Scientific American.

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Galvanized Iron.

Sheet iron coated with zinc is known by the above name. We suppose it obtained this title from having been first produced by the galvanic battery, a very different process from that now employed in its manufacture. What is the object of coating iron with zinc? Iron is the cheapest of all metals, and possesses great strength and flexibility, thus rendering it adaptable for a vast number of purposes, but it has the defect of actually rotting or burning slowly when exposed to a moist atmosphere, owing to the great affinity which it has for oxygen. This is the reason why its surface requires to be protected to prevent it rusting or oxydizing when exposed to the weather, and zinc is perhaps the best protector yet discovered. Tin and copper metals having a lower affinity for oxygen than iron, have been employed to coat and protect it, but they are not suitable for this purpose. By the laws of electrical affinities, when two different metals are in contact and in presence of water or moisture, the negative, under ordinary circumstances, is protected at the expense of the positive metal. The latter is the metal which has the greatest attraction for oxygen; the negative one the least. Tin and copper are negative metals to iron, but zinc is positive, and this is the reason why it is a superior protector. Although an oxyd of zinc quickly forms on the surface of galvanized iron, yet as it is not very soluble in cold water, and does not readily wash off with rain, but adheres to the surface and shields the metal like a paint. Zinc is therefore a good, and it is also a cheap protector for sheet iron exposed to the atmosphere. For this reason it need not excite surprise that galvanized sheet iron, wire, &c., have come into such extensive use during the past few years.

A number of patents have been obtained for coating iron with zinc and various other metals, but so far as we know, only one of these is successfully in common use—this is the patent of E. P. Norwood, issued in Great Britain, May 3, 1843, and in America, Sept., 1844. This process of galvanizing iron imparts that crystaline appearance to it which resembles some kinds of japanned work. The iron to be coated with the zinc is first cleaned to remove all scale or oxyd from its surface. For this purpose it is immersed in dilute sulphuric acid, and scrubbed with sand and emery until it is quite bright, and is then washed in water.

The iron is now covered with a thin pellicule of tin, which is precipitated from a solution of salts of tin as follows:—A quantity of the "salts of tin," (about a pound to the five gallons of water) are dissolved in water in a tub or vat, and into this the cleaned sheets of iron are immersed and brought into contact with pieces of metallic zinc at top and bottom. In a very short period a thin skin of tin is found adhering to the iron, something like that of copper which forms on the blade of a knife when dipped into a solution of blue vitriol. The sheet of iron is now lifted out, and dipped carefully into a bath of molten zinc, the surface of which is covered with a thin stratum of pulverized sal-ammoniac. In every case the iron must be kept but for a short period in the molten metal, or it will be injured and rendered brittle. The sheets of iron thus coated with zinc are afterwards passed between rollers to smooth their surface.

The galvanizing of iron has been conducted under this process at the extensive works of Marshall Lefferts, in this city. One day after the date of this number of the SCIENTIFIC AMERICA—May 3d—this patent expires and the process becomes public property.

Finding that we cannot enter into further details of this subject, without extending this article to an undue length, we will return to it next week, and describe other processes and other useful applications of zinc and iron, which will be found of great use to mechanics and manufacturers in every department of the useful arts.

Wants of California.

A correspondent writing to us from Los Angelos, California, states that there are two openings in that county for branches of the arts which will make a permanent business, and prove profitable. "The locality," he says, "is one of the choicest spots on earth, as it regards climate and good fruits." These latter involve the requirements of the two branches of business alluded to. They are glass making, and the manufacture of pottery ware. The glass will be required for wine bottles, as that section will yet supply vast quantities of wines, the grapes being of a superior quality, and yielding wine surpassing that which we now import from Europe. There is no glass manufactured at present in California, and there is but one pottery furnace in operation, and that is in the upper part of the State. Preserved fruits will yet constitute an important business in Los Angelos, and great quantities of earthenware vessels to contain them will yet be needed. In the latter part of our correspondent's letter, he says:—

"We, no doubt, have plenty of men in the State acquainted with the manufacture of the articles, but they are here seeking a hastily gathered "pile," and intend "going home to enjoy it;" if they fail in these anticipations they retire broken down and useless. We want men to come here to reside permanently, with their families, and engage in works that will ensure comfort, and riches too, if the means be properly and steadily used. The time to make "piles" by magic, as it were, has passed in California. They have to be made now by a permanent arrangement."

The natural resources of California are of the most varied, rich and inviting character, but heretofore they have principally attracted those thither who did not intend to make that country their home. Some of the most ingenious, skillful, enterprising and scientific spirits from all parts of the world have been drawn there, and numbers of them have now made it their future home; but a great many more of the *right sort* of emigrants, such as our correspondent describes, are still wanted.

Scientific Farming.

The great mass of agriculturists in this country, as also in the world, may be divided into two classes. The first great class, containing all but about one in a thousand, are content to go on in the ways of their grandfathers. They *understand* farming fully; they are *practical* farmers. These men add nothing to the knowledge, and but little to the wealth, either of themselves or of the world at large. They can be disposed of in very few words. The other class are enthusiasts; and under the heading which we have laid down for this article would branch gloriously into a dissertation on salts and sub salts, soils and sub-soils, acids, gases, and improved machinery. The road is equally simple to them, but it is a very different one from that of the class referred to. Class No. 2 holds that all farmers cultivate too much ground; that none plow deep enough; that none manure strong enough; that none bestow sufficient attention on fences; that none plant trees and vines enough; that none have sufficient regard to sustaining the power of the soil; and, in short, that none are sufficiently mathematical, chemical, and, generally speaking, abstrusely scientific in their operations. They would induce farmers to subscribe for every agricultural periodical, read every book, attend every fair or agricultural lecture, and become perfect walking dictionaries in their familiarity with the names and opinions of all chemists and alchemists, from the discoverer of Glauber salts down to the manufacturer of Paine's gas.

In practice, however, it happens almost invariably that these scientific farmers lose, rather than gain, by their own farming operations, and this fact cannot be considered too significant. There is an extreme in this business as in every other, and whether the matter be viewed in an abstruse scientific light, and mathematical formulas and equations be developed to show the state of affairs; or whether we take, in ordinary language, the simple term "judgment," as expressive of the element desired, the fact is indisputable that the truth lies between the extremes, and is a very difficult matter fully and properly to be arrived at.

Rotation in crops is desirable; but how often the crops should be changed with every variety of soil, and with every conceivable ratio of the cost of labor, as compared with the value of the products, is a matter extremely difficult to determine. Rotation involves extra labor. To change pasture to tillage, and this again to meadow, is far more expensive than a continuation of either condition; and the truly wise farmer ascertains, or judges as accurately as possible, the point where the conflicting considerations actually meet. Planting trees is most assuredly a good investment in general; but a farm all orchard would necessitate a great expense for fertilizers, and a long and patient waiting for a return. Guanos and artificial manures are, in many cases, highly profitable; but unfortunately the knowledge of soils and the capacity to describe them so that every farmer may determine for himself precisely what is wanted, and how much, on his land, and the actual pecuniary result, is yet far from being effected. Improved machinery is highly advantageous, but it is easy to be led into the expenditure of too much, and to be most egregiously imposed on in such devices.

While we are thus free to admit the possibility, in fact, the strong temptation, in those of progressive minds to invest largely in science at the expense of practical results, the great disproportion in the two classes first referred to must be borne in mind, and each reader may ask himself which of the two classes he most probably ranks in. A perfectly reliable and infallible judgment would call for a far larger amount of cultivation per acre, and a greater expenditure for fertilizers and machinery than generally obtains. The mass need no checking in this respect, but the few who do are most likely to be found among the readers of this journal.

Having sufficiently pointed out the danger of overdoing in science, we may the more heartily urge the old grannies to their duties. It is true that *nearly* every farmer cultivates too many acres of land. It is true that few farmers avail themselves so fully as is profitable, of the improvements of the age, either in fertilizers, cultivation, rotation, drainage, irrigation, harvesting, or curing. Thousands, yes, millions of dollars are annually lost to the country and to the world through the ignorance and obstinacy of farmers, which a very few dollars of time pleasantly applied to the reading of a still fewer dollars worth of information, would have entirely avoided; while at the same time the obtuse mind of the hard-fisted laborer would have been expanded and developed, and his capacity and means for enjoyment greatly increased. Store, then, the mind with facts, and diligently cultivate the judgment to discriminate. If reapers and harvesters, ditching machines, sub-soil plows, experiments in drainage, etc., cost too much to be expedient for one, club together the neighboring farmers, and make a purchase or experiment. Form associations for mutual comparison of data; quicken your perceptions by rubbing together ideas, and multiply your experience by giving others the benefit.—Neighboring experiments, where soils, climates, and distances from market are necessarily very similar, are far more valuable in practice than distant ones, which may be paraded with more ostentation. Do not look for *immense* results in any experiment. It is unfair to ignore progress unless the results are three or four-fold the old method. Do not expect a gain of more than ten per cent., all things considered; but if this can be accomplished every year, or even once, without again retrograding, the result is sufficient to make all the difference between profitable farming and absolute bankruptcy.

If you have cattle to consume it, the Chinese sugar cane may be planted, and very possibly with good effect, as green fodder; but do not, we beg you, expect to make sugar, or even respectable molasses, without elaborate and expensive machinery, and a reasonable amount of care and enlightened experience. The Chinese potato is very different in this respect, and may ultimately be of great value as food for man, or as a root to store for winter use in feeding; but a score of experiments in a town are very nearly as good as a thousand, and far better, unless the thousand are properly conducted. There are some whose tastes incline them to such efforts. Aid such "martyrs to science" in experimenting, and compare notes carefully on the results; but do not each spend half the summer in tending these strange plants, covering the joints of the vines, etc., to find at the year's end that you have been *almost* successful.

We have in mind nothing which we care to designate particularly as an imposition on the farming public; but although interested parties are always crying *immense* results, the farmer who expects such from any one step may generally be set down as a deluded man. There are those who are wide awake to speculate in novelties; but the great mass must be content to accumulate by carefully and skillfully grouping together almost trifling economies, with a view to produce the greatest possible quantum of finished goods, at the least possible cost.

American Pearls.

"Like Orient pearls at random strung."

No line of poetry has been more often quoted than the above, but we fancy it will now have to be crowded a little to the one side for "American pearls in Jersey found." Various kinds of precious stones have been found in the United States, but until now, no pearls, so far as we know.

A few weeks since, a pearl was discovered by accident in a fresh water shell-fish near Paterson, N. J., and since that time quite a number have been obtained, and no little excitement caused thereby in the neighborhood. Some of these pearls have been exhibited in one of the largest jewelry establishments in our city, and for size and beauty they are not inferior to those of the Orient.

Pearls are found in several kinds of shell-fish—both marine and fresh water. They are principally composed of lime and the gluten of the fish, are very beautiful, and have been used as ornaments since the earliest ages. There is a delightful play of colors on their surfaces, caused by very delicate groovings—which require a microscope to detect—polarizing the rays of light. From the scarcity of genuine pearls the larger ones have sometimes sold at very high prices.

Artificial pearls are manufactured to a considerable extent (so it is said) in Paris, from the scales of a small fish called *ablette*. Small hollow glass globes are first made, and their interior is lined with a coating of these fish scales, mixed with a solution of isinglass as a vehicle. In appearance they resemble pearls as near as glass brilliants resemble diamonds. The genuine American pearls are found near Paterson in a small creek, the waters of which are supposed to have something to do with their formation, as none have been found in the same kind of shell-fish in other creeks.

Sewing Machines.

It was our expectation one year ago that before this time, some of the ten dollar sewing machines would have been so perfected as to have come into pretty general use and worthy of recommendation. But such has not been the case. In answer to a great number of inquiries, we would say that while many improvements have been made and patented within twelve months past, as yet no particularly cheap machine has been introduced which we can recommend to purchasers for family use. Wheeler, Wilson & Co., Grover & Baker, or I. M. Singer & Co, and some others, make good machines costing from $75 to $150, which we would recommend to purchasers instead of any of the very cheap ones that we know as being yet in the market.

The Pacific Wagon Road

The Pacific wagon road provided for at the last session of Congress will soon be under way. The Secretary of the Interior, we understand, is prosecuting with vigor the arrangements for its construction. It is to be divided into several sections under the control of separate superintendants.