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Contents:

(Illustrated articles are marked with an asterisk.)

THE HEATING OF BUILDINGS BY STEAM.

Our articles, published on pages 55 and 88, current volume, appear not to have cleared up some points, connected with this important subject, in the minds of all our readers. Of the difficulty those not thoroughly acquainted with the theories of heat and steam find in comprehending these principles, the following quotation from the letter of a correspondent may stand as a fair specimen. He writes: "I am heating two drying rooms with about 2,000 feet of pipe in each. Am I to understand by what I read on page 55, present volume, that I get as much heat from 40 lbs. of steam as I do from 80? If not, how much do I gain by doubling the pressure? Is there any way I can bring the steam back into the boiler after it has passed through the drying rooms?" We propose to answer these questions in their order, not as to the single correspondent from whose letter we have quoted, but to numerous inquiries of similar import which we constantly receive.

The first question shows that our correspondent does not understand the difference, made by writers on steam, in the terms *pound of steam* and *pound pressure of steam.* Our assertion was that one pound of steam (saturated steam, of course), that is, one pound of water converted into steam,—one pound weight of steam—not one pound pressure, always contains the same amount of heat, at any pressure. The entire heat in a body of steam cannot be measured by its pressure, but only its sensible heat—its temperature—is so measured. Thus steam at 20 lbs. pressure has a temperature of 307° Fahr.; but this multiplied by the entire weight of steam gives a product representing only a little more than one fourth the entire heat the steam will impart before it congeals to ice, or less than one third the heat it will impart before condensing to water at 212°.

Now what we say is that, by taking the same weight of steam and increasing or lowering the pressure to which it is subjected, we shall not practically alter the amount of heat it contains, which is specific and constant at all pressures; and that the amount of fuel required to produce this amount of steam will be a constant, except that, in producing steam at high pressures and temperatures, there is greater waste by radiation from the furnace and boiler, and a larger waste through the uptake. This waste is more than compensated in the use of high pressure steam in engines, because of the increase of work obtained by using steam expansively; but in heating buildings it is an unnecessary waste, for which there is no recompense except that heat will radiate more rapidly from pipes carrying high pressure steam, and consequently a less extent of radiating pipe will be required to heat a given space. Hence the cost of the pipes would be less at the outset; but this would in most cases be offset by the increased cost of a boiler constructed to withstand high pressures. The use of high steam for heating is then a fallacy, which increases danger and lessens economy.

The third question is: How can I get the steam back to the boiler? We answer you cannot get it back as steam, unless you pump it or force it back by some other mechanical means, and this leads us to the consideration of another popular fallacy, namely, that steam circulates in pipes precisely as air does.

The difference between steam and hot air is this: Air is a mixture of gases that at any temperature known to science remains a gaseous mixture. Saturated steam is a gaseous compound, that *never loses any portion of its heat without a change of a part of it to water.*

Let us see if we can make this plain. A pound weight of steam, under a pressure of 60 lbs. to the square inch, contains 307 units of sensible heat, and 711·5 units of latent heat. Now, these quantities of sensible heat and latent heat being specific for steam at the pressure named, it follows that the subtraction by radiation of a single unit will result in the condensation of a portion to water, which can exist at atmospheric pressure as water with 966·5 less units of heat per pound weight than steam can. So if we go on subtracting heat we go on condensing; and if we maintain the pressure by new accessions, we are constantly condensing steam by robbing it of its latent heat; and the water thus produced gravitates toward the lowest part, which, if properly connected with the water space of the boiler, will allow the water in the system of pipes to seek and maintain the same level as that in the steam generator. Coming from the boiler as steam, it returns only as water. If the steam be used at atmospheric pressure, every 1,640 cubic feet will, by its condensation, be reduced to only one foot of water. This enormous reduction of volume creates, so to speak, a vacuum into which the live steam rushes with a velocity far exceeding that which could be created by the difference in the specific gravity of heated and cold air.

This is the secret of the rapidity with which heat is carried by steam to long distances from the boiler, a rapidity so great that we once saw, in a large dyeing establishment, sixty hogsheads of water in one vat raised to the boiling point in five minutes. No possible application of heated air, circulating by virtue of differences in specific gravity, could accomplish such a result in five hours, if indeed it could do it at all. The fact is, that there is no vehicle for heat known to science that, in rapidity, can at all compare with steam. But there is for this purpose no need of high pressures. So long as we have *steam,* it is enough. Condensation will produce the partial vacuum, which the steam will expand and swiftly fill, and thus the circulation, of steam outward from the boiler and water returning, will be steadily maintained. This is true, of course, for all cases where the temperature of a substance, to be heated or dried by steam pipes, does not require to be heated above 212°. If higher temperatures than this are needed, the pressure of the steam must be increased accordingly.

SUBSTITUTING OTHER VAPORS FOR STEAM.---ETHER AND BISULPHIDE OF CARBON.

The consideration that the latent heat of watery vapor is greater than that of the vapor of any other substance (see the table, page 5 of the current volume), and that, consequently, more heat is consumed by the evaporation of water than by the evaporation of any other fluid, has given rise to the idea that it would be more economical to use another fluid than water for the production of steam and the transformation of heat into power. Thus the amount of heat required to evaporate one pound of turpentine is scarcely one seventh of that required for water, but then the boiling point of turpentine is so much higher that the advantage might be counterbalanced by the stronger fire required; but it is especially alcohol and ether which have attracted attention, as these liquids, besides requiring for evaporation respectively only about one third and one sixth of the latent heat required by water, combine with this property that of possessing the low boiling points of 176° and 95° Fah. As ether in particular appeared very advantageous in this respect, it has been extensively and thoroughly tried; and we remember to have seen, among other attempts, a very large ether engine, built at the Novelty Works, New York. The execution of this undertaking was as thorough and perfect as can be expected only from a workshop possessing the superior capabilities of that excellent establishment, now, alas! suspended by the results of our unwise legislation on shipbuilding. The engine worked, of course, on the condensation principle, as ether is too expensive not to be used over and over again; and the method of surface condensation was here especially advantageous. Experience proved that there was no advantage in the supposed lesser amount of latent heat consumed, the only advantage being the lower boiling point, and this was largely overbalanced by the disadvantages in the practical working of the machine, the ether being a powerful solvent for the fats and oils, used for lubricating, and the ether vapors would pass through seams, cracks, and stuffing boxes which were perfectly steam tight, so that it was found next to impossible to keep it any length of time in the boiler; and, last but not least, anywhere this hot vapor escaped it was in great danger of taking fire, and would cause local heat, generate undue pressure, and become totally unmanageable; and it alarmed the experimenters repeatedly to such a degree that finally they threw up the ether experiment in utter disgust, and sold the machine for old iron.

The reason that there was found to be no advantage, in the fact that ether vapor contains less latent heat than water vapor, was simply in overlooking that these amounts of latent heat are always given by weight and not by volume; as, however, in driving a piston by means of a vapor, we have nothing to do with the weight of the vapor used, but only with its volume (for, by every stroke, we must fill the cylinder, whatever be the weight of the vapor), we see at once that, in order to come to a correct conclusion in regard to the economy of the latent heat consumed, we must compare this latent heat for equal volumes, and not for equal weights. In order to do this, we may reconstruct the table (given on page 5) for the latent heat of equal weights, into one for the latent heat in equal volumes of vapor; and this we may easily do by multiplying the latent heat of each vapor with its specific weight. The figures contained in the third column of the following table representing the relative amounts of latent heat in the vapors of different substances which are there reduced to the standard of water=1000, by dividing each of these products by 0·433.

TABLE OF LATENT HEAT OF VAPORS FOR EQUAL VOLUMES

Name.	Units of latent heat of vapor. for equal weight.	Spec. grav. of vapor. (Air = 1.)	Product of latent heat with spec. gravity.	Units of latent heat of vapor for equal volume. (Water=1000.)
Water	962	0·45	433	1000
Alcohol	385	1·25	481	1111
Ether	162	2·26	365	840
Oil of Turpentine.	133	3·21	487	1125
Bisulphide of Carbon	210	2·60	546	1261
Ammonia	900	0·59	531	1226
Carbonic Acid	300	1·53	459	1060
Chymogene	140	4·00	560	1293

It is seen from this table that, in consequence of the fact that the vapors which possess the least latent heat are the heaviest, and therefore possess, for the same weight, the smallest bulk, the relative amounts of heat for equal bulk do not differ materially; or at least it is seen that the difference of the extremes, in place of one being more than seven times the other, as is the case with ether and water, are inconsiderable, when we compare equal volumes, differing less than one third part in the most extreme cases; in fact they are so small that some investigators have come to the conclusion that in all cases the same volume or bulk of vapor is produced by the same expenditure of latent heat, and consequently of fuel, whatever be the liquid which is evaporated, asserting that the differences in the figures of the last column are only due to the errors of observation consequent upon experiments of so delicate a nature as the determination of the specific gravity of gases and vapors, and of the latent heat absorbed by their evaporation—a conclusion of a cognate nature to that in regard to the same amount of specific heat, which the atoms of all elementary bodies appear to possess, and which was spoken of on page 389 of our last volume.

A liquid as volatile as the ether being thus almost uncontrollable over fire, in a steam boiler, the next question is: Can it not be heated in another way, say by means of the escaping steam of a high pressure engine? Or may it not be inclosed in a tubular boiler, through the tubes of which, in place of the flame and heat of coal, the exhaust steam is passed before going to the condenser? There is no doubt that in this way we may utilize the exhaust steam, without producing any back pressure, as has been the case with most other contrivances suggested for this purpose. As the exhaust steam may have a temperature of some 240°, and must have at least 212° (otherwise it can be no more steam), we may develop considerable pressure in a boiler containing ether, heated in this manner. According to Régnault, the pressure of the ether for different temperatures is as follows:

TABLE OF REGNAULT FOR THE PRESSURE OF ETHER AT DIFFERENT TEMPERATURES.

Degrees Fahrenheit.	Degrees Centigrade.	Pressure of ether in atmospheres.
240	116	9·25
230	110	8
212	100	6·50
194	90	5
176	80	4
185	70	3
140	60	2·5
122	50	2
104	40	1·33
86	30	0·8
68	20	0·6
50	10	0·33

It is seen from this table that the heat of exhaust steam is amply sufficient to develop considerable pressure by the intervention of ether in a separate condensing engine; but as ether is a quite expensive substance, being a product of chemical action on organic growth, the next question is: Can it not be superseded by another cheaper ingredient? And the answer is affirmative. We find in the table, on page 5 of this volume, bisulphide of carbon mentioned; this substance being simply a product of the combustion of charcoal in an atmosphere of sulphur vapor, CS_2, as carbonic acid is a product of charcoal in an atmosphere of oxygen, CO_2, can be, and is now manufactured very cheaply, while its boiling point (113° Fah.) is only 18° higher than that of ether. The above table, given for the pressure of ether, is approximately correct for that of bisulphide of carbon, if we add 18° Fah. or 10° Centigrade to the temperatures mentioned.

We are happy to find that the idea has been realized, and that at present, in the city of Boston, a steam engine* is successfully in operation, in which the heat of the exhaust steam heats bisulphide of carbon, and so originates a new pressure in another boiler even surpassing the first pressure, that of the steam in the boiler heated over the fire. Such a bisulphide of carbon engine may, of course, be separated from the steam engine, or may be so connected as to act on the same shaft and to form a single engine, in which the great problem, of changing as much of the heat as possible into power, will be much nearer to solution than was ever the case before.

THE INDIRECT INFLUENCE OF INVENTION UPON MANUFACTURES, ARTS, AND COMMERCE.

In a recent editorial, we spoke of the direct beneficial influence of patents upon general business. We propose now to notice some of the ways in which business is indirectly benefitted by invention, the latter having undeniably been greatly stimulated by our patent system.

In the first place, business is helped by the increased facilities for its transaction afforded by such inventions. Communication, transportation, printing, all of these have been

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*This engine is fully described and illustrated on page 31 of the current volume.

improved so much during the last fifty years that even we who live in the days of the telegraph, ocean steamers, railroads, and steam power presses, do not at all realize the magnitude of the change. Fifty years ago such a business as is transacted by more than one firm in New York could not have been created even by the greatest business capacity. In creating these immense concerns, the proprietors have had the aid of cheap printing to advertise them, of railroads to bring them customers from distances that fifty years ago would have occupied months to traverse, of the telegraph to transmit orders, and of a hundred of other improvements. The steam elevators, that raise their numerous customers to the acres of floors in the upper parts of their buildings, are patented machines. The bills and forms, which enable them to transact their business without confusion, are executed cheaply by patented machinery. The paraphernalia of their counting rooms include numerous patented helps to business. The very goods they sell are mostly manufactured by patented looms, driven by patented water wheels or steam engines.

Even the currency is so improved that the counterfeiter finds his deception more difficult and more easily detected.

But there is a still more indirect way in which general business is benefitted by the patent system. In this Yankee land, where the masses are constantly enlightened by the agency of the common schools and newspapers, every lad before he is fourteen knows something of the nature of patents, and has heard of money made and to be made in the invention or in the business manipulation of some patented improvement. The most ambitious often see, or think they see, that this way lies fortune. Many are thus induced to interest themselves in machinery, and to acquire some knowledge of mechanism. We thus have become a nation of mechanics, ready at the moment any exigency of agriculture, manufactures, commerce, or war, suggests a want, to act upon the suggestion, and the needed improvement shall be forthcoming. The farmer's boy invents his churn, his dog power, his washing machine, before he is twenty, and, by the time he reaches middle life, understands enough about machinery to run a saw mill, or even something more complicated, if necessary.

It is this universal, although partial, knowledge of mechanics that has rendered the introduction of agricultural machinery so successful in this country, and has so increased the production of the soil, that every commercial artery is now plethoric with the teeming harvests of our inland domain. Who, fifty years ago, would have thought of cultivating a thousand acres of wheat? The chances of harvesting without serious loss this amount, by any help attainable at that time by a single farmer, would not have been one in a hundred. The modern harvester, the threshing machine, has changed all that, and no one now thinks of impossibility in connection with harvesting a thousand acres.

What has caused the unprecedented growth of this great commercial center, New York? New York, as it now is, would have been an impossibility without the improvements we have named. Not a bushel of wheat from Illinois or Minnesota could ever have found its way to this port; not a tithe of the large business houses which now crowd the lower part of the city would have been heard of; the busy manufacturing towns that fill their establishments with wares would have been nothing but hamlets, and the vast prosperity, that has made America the wonder of the old world, would never have been one of the most brilliant chapters in history.

AGRICULTURAL CHEMISTRY AND CHEMICAL MANURES.

The researches of that veteran chemist, Baron Liebig, and others in the analysis of soils and the use of artificial manures did not result in such extensive progress in agriculture as was anticipated. As the effort to apply the knowledge gained by these researches was made throughout the world by intelligent agriculturists, it became evident that there was still some lack in agricultural chemistry, some mysterious circumstance, relation or element, that defeated this endeavor. As a consequence, the idea of chemical farming became a thing to be ridiculed, and fell into an ill repute which still attends it. The prejudice thus created will for a long time impede progress; but there cannot be a doubt that the missing link, which, if found in Liebig's researches, would have resulted in success instead of failure, has at last been discovered.

In the light of this revelation, the cause of the failure to apply chemical principles to agriculture is plain. We find it fully explained in the lectures of M. Ville, a translation of which, as delivered at the experimental farm of Vincennes, France, now lies before us.* These lectures are, we believe, the most important contribution to agricultural science that has appeared during the last half century. In our review of them, which we shall not attempt to make exhaustive, we shall extract some passages which will give a glimpse of their character to such as have not yet read them. In the third lecture, M. Ville remarks:

> *A priori*, one would think that a chemical analysis which has been pushed so far in our day, and whose methods have acquired at the same time so much delicacy and certainty, ought at least to give us a means of estimating with certainty the richness of the soil, and so guiding us in the choice of the manure best suited to its nature. There is none, however, and I defy the most skillful chemist to say in advance what will be the return from earth submitted to him, and what manures are most appropriate.
>
> A few words will explain the reason why chemistry is powerless to furnish us with these indications: you must recall the distinctions we have drawn between the different elements of which the soil is composed.
>
> Let us suppose a soil containing both quartz sand and felspar sand among its mechanical elements. For vegetation these two sands are equivalent, although the first is from silica and nothing but silica, while the second is a silicate based upon lime, potash and soda, besides containing phosphate of lime in very feeble but appreciable quantities.
>
> Here, then, are two bodies whose composition, in spite of similitude of exterior, have no analogy; and which, however, are equivalent in an agricultural point of view, because, the felspar being insoluble in water, its *rôle* in regard to vegetation descends to that of the quartz sand, that is to say, to a simple mechanical element. But for the chemist, there are no insoluble bodies, so he confounds in one whole the potash, lime and phosphate of lime that the felspar sand contains, though they are of no use in vegetation, with the products of the same nature which we have ranged under the class of active assimilable elements. Thus is explained the insufficiency of the signs with which chemistry can furnish us.

In order to understand fully the meaning of this quotation, it is necessary to say that M. Ville includes all the essential constituents, of soils in which plants can grow, in the category of fertilizers; but he divides them into two classes, the first of which is azotic or nitrogenous matter, and the second of which includes ten mineral substances, only three of which, phosphate of lime, potash, and lime, are so directly connected with the growth of plants that they need occupy the attention of the agriculturist in his attempt to restore to soils what has been drawn from them by the growth of crops. The other minerals act mechanically and are hence called mechanical fertilizers; but M. Ville maintains that they exist naturally in sufficient quantities, and that it is not necessary to provide them. So far as the mere growth of plants is concerned, this is probably correct, but there are doubtless many cases in which it is desirable to add some material not directly concerned in plant growth, for the purpose of modifying stiff soils, or tempering light ones.

The most favorable conditions of soil for plant growth being the presence of azotic matter, phosphate of lime, potash, and lime, M. Ville calls a mixture of these substances "the complete fertilizer." The non-assimilable elements are considered as purely mechanical in their effects.

The following experiments are given to illustrate these facts:

> In burnt sand, free from all additions but moistened with distilled water, wheat acquires but a rudimentary development—the straw hardly attains the dimensions of a knitting needle. In this condition, however, vegetation follows its usual course; the plant blooms, bears grain, but in each head there are but one or two dwarfed, badly formed grains. Thus, without soil, the wheat finds in the water it receives and the carbonic acid of air, aided by the substance of its grain, resources sufficient—sorrowfully, it is true, but at last—to run through the entire cycle of its evolution.
>
> From 22 grains of seed, weighing nearly 18 grains, we obtain 108 grains of harvest. Add the ten minerals (phosphorus, sulphur, chlorine, silicium, calcium, magnesium, potassium, sodium, iron and manganese) to the sand, excluding the azotic matter, and the result is but little more.
>
> Under these new conditions, the wheat is a little more developed than in the preceding case, but the harvest is still more feeble; it reaches 144 grains. Suppress the minerals and add only azotic matter to the sand; the growth will still be mean and stunted, but the harvest will slightly increase, as it reaches 162 grains. Let us follow the changes. In pure burnt sand, 108 grains; with minerals without azotic matter, 144 grains; with azotic matter alone, 162 grains.
>
> In this last case, a new system is shown. As long as we operate only with minerals the plants are diseased, the leaves show a yellowish-green color. As soon as we add azotic matter to the sand the leaves change their color, becoming ing a dark green. It seems as if vegetation would take its usual course, but the appearances are deceitful; the harvest is still feeble.
>
> Let us attempt a third experiment, which will, in a measure, be a synthesis of the three preceding. Unite azotic matter and the minerals in the burnt sand. This time you will be tempted to believe in the intervention of a magician, the phenomenon so far surpasses those preceding it. Just now the growth was languishing, doubtful, diseased; now the plants shoot up as soon as they break the ground; the leaves are a beautiful green; the straight, firm stalk ends in a head filled with good grain; the harvest reaches from 396 to 450 grains.
>
> You see, gentlemen, relying upon experience, which is our guide by choice, we have succeeded in artificially producing vegetation to the exclusion of manures and all unknown substances.
>
> You will acknowledge that this is an important and fundamental point. No more mystery, no undetermined power; some chemical products of a known purity, distilled water perfectly pure in itself, one seed as a starting point, and the result, a harvest comparable in all points to the best obtained in good earth.
>
> We are, therefore, justified in saying that the problem of vegetation here receives its solution, for we have not only defined the conditions necessary to the production of vegetation, but the degree of importance of each of the concurring agents.

Azotic matter in its decomposition furnishes ammonia, and nitrates; and the clay constitutes a receptacle which holds and gives out gradually as may be required these important ingredients. M. Ville divides plants into two classes, according as they draw their nitrogen from the air or the soil. Thus wheat is a type of plants which prefer their nitrogen in the form of salts of ammonia, and take it from the soil. Beets prefer it in the form of nitrate and take it from the soil. Peas and the other leguminous plants prefer to take it as a gas from the air. The consequence of this distinction is that plants which take nitrogen from the air will flourish in a soil containing only the other elements of the complete fertilizer, namely, phosphate of lime, potash and lime. Therefore, by planting in a soil one of each of the two classes of plants, it is possible to tell whether the soil contains the azotic and mineral matters or not. Thus, if peas and wheat be planted in the same soil, and the peas yield well while wheat yields little, the land has the mineral elements but lacks the azotic or nitrogenous matters.

At Vincennes, previous to the fertilization of the soil, the land produced nothing, and hence was proved deficient in all the elements of the complete fertilizer, by the addition of which it has been made extremely productive.

As chemical analysis of soils fails for reasons above stated the richness of the soil is determined as follows:

> Suppose you institute seven cultures of the same plant—it may be of the beet or wheat, as you will.
>
> To the first give the complete fertilizer; to the second, the same fertilizer excluding azotic matter; to the third, the complete fertilizer deprived of phosphate of lime; to the fourth, the complete fertilizer less the potash; to the fifth, less the lime; to the sixth, less all the minerals—that is to say, reduced to the azotic matter; the seventh not having received any manure.
>
> It is very evident that if, in the complete fertilizer, the effect proper to each component is manifest but as it is associated with three others, the comparison of the returns obtained from the seven strips of the little field ought to indicate what the soil contains and in what it is wanting.
>
> In this system of investigation, the culture with the complete fertilizer becomes, in a measure, the invariable standard of comparison to which are referred the returns of the other strips of ground; and, according as they approach or recede, we conclude that the earth contains or does not contain the element which has been voluntarily excluded from the fertilizer.
>
> To put the value of this method beyond doubt, M. Ville reports the results given under three different conditions.
>
> At the experimental farm at Vincennes were obtained, in 1864, the following proportional returns from wheat:

With the complete fertilizer	5644
" " " without lime	4333
" " " " potash	4044
" " " " phosphate	3466
" " " " azotic matter	1888
Without any fertilizer	1588

> The conclusion is evident. At Vincennes, the complete fertilizer was necessary; the azotic matter was most deficient.
>
> An eminent agriculturist of the department of the Somme furnished a second example, which is upon the beet:

With the complete fertilizer	4504
" " " without lime	4103
" " " potash	3703
" " " phosphate	3208
" " " azotic matter	3200
Without any fertilizer	2202

> You see here, also, the earth is wanting in azotic matter, and, to put it under high culture, we must have recourse to the complete fertilizer.
>
> The third example is from a culture of sugar cane, instituted by the Hon. M. de Zebrun, of Guadaloupe, a former delegate from that colony:

With the complete fertilizer	50666
" " " without lime	44444
" " " potash	32111
" " " phosphate	13333
" " " azote	49777
Without any fertilizer	2666

> If I add that sugar cane particularly draws its azote from the air, you will conclude that the soil is particularly wanting in potash and phosphate of lime.
>
> Here are, then, two methods of knowing the richness of the land. The first is founded on the culture of two different plants without any fertilizer, and the second, on the culture of the same plant with five different fertilizers. These two applications of the same principle lead to the same results, and verify and complete each other.
>
> I need not add, that for each of these trials to have its full signification, the earth must not be used until the effect of each fertilizer has been spent.
>
> By the aid of our experiments in burnt sand, and with only chemical products, we have realized a theoretic scale of culture whose progressive returns have shown us the laws which regulate vegetable productions. By the light of the collection of ideas, we were enabled to conceive and to realize practical processes of analysis accessible to all, whose testimony is of almost absolute certainty, and by means of which we can always say what a land contains, what it needs, and can consequently determine the nature of the agents to which we must have recourse to fertilize it.

In subsequent lectures, M. Ville gives tabulated statements of results from the use of what are ordinarily called chemical fertilizers, that is, such as are not directly of organic origin. These statements indicate that the chemistry of plant growth is destined to pass from under the odium of previous failures, and take its place in the sciences as a splendid collection of established facts, which will inaugurate a new era in agriculture.

We cannot extend our remarks and quotations further, but we will say that we have rarely examined a work more replete with interest, or perused a record of experiments in which the true scientific method has been more closely followed.

SHORT EXTRACTS FROM A FEW LETTERS.

An esteemed correspondent from Fort Concho, a remote spot in western Texas, forwards us a long list of subscribers, and states as follows: "This post is far west of any organized county, cultivated land, or signs of civilization of any kind. The citizens, if such they can be called, are mostly refugees from Mexico or outlaws from the States. Every one goes around armed to the teeth, homicides are common, and horrid shooting affrays are more so. Military law is the only law we have, and that has no control over these outside 'citizens.' When we reflect on the kind of men who recruit the army in time of peace, and what reckless men are willing to drive the mails, by stage, through these wild regions among hostile Indians and more dangerous 'citizens' (though the stage is always escorted by a soldier), we cannot wonder that there is no safety for money in the mails."

Another says: "I live in a small village, where there is more taste for whiskey than for science. It is hard to form a club of ten without cutting a club to break my own head. I have received five names by advancing the money for three, the fourth being a present to my brother in Nebraska; for the balance of the club, I am "going it alone. I hope

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*Chemical Manures. Agricultural Lectures, delivered at the Experimental Farm at Vincennes, by George Ville. Translated by Miss E. L. Howard. Third Edition. Atlanta, Ga.: Plantation Publishing Co.