces), the plant will have the facility to draw in from a slowly-dissolving manure, the elements of which they stand in need.

2d. I have said, in the second place, that for cold or clayey grounds you ought to cause a high degree of fermentation for ligneous materials; the reason is, that a compact earth will never have enough warmth to digest, easily and promptly, the nourishment which you consign to it. I know well, that what is called *fresh* manure, or little fermented, such as occupies a large volume, but of little weight, is exactly suited to soils which have need of being divided. I know very well, that where this long manure has been held in a compact soil, it should divide the clay, and permit the air to penetrate it; but, on the other hand, it may happen that this long manure, little fermented, will decompose, but with great difficulty, and that it will not be profitable to the crop upon which it is cast. The manure will not be entirely lost to the second crop, because the summer sun completes the work, and renders this manure soluble for the next second crop; but, in the meanwhile, a part of the carbon will volatilize, and your first crop will only have given slight products.

The difficulties are so grave, that I have not hesitated to choose for cold and clayey grounds, manures reasonably decomposed. At the same time, I admit of some exceptions, remarking that I am not in glaring contradiction to the general opinion of farmers, because what they call fresh manure, or manure such as it comes from the stables is manure very near like that of my method,

after fifteen days fermentation. Thus, for spring sowing, do not hesitate to push the fermentation farther, to suffer the materials to remain in the heap eight or ten days longer for cold, argillaceous, and compact soils, because time presses you, the soil is so inactive, and the dressing of its aliments should be more complete. If, on the contrary, in the same soil, you wish to cultivate plants which remain a long while in the ground, you only let your heap ferment for fifteen days. There you employ what they call fresh manure, only you should take care to make your lye more unctuous, stronger, and richer, to the effect that the grain may thereby find an aliment in the folds of vegetable manure, and can germinate with rapidity and vigor. The result will then be, that the elements of manure, decomposing little by little, and progressively, the roots of the plant will find food regularly up to harvest.

You pursue the same course for the sugar-cane, the cotton-tree, the mulberry tree, and for all plants which remain a long while in the soils; also for orchards and nurseries.

3d. In the third place I have said, that if the soil was intermediate between sandy and clayey, that is to say, if it approaches free soil, you should give a little less fermentation to the manure. There, it is thought, that since this soil contains sand to give access to the air, and that the materials of the manure being a little fermented, they ought to decompose with sufficient facility. Here I am again very near in agreement with science, although not exactly so. I am not dogmatic, and I still admit of some exceptions, as to the plants which are cultivated, and as to the climate. Thus, if in this soil you wish to cultivate flax, hemp, tobacco, and other plants, which ought to remain but a little while in the ground, do not waver about pushing still farther the fermentation in your manure-heap. But if you desire to cultivate in this soil plants which are to remain a long while in the ground, give it only a small amount of fermentation; stop it the tenth day. If you intend to put in your manure before winter, cause but little fermentation, and stop it the eighth day, or after the second watering.

4th. Should your soil be very calcareous, make your manure rich, ferment it but little, stop after the first watering, because the lime is already a fermenter, from which the elements of manure can not escape in the soil.

5th. Should your soil want lime, push the fermentation vigorously, because, in this soil, you would miss this most precious agent to complete the fermentation of the buried vegetables, and double or triple the quantity of lime in your lye, but do not neglect to observe the influences of climate. Thus, in southern states, a soil may want lime and still be warm, especially if it is much exposed to the sun, a hill-side exposure, or of a black color, because in this case it absorbs caloric.

6th. In fine, I have laid down as a principle, that in all soils which are infested with noxious weeds, and especially in neglected soils, and in the southern states where the heat tends to multiply all seeds which are carried there by the winds, you should submit the manure to a vigorous fermentation, so that these manures may not add to the foul weeds which spring up in the fields, from the germs which they would otherwise contain, and which flourish with more facility and power when they are surrounded by the principles of manure

But here presents an objection, which you will not fail to make. You say to me, "You advance the principle that in a number of cases we should scarcely ferment the manure at all. Now if, on the other hand, you tell us to submit all manure to a vigorous fermentation, in order to destroy the germ of various seeds, you are in contradiction to yourself."

To this I will reply, that it is possible to destroy the germs of all various seeds, without causing the materials to ferment for any length of time. As for example, I wish a manure a very little decomposed, but at the same time, I wish to destroy the noxious seeds which may be found in my materials. I operate thus: I make a rich lye, by which I produce a rapid fermentation, which in four or five days raises to 170 or 190 degrees Fahrenheit. The germs of all hurtful weeds are destroyed, and I use my manure the sixth day. The same as if I had produced a strong fire, for boiling beans, and keeping the water at 210 degrees for a few seconds, I had taken off the vessel, immediately after the ebullition; the vegetables would not be cooked, but the germ of the bean would be destroyed.

Now this manure will be very little decomposed, very little gas will be dissipated, and the less from my heap, as, from its being closed in by earthy substances, the gases are retained and absorbed in their passage.

CONCLUSION.

Chemists, who have stated with so much precision the loss in manures which is occasioned by fermentation, have not operated upon my heap, and it is certain that, if they rendered their experiments upon a heap of my manure, well prepared, they would acknowledge that in it the loss is almost nothing.

So, then, have I modified all the calculations of the chemists upon the question, "Should manure be fermented?" I have completely displaced the question, and, if on one hand, I prove by my mode of operating, that notwithstanding a considerable fermentation, my heap scarcely loses anything in its fertilizing substances, and if, on the other side, I confirm that by my vigorous fermentation, and directed by my will, I replace the effect of the trampling of cattle, and in rendering soluble vegetables, the most obstinate to decompose, I believe that I have rendered the most important service to agriculture.

I have ended this discussion, and perhaps, reader, you may demand of me, how it is that an unassuming farmer can put forth his opinion, with sufficient hardihood, upon a matter so delicate, and upon which the best authors have been of different opinions?

Without doubt it would be temerity on my part to throw my voice into the balance. But, reader, do not forget that I claim, under a new principle, that my method is nothing less than the study of the laws of fermentation, a part of physics, into which science, to this day, has the least penetrated, and which is perhaps, all the mystery of life. Man reads in the stars—he measures with certainty the distance which separates us from the sun; but demand of him the real cause of fermentation, by the aid of which all organized beings are formed, decomposed, and reconstituted, and he will be hushed into silent meditation.

Demand of him how the dung of the cow is metamorphosed into odorous flowers?—how it is that a grain, decomposed, and elaborated by nature, becomes man—thought—genius—a Descarte—a Corneille—a Washington—a Napoleon—the voice of science remains mute, and it is to be feared, that thousands of ages will yet pass without revealing the truth to future generations.

What then should we do, in waiting for the discovery of this cause? Occupy ourselves with the fact. Fermentation exists; let us study its laws, its various phases, and by its different application, let us convert vegetables into fruit, into grain, into cattle—let us help nature to produce life, populations will augment and with this growth of the mind, perhaps a day of genius, aided by the always growing force of civilization, may pierce the mysteries which veil from our sight the profoundest secrets of nature.*

ARTICLE FOURTH.—*Application of my Manure, according to the Nature of the Plant.*

Till now, the idea of administering to plants a nourishment proportioned to the duration of their existing in the ground, had not occurred to any one. The same manure was applied to plants which remained but three months in the soil, to the flower which had but a month to live, as to the plants which abided a year and more in the earth, before rendering their produce. We must agree that it was not very rational, but people could do no better.

This method opens the way, and teaches how to compose manures, and to vary them, not only according to the voracity of the plant, but according to its duration in the ground. Thus, in the case where one wishes to push the plants which remain but a little time in the ground, it is necessary to compose a hot manure, rendered immediately soluble, in order that the plant may be quick, large, and ripe. If, on the contrary, you cultivate plants which remain a long time in the earth, you should compose a manure with materials which decompose slowly and successively. Thus, a perfect manure for these plants would be that which would be fabricated out of the greatest variety of vegetables, and difficult to decompose; you put all the elements of the lye, which, by their agglomeration, form its force, and of which each material is decomposed little by little, and successfully, and you should add horn shavings, ground bones, leather shavings, &c., &c., in order that these plants may never want nourishment. If you plant the mulberry, the cotton-tree, sugar-cane, fruit nurseries, you act the same. In fact, the young plant wants a soluble manure with it, but at first it should have but little; afterward a second material decomposes, then a third, then a fourth, till at last it comes to the most difficult of decomposition; and it will no longer be necessary to manure the plant each year, or to expose it to that which will check its prosperity.

It is necessary that the manure should be distributed, like nourishment to the infant, which is first fed with milk, and afterward with aliments more substantial, as age develops its constitution—such is the advance of nature, she proceeds only by degrees.

* To enable any one to execute what is communicated in this article, it is necessary to know the nature of the ground which is to be cultivated. To this effect, the process by which each one can analyze his lands, may be found in chapter 1st of the supplementary articles.

ARTICLE FIFTH.—*Solution of the Problem put by the celebrated Payen.*

But a short time since, this celebrated chemist wrote in a French agricultural journal, that the art of manure consists in the avoidance of the too great solubility of materials which decompose too easily, and to render soluble those which decompose with too much difficulty. Well, this problem is resolved by the present method; my system is nothing more than the realization of Mr. Payen. If I have straw or hay, which decomposes too quickly, I water them with a lye, which incorporates the unctuous solid materials with earthy salts and alkalies, and this manure, in being soluble, lasts longer than herbaceous bodies or straw.

If I have hard and woody vegetables, I water them with my mordant lye which attacks them, macerates them, and renders them soluble in a little time.

ARTICLE SIXTH.—*Nourishment of Plants, and of what they are composed.*

It is known, not only that plants take nourishment from the soil by their roots, but also that they take a large part from the air by their leaves, organs constructed for this purpose. Now, the larger the leaf, the more facility has the plant in taking its azotic nourishment, as it is principally nitrogen which it imbibes from the air. And it follows very evidently from this, that the larger the surface of the leaf, the better state is the plant in to derive its aerial nourishment. This remark, which is not new, may possibly beget one which shall have some novelty.

Since the nourishment of plants is composed of humus, of carbonic acid gas, of nitrogen, salt, &c., and that plants with large leaves have greater facility than those with narrow and pinnated leaves to imbibe nitrogen, carbonic acid gas, and other gases which form the base of humus, you should put, in the lye destined for the first, more of the alkaline salts; and in that destined for the second, more of unctuous substances, and containing a larger quantity of humus.

Thus, in lye intended to manure pumpkins, potatoes, corn, tobacco, and other plants with large leaves, you should make the salts and alkalies prevail over the animal parts. On the contrary, in hemp, grain, and all the grasses, the animal parts, or such as contain the most humus, should predominate.

You see why moulds, mixtures of plaster, ashes, &c., are better suited to natural and artificial meadows than animal parts, or those charged with humus. The only decomposition of roots which die in the meadows are sufficiently filled with humus, but they want exciters; they are the digestive salts of a thick and engorged sap. This is the reason why so many farmers acknowledge the good effects of ashes and plaster upon their meadows.

ARTICLE SEVENTH.—*Vegetable Metempsychosis, or Transmutation of a Dead into a Living Vegetable.*

QUESTION. Do you not think that it would be rational to employ for composts, and whenever it is possible in vegetable decompositions, the stalks of the same plants which this manure will be destined to produce, because I am

persuaded that the decomposition of a particular vegetable will be better adapted than any other to the prosperity of its like, in the new production?

ANSWER. In general, everything appropriated to another, suits it better than if chance alone had caused their junction. Now, if we replace the natural manure of animals, which is applied, almost without examination, to the culture of all plants indiscriminately, by a rational manure; that is to say, in the composition of which enter substances of a nature analogous to those which form the structure, or the product of the plants which are cultivated, it is inevitable that we should prepare for these plants the elements of their existence, their increase, and their prosperity. Thus, at all times it has been remarked, that the straw employed as litter, and as manure, was perfectly suited to the culture of wheat. The reason they were ignorant of, but I think that it is altogether natural.

Without throwing myself into scientific discussions, wheat straw contains various elements, and particularly salts, potash, and lime. If manure, buried under a piece of corn, does not contain the principles which I have pointed out, nature will make an extraordinary effort to procure for the corn plant the elements of which it is in need, and which she, nevertheless, finds, whether it be in the earth, in the air, or in combinations of which we are ignorant. But if, in place of resigning this to the sole charge of nature, man places at the foot of this plant principles such as constitute it, nature will have less efforts to make, the plant having near that which it wants, nourishes itself with more facility and power.

This is why straw manure, ashes, feculent materials, in which the decomposition of straw and grains preponderate, cause the grain of wheat to prosper, which contains much phosphate of lime. So, to take another example, it is known that plaster acts upon leguminous plants, peas, beans, clover, &c.; but science has given rise to thousands of discussions to discover the cause of the effect, and upon this science has not advanced beyond us. This is a secret of nature which mortals have not yet been able to penetrate. As to myself, what does it import me to know why and how plaster acts upon legumes, vegetables, as well as forage? I only wish to follow facts.

Is it true that when we observe that a principle or element is useful to a plant, it is necessary to furnish it?

The reply can be only in the affirmative. Since the legumes have a partiality for plaster, we make it predominate in the composition of our lye. If afterward you desire to know why it is that legumes are partial to plaster, I can only mention the incontestable fact, that if we analyze leguminous plants. we will discover that they contain more plaster than other plants.

It is thus that, little by little, I will give to my readers the analytical results of the principles which prevail in plants, and it will be easy for every one to judge what are the elements which he should add to his lye to prepare it for composts, and for the conversion of vegetable into manure.

If it merely depended, at all times, upon the transcription of the material analysis of each family of plants, I could avail myself of tables which already exist, and where this analysis is made; but I wish, after my own experiments

in the ground, to test if the experiment is in accordance with the declarations of science, the only means of never being deceived.

This career which I have opened is larger than, at first, will be believed, but with time, labor, perseverance, and the assistance of farmers who are willing to second me by their own essays, in the different states, we will attain the goal.

Article Eighth.—*Economy.*

Question. The title of your method further says, that your system is economical. Will you be good enough to point out in what consists this economy?

Answer. Always, when one makes his own manure, in place of buying it, and when he manufactures the elements of its composition without cost, that is to say, in using that which is on the place, and which is often suffered to go to waste economy is insured.

Whenever any manufactory whatever is first organized, the benefits are almost always less the first year than in subsequent years. This is like the adoption of a new system, and naturally all innovation is accompanied with a little sacrifice at its introduction. It is necessary to organize the workshop, purchase the tools, instruct workmen, and form schools. Now, the benefits are never so considerable at the beginning. The more or less economy depends still upon the dispositions which you take to place your tools in the best position to facilitate the manual labor of the waterings, which are the most important parts of the manipulation. It should be well understood, that as water is the base of the system, it is necessary to have a large quantity of it, as a ton of straw is turned into four tons at least of manure. Dispose your heaps near to the water—a pond, a brook, a river, or a well; save particularly rain-water, construct reservoirs, make ponds; and mark well, that, for you, water is manure. But that is not all: to receive these waters, to convert them into saturated water, or half lye, it is yet necessary to combine economy with the mode of watering. Here localities will afford greater or less facilities. But, in fine, it will always depend upon your intelligence to make your combinations more or less economical. Thus, a perfect disposition is, first of all, to make your preparations at the foot of a declining piece of ground, where the water, after having been converted into lye in a basin above it, can soak the heap by its ordinary fall. It is easy to conceive, that if your heap waters itself from a basin above it, the labor is considerably reduced. If your farm (or your greatest convenience to the necessary quantity of water) is situated in a plain where there is no fall, it will be well then to make use of a pump to carry the lye upon your heap.

Thus, then, in one hand hold the method, which traces the principles, the general rules, and with the other take your dimensions, place your tools, especially so that the waterings can be practised with economy: for, to resume, I can teach you economical processes; but if you will not aid me, the benefits of my system will be less, for I can not sell you economy. If anything in the world belongs to intelligence, it is certainly the order which engenders economy You who have commenced without having sufficiently meditated upon my system—upon the mass of water which is necessary—upon the elements which

must be gathered upon the water to saturate, may, the first time, lead yourself into error; but study, change your preparations if it is necessary, act with intelligence and skill, and the economy will be great and certain. This economy will increase year by year.

If you want to make a large quantity of manure leaven, you should establish basins or reservoirs in which the water can be corrupted—the more corrupt it is, the more valuable—and afterward preserve the juice or liquid which flows from the heap during the operation, and which constitutes the leaven. If these two are in a perfect state, you can then in subsequent operations, without fear, reduce the lye ingredients to one third of the quantity indicated in the table, without prejudice to the quality of the manure.

Another great principle of economy in a farm, consists in not permitting animal matter to volatilize. Thus, the dung of horses, of horned cattle, and others, employed in a dry state, have lost one half of their value. These materials, on the contrary, thrown day by day, or at least twice a week, into your reservoir of saturated water, will not only prevent the loss which would have been occasioned by evaporation in the air, but will serve to corrupt the water and enrich it. This will give cleanliness to the cattle. It is not to be believed that cattle love to roll in their own dirt; on the contrary, they love cleanliness and cleanliness gives health. To this end, that is, to insure the animal dejections in their freshness, in order to enrich the saturated water, the farmer ought every morning to make the large cattle get up in their stables and in the barnyard some ten or fifteen minutes before driving them out. During this time these cattle will accomplish their functions, and will deposite the product of the night's digestion; whereas, if the animals are driven out immediately after their rising, they will deposite their dung far from the farm, in the fields or in the woods, and this matter will be, little by little, lost to the farmer.

(This article is completed by what is said in the following section, Article 5 No 5.)

SECTION SECOND.

1. *Saturated Water.*
2. *Place of Operations.*
3. *Ingredients of the Lye.*
4. *Composition of the Lye.*
5. *Manner of making the Manure.*

ARTICLE FIRST.—*Of Saturated Water.*

QUESTION. I suppose that the more the water is corrupted, old, and charged with matter, the more it ought to contribute to the prompt decomposition of the vegetables, and to the good quality of the manure. But to be well able to fix upon the various qualities of this water, it is necessary that you should make a classification

ANSWER. You are right. I will divide the saturated water into four classes, or distinct qualities

1. *First quality*

The first quality of saturated water is that which is composed of rain or snow water, and in which shall have been put much of various kinds of green vegetables, urine, excrements, offal of animals, spoiled fish or provisions, greasy dish-water, soapsuds, lye, and in short all similar residues. It will readily be comprehended that all these matters, in corrupting the water, will also considerably enrich it at the same time. A water thus composed, and which has been permitted to grow old, will of itself more than half constitute a lye, and in adding some salts you will have a lye of the first quality.

2. *Second quality.*

The second quality of saturated water is stagnant and corrupted water, such as is found in ditches, ponds, and in low places, and in which green vegetables have been decomposed. In drawing off this water, you ought to be careful to stir the bottom of the ditch or pond, in order to enrich the water with slime or mud, which you will find at the bottom, having there formed a deposite.

3. *Third quality.*

The third quality is rain-water, or snow-water. In my experiments I have always remarked, that with this water, not only the fermentation of the materials operate with more ease than with fresh water from wells, springs, or rivers, but that the manure which it produces is better than that obtained from these last waters.

In my opinion, the cause of this difference is, that rain and snow water, direct from the clouds, ought to have in it more electricity than that which is amassed under ground in traversing various beds of the earth, and consequently I suppose that it may be a more active agent in fermentation. But that which better explains the effect produced by rain or snow water in my manure, is, that these waters contain ammoniacal and calcareous elements, all of which, in exciting fermentation, communicate at the same time a fertilizing principle to my manure. The existence of these salts in rain and snow water, has been detected by chemists, and recently confirmed by Dr. Dana, in an admirable work known under the title of "Muck Manual."

4. *Fourth quality.*

The fourth quality of water is running water, of streams, rivers, or branches, and the last quality is fresh water from wells and springs.

In using these waters in the lye, it would be well to augment by one fourth the ingredients in the table, especially at the first operation, because then you have not the aid of the leaven of manure.

ARTICLE SECOND.—*Place of Operations.*

1 *Grate.*

QUESTION. Is it absolutely necessary to construct a grate? Can we not put up the heap upon a platform without the grate, because everybody has not poles at his disposal? And what is the advantage to be derived from the employment of this grate?

ANSWER. The grate in question is only a means to facilitate the operation, but it is not indispensable; you may put up the heap upon a platform without the grate. Nevertheless, the employment of the grate represented by fig. 2 presents two very valuable advantages. In the first place, it facilitates the flowing of the liquid, and then it gives access to the air under the heap, which greatly accelerates the fermentation. In fact, with the grate, the fermentation commences at the bottom of the heap—it is more prompt: while without the grate, it commences at the middle of the heap, and the operation is retarded from one to two days.

If one has not poles at his disposal, he can use any other material, so that he makes a grate of some kind, and as he may be more or less able to do it, any farmer can construct one for himself, and then he will have no need to disburse anything for this object.

2. *Of the employment of old boards in place of beating the surface.*

QUESTION. You say that the surface of the excavation upon which you wish to put this grate or heap, should be beaten or puddled, in order to prevent the filtration and loss of the juice which flows from the heap during the operation Do you not think that it would be more advantageous to employ boards to this effect?

ANSWER. Without doubt, a bed of boards will perfectly fulfil this end. In thus doing, the excavation in question will be more solid and more durable, only it will be necessary to fill up the cracks or openings with puddling earth or any other mortar, in order that the liquid may not escape in that way.

I should have mentioned this in the body of the method, if I had not feared to occasion some expense, as everybody has not boards at his disposal, while the beating of the ground only costs labor.

The lye reservoir and its object are sufficiently explained in the body of the method.

ARTICLE THIRD.—*Ingredients.*

QUESTION. You say that the ingredients are to be found upon the place, and that the farmer has not any disbursement to make for this object, while the lime, salt, and saltpetre, for which you do not name any substitute, must be bought; barley or other grain, such as is to replace the feculent materials, although upon the place, have nevertheless an intrinsic value, which it would be easy to realize. Please explain

1. *Lime.*

ANSWER. Concerning the lime, his purchase only becomes necessary when he has no limestone about his farm, or shells to burn, and whenever there is a possibility of procuring these materials without expense, it ought to be taken advantage of, especially limestone, because, by means of these stones, any one may fabricate, all at one time, four of the elements of the lye—namely, lime plaster, soot, and ashes—and that without expending anything.

In this way, dig a hole in the ground, five feet in diameter and two feet deep; then start at the interior base to build an arch with the limestones, leaving an opening on the north side to give a draft to the fire; then put on it some limestones, and, if possible, some old plastering; then fill it up with earth; apply the fire to it from time to time; feed the fire so that in about thirty hours the operation is terminated, and you have, 1st. Fresh lime.—2d. Plaster which has been melted and returned to powder.—3d. Burnt earth mixed with soot.—4th and last. Ashes.

This is a further argument that the greater or less economy of my system depends upon the intelligence and the genius of the farmer who makes its application.

If it be impossible to procure either limestone or shells, the lime will have to be bought, the cost of which, in the quantities required by this method, can not be much.

2. *Soot.*

QUESTION. As a substitute for soot you name the product of an *ecouage*. What do you call an *ecobuage?* and how is it that this material contains soot? It seems to me that burnt earth and ashes have no affinity to soot. Is there any other substance to substitute for soot?

ANSWER. I call an *ecobuage*, or clearing-fire, a heap composed of combustible materials, such as trunks of trees, roots, branches, briers, heaths, sods of turf of all kinds, all materials which are obtained from the clearing of woods, and breaking up of pasturage, which is burnt, a common practice upon farms, and as these substances united in a heap are more or less humid and earthy, it follows that they will consume but slowly. Now, from this clearing-fire undergoing a slow and continued combustion for many days, there is the product 1st. Of ashes, furnished by the burnt wood. 2d. Burnt earth, furnished by the earth which has attached itself to the trunk, the roots, and the turf-sods; and 3d, there is the soot engendered by the smoke, and which is found mixed with the ashes and the burnt earth.

No doubt I will only find the soot in small portions, but this will suffice for our operation, the more so, as this substance, although valuable in the combination, is not *indispensable* in the lye, for this ingredient scarcely contributes anything to the fermentation of the materials. Then the employment of these materials is still advantageous in this sense, that, besides the principle of soot which is contained in the ashes and the burnt earth, these two last substances possess yet other fertilizing principles for the base of an amendment, which have a very good effect in the entire operation. Old plastering from ruins, also,

contains the principle of soot. I have not mentioned it in the body of the Method, because it is rare that this material is in the possession of the farmer, while the "clearing" is practised by almost all farmers, and does not occasion him any disbursement.

3. *Ashes.*

QUESTION. To replace unslaked wood-ashes, you take 5 or 6 lbs. of potash, or of soda, but this substitute it is often necessary to buy. To avoid this expense, can we not, in the absence of unslaked wood-ashes, employ the ashes of pitcoal, or slaked ashes, or, in short, add them to the first, without prejudice to the operation?

ANSWER. If you have not unslaked ashes, or you can not get a certain quantity for your manure lye, which, moreover, is a case very rare in farms, you can then employ coal-ashes, or slaked ashes; but it will be necessary, in tha case, to double the quantity, that is, in place of two bushels, take four bushels

If you have at your disposal ashes both unslaked and slaked, and coal ashes, you will reserve the first for your manure lye, and throw the others into the basin of saturated water; that is in case the quantity is too great to be added to the lye

4. *Salt.*

QUESTION. I think that the cost of salt is so small, that it scarcely merits to be carried into the account; the price is so low, and the quantity so small, that it is not worth the trouble to make it a question of economy. But I can not conceive how a little salt can have any effect in a heap of manure of four tons. Can you tell me the reason?

ANSWER. You ought to put but very little salt in your lye, because salt, used in small quantities, divides the greasy particles, facilitates the course of the sap, favors vegetation, and produces a certain heat which hastens fermentation; while a very large quantity will, in many cases, be prejudicial to vegetation, and will arrest fermentation.

This argument is relied upon now by men both of science and of practice; I do also know, by my own experiments, that in putting a little salt in the lye my manure is better. For the rest, you have already remarked, that I seek to imitate nature. Thus, you will observe, that digestion is better accomplished, although the salt may be scarcely visible, than when our food is taken without salt. The appetite is excited, the salivary glands discharge themselves, by which the aliments are better moistened, and better attacked by the juices of the stomach. Now, the same phenomena are going on in plants; a little salt animates the sap, which circulates better, and does not choke, as when the manure is only mucilage.

5. *Saltpetre.*

In regard to saltpetre, every one knows that it is formed in caves, in stables and under limestone rocks. Any one can, then, procure his saltpetre for his lyes, without its being necessary to lixiviate the earth, by scraping it down o

around the wall, and then one adds it, in its rough state, to the other ingredients of the lye. In fine, nothing is more easy than to make at home your own artificial nitres, in erecting near the manure-heap, and under low buildings, to which a little air is given, small walls composed of vegetable earth, ashes and vegetable and animal materials of all sorts. You water these walls from time to time, and the nitre forms in them, and is continually reproducing. You gather it by scraping the walls. When the weather is wet and damp, and when there is no wind, the nitre makes the faster

To make you understand the points of resemblance between the art of making nitre (the substance from which saltpetre is extracted), and that of fabricating my manure, I will point out to you the artificial process by which nitre is produced.

Nitric acid can only be formed from that part of the air which is termed azote, a gas which is also contained in quantities in animal matter. To make 200 lbs. of saltpetre it is necessary to make use of 300 lbs. of animal matter. But this nitrogen is not sufficient, air must yet be furnished. Thus, the essential conditions to cause the formation of nitre, are:—

1. Animal matter
2. Air.
3. Moisture.
4. An alkaline base, such as lime or potash.

Other things are often added to these elements, as vegetable substances, and these fulfil other objects; they furnish potash, a small matter containing the animal principle, and sometimes nitre, and in dividing the mixtures submitted to this process they favor the contact of their parts with the exterior air; but in putting many vegetables into artificial nitres, you obtain more nitrate of lime.

(This is one of the truest explanations of my method, since I employ vegetables so largely.) There are, then, many points of resemblance between artificial nitres and my manure-heaps.

The product of a good nitrification is four ounces per cubic foot of earth. When this manufacture is under cover it is in the best condition for success, and the only economical nitrifications are those which are connected with agricultural experiments.

There are yet various ways of manufacturing nitre, which it is unnecessary to examine here. It is then established, that one of the causes of the strength of my manure is the quantity of sal petre which is formed in the heap, and in my vegetable compost, especially if it is permitted to grow old; for artificial nitrifications represent very nearly the aggregate of my system.

The nitrate, or the elements of saltpetre, spread upon the ground, especially if the land is calcareous, as well as saltpetre in a state of purity, if they are well applied, produce great effects, as they become combined vith the lime, forming the nitrate of lime, one of the most active manures which exists; another, and most certain effect of this nitrate, and of saltpetre is, that they draw moisture from the air, and give freshness to the plants.

I have enlarged a little upon this matter, because I wish to demonstrate that the art of making nitre closely approaches my method; hat any one can make

his nitre by only following his manufacture of manure, and that he will owe a part of his success in the earth to the quantity of nitre which is formed in his heap of manure made after this method.

6. *Plaster.*

QUESTION. As a substitute for plaster you indicate various earthy substances, but it seems to me that these materials have but little analogy to plaster, and do not possess fertilizing virtues. Then, although these substances, or at least one of them, is to be found in the major part of farms, there are, notwithstanding, some localities which are entirely without them. In such case, can we not use earth in place of them?

ANSWER. In truth, the most part of earthy substances contain but very little plaster, and some even none at all, but, nevertheless, their use up to a certain point produces the desired result. The essential part for us is, to incorporate in a heap of vegetables a solid matter for the basis of the amendment, to the effect:—

1. To render the mass more solid and compact, in order to facilitate the fermentation of the heap.

2. To absorb and retain the ammoniacal gas developed by the fermentation.

3. To prolong the duration of the manure in the earth.

If you can not procure either one or the other of these earthy substances, or if you have not enough of them, you can then replace them with earth. You should always use light earth in preference to argillaceous or clayey earth, this last being too cold.

7. *Human Excrements.*

QUESTION. How do you explain the power of these excrements?

ANSWER. If you adopt the principle that manures composed of the greates variety of elements are the richest, the explanation is easily found. The aliments with which man nourishes himself being of a great variety, and more or less rich, as meat, grains, fish, &c., it is natural to understand why this manure is the richest when in its primitive state, but not when it is reduced to a poudrette, where it has lost, by defective manipulation, the greatest part of its fertilizing principles.

8. *Dung of Animals.*

QUESTION. As a substitute for feculent materials you prescribe five barrels of animal dung. Can you not take less without prejudice to the entire operation?

ANSWER. If you operate with horse-dung, or other hot manures, you can reduce this substitute to four barrels, but I, at the same time, indicate the dung of oxen, cows, &c., while that of hogs varies according to the nourishment which they take, consequently, for your first operations the quantity prescribed in the table should be adhered to. But I repeat it, that after your leaven and saturated water are well constituted, you can reduce these quantities without prejudice to the operation, or to the quality of the manure.

QUESTION. I know that the dung of oxen, and of cows, is a colder manure

than horse-dung, but I can not satisfy myself of the cause of the phenomenon, and the more so, as the ox and the cow are nourished from nearly the same food as the horse. Can you tell me the reason?

ANSWER. It appears to me that the cause is this. Ruminant animals chew their food a second time, and longer than the horse, whence it follows that the fermentation of their aliments in the stomach, and in the intestines, is better accomplished than with the horse race. Now, the more complete the fermentation of a vegetable, the less heat remains to be developed.

This is why horse-dung, of which the materials are less fermented, less divided, and less decomposed, gives out more warmth to the nourishment of plants than the dung of cows, the particles of which are closer together and more united. Open the two manures, and at a single glance it will be observed that that of the cow can be but little more fermented, and that the other, less broken, produces more heat. You can see, then, why it is remarked that cow manure is better than others upon light and sandy soils, and that horse-dung is preferable to cow-dung for strong, cold, and clayey lands.

QUESTION. I do not know if your remark is very just upon the subject of ruminant animals, because the sheep and the goat ruminate, and their manure is still hotter than that of the horse.

ANSWER. If straw and hay were the principal nourishment of sheep and goats, as they are of the cow, their dung might perhaps not be worth more than that of the cow; but observe that the bovine cattle feed on grain, the croppings of forage, and most active odoriferous plants, whence its dung ought to be very active. Also observe, that this manure is much richer in the fine season than in winter, and upon the mountains than in the plain.

Thus, then, it is not sufficient to class the value of manures after the kinds of animals which produce them, but they should be considered with reference to the richness of the aliments of which they are the residues, and the seasons in which these manures are produced.

9. *Grain.*

Concerning grain as a substitute for human excrements, I have not recommended the use of grain, but in the rare case of the absence of feculent matter. For example: when one first purchases a farm, or a new farmer enters into new grounds, where there is neither cattle nor manure to be had, he may still compose a good manure-heap by means of fermented grain, which will produce a greater effect than he may have an idea of, because the fermented liquor which results from it is a moving principle, an active lye to attack and decompose the woody substances, by merely adding a new strength to the base of albumen and starch; but I do not mean to say by that, that manure produced from this operation will be as perfect as if you had used animal matter.

10. *Diastase, or fermentous matter contained in grain.*

It is now acknowledged by chemists that diastase, a substance recently discovered by chemical analysis, found especially in barley, is a powerful vehicle to fermentation. This substance is found in the embryo of the barley-grain; it

acts, during the first stages of vegetation, upon the germ of the grain; it is that which engenders the sugar fermentation, and develops the plant, and the power of diastase is such that two thousandths will suffice to cause this fermentation.

Then diastase not only exists in barley and in other grains, but in nearly all other vegetables, although in very small quantities, and as it is only necessary for one thousandth to act energetically, it follows, that for the little that is found in a gathered mass of vegetables, pressed and watered, it will act with energy upon the germ which is found in them. There is, by this means, conversion of the germ in sugar; that is to say, the first fermentation; after the vinous fermentation is produced, then the acid: then at last the putrid, which is the stage of destruction of the ligneous bodies; that is, *that* of which we are in search.

The learned chemist, Dumas, maintains that sugar exists in all vegetable substances; that always the sugar fermentation is the first; and that, consequently, my fermentation, like all others, commences by the action of the diastase upon all that is fecula, and that the other fermentations are only such as follow in the order above named.

This explanation refers not only to the addition of barley or other grain, but it throws light upon the first and true cause of the fermentation of our manure. You will now perceive why it is that I have prescribed the thorough intermixtures of the materials in heaping them, and I add, that if one has green vegetables at his disposal, he ought to intermix them with the other materials. Grain, and especially barley, possesses another property: in the state prescribed, that is, after having been steeped for the time mentioned in the lye or in the diluted urine, the albuminous particles detach from the grain, and contribute to anoint vegetables with a greasy and animal substance. Thus, those who wish to make a very active manure, as gardeners generally desire to have, will only have to add to the quantity of feculent matter indicated in the table, the water in which barley or other grain has been steeped. It is to this mixture that I attribute the astonishing fermentation that I obtained in one of my experiments in which it exceeded 250 degrees of Fahrenheit.

11. *Retrenchment of the Soot, Salt, and Saltpetre.*

Question. Is it absolutely indispensable to use all the ingredients to obtain the high degree of fermentation necessary to reduce vegetables into manure in a few days? Can we not leave some of them out without sensibly injuring the whole operation?

Answer. The materials absolutely necessary to produce the wished-for ermentation, are:—

1. Lime.
2. Ashes
3. Animal matter.
4. Then a mineral substance, as the basis of the amendment, in order to obtain the necessary slime.

By means of these four ingredients, and in acting as I have prescribed in the foregoing, one can still obtain a good result. At the same time it should be

borne in mind, that in adding the other matters, the manure which they produce is better, because, not only have you added thereto various elements very precious to the fertility of the ground, but, by their mixture with other ingredients, you have facilitated the production of nitrate of lime, and of caustic potash.

Thus, then, although the soot and saltpetre are not absolutely necessary to cause the success of the operation, you should, nevertheless, always employ these substances when you can procure them with little expense.

Those who have marl at their disposal ought to use preferably to the other substitutes for plaster, or even to plaster itself. In using marl, you can even diminish, by one half, the quantity of lime, as marl is very rich in alkalies. So, also, if you use human excrements, urine, or much liquor from stable manure, you can omit saltpetre, as these materials contain its principle. You should also understand, that if you use saline residues, sea-water, or sea-mud, or if you are acting upon vegetables containing much salt, as sea-ores, &c., you can dispense with the use of salt in the lye.

12. *Employment of ground bones, horn shavings, sawdust, ground charcoal, blood, and other residues of butcheries, and those of salting establishments.*

Question. All the elements of your lye are known as proper to fertilize the ground and nourish the plants. Now, there are others which have also that value, and which you take the pains to mention, as for example, ground bones, horn-shavings, sawdust, pulverized charcoal, blood, and other offal of butcheries, the residues of soap and candle manufactories, those of salteries, &c. Should these materials not be hurtful to the operation, how should we act to draw from them the greatest profit?

Answer. For my combination, and to attain my end, it is important, first of all, to find the materials which are at the disposal of each farmer, or at least those which they can procure with facility, and at the least expense, in order that the adoption of my system can become general.

Doubtless there are some farmers who have at their disposal, or can procure at a trifling expense, not only all the materials mentioned above, but yet more, any other substance known in science, or in practice, as possessing fertilizing qualities, which they ought to employ, because one being rich in carbonic acid, others in salts, others again in azote, it is certain that their mixture with other ingredients will greatly enrich the mass.

As to the manner of using these various materials with the greatest advantage possible, you should mix the organized bodies with the vegetables, and pass the whole of them through the lye; and as to the inorganic matters, or such as are in a liquid state, they should be thrown into the basin of saturated water in cases where the liquid is produced, in a season when manure is not wanted to be made. If, on the contrary, it is at the time of making manures, they should be thrown into the lye reservoir, always observing a certain proportion.

In proceeding thus, these materials will dispose themselves to solubility, or dissolve, and, in short, will be found divided in an equal manner in all the mass of the manure or compost heap

ARTICLE FOURTH.—*Composition of the Lye.*

1. *Reduction and augmentation of the ingredients.*

QUESTION. To reduce, or to make predominate, such and such elements in our lye, what is the least, and what is the greatest quantity of each ingredient which we can use in the composition of our lye?

ANSWER. To appropriate the lye to the soil and the plant, as is said in articles 3 and 4 of the first section, you can augment or increase each of the ingredients stated in the table, in the following proportions, without endangering the success of the operation, namely:—

1st. Lime—2 bushels may be reduced to 1 bushel, or augmented to 8 bushels.
2d. Soot—2 bushels.....do.....0.....do.....5 do.
3d. Ashes—2 bushels.....do.....1.....do.....8 do.
4th. Salt—4 pounds.....do.....0.....do.....16 pounds.
5th. Saltpetre—2 pounds....do.....0.....do.....100 do.
6th. Plaster—5 bushels.....do.....2.....do.....15 bushels.
7th. Excrement—3 barrels..do.....2.....do.....12 barrels.
8th. Leaven—1 barrel.....do.....0.....do..... ...10 do.

It is to be understood that these proportions are established for one ton of dry materials, or two tons of green vegetables, and that if you use more of these materials, you ought to augment the quantities progressively, and in a certain proportion.

You may diminish or increase the materials named as substitutes, in the same proportions.

I ought to recommend, not to depart widely from the quantity of lime fixed above, and only to augment the quantity first named in the table in cases foreshadowed in the third article of the preceding section, because lime being corrosive, it follows that if you put a quantity much too strong, it will eat up the unctuous particles of the manure. Neither ought you to go much beyond he quantity of soot fixed above, for in such cases this ingredient will stop the fermentation.

2. *Variation of the quantity of the ingredients according to the size of the heap.*

QUESTION. I suppose that we ought to increase or diminish the quantity of the ingredients in proportion to the quantity of our materials. You say, "in a certain proportion," but this annunciation appears to me rather vague. Can you not be more precise in these proportions, in giving a calculation that will guide me?

ANSWER. It must be admitted as a rule, that the quantity of the ingredients to employ, depends upon the state in which you find the saturated water. Now if this water is of the first quality, as is spoken of in the first article of this section, and you have a good leaven at your disposal, you will be in the first condition, and you can reduce by one fourth your other ingredients in acting upon the quantity of materials announced, namely, one ton of dry vegetables, or two tons of green.

If you use water of the second or third quality, if you act without leaven, and

If you only have the quantity of materials above announced, you will be in a second condition; you must then use these ingredients in the proportions stated in the table.

If you have water of the fourth quality, and no leaven, and you only operate upon a small quantity of materials, you will be in the third and last condition, and it will then be necessary to augment by one fourth the quantity of the ingredients.

If you act upon many tons of materials, and you are in the first condition relative to saturated water and leaven, you can reduce by one third your lye ingredients. If you are in the second condition, you can reduce them by one fourth; if you are in the third condition, you ought to maintain the quantities laid down in the table.

If you employ a larger quantity of materials, say 15 to 30 tons, and are in the first condition as to saturated water and leaven, you can reduce your ingredients by one half. If you are in the second condition, you can reduce them one third. If you are in the third condition, you ought to reduce them by one fourth.

If you employ more than 30 tons of materials at a time, you can in the first condition reduce the ingredients five eighths; in the second condition by one half; in the third condition by only one third. In acting thus, you will still have a satisfactory result, while it is natural that the more materials you put in the lye, the better will you make your manure.

3. *The least and the greatest quantity of materials that can be employed in our operation.*

QUESTION. What is the least, and what is the greatest, quantity of materials that can be employed at a time, without endangering the operation?

ANSWER. For vegetable manure you ought not to take less than 1,000 lbs. of vegetables, dry or green, and for vegetable compost not less than 2,000 lbs. of materials. These quantities are strictly necessary to obtain the degree of heat necessary for the prompt decomposition of the materials.

As to the largest quantity of materials which can be employed at a time, it is unlimited, for the larger the heap the better. In fact, it is much more easy to operate upon a large than upon a small quantity. In a large heap the fermentation operates more freely, and is developed with greater facility; it is more active, more powerful, than in a small heap, and consequently the success of the operation is much more easy to realize.

4. *Virtue of the Lye.—What it is.*

QUESTION. A lye well composed, has it the same virtue, and does it fulfil the same end, as the urine of cattle?

ANSWER. The lye is in reality a fictitious or artificial urine, by means of which we substitute with advantage the urine of cattle. In fact, the principal elements which constitute the urine of beasts, enters in the composition of this lye, and by joining to it the fermented juices which I have designated under the name of "leaven," which replace, or form a substitute for the action which

the animal organization exercises upon urine, and which engenders ammoniacal salts, you not only obtain a liquid richer than urine (since you can vary its elements, the mordant, and the action), but still more advantageous, since you can at will make the whole quantity of juices which you may want to fabricate your manures for sowing time.

The solution of the problem, "to replace the urine of cattle by an analogous liquid, possessing the same virtues as urine, and which can be made at will, in as large quantities as is wanted," is one of the most important points of this method.

Article Fifth.—*Manner of making the manure.*

1. *Mode of making the Manure prepared in this manner as short and fine as you please.*

Question. You say, Article 8, in the body of your work, that in order to crush the ligneous vegetables, they should be spread evenly on the ground, and the larger cattle be made to walk over them, or a roller be used, so as to prepare them to become more thoroughly impregnated with the lye. All this I comprehend very well; but the major part of these ligneous vegetables, such as stalks, stems, &c., though they may be crushed, will still retain their former length; and though imbedded into the general mass of the heap, they will probably not become sufficiently approximated and united to render the mass compact, and of uniform density, so as induce and facilitate fermentation; in short, though these materials may become softened through the effect of high fermentation, and, as it were, baked, and partly relaxed and dissolved, yet they will not become sufficiently separated to be freely ploughed in and incorporated with the soil, especially if having undergone only a few days' fermentation, so as to render the manure adapted to the soil, and the kind of vegetable for which it is intended. This being the case, how can this inconvenient defect be obviated by some simple and easy management in the performance of the work?

Answer. Your observation is correct and judicious. The difficulty certainly can be remedied, and in this way:—

As regards the long pieces of stalks, roots, &c., let them be put in the middle of the heap, taking care to distribute them equally as the heap progresses in its construction. Arrange the heap in such a manner that these ligneous bodies are deposited in the middle of the heap, intermixed and surrounded with the rest of the materials, such as straw, green vegetables, &c., so that the ligneous particles, which are adverse to approach and amalgamate, may be brought into close contact with each other, pressed together, and thus fermentation induced The fact is, that these ligneous bodies, though placed in the condition described, will not for some days become completely dissevered; a long stalk or twig will still retain its primitive length; but they will, as you say, have become softened, trenchable, and baked through. When reduced to this state, it is very easy to cut them, and by that means make the manure as fine as you please. The cutting process may be performed as follows:—

When the manure is to be brought out on the soil or field a man, armed with

a cutting instrument, mounts the heap, and cuts into the mass lengthwise and crosswise, over the whole surface of the heap, to the depth of ten or twelve inches, according to the capacity of the instrument. These incisions should be made from three to twelve inches apart, according to the degree of fineness desired. This operation being done, the wagons or carts are loaded with the manure thus cut up; and so soon as one perforated layer is carried off, the same process is repeated on another layer, then on a third, and so on, until the whole heap is cut up. A common hatchet may be employed in this operation, such as every farmer has on his premises, or, if wishing to perform the work with greater despatch, a hatchet of larger dimensions may be used, or a cutting instrument in the shape of the knives which are generally used in cider-mills.

It will be found, on experiment, that this labor is both easy and rapid in its execution, because the heap, being soft and yielding, yet compact, the cutting is effected promptly and without much resistance; indeed, one single man can in half an hour, cut a layer of twenty inches depth, which, for every layer from a large heap, yields at least twenty-five loads of manure.

2. *Necessity of the mixture of the leaves of trees with other vegetables.*

Question. In the body of the method, Article 8, you speak of the mixture of the leaves of trees with other vegetables. To what end do you make this particular recommendation?

Answer. I have expressly recommended this mixture for the reasons following:—

First, leaves of trees, and especially dry leaves, contain very little fecula and sugar; consequently their fermentous power is very feeble in comparison with other vegetables; it is necessary then to add to them materials which enclose more ferment than them, in order to aid their fermentation and reduction.

And then, in operating by irrigation, as it is spoken of in the second process, this intermixture is still more indispensable, inasmuch as the leaves take the lye difficultly, and if you put in a layer without mixture with other vegetables, they form into balls, and become so glued together that the lye poured upon them touches only the surface of the ball or knot, flows on one side, and the watering does not attain its end, because the interior of the balls remain dry, the lye not having penetrated; whence the fermentation will operate difficultly, and their decomposition will become slow and imperfect. Whereas, mixed with other vegetables, the fermentation is more powerful, the leaves being parted through all the heap, the lye can reach them—they are moistened and decompose.

If you operate upon leaves of trees, or other very short defective materials, which consequently heap up difficultly, it would be well then to construct of longer materials a bank upon the sides of the grate, all around, about a foot high, and from a foot to eighteen inches thick; by these means you will have obtained a cavity of a foot in depth. It is in this last that you should throw leaves or other very short materials, taking care to mix them well as they are thrown into the cavity. When the cavity is full, and the materials which have been thrown

in are level with the bank, you finish this layer in the manner already indicated in the body of the method.

Then form a second layer in the same manner as the first, and thus continue until all the materials are heaped; then cover the heap with straw, hay, or, in fine the vegetables which always remain around the heap after the operation.

3. *Covering the Heap.*

QUESTION. You often repeat that we ought to cover the heap with straw or hay. It appears to me, that provided we cover the heap, it is of little importance what with, the end is accomplished. I even think that if it was covered with planks or with earth it would only be the better for it, because in this manner the gases developed by the fermentation could not escape from the top of the heap: hen the boards still serve for putting stones upon them, in order still more to press the materials in case we should be acting upon vegetables which pack difficultly, and which have not been sufficiently mixed with earthy substances to render the heap compact and solid, so as to facilitate fermentation.

ANSWER. In truth, I have intentionally made these repetitions, and for this reason. In our operation we ought to use all the means in our power to cause the degree of heat necessary for the reduction of the materials. Now, if we cover the heap with a good layer of earth, or with boards lying close together, we smother the fermentation instead of developing it, because the necessary evaporation can only be effected from the top of the heap, whereas, when it is covered with a solid and compact body, it is interrupted in its course, which smothers, or at least which greatly enfeebles the fermentation. Then the air, an agent of our fermentation as powerful as the lye itself, not being able to penetrate the surface of the heap, we lose not only its action, but also its azote; whereas, in covering the heap, as is prescribed, the evaporation can be realized, it gives access to the air, and, in a word, these obstacles disappear.

If you wish to cover the heap with boards, for the purpose mentioned in your question, you should then not place them too close, and dispose them in such a manner as to leave intervals of five or six inches between each, in order that the evaporation may pass through these spaces.

As to the loss of gases by evaporation, this loss is scarcely sensible, because nearly the whole of them are "fixed" in the materials, and particularly in earthy matters, which are found mixed with the vegetables. As to the rest, we should not wish what is impossible. We can not go against laws traced by Nature herself: we retain what it is possible to retain, and that without prejudice to the entire operation. This end being attained, we seek there to stop.

Thus, you see how important it is to cover the heap in the manner prescribed, and how this point, so small in its appearance, becomes great in its consequences. I also seize upon this occasion to recommend to my patrons to conform to the prescriptions of the method, or at least not to depart too far from the fundamental rules which are here traced; for I repeat, that all which is here reported is the result of numerous experiments, and that the various processes have only been adopted after having observed, among many others, that they were the best and most proper to insure the success of our operation.

4. *Destruction of the heap, advantage which results from it.*

QUESTION. In the same article 8, you counsel us to demolish the heap, and reconstruct it immediately after. What advantages result from this operation?

ANSWER. In operating thus, you assure yourselves:—

1. The complete decomposition of the materials which were upon the side of the heap, which never decompose well there, not being enough pressed, and wanting moisture; also those at the bottom of the heap, which, in case of operating without the grate, are not entirely reduced, for the reason that they are chilled by the ground upon which they rest. It is true that this portion is very small, but we are trying to render the whole mass equally good.

2. By the change of the place of the materials made by the new heaping, the oxygen is renewed, and the lye reaches all parts of the vegetables which had theretofore escaped; all this causes a prompt and powerful fermentation, which completes the operation.

This labor is particularly recommended to persons who have not yet had practice and skill in the operation; it is a certain means of insuring the success of the operation.

5. *Labor.*

QUESTION. But this demolition increases the labor, which is already considerable, and for this reason, I fear, many farmers will not execute it, for it is true that there are some active farmers who do not much regard it, but it is not less true that there are some who do, and to whom this branch will occasion some expense for laborers. In fact, should we not reduce the labor in general?

ANSWER. Without doubt it can be reduced. I can only repeat to you, that it all depends upon the perfect or defective manner in which you have organized all your preparations. In answer to your whole question, I will say, that in nearly all well-conducted farms, the hands attached to them are ordinarily sufficiently numerous to give no cause for the employment of strangers on this occasion. The farmer, in pursuing his usual discretion in the proper distribution of the labors of his farm, so as to employ his force with the greatest advantage will certainly attain this end without any increase of hands. And should he even, in the fabrication of his manures, employ two or three extra hands, what harm can come of it? Will not their labor be doubly repaid to him in the increased products of his farm? In fact, it is altogether impossible for the farmer to make any sacrifice in fabricating masses of manure out of elements which cost him nothing. As to the rest, he will be a lucky man who accomplishes all his desires without previous labor. I am here endeavoring to insure to him the success of his agricultural operations, that is to say, to insure him nourishment for the year, to lay the groundwork of his fortune. Now, this is well worth the pains of serious application to it, and to use the means which are in the power of every one to cause this result.

SECTION THIRD.

1. *Composts.*
2. *Means to augment the Manure of a Farm.*
3. *Waterings.*
4. *Summary of the principal Advantages of this Method.*

ARTICLE FIRST.—*Vegetable and Mineral Composts.*

1. *Mixture of vegetables with turfy materials.*

QUESTION. In the section upon composts, article 1, you say, that upon two tons of hay or green vegetables, or upon one ton of dry vegetables, we ought to put a ton and a half of turfy materials. Now, can we not act upon these last materials without mixing them with vegetables? or, in case that the mixture is necessary, can we not take less vegetables and more turfy materials? And why ought we to permit this last matter to dry?

ANSWER. It is here desired to produce a fermentation sufficiently high to decompose all these materials in a short space of time. Now, as the fermentative power exists in the vegetables, and as this power is more or less strong, according as the vegetable is rich in diastase, in fecula, and in sugar, it follows, that if we use turfy materials without mixing them with vegetables, our fermentation will never attain a degree of heat sufficient for prompt decomposition, because the turf being principally composed of roots and vegetables, of which one part is already in putrefaction, does not, of itself, present a sufficient ferment for the action of our lye. It is necessary, then, to bring vegetables to their support.

If your turfy materials are a little earthy, and contain much undecomposed vegetable substance, you can double the quantity if you mix with dry vegetables, or triple it if you mix with green.

You ought to permit these substances to get almost dry, because in this state they absorb a larger quantity of the lye.

In regard to the process described in article 2, you should understand that here we can only obtain a moderate fermentation, seeing that we are using manures which are already fermented, and which, consequently, can no longer develop a great heat.

Here, again, you can double or triple the quantity of your turfy materials, if they are of the kind mentioned above.

As to the mineral composts, there can be no question of fermentation, since we act only upon earthy materials.

2. *The most favorable season for the preparation of composts.*

QUESTION. What is the most favorable time for the manufacture of composts?

ANSWER. In regard to the vegetable composts of article 1, you ought to prepare them in the season of the greatest abundance of green vegetables, and as

to those of article 2, they can be fabricated either in the spring, summer, or autumn, but you ought always to prefer manures made out of green vegetables to those made out of dry. They possess many advantages.

The first is richer in substances which have a humid basis, and the mass is tenderer, more decomposed, more compact, more unctuous, whence it follows that the compost which it produces is superior to that which is obtained from the second.

As to the mineral compost, it can be made at all seasons, at spare times. Nevertheless, summer is more favorable than winter, as in winter the freezing weather may not only interrupt the operation, but it may also alter the quality of composts, for the mass being fresh and humid is apt to freeze, which it is very important should be prevented.

If you wish to prepare this compost in winter, it will be well to put it in a close place, in order to shelter it from the severity of the weather.

3. *Is it advantageous to use compost in a fresh state*

QUESTION. May we use these composts when fresh, that is, immediately after their dessication, or should we suffer them to become old?

ANSWER. You can spread these composts upon your grounds or meadows, immediately after their dessication, yet, in suffering it to become old, the vegetable compost increases in quality, while the remaining heaped up, it very nearly represents an artificial nitrous earth, or the rough matter of saltpetre, and as the nitre is a powerful agent in vegetation, it follows that the older a compost is, the richer will it become in fertilizing substances.

And as to the fermentation, it is not to be feared. As it contains a large quantity of earthy materials, the fermentation of the heap is almost nothing.

4. *Preservation of composts.*

QUESTION. How should we preserve our composts?

ANSWER. In regard to vegetable compost, its preservation is easy. You form, as it is made, heaps two, three, four, and five feet of height, and of any length or breadth. It will be well to place these heaps under a shed, as they should be sheltered; yet if this disposition of them requires the construction of sheds, and consequently some expense, you can, to avoid expense, place them in the open air, taking care to cover them with old boards, straw, or hay, in order to preserve them from the rains.

Concerning the mineral compost or earth manure, I repeat, that as soon as the mass is well stirred and kneaded, it should be divided into loaves of from 60 to 100 lbs.; these loaves should be put into a heap in such a manner that the air can pass through it so as to facilitate their drying, and that the heaps should be made under a shed.

In this way these composts may be preserved for many years without injury to their quality. They should be pulverized just before using them.

5. *Regulations to observe in the fabrication of composts*

QUESTION. What regulations should be made in the fabrication of composts?

ANSWER. In the composition of vegetable and mineral composts you ought to observe for rules:—

1st. That the more intimately the materials are mixed, the more the mass is stirred and kneaded, and the older the compost grows, the more does it acquire fertilizing properties.

2d. That it is unnecessary to observe the quantities and proportions of the various ingredients prescribed in the method; because it is to be understood that the force and value of the composts will be in proportion to the fertilizing materials which you use, and that you can double, triple, or quadruple the doses, according as you wish to have your composts more or less strong, and according to the various soils and plants to which they are to be applied. To this last end, you ought to make predominate in the lye those particular ingredients which are especially necessary for the amendment of such and such soils, or to the growth of such and such plants, as is indicated in the preceding section—art. 2, sec. 4, 7, 10, and 11.

6. *European composts, or moulds, compared to mine.*

QUESTION. In England and France they also make composts by means of fermentation. Are yours superior? And if they are, will you tell me the reason?

ANSWER. The English, although extremely advanced in the culture of the earth, are precisely those who have made the least approaches to my liquid operation. They operate in the dry way. This is their process: They form layers of ligneous vegetables, of lime, and of earth. This operation is not only very long and very costly in lime, but the compost or manure which is obtained after a year's delay and more, is often not of a good quality, for the reason that the quick lime, placed immediately in contact with the vegetables, sometimes destroys a large part of the humus which the ligneous bodies would have furnished by their decomposition; and if there should be too little lime, notwithstanding the lapse of a considerable time, the decomposition would not be sufficiently advanced. The proper medium in this operation is very difficult to observe; whereas, by the liquid way, I compose a mould superior to that of the English, in the space of a few hours, instead of a year.

The Normans also make moulds for the culture of flax. With them, experience has for a long time shown, that rich manure was not favorable to the grain of flax, which, by its diminutiveness, being in too close contact with the clod of manure, is often observed to fire before it has attained the first degree of development. From whence they were driven to the composition of a mould in which the grain of flax could germinate, and into which its roots could easily penetrate, and take, little by little, its necessary nourishment, without being engorged at once with too strong juices, and they fell upon the following means: They take a bed of stable manure, and a bed of earth, and occasionally stir them up, and in about a year they use this mould for the culture of flax, and also for other uses, but more particularly for flax.

This manure, incorporated dry with the earth, stirred many times in a year a large part of it is dissipated by a slow fermentation, by the air, rains, and the

vegetation of enormous thistles and other parasitical plants, which pump all the juices, has consequently but feeble action; and, moreover, the mould is incomplete, although it has taken much labor, and a year's time, to produce it; whereas my liquid way aims at a different object, that of disseminating at once all the salts and substances, rich in humus, in the earthy materials, of which each grain, by means of its kneading, strongly retains these fertilizing principles, and administers them, little by little, to the plants, and without engorgement, either for the reason that they are retained with more tenacity in a kneaded earth, or because my lye is composed of numerous elements which decompose one after the other, according to the diversity of their natures. It is known that a slow and prolonged fermentation is destructive to matter, and that a rapid and energetic fermentation produces an augmentation in the bulk, rather than a loss. It is thus that beans, cooked in boiling water, lose none of their substance, they are only softened, and disposed to solubility, by means of the digestive fermentation; whereas, these same vegetable bodies, subjected to a slow and dry fermentation, would be converted into powder, like chestnuts neglected in the hot ashes.

Well, it is this last result which is realized, not only in the Norman moulds but also in all others which are fabricated dry after a long fermentation; whereas, if I decompose in a few days green vegetables, by means of my lye and my rapid fermentation, and if I knead the whole with an earthy material, I avoid any loss of substance, and I compose a vegetable mould, which I can use with success at any time, whether in one year or many years, without its fertilizing powers being weakened, while the other composts are gradually destroyed, in consequence of their faulty preparation, and for want of an intimate amalgamation by the humid process.

6. *Poudrette compared to my Composts.*

Question. There is yet another compost known under the name of poudrette, where is it fabricated, and how is it made? One finds its use advantageous, and another is of a contrary opinion—what do you think of it? Do you think yours is superior?

Answer. Poudrette is a compost of French origin. It is made in many of the large cities of France, but it has only within a few years been made in America. Poudrette is fabricated of feculent material, that is, of human excrements, which they sometimes mix with earthy substances or plaster, for the purpose, I suppose, of absorbing the ammonia of the feculent material. The effect in the earth of poudrette is more or less active, and its use more or less advantageous, according to the species of ground and plants to which it is administered. This explains the diverse opinions which are entertained by farmers who have used it. In general, poudrette, as an active manure, is of short duration in the ground. Then, this manure being fabricated of human excrements, and the substance which they add to it being in too small quantities to prevent the too great solubility of the matter, and for the long retention of its fertilizing principle, in order to feed, little by little, the plant in its various stages of vegetation, it follows that, by freeing itself of too much of the juices at a time

it engorges the roots of the plants and injures the development of the vegetable, especially in sandy, light, and warm soils. Again, the feculent material, rich in its primitive state in fertilizing substances, undergoes, in its reduction to poudrette by the manipulation, the washing, the evaporation occasioned by its long exposure to the air, a loss which we may confidently estimate at one half. In fine, its use is expensive. Now, in my composts I use feculent materials in their fresh state, which I there fix, and disseminate them largely among earthy materials, each grain of which, having been kneaded with it, retains in force its fertilizing principles, to administer them little by little to the plants and without engorgement, either by reason of its being more divided and retained with more enacity in a kneaded earth, or because I incorporate them with amendments which decompose one after the other, according to the diversity of their natures; and, in short, the farmer fabricates my composts himself, and with elements which cost him nothing. Notwithstanding, judge yourself which of the composts is the best and most advantageous to agriculture, the English, French, poudrette, or mine.

ARTICLE SECOND.—*Means to augment considerably the Manures of a Farm*

1. *Dried earth, in place of straw, as litter for beasts.*

QUESTION. There are some farmers who put dried earth in their stables, and particularly in their barn-yards, in place of straw, for litter for their cattle Does this system appear to you advantageous?

ANSWER. This system is assuredly advantageous; and now it acquires so much the more importance, and becomes so much the more recommendable, as the present method gives you the facility to reduce the straw which you had designed for litter into manure, without the aid of cattle. So, amass in fair weather, near your barn-yard and stables, piles of dry earth, which in general should be of a different nature from that of the field which you wish to manure, if it is possible, because then you carry an amendment to the soil, which straw is not. Put this earth in your barn-yard and stables, and the result will be, that the dung and the urine will be absorbed by the earth, which immediately purifies them, whereas the straw, in decomposing, adds one putrefaction to another; that the earth will absorb and retain the gases: consequently you will not have putrid emanations nor loss of gas—there will be salubrity for both man and beast. This earth, impregnated with dung and urine, kneaded under the feet of the cattle, will lose nothing which has been given to it; put it into a heap guarded from waters, or under sheds, and they will always preserve their fecundating properties entire.

This system is the most seriously advantageous and economical to fabricate masses of manure for nearly the whole year; that is, to preserve without fail the animal dejections, and administering them to plants without any loss, in augmenting the mass by the even division of the matter, of which each grain of earth retains a part, and which it only abandons in proportion to the wants of the plant, and this can be done without causing any fear that the cattle may be hurt or incommoded by the earth which is dry, light, and sweet • you then

convert your straw and other vegetables into manure at seeding time, either in March or October.

These are the two months of the year in which you can put straw under your cattle, if you desire it, because at this time the straw can be fermented regularly by the aid of this method. Thus, in these two months, put straw under your cattle—or earth, it matters little which at this time, as all the straw will be converted into manure by waterings with the lye. Thus all your manures are warm and equally matured as the dung of a horse, of which all its parts are submitted to the same fermentation as in the intestines, by the aid of the same juices.

If you have twenty-five tons of straw on the first of October, you will have by the fifteenth of October, one hundred tons of manure, worth double one hundred tons of stable or barn-yard manure, because the first is rich in juice, equal in its parts, and all warm; whereas the second is an inactive body, washed by the rains of many months, dried out by the sun, cold, spongy, and scarcely colored by the juices, which are gone.

Do you know what will be the result of this manner of operating? Not only you will have lost nothing in retaining captive all the animal manure in the earth, but you will have double and triple the quantity of manure, because prolonged fermentation destroys even more than one half, and your manure is new, powerful, active, and appropriated to your soil and to the plants which you cultivate according to all the phases of their vegetation, and it will act beyond your hopes. It is time you should cease to calculate manure by its volume and its weight, and to demand how many cart-loads to the acre! Look to the quality of it. Do you not believe that a few ounces of beef are more nourishing to a man than a pound of potatoes? Yes, Mr. Dumas is right; there is a perfect analogy between animals and plants: and if in France this learned man was the first to proclaim this truth, I will be in America the first to have made its application in varying and in ameliorating the nourishment of plants according to their wants—like Nature, who has destined for each animal a different nourishment, and such as is suitable to its constitution.

2. *Immense advantages of the employment of human excrements or animal dejections.*

Question. I can see very well the utility of feculent materials, but it appears to me that the quantity of human excrements produced by nine or ten persons living upon a farm, will scarcely serve to manure five acres. Now, if my farm is of one hundred acres extent, there will remain ninety-five acres which have not received this manuring. What say you?

Answer. The generality of large cities have but one river, or one water-source, for all their population, but these waters, distributed in small streams in each quarter, quench the thirst of all its inhabitants. It is the same with animal manure, which, distributed with skill through a great quantity of vegetables or minerals, can feed a great deal of ground. The better to make you feel this truth, I give it as the result of my own observations, that a man renders per day at least three pounds of urine and other matters, in supposing even a less

of two pounds of urine in the fields: this, multiplied by 365 days, gives a yearly product of 1,100 lbs. per person, or 11,000 lbs. for the ten persons who ordinarily live upon a farm. Well, with these 11,000 lbs. of matter or liquids, by adding to them the elements which I have indicated in the table, you may produce 220,000 lbs. manure, superior in quality to the same quantity of cattle manure. Now, acting upon a similar system, not only with human excrements, but also with the dung of cattle, will produce us such an enormous quantity of manure, that we may confidently say that my method contains an entire agricultural revolution, for in agriculture everything is linked together; and if you apply more than 500,000 lbs. of manure, you will after that have more forage consequently more cattle, consequently more manure; more straw of all kinds consequently more material to feed your manure manufactory: in a word, an infinite chain of successive amelioration.

Article Third.—*Waterings*

1. *Effect of watering compared to that of my mineral composts.*

Question. In Article 8, in the body of the method, you say that it is more advantageous to fix the purin, or juice of the manure heap, in the composts, than to employ it in waterings. What is the advantage which results from this?

Answer. Substances which fertilize the earth evaporate so rapidly that it is important to fix them in a solid body, rather than to put them in contact with the air by liquid exposure; because, independently of the disagreeable taste which waterings with urine, or other corrupted matters, impart sometimes to forage and other plants, they present the further inconvenience of permitting the evaporation and loss of a large part of their fertilizing substances; whereas, in fixing these same liquids in earth, and by adding to them the other elements of the lye, you obtain an earth manure, with which you manure plants, by distributing to each a little nourishment, and thus you amend the soil—you do not harden it; on the contrary, you hold it permeable to the rays of the sun, which hastens the growth of plants; and notwithstanding the temporary humidity which is given to plants by watering, the mould or earth manure impregnates itself with dew, maintains the vegetables a longer time in superior freshness, and is more lasting, since it is both manure and amendment at once. Besides, this earth manure is prepared at spare times. When you make your compost preparations for seeding time, you can use these liquids as they are obtained, at least in the seasons when you do not manure the land; whereas with waterings, when the purin-vat is full, the farmer is compelled to use his liquid manure even before the proper time for manuring has arrived. It is then a forced labor. In short, they manure a much larger surface with earth manure, which they spread in a greater or less quantity, according to the case, and which they throw in an equal manner upon all parts of the soil; whereas by waterings upon an uneven surface (for a perfect level is not to be found in fields), the liquor is nearly all carried from the prominences into the depressions of the field, so that at least it is very sure of being spread in an unequal manner. I have made enough water

long to be able to affirm these results to farmers. Further, I do not intend to impose rules upon agriculture. The two systems may offer their advantages according to the nature of soil and plants. It is with this view that I have put the process in the body of the method But I ought to state a fact, which is that the effect of mineral composts, or earth manures, upon sluggish grounds have been much more sensible than waterings made even with my lye.

2. *Liquid manures compared to my composts.*

Question. I have read, in an agricultural journal, that in some countries of Europe they make use of liquid manures, and that they obtain from them good results. What are their processes? To what kind of plants is this manure administered? What is its quality? Is it superior to your composts?

Answer. In various countries of Germany and France they use feculent materials in their primitive state, that is, in liquid, especially in Alsace, but more particularly in French Flanders, and this is the Flemish process:—

Each farmer constructs a cellar in masonry some six hundred feet from his farm buildings. The bottom of the cellar is paved, and the four walls of the cylindrical vault which they support are built of brick. If the farm is large they establish many cellars, one after the other. They give to each cave two openings, one in the thickness of the vault and in the middle, the other in the north wall and in the surface of the circle of the vault. The first serves to introduce the substances, it is shut by a thick window; the second, a smaller opening to the north, gives access to the air, which is necessary to start the fermentation. An ordinary cellar contains from 350 to 400 barrels of matter

Through the whole year, and especially when work presses the least, the farmers go to the neighboring cities in search of night soil, which they empty into these vaults, and in the course of some months' fermentation this liquid manure is carried upon the field by means of a cart, from the tail of which the liquid is permitted to flow.

The use of this manure is principally reserved for the culture of oleaginous plants, colza,* flax, and also tobacco. They also make it serve to water the seeds of succulent plants intended for provender, such as carrots, turnips, &c. They spread it before and after seeding, or after transplanting. The transplants, especially those with large leaves, such as tobacco and colza, acquire in a few days great vigor.

Such is the general feature of Flemish liquid manure. The Fleming is proud of this mode of manuring, which with him is perfectly successful; but as, in my opinion, what is good in one country may be good for nothing in another, I will endeavor to establish, that in America the application of this system would be dangerous.

Whence comes it that the Flemings use with success their liquid manure? It is that their soil, in general, is cold, and that a warm and quickly soluble manure is necessary for all cold and sluggish grounds.

In America, where the climate is warm, the vegetation extremely active, the ground in general rather light than strong, rather warm and voracious than cold,

* The name of a Flemish vegetable, from the seed of which a lamp oil is extracted.

earth manure, or composts, suit them better, because it serves to refresh the soil, rather than to heat it more by a liquid manure, which is soluble as soon as it is put into the ground, and which renders the ground yet more craving for moisture, and drier after the watering. Now, to adopt the Flemish manure in America would be unwise.

As to the liquid manures having urine for their basis, do you know what you carry upon the field with a cask of a thousand pounds of this liquid? Nine hundred pounds of water certainly, which have not more fertilizing power than ordinary water. Chemists have decomposed urine, and have always found that it contained 940 lbs. of water. Well, is it not better, and worth more, to carry out earth which shall have absorbed 1,000 lbs. of purin, because, after drying, the water will have disappeared, and this earth will have retained only the salts, and the substance of the purin. Whereas, if you spread your liquid upon a large surface, it loses a greater part of its gases by evaporation, it develops weeds rapidly, and it is of short duration, because it is soluble from the day of its application. Then you spread your liquid very unequally, because there does not exist a perfect plain, and water always seeking its level, will naturally settle more upon concave points than upon convex; whence it follows, that some plants are but little fed, and others are burnt up or engorged by too much nourishing substance at a time. If it should come on to rain a little while after the liquid manuring, the manure, which is soluble, spreads, and escapes under the layer of vegetable earth.

None of these inconveniences are present with my mineral compost or earth manure; the contrary is realized, because this earthy manure is put at the roots of the plant, where it manures and amends at the same time, whereas the liquid manure hardens the soil and volatilizes itself.

QUESTION. But you say you do not see any advantage in liquid manuring, and yet you can not deny that the germination is more prompt, and that it diminishes the chance of the grain being devoured by insects before coming up?

ANSWER. I acknowledge that the argument would be good if there did not exist other means to make the grain sprout rapidly; but the soaking in lime-water, to which every kind of grain ought to be submitted before sowing, will produce the same effect, and certainly the lime which envelops it would be more fatal to insects. Soot produces also the same effect, and cultivators of melons in the south of France, never neglect, before sowing, to soak this seed twenty-four hours at least, in advance, in a tub of soot-water.

Beside, I will show you a new kind of soaking, which is a consequence of this method, and which, according to my own experiments, I believe to be the best of any known.

Before planting or seeding the grain, let it remain twenty-four hours in a bath of lye made after this method. This soaking accelerates, in an astonishing manner, the germination of seed, especially those which had capsules, such as beans, red clover, peas, lentils, &c.; and they are not devoured by insects, by reason of the bitterness and acrid taste occasioned by their steeping.

The only advantage that I recognise in liquid manuring, and in this case it is limited, is in transplanting, because the plant being wrested from its nourishing

parent, in its instinctive efforts to resume the course of its interrupted life, seeks a quickly soluble nourishment, which will rapidly repair its lost strength. Thus farmers and gardeners who practise transplanting, have observed that their liquid manure in this case produces wonders, but is rather a remedy than a nourishment. It is the same as when a tree is sick, the surest means to save it is to administer a liquid nourishment, as it has not the time to await the decomposition of a compact manure. It is as the succulent broth which is given to a convalescent, when a morsel of bread or of beef might compromise his existence

To resume, I do not observe, then, but a single advantage in liquid manuring, which is sooner to reanimate transplanted vegetables, and I can scarcely make this concession, because, if the transplants were watered immediately with pure water, or if there happen a seasonable rain, it would restore them every bit as well taking it for granted that the soil was manured.

Secure of success with my method, I condemn the system of liquid manures and waterings for general use. You may, perhaps, make an objection to my composts; you may tell me that often one has not earth to sacrifice for composts, that they would be obliged to take it from a vegetable layer. If, indeed, there is but little vegetable earth, or if there is neither inequality of ground, nor slime, nor mud, the system of composts may cause some embarrassment; but as it results that this earth, which is taken from the vegetable layer, is not lost, as it is a conductor of manure, as it rests upon the soil of the same proprietor, I believe there are very few cases in which it would be impossible to displace a sufficient quantity of earth for this purpose.

I conclude, then, that my compost constitutes one of the most important points of my method, that it will for ever replace all the composts fabricated in the dry way, and also the liquid manures.

The last three chapters of the first part being of a secondary interest, and as they are, besides, sufficiently explained by the preceding, I will terminate this second part by the recapitulation of the advantages which result from the application of this system.

ARTICLE FOURTH.—*Summary of the principal Advantages of this Method.*

From the whole of the first and the second parts, it will result that this method presents to agriculturists the following advantages:—

1st. The decomposition, in a few days, of all straw, and green or dry ligneous vegetables, and their conversion into a rich, unctuous, and durable manure. So with all sorts of straws, whether wheat, barley, rye, oats, buckwheat, &c., potato vines, corn and tobacco stalks, and, in short, all kinds of plants, green or dry; leaves from the woods, sugar-cane, and the like; all kinds of weeds, sea-ores rushes, docks, salt meadow grass, briers, heaths, clods of turf, peat; in a word, all substances proceeding from vegetation, and a multitude of other objects which lie about a farm, can, by this method, be converted into manure.

2d. That those who have straw at their disposal can convert it into manure immediately after the grain harvest and according to their localities, and will be in a condition to obtain, in the same year, a second harvest, instead of waiting nearly a year to convert, day by day, their straw into manure, under the feet of their cattle.

3. That those who may not have straw, will make their manure with ligneous plants, weeds, and any vegetables whatever, of which the greater part will decompose by ordinary means only in a few years.

4th That each one can himself fabricate his manures at will, consequently make his manures at the time when it is necessary to put them in the ground, an advantage the more precious, as it is the only means of preventing them from being mouldered, damaged, and despoiled of their juices.

5th. That he can make his manures much more durable than those which he buys, or fabricates by the aid of cattle, because he conceives that divers substances which decompose but slowly and successively, having been bedded together intimately, and divided by a liquid, ought to form various aggregates which the earth could decompose but slowly, and one after the other.

6th. That he can easily, and without any complication, vary the manure according to the climate, the nature of the soil, and the plants.

7th. That by means of a manure graduated and appropriated to the nature of the vegetable planted, he can force all kinds of plants with a vigor heretofore unknown.

8th. That he can render useful what has heretofore been lost, particularly what annoys and infects habitations, such as rank weeds, litter of all kinds which accumulate about farms and houses, feculent materials, urines of the house, remains of animals, suds, kitchen slops; in short, all the residues of the house.

9th. That the lye is made cold, without chemical preparation; that nearly the whole of the ingredients of which it is composed are found on each farm, and without cost; that the water which is the base of the system costs nothing; that, in fine, everything concurs to render it economical.

10th. That by the great quantity of liquid which enters into its fabrication, the weight of the dry material is more than quadrupled, and that of the green vegetables is more than doubled.

11th. That he will destroy, through the high fermentation, the germ of weeds which always infest the materials of manure, so that this manure will not produce weeds upon the field, or other grain than you sow. That the lye thrown upon the manure heap of a farm, also causes the same result.

12th. That he can rot his manure regularly—that is, that he can render it equally good and unctuous in all its parts, by means of a lye which distributes the salts and the soluble parts in a regular and uniform manner, which produces an equal crop upon all parts of the field.

13th. That the system of watering with lye presents the advantage that the manure heaps will no more be white or mouldered, because they are maintained in all their parts by an equal moisture, forming a soft and blackish mass, in which one part is neither fed nor moistened at the expense of the other.

14th. That those who have neither straw nor vegetables can convert even the earth or soil upon the place into a very fertilizing earth manure.

15th. That he can, with the greatest facility, and in a little time, make composts which will surpass in quality the ordinary composts of the whole country which are barely obtained in one or two years.

16th. That this earth manure will offer the advantage of being able, in the spring, to enliven the seeded fields, which may have suffered from the rigors of the winter, and to manure the grain which may have been sown without manure.

17th. That these composts, or earth manures, are very precious to the culture of corn, tobacco, sugar-cane, cotton, and at the foot of trees, in gardening: the mineral compost has a great effect upon meadows.

18th. In fine, that these composts maintain the freshness of the soil, and rapidly develop a glorious vegetation, especially when applied to fields of small grain.

19th. That by means of the lye it will be easy to multiply the manure-heaps of a farm, which should only serve as a leaven to convert the masses of vegetables into manure.

20th. That he can, without fear of depriving his arable lands of manure, break up his pasture lands, since he can multiply his manure-heaps without enfeebling them.

21st. That, by multiplying his manures, he can entirely suppress the ruinous system of fallowing; for, since our wants are perpetually recurring, the earth should not rest in giving forth her abundance; she sleeps only in winter, or during the excessive heat of the summer: in all other seasons, if you will only confide to her good manure, she will produce.

22d. That all ponds, and residues of distilleries and manufactories, can be reduced to manure.

23d. That gardeners can reanimate their hot-beds without changing their manure; that they can obtain early produce much sooner than with the systems now in use, while they can make their manure as strong as they wish it.

24th. That the products obtained from this manure will in general be more substantial, the forage and pulse more succulent, the grain heavier, &c.;* because this manure, being well matured, combines all the necessary elements for the fertilization of the ground, and the proper nourishment of plants. In a word, that its use will cause an infinity of ameliorations in agricultural products.

Such is the merit of this system, and such are the qualities which recommend it to the use of farmers.

In the face of advantages so great, so positive, and so clearly demonstrated and proven, we are no longer permitted to doubt that this method will render a great service to the country in augmenting the products of the soil, and that i will be a source of riches to individuals in putting them in a condition to double their crops. The most incurable prejudice, or utter folly, will alone be blinded to its utility.

* Here I ought to acknowledge, that I have for a long while hesitated to mention this virtue of my manure, and if I have at length done so, it is certainly not to extol the system, but merely to obey my convictions, for the products obtained from this manure have always been of a quality superior to those obtained from other manures. I have done it also, so as not to be behind my subscribers, who, after having proved it in the ground, would, like me, recognise this virtue, and who then might believe that I was ignorant of it. I have, in fine, hesitated, because this virtue is of such immense importance to the destinies of the country that I had hardly dared to name it.

SECTION FOURTH.

SUPPLEMENTARY ARTICLES AS THE CONSEQUENCE OF THIS METHOD

1. *Analysis of Earths.*
2. *Division of Manures.*
3. *Preservation of Manures.*
4. *Practical Results of the Method.*

ARTICLE FIRST.—*Analysis of Earths.*

THE first study of a farmer should be a knowledge of the different natures of the grounds which he cultivates, their various qualities, what they are capable of producing, and the manures which are suitable to them, so as to modify these grounds by amendments (which are also a mode of manuring); that is, by the mixture of various earths of opposite or different natures, or the introduction into the soil of such vegetable or mineral substances as may tend to modify the original nature of the tillable soil.

1. *Simple means to detect the nature of earths, without the aid of chemistry.*

QUESTION. How, without the aid of chemistry, can a farmer learn approximately the nature of his grounds?

ANSWER. Without the aid of chemistry, or the art to decompose bodies, it is difficult to analyze grounds with exactness; but it is, nevertheless, very easy to make an incomplete and, in most cases, a sufficient analysis, without the aid of science.

What is of most importance to know, is—

1st. Is there lime in the soil?

2d. Is it clayey or sandy?

3d. Does it contain much or little of humus?

You can proceed in the following manner:—

Physical analysis, or that which can be appreciated by the senses.

1st. To detect the presence of lime.

At different places in the field, mix a small quantity of earth to the depth of the soil, and take a little from each mixture, so that you may have a handful of the average soil; dry it by the fire or the sun; then throw strong vinegar upon it. If it effervesces rapidly—that is, if it bubbles up, or puffs into small blisters—it is a proof that the earth is very calcareous, and that it contains more

or less lime. If its bubbling is sluggish, there is but little lime; if it does not effervesce, the ground is not calcareous, or it contains no lime.

This point is of the utmost importance to know.

2d. We wish to know if the earth is argillaceous or silicious (clayey or sandy). Rub between the thumb and finger a pinch of the moistened earth, and it is easy to judge by the touch if it is smooth, soft, or rough, or if it is clayey or sandy. If the argil prevails, the touch is smooth, soft, and soapy; if the silex or sand prevails, the touch is rough.

This a certain way to know, not the exact quantity of clay or sand which this earth contains, but whether the clay or sand predominates.

If you wish to approach nearer to the truth, you put this earth in a bottle half full of water, shake it well, and, after standing a little while, pour it into a basin; the argil or alumine goes with the first water, and the sand or silex, which is heavier in consequence of its parts being closer than those of the clay, remains at the bottom. Filter this argillaceous water through blotting-paper, dry it, and do the same with the sand. When the two earths are separated and dry, weigh them, and you will see whether there is more of sand or of clay. Before this last operation, you throw some strong vinegar upon this earth to disengage the carbonic acid, or that part of the air which the lime retains as long as the vinegar has not expelled it. It follows from that, that if there is very near as much sand as clay, it is a free earth. If there is much more sand than clay, it is sandy ground; and if the clay prevails much, it is argillaceous ground. Free earth is composed of forty-five per cent. sand, about forty-five clay, five per cent. lime, and about five per cent. humus.

3d. In order to know if the ground contains much humus, or decomposed remains of animal or vegetable matter (a state of decomposition which is very variable), place this earth, well dried and weighed previously, in a pot or crucible of metal or earth, which you put upon a quick fire (before the operations of which I speak in numbers 1 and 2), and then stir it for some minutes. If there is much animal matter, a strong odor of burnt feathers is disengaged. If the material is vegetable, and the fire is sufficiently strong, you will see a blue flame. This is also easy to discover, by putting in contact with the interior bottom of the pot, a small piece of very dry wood: if it inflames, the vegetable detritus should consume; then weigh it, and as the burnt animal or vegetable parts have scarcely any weight (nothing of them being left but their ashes), you will know very nearly, by means of a new weighing, how much was contained in the earth. The knowledge of the principles of lime and of humus is essential. Now, each one can make this analysis of his lands; it is only necessary for him to have a little concentrated vinegar and the balance of the house.

2. *Advantage resulting from this analysis.*

QUESTION. What is the advantage, the utility of this analysis?

ANSWER. It will be of great use to you, because, if you observe that your soil is very calcareous, it would be useless to heat your grounds, and put much lime into your manure lye; you will also then know what kinds of grasses best suit your lands

3. *Interest which every one has in knowing the nature of his lands.*

QUESTION. But what interest have I in knowing whether my lands are free sandy, or clayey? one knows by his experience what kinds of plants are most suitable for his grounds.

ANSWER. Certainly; but if you know that your soil is free, you are not ignorant that you are in the best condition to obtain the finest products. If your ground is clayey, you seek the means to amend it with sand, in order to approach free soil. In fine, if it is sandy, you strive to amend it with clayey ground in the vicinity, or with sub-soil, at least if you do not wish to cultivate bulbous-rooted plants, which prosper in ground where, out of fifteen parts, there are fourteen of sand. You have also this advantage, to be able, by means of amendments, to introduce into your fields new cultures, especially when you know how to vary and appropriate your manures.

4. *Means to detect marl.*

QUESTION. Will this process enable us to discover marl? for I know how it acts, but I am ignorant of what it is composed.

ANSWER. Nothing is more simple than to detect marl, whether white, carroty or brown, sandy or argillaceous. Whenever you doubt whether you have discovered an earth which contains marl, you should throw upon it strong vinegar; if it effervesces very rapidly, and if this earth contains a third of alumine or argil, or of impalpable matter, you may be very sure of its being argillaceous marl; if, on the contrary, it contains more sand than clay, it is silicious, and then you employ it as an amendment, in applying the one and the other to earths of an opposite nature.

ARTICLE SECOND—*Division of Manures.*

1. *Manure heaped up at any point is prejudicial to vegetation at that place.*

QUESTION. What is the advantage which results from the judicious division of manures?

ANSWER. It is remarked that the plants do not require manure heaped upon a point, as it is rather an obstacle to the play and development of the roots. Therefore divide the manure, especially animal manure, which loses so soon its fertilizing properties by atmospheric influence, and the attack of insects. By attending to this you double or triple the means of action. In order to make you comprehend well the advantage which results from the division of manures, I will cite some examples.

2. *Advantage resulting from the division of manure.*

Bury a small quantity of human manure at the foot of a mulberry. The lateral roots of the tree will turn aside to this aliment, but these roots can only appropriate a small portion of these matters, and this principle tends so rapidly to its destruction, that it is suddenly attacked by insects, and there results a loss which may be valued at nine tenths, and yet the mulberry will not be found to have nourished itself through more than one or two roots. See, then, a mate-

nal which, placed in an unfavorable condition, is almost totally lost. Now, for example, I throw in three pints of water; I dissolve it by stirring; I uncover the earth around the mulberry; I pour a little of this lye all over; I cover it with the earth which had been removed, and I obtain a positive result from this simple division of the element of manure. We know very well that nothing is lost, the insects can not get at it, each particle of earth is impregnated with a fraction of the manure, which it keeps to administer to the roots all around.

We see upon a meadow fresh dung which the ox has dropped, and which, in some days, will be devoured by insects and dried by the air and the sun. I pick up this fresh dung, and I dissolve it in water; I fix the liquid in the earth, and with this earth pulverized I feed a superfices ten times larger than it occupied when first dropped. The place where the animal had dropped it is found sufficiently manured after the matter has been removed from it; and I avoid this crowd of insects, which, coming out of the matter full winged, multiply where the dung has fallen, to torment and distract the cattle.

What in effect do I do? I charge a boy of the farm to gather all the dejections of my cattle which can be conveniently done; I throw them into my reservoir of saturated water, and while enriching this water with fertilizing principles, I, at the same time, accelerate its putrefaction, and in having a saturated water, well corrupted and well charged with animal materials, I can then, in the fabrication of my manures, diminish the quantities of the other ingredients of the lye, without injury to the quality of my manure, and I have attained this economy by the sole reason that I have lost nothing.

A horse dies; I suppose that a farmer divides it and spreads pieces of its flesh upon various points, or more intelligent still, that he places it in a hole, in putting light earth above and below, with lime, as is also recommended by our best authors. What are the consequences? In the first case, the dogs, the crows, the rats, and other animals, will have retaken that which seems to have been their own of right, or, at least, scarcely will some particles of earth give here and there a little manure; and in the second case, he will have obtained a certain quantity of earth charged with animal matter. But in this last case, also, the loss will have been immense, because the insects and the atmosphere, which always penetrate the soil, will have, during a space of four or five months, the time necessary for the destruction of the flesh, taken away nine tenths of the value of the animal. Now, what is my practice? I put the animal in the middle of a large heap of manure, after having cut it into many pieces in order to facilitate its adjustment in the heap; and that it may decompose itself more easily, I make five or six waterings, in place of three, after having added a little more lime to the lye. This animal weighed 500 lbs. I obtain in twenty or twenty-five days, 2,500 lbs. of a valuable extract, with which, in adding some salts, I produce 2,500 lbs. of earth manure. What is it which has produced this result? It is the extreme division of the element of manure operating by the fermentation which evolves the azotic principle of the animal. If the animal dies at a time when I am not fabricating my manure, well, I throw it into my reservoir of saturated water after having cut it into many pieces, and I add, from time to time, a little quick lime to absorb the ammonia or the odor.

Thus, then, it must be concluded, that in dividing manures one procures an advantage, and that it is a positive advantage, by the intelligent use of the division of matter. Now, what are the means to produce this division? There exists but one; it is the present method.

ARTICLE THIRD.—*Preservation of Manures—Mode in use compared to that which I propose.*

QUESTION. You must have visited many farms, and have seen how the farmers do to preserve their manure from one season to another, and how they apply it. Do you think their mode advantageous or can you name a better?

ANSWER. I have been in many states, and have seen a great number of farms. I have seen, that the litter which they throw from the stables is put into small heaps, near the stable doors, and that other heaps were upon divers places of the farm, occupying a large surface, and being only two or three feet high; that in the barn-yard they had spread, as it was needed, straw in such a manner, so often that the whole surface of the barn-yard is covered with litter, forming a bed two or three feet thick, from which the liquid is always escaping. I asked of each farmer why he made such a disposition of his manure? The greater part of them replied that it was the custom of the country, and that they did as their ancestors did. But one of them, better instructed, told me that he let his litter remain from three to six months in the barn-yard, because it was too much trouble to take it away periodically to heap it outside; that besides, in this manner, this litter decomposed slowly by means of the rains, the urine and the detritus of his cattle; that as to the stable manures, he only raised them two or three feet, because in this manner the rains could penetrate them, and bring them into a fine fermentation, which kept them fresh for six months, and until their being used; that if they were raised seven or eight feet high, the rain would not wet them, they would be no more fermented, and would not be sufficiently matured at the season of their being put in the ground.

By this well-established reasoning, the question is placed upon its true grounds, and by giving my reply to the farmers, you can judge which of the two is right.

Well, I maintain that you ought to raise the litter of your barn-yard every fifteen days, or at least all the month; remove this from the stables every eight or ten days, form it into a heap, and raise it six or ten feet high, whether you have the intention to use it immediately, or to preserve it for six or eight months.

If you put in your manures in a short time—for example, in a month—it is a great error not to raise the manure-heaps above two or three feet, because they will not have time to make, either from being chilled by the ground, or because you have not watered them, and that the rains, upon which you count to do your work gratuitously, may, contrary to orders, not come for two months; and even should the rain come the next day, after having built your heap two or three feet high above the soil, you will have a slow fermentation, because it is necessary to raise the manure-heap five or six feet at least, for a rapid fermentation to come with the aid of waterings.

If you wish to preserve your manures for a long time, they mus be raised seven or eight feet high at least, because if you keep them low they will occupy a large surface; as this surface is spread, the more they will be washed by the rains, and the more they will lose their juices; the air, the wind, and the sun, will dissipate the gases, which should be preserved.

But, say you, if I wish to preserve my manure-heaps for a long time, and if I raise them very high, I am certain to have nothing more than mould in place of manure, because the heaping of a large mass of litter will cause a prompt and powerful fermentation, which, by its length, will destroy in place of preserving it: whereas, in keeping them low and moist by the rains, I maintain them fresh for the next six months, and I have not sustained any loss.

I reply to you, that your objection, which seems just at first sight, is in truth not so, and I show your error from this:—you suppose that the rains which wet your heaps of two or three feet thickness, would moisten equally a heap of ten feet high; but it is not so. Take notice that you seek to preserve the rain-waters even at the moment of their fall, and that I seek to spread them, because I wish to water my manures where I think it useful, and not when it pleases the clouds to discharge themselves upon the earth. You follow chance; I go as a man with a torch in his hand. I wet my manures a little before using them, and I make them by the help of a regulated fermentation, decomposed much or little, according to the grounds and the plants to which I wish to apply them; also in taking them from the stable and the barn-yard, my manures are not watered, they are scarcely in a humid state, and it is in this state that I throw them into a very high heap; I heap them and water them; but upon each foot of the heap which I build, I spread a layer of earth four or six inches thick, which has the faculty of preventing fermentation, and which becomes mould; this gives me a surplus of manure. I hold them in a kind of an insulated bath; I arrange them in such a manner that the air, the sun, and the water, can neither dry them, nor wash them, nor reach them; I form a kind of shed of the manure itself to cover it, and to expose it as little as possible to its enemies, up to the time to which I seek to preserve it, as it is without contemplating its amelioration. I do not wish to ferment it, because I must preserve it for many months, and I have a greater certainty by my method of preserving my manures, than you have to make yours, since I protect all my manures, and you encounter immense losses by its being displayed upon a large surface; your manures are not enriched, their juices run off, or are evaporated. Every new rain which falls displaces the juices, and after many displacements of this kind, the manure which remains has no longer the smell of ammonia, it becomes dry and spongy, and is nothing more than the ghost of manure. In vain you make a large hole in the ground to retain the juices of the heap, which are washed out by the heavy rains; in a large yard this hole is full in an instant, and nothing can prevent the escape of the blackish mass of juices which are lost out of it.

Well, this accident, which is of incalculable importance, does not occur with me. My heap, when raised, presents but a small surface; I incline its top like the roof of a house; the rains do not penetrate it, and consequently I never lose

its juices; the fermentation is suspended, and no loss is sustained by the effect of the sun and the air, which would carry off its ammoniacal gas. Then, when the time for manuring approaches, I take measures for seasoning and maturing it. Thus, if we are at the autumnal rains, I open the top of the heap trumpet-shaped, so as the rain can penetrate it: I make near to it a large hole in the ground, to receive what may flow from it, which will never be abundant, because my upper surface is small, and the heap is high. In the water which flows from the heap, I throw the elements of my lye, and with a dipper, or buckets, or a pump, I make a very efficient watering, having first made holes all over the upper surface of the heap, in order that the lye may be spread regularly through the whole mass of manure, and that the fermentation, which had been suspended for so long a time, may start with vigor, and, if I so wish it, furnish me with decomposed and enriched manure in place of yours, which has been washed and discolored, and whose parts you believe to be rich, because they are humid, have been fed with rain-water, instead of the salts and substantial juices which the rain has washed out of them.

I am convinced that your ancient process is a prolific source of the miscalculations which have been made by following its application. If, for example, you carried these manures, thus washed and despoiled of their juices, upon a light and sandy soil, how could you hope for a good crop of grain, if it should not prove a wet season? In time of a great drought, a rich manure, and charged with salts, preserve the freshness of the soil and plants; the salts impregnate the dews, and they are thus administered to plants: whereas with a manure dry and discolored the earth has nothing to protect it from the burning rays of the sun, the dews become of no effect, the seed languishes, and the crop fails. It is necessary, then, that the farmer should use all his efforts to employ manures in their highest perfection, because the better he preserves them, the more he will provide against loss.

Now, the best way is to make a great deal of litter-manure a month before the time of putting in his manures, and after this time to put no more under the feet of his cattle than just enough to collect their dung and urine, and to prevent them from becoming stained and dirty in lying down: that is, if he does not wish to adopt my system of manure described in Chapter 10.

As it is easier to take care of and preserve a small quantity of manure than a large one, you will guard with precaution this small quantity, which will serve at seed-time for a leaven to convert into manure all the straw which you can spare. It will result from that, that you will have avoided a great loss of substances in the straw, which should be buried in about fifteen days of fermentation in their state of perfect manure, ripened to the point wished for, instead of being deteriorated by a six-months' exposition to the air, and a destructive fermentation; for I repeat to you that the slow fermentation of your barn-yard litter, and of your three-feet-high heap, is as pernicious to the fertilizing matter as the loss of juices by the rains, the air, and the sun.

Thus, it will be easy to calculate, from the crop of straw, that, for example, it being thirty tons, fifteen ought to suffice for the nourishment and litter strictly necessary for the cattle, and that therefore you should preserve, for the manu

of September, fifteen tons, which in fifteen days will be converted into sixty tons of manure.

There is still another objection which you will not fail to make, and to which I respond at once, in order to finish and entirely to clear up this question, namely, "Which is the best of our two processes?"

You tell me that your barn-yard manure makes itself; that one has only the labor of filling the carts and transporting it to the fields; that you profit by the rains, and that it is watered without work; whereas with me water is necessary, which is far from always being at one's disposal; and that, in fine, I must have hands to put the manure into a heap, and to water it. This is true: but first take notice, that, according to my process, your manures will be worth double and triple, when you take into consideration its fertilizing principles, and then consider well whether your success depends more upon the quantity or the quality of your manures. Now, it seems to me that it is well worth your pains to devote a few days to this essential branch of your establishment, to seek the means of collecting the waters from the heavens, and that you would do well to irrigate your manures with it at the time when this work is necessary. In fine, use the two systems to be able to compare them, and let me know which you decide upon keeping.

Yes, I consent to this, and the more willingly that yours appears to be more rational than mine, and I promise to let you know the result.

Well, sir, I wish you success. Adieu.

Wherever I have continued my visits, I have seen manure treated in the same way. All acknowledge that the juices of the manure-heap are diluted and wasted by the rains, but they add:—"What do you wish me to do? it can not be otherwise." I believe that I have demonstrated that it can be otherwise; that the cost of the labor, which consists in removing from the stables, heaping up, and watering the manure-heaps, at the proper time, instead of trusting to chance waterings by rain, is, compared to the benefits which result from it, so small, that no one can seriously make the objection, or pretend that it is better to await the rain and let it be despoiled of a greater part of its worth, rather than to preserve it at the expense of some care and trouble.

I have seen, also, that in a great number there were parcels of small heap of litter-manure upon various fields; that upon other places there was manure which had been spread for a long while; and after examination I found that it was more than a month that these heaps had been there, without the farmers ever having dreamt of burying them; also, these manures had no more color and they were but the ghosts of manure.

But if the mode of burying the manures immediately after being carried into the field, as is recommended by science, presents great advantages, this practice acquires still further importance in the application of my vegetable manure. In fact, my fermented manure being richer in gases and juices than those from cattle, and these gases tending to evaporation, it is very important to bury them, as they are transported into the fields; it is a sure means of maintaining them in all their power to benefit the plants.

I seize, then, this occasion expressly to recommend not to open a heap of

manure made after this method, but when the fermentation is over; and not to transport and spread it upon the field until he is ready to till the field; or, what would be better still, would be to throw it from the cart into the furrow while the plough is covering it; that is to say, that while one man is tilling the field, another transports the manure and throws it from the cart into the furrow which the plough is next to cover; and so continuing the operation, the manure will be covered in all its freshness, and consequently in all its power. This practice is also recommended by our best agricultural writers.

But, say you, this system is only practicable upon farms where there is an abundance of hands and beasts of labor, but that with you, who can only run one plough, it is impossible to haul, and spread, and cover in the manure at the same time.

Your remark is just, and to remove this obstacle I name to you another means of saving your manures from deterioration, in case you let them remain for a long time upon the fields.

If you want to transport your manures a long time before ploughing time, you form, at equal distances, small heaps all over the field, each of which will contain one or two cart-loads of manure; then you will take care to cover all the surface of these heaps with the earth of the vicinity. By this very simple precaution, you assure to yourself advantages which compensate for much of the labor of this operation. In fact, the manure, thus covered, completes its ripening; no more is lost by evaporation. The earth serving to envelope it is converted into a good mould, which further augments the quantity of manure. In acting thus you can transport your manures at spare moments. I have so preserved small heaps of manure for three summer months, and at the opening, I was not a little surprised to see it fresh as when it came from the farm.

Article Fourth.

Question. Finally, your method having been in circulation for a long while, it ought to be in use in a great many farms. Are they satisfied with the result?

Answer. My system is already adopted on a great many farms in all parts of the Union, and I have the satisfaction to say to you that all those who have tried it are highly satisfied with the result, as you will find in all the agricultural papers, reports of agricultural societies, and certificates of distinguished farmers, who attest the efficacy of this manure, and the advantages of the system.

I will conclude this work by the insertion of a letter written by a distinguished farmer near New York, a subscriber to this method:—

"Sir: Your method, and the results which followed my application of it, have suggested to me some reflections which you are at liberty to publish, if you judge them useful to agriculture.

"To my mind, one of the causes of the slow progress of our agriculture consists in the fatal delusion of farmers in the production of manures by cattle, and upon the necessity of stimulating amendments, such as lime, plaster, ashes, &c., used by so many farmers. Those who have the imprudence to write that the only means of agricultural prosperity consists in the purchase of many cattle,

for them to consume all the straw of the farm, and who counsel the employment of stimulants, without being much concerned about their cost, and their different applications, according to the nature of soils and plants, have never done any thing in the agricultural arts but in their closets. They have never yet felt the consternation which takes away from the true farmer all his faculties when he perceives his workman lifting the last cart-load of manure, and in raising his head he sees beyond a vast field to manure, all tilled, all ready to receive a sowing, but which will not produce the expenses of labor. He sees it without hope of finding other manures for a long while. As for myself, I feel very opposite sensations; I hasten to carry off my heaps, to replace them by others; I fabricate earthy manure for my artificial and natural meadows; in one word, I make as much manure as needed on my farm. The benefits which I derive from your method are immense, since, previous to my becoming acquainted with it, I made scarcely one hundred and fifty loads of cattle manure, which was about one fourth of the quantity I wanted to keep my farm in a high state of cultivation; I had, therefore, to buy four or five hundred dollars' worth of manure every year. Now, I not only avoid this expense, but my land is far better manured than formerly. And how much money do you suppose I have expended in the making of this mass of manure? Just twenty-four dollars for lime. The other materials were on my farm, and cost me only the trouble of collecting and bringing into one place. Thus, I say it confidently, agriculture has suffered, because farmers knew no other manure than that made from cattle, or the most expensive stimulants; and it will be solely from the method you have given us, *how to make our manure otherwise*, that agriculture will henceforth make rapid progress. I do not believe that a more important truth has ever been proclaimed to the world.

"These, my dear sir, are all the testimonials I can give you. I trust they will prove satisfactory to you; and as I do not consider your method one which ought to be changed every day, and do believe, on the contrary, that it will endure as long as agriculture itself, I urge you to take suitable measures to propagate it promptly, for its introduction into farms will not fail to cause happy results to the profit of agriculture, and consequently, of the country."

You see, then, my dear reader, the consequences which result from an intelligent application of this system. Therefore imitate this worthy and intelligent farmer. Like him act with intelligence and skill; display ingenuity in the organization of your place of operations; pursue your labors with perseverance, and be certain that very soon you also will be in a situation to address me lines as satisfactory as the above. Meanwhile you have my most sincere wishes for your agricultural prosperity.

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