

Scientific American.

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Geography and Geology.

The first of our subjects, geography, is the science of describing the surface of the globe, while geology has for its object the description of the interior of the earth, and tracing the history of the rocks of which it is composed. Any one looking at a map will at once perceive the amount of talent, observation and calculation necessary to perfect such a drawing, and the same is equally true of a geological chart or section. We wish, in this article, to show the necessity of a perfect description of our earth, and also indicate the means at command for performing the labor, and, so to speak, for jotting down the items in the great encyclopædia of facts.

It is of the utmost importance to the mariner, and all who trust themselves upon the ocean, that there should be perfect and reliable charts and instructions, deduced from practical observations, of the route they are about to travel. It is equally necessary that every current should be indicated and soundings taken, and the depth of water, at various points, marked on the charts, so that every ocean and sea may become as well known as the Atlantic, from New York to Liverpool. Commerce demands geographers to work in this field, and the saving of human life is their reward. Again, it is necessary that the land should be equally well mapped out, in order that boundaries may be accurately determined, and the divisions of States and countries may be truly known. It may seem surprising to some of our readers, that the destiny of a nation often depends on a geographical question. The late war between Great Britain and Russia was one of boundary, and the Paris Conference was called to settle the question; and there are many parallel cases in history where one geographer would have settled a question which took many battles and victories to determine.

Geology is important, as developing the resources of a country—its explorations are requisite to make out where the coal, iron and mineral veins are concealed—to discover the locality of building stones, and marbles, and of clays for bricks, and also to determine their extent, and the best places to commence their working.

Now, let us inquire the means at command for attaining these objects. The governments of nearly every country having any pretensions to civilization have now an organized body of scientific men to make these geographical and geological charts, sections and maps. We have a Coast Survey, and we are occasionally sending out exploring expeditions whose aim is to do the work we have mentioned. Each State has its geologist and scientific corps for exploring and giving to the world an account of its resources and capabilities. Great Britain has her Ordnance Survey, and her ships of war are always carrying on this work of mapping the globe. Germany has her great band of scientific amateurs, and the learned of each nation are voluntarily doing their utmost for the good of the world.

A vast amount of labor has been done in this field by the means we have specified, but there yet remains much to be done, and we would point this out as a sphere of enterprise in which many can engage, and by first making a chart of their own district they may extend their labors to wider and unexplored fields.

Winter Evenings.

The season when King Frost enchains our country in his icy grasp, and throws his white mantle over the earth, will soon be upon us, and we must begin to think what we shall do with ourselves in those long winter evenings, when there is no comfort but at the fireside, or in sitting close around the stove. Those evenings contain many precious hours that ought not to be, as they too often are, wasted and lost. Reader, we will propose a scheme

to you whereby you will find them pass pleasantly and profitably; and when spring again comes, with its gladsome sounds and beauteous vegetation, you will be happier and better for the winter that has passed. Our advice, then, is, learn to do something. No matter what—to draw, to paint, to put together machinery, to read or speak a language that at present you do not know; invent something in your own line of business that is wanted, and determine to make it by the spring. Learn something, read a useful book every evening, if only for an hour; but do whatever you determine regularly and punctually, and you will be surprised how much knowledge you will have acquired in a short time. Do not idle away the precious moments in foolish conversation and story paper nonsense, although they are both very good in their place; but try and master a branch of science—each one of you knows which you like the best, and which is best suited to your habits and capabilities—and should you meet with difficulties in the way, as no doubt many will, write to us, and we will give you the best aid and advice that it is in our power to dispense.

At any rate, set earnestly to work, and learn to do something, and who knows but that there may be among the subscribers to the SCIENTIFIC AMERICAN an embryo Newton, Herschel, Morse or Watt. If such there should be, this advice may tend to develop his genius, and the world will eventually thank us for having advised our readers not to neglect their winter evenings.

Manufacture of Starch.

Starch is an important element of food with animals as with vegetables, and its ready convertibility, without change of composition, into suitable forms, such as dextrine and sugar, fits it exactly for carrying on those changes which occur in the juices of vegetables. It is stored up in the seeds, roots and pith of plants, and by its decomposition affords the materials for the most essential vegetable products. Starch, from whatever source, always presents the same chemical characters; its physical peculiarities may, however, vary slightly. In its pure state, it is a fine, white powder, without taste or smell, and has a peculiar crispness when rubbed between the fingers. It is not soluble in cold water, and on this fact the manufacture, or rather, the extraction, of starch depends. The simplest method of preparing starch, and separating it from the gluten, and other constituents of wheat, is by washing dough in a linen bag, in a gentle stream of water. The usual process, however, whether potatoes, wheat, rice or maize is treated, is as follows:—

The substance is crushed, left to steep in cold water, and occasionally agitated; or a quantity of the grain is conveyed, by appropriate machinery, under small jets of water, until all the starch grains are washed out; the water having the fine starch suspended (not dissolved) in it, they are left to settle, and then dried, when they crack into the little prismatic shapes so well known to all consumers of the article.

The crushing is a very inconvenient operation, especially with indian corn; and Mr. Watt, of Belfast, Ireland, has taken out a patent in this country for the manufacture of starch from indian corn whole. His process is as follows, and in our opinion will be found to answer perfectly:—He first takes the car of corn, and steeps it in water for a week, keeping the water at any temperature between 70° and 140° Fah., and changing the water several times. In this there will be a slight fermentation, and as soon as it has ceased, the corn is taken out and ground to a kind of powdery pulp, as it is quite soft from the steeping. Warm water of the above temperatures must be kept running through the mill-stones, and this will carry away the starch; the water is passed through the sieves, or other arrangement for catching the starch, and the whole is allowed to settle—the clear water being run off, and the starch dried and packed as in older processes. It was patented June 30, 1857.

Human Strength.

When we say that any one is strong, we mean that he is capable of enduring physical exertion and fatigue longer than the average run of men. Many experimenters have endeavored to find an average on which to base observations as to the strength of men; but many allowances have to be made for climate, temperature, food, age, and other accidental interferences. It has, however, been determined that the best method of arriving at a true idea of the strength of men, is to observe the average effect produced by a laborer who continues his exertions several successive days. What is called a "dynamic unit" is then fixed upon as a standard by which to compare results, and this is 1,000 lbs. avoirdupois carried one foot in one minute.

According to M. Coulomb, a man traveling on a level road may walk 30 miles per day, or 264 feet per minute, and continue his exertion fourteen hours a day. Taking the man's weight at 150 lbs., he has expended 23,760 dynamic units, or, in other words, has used the amount of strength that would have been required to transport 23,760,000 pounds one foot in one minute.

If instead of walking on a level road he ascends a staircase, the velocity is reduced to 26.4 feet per minute, and he can only work eight hours per day. In this case he has only expended 1,901 dynamic units.

A person carrying a weight of 90 lbs. along a level road, travels at the rate of a mile and a half an hour, or 132 feet per minute, and continues his exertion seven hours per day. The useful effect is, consequently, 4,989 dynamic units.

The force which a man exerts in dragging a load has been variously estimated. Schulze says that a man can exert a pressure of 107 lbs. for a short time, and that a man may walk at the rate of from 4½ to 6½ miles per hour.

The most advantageous method of employing human strength is in rowing a boat. Of course there are numerous exceptions to these rules of strength we have given, as they can but be an approximation to the average; but in investigations of this kind we must be content with such results.

Another Important Decision by the New Commissioner of Patents.

We have the pleasure to present, in this number of our journal, the report of a late decision by the new Commissioner of Patents, which not only confirms our previous high estimate of his administrative qualifications, but foreshadows the inauguration of a line of future official action that cannot fail to be productive of the most important results.

The decision in question was given in the case of D. D. Badger's appeal, on an application for a patent for an improvement in iron beams, and claimed as a "new article of manufacture." The application was twice rejected, and then carried up on appeal to the Commissioner, who referred it to a Board composed of Chief Examiners Baldwin and Dodge, with instructions to report back to him in the usual manner. Counsel for applicant (Munn & Co.) filed with the appeal a special request that, in rendering its decision, the Office would define its views in regard to the consideration of claims of a character like that presented. The Board was unable to agree, and the members reported their respective opinions to the Commissioner, who thereupon gave the case a personal hearing. We annex his decision. He confirms the report of Examiner Dodge, and sets aside that of Examiner Baldwin. We should be glad to publish both the reports of the Board, but our limits, at present, forbid. The report of Examiner Dodge is very interesting. He takes the most broad and liberal grounds, and fortifies every position by quotations from the highest authorities. His arguments are unanswerable.

We would here remark that much contrariety of opinion has, for a long time, existed among the examining officers at the Patent Office, not only as regards the proper wording of claims and titles, but also in regard to the

degree of novelty that an invention must contain in order to render it patentable. Each Examiner has been permitted to follow his own notions in rendering decisions, and to constitute himself judge, jury and prosecuting attorney, in disposing of the petitions of applicants. The result is that the decisions and practice of the Office have often been of a contradictory, and sometimes of a ludicrous character.

We rejoice to believe that this mixed-up method of practice is about to be drawn to a close. In the accompanying decision, Commissioner Holt declares, in effect, that under his administration, the Patent Laws shall be liberally construed; that every new and useful improvement shall be entitled to a patent; that simplicity shall not be a bar to the patent; that names are not things; that the applicant may patent his improvement as a "New Article of Manufacture," or give it any other term that he chooses; that it is sufficient if the specification describes an invention uniting the indispensable requisites of novelty and utility; that the applicant shall not be embarrassed or impeded by the demands of Examiners in reference to terms and words.

We regard this decision of Commissioner Holt as one of the ablest documents that has ever emanated from the Patent Office. It is strong, dignified, liberal and bold. The constitutional aspect of the whole subject is examined and discussed with judicial clearness. The concluding portion contains an eloquent tribute to inventors, which will be read by them, in all parts of the country, with thrilling interest, and with immense satisfaction. He addresses them as the benefactors of their race; and says that it is the duty of the Patent Office, instead of perplexing and discouraging, to take them kindly by the hand, and, if possible, strew their pathway with sunshine and with flowers!

Most cordially do we respond to these sentiments. Most heartily do we applaud the Commissioner for the noble stand he has taken in behalf of inventors. In their name, and in the name of the whole country, we thank him for what he has already done, and we urge him to go on, fearlessly, with the good work.

COMMISSIONER HOLT'S DECISION.

U. S. PATENT OFFICE,  
Oct. 23, 1857.

In the matter of Daniel B. Badger's application for a patent for an iron beam, to be used in the construction of buildings, and which, as made in pursuance of the specification, is claimed to be "a new article of manufacture."

This case having been twice rejected, and brought before me on appeal, was referred to a Board of Examiners, who differ widely in regard to the principal question involved, but conclude their report by deciding that in view of the reference given—the application of Adrian James, rejected on the 28th day of May, 1850,—a patent should not be allowed. Under these circumstances, concurring as I do in the determination arrived at, it is somewhat irregular on my part to discuss the principles commented upon in the Examiners' report. I am urged, however, to do so, both by the Board and by the applicant's counsel, with the hope of establishing a more uniform rule of action than has heretofore prevailed in the Office in regard to this class of inventions. I have looked, accordingly, into the authorities bearing upon the subject, and submit briefly the conclusions to which they have led me.

It is objected that this beam could not be patented, because, as is insisted, it is not "a new article of manufacture." It is admitted that it is not an "art," nor a "machine," nor yet "a composition of matter," as that term is universally interpreted. If, then, it is not "a new manufacture," nor a new and useful improvement upon such, it is a non-descript, so far as patent law is concerned, and whatever may be its merits on the score of novelty, utility and invention, it cannot be patented, because it finds no place in the Statutory Catalogue. This renders it necessary

to define, if practicable, with some degree of precision, the import of this term. The familiar etymology of the word "manufacture" indicates that it originally implied something made by the hand of man; but it has long since outgrown this primitive and narrow signification, and keeping pace with human progress, it has come at last to include alike the process of fabrication and every object upon which art or skill has been exercised, whereby a product has been fabricated, either by the hand of man or by the labor he directs. (Webster on Patents.) This broad, though sufficiently accurate definition would embrace "machines," which certainly, strictly speaking, are "manufactures,"—the latter constituting a genus of which the former are but a species; so far as relates to "machines," the statute, therefore, must be regarded as presenting, in fact, a *double enumeration*, which is interesting to note, because manifesting the extreme solicitude of the Legislature to cover, with its protection, the whole field of useful invention.

It is often an embarrassing question whether a particular invention is "a new manufacture," or only an improvement upon a manufacture already subsisting and known, and it is not easy to lay down a rule which would, at all times, solve this perplexing problem. It may be safely held, however, that if the invention only modifies a pre-existing manufacture, and by that modification merely improves, without so essentially changing its character and functions as to destroy its identity, it will be but an improvement, and should be so claimed. This question should be treated as of really but little practical importance. By our laws the specification is made part and parcel of the patent; and if the invention be therein correctly set forth, no misapplication of terms in the designation of the claim will vitiate the patent *a fortiori*; it should not be allowed to prejudice the application. It should, at most, furnish grounds for a suggestion on the part of the Office, whereby the error might be corrected. It is not assumed in this particular case, that more appropriate designation than that employed, could, within the range of the patent law, have been given to the invention. The position maintained is that the "beam" is not, in point of fact, "a new manufacture." There are on file the affidavits of three practical mechanics, who represent themselves as well acquainted with the various kinds of iron beams used in the construction of buildings, and who, therefore, sustain to this issue the relation of experts. After comparing the beam of Badger with those which have preceded it, they declare that they regard it as "a new article of manufacture." Their judgment, uncontradicted, is entitled to the greatest weight. Coryton (on Patents) holds this language: "The amount of difference from existing things requisite to constitute the result of the improvement or discovery 'a new manufacture,' is, in every case, a question of fact to be referred to the particular branch of industry to which it is applied, and requiring an accurate acquaintance with the state of manufactures, rather than a knowledge of general jurisprudence for its determination."

The objecting Examiner is understood to assert, in effect, that this beam is in no sense a manufacture, because not an article of merchandise; and that it is not patentable, for the reason that it is wanting in invention. In regard to the first feature of the objection—admitting, for the sake of the argument, that a manufacture is necessarily vendible and merchantable—I think the beam comes fully up to the requirements of the Examiner's definition. Like door and window frames, and other heavy articles of iron which now enter extensively into buildings, it is made for sale, and is, in fact, bought and sold, and forms as much an article of merchandise, as legitimate an object of commerce as a paper of pins. I confess myself unable to perceive the strength of the position taken, that it is, at best, but "an improvement in architectural materials," and cannot be ranked as a manufacture, because its utility can only be tested or realized

when it is "used in some other and further connection" than that which it occupies in the workshop, or in other words, only when it has been placed in position in the building. The same thing, it seems to me, might be said of the plow, whose merits are only demonstrated after it has buried its share in the field which it is destined to furrow—and so of a countless multitude of similar inventions. The reference given being out of view, and the novelty and utility of this beam being conceded, I should, therefore, not have hesitated to grant a patent for it as a new article of manufacture, or as a new and useful improvement thereon, as the facts might have warranted. Nor should I have delayed my judgment in the matter until I could have instituted an elaborate and critical analysis of the process of labor, mental and physical, through which the inventor had probably passed, with a view of ascertaining the amount of invention which has been called into exercise. I regard such a method of investigation as delusive and unsatisfactory in its results. We know that some of the most important and valuable discoveries which have marked the progress of the arts and sciences have been the effect of accident, or the suggestion of some stray but happy thought, which came, as it were, unbidden; while, on the other hand, men have exhausted their intellects and their lives in fashioning, combining and maturing the most abstruse processes and machinery, without having contributed one dollar to the world's wealth, or one throb of enjoyment to its happiness. The law, essentially practical in its judgments, looks only to the *fruit* of the invention, and if it finds there the indispensable features of novelty and utility, it will presume a sufficient amount of invention to support a patent; nor is there any other lens through which the invention can be safely examined. All others, however specious, do but obscure and darken the inquiry.

Until within a few years the English Courts, regarding patents as establishing monopolies in derogation of common right, have shown them little favor, yet if any case has been reported in that country, combining novelty and utility, but in which the patent has been declared invalid for want of invention, it has escaped my researches. Such a case would be an extreme one, and should be most cautiously pronounced upon. (Webster's Reports of Letters Patent, 409, note E.)

The Constitution declares that Congress shall have power to promote the progress of science and useful arts by securing for limited time to authors and inventors, the exclusive right to their respective writings and discoveries. This embraces *all inventors*, and imposes no limitation save that the invention protected shall be useful. It is a fair if not a necessary inference that Congress has sought to carry out this provision of the fundamental law, by extending as ample and complete protection as was contemplated by the founders of the government. Indeed, in the comprehensive words employed in the statute, we have a sufficient evidence that the National Legislature has met this obligation in good faith, and if it has not been fulfilled it has not been from lack of zeal, but from lack of the knowledge of languages. If, however, the stringent construction not favored in certain quarters be adopted in practice, it is to be feared that many inventors who have been summoned to this Office by the Constitution, would find its door shut in their face. It must be assumed as the only safe and tenable ground which can be occupied in the administration of this Office, that *every new and useful invention* is patentable, and may be appropriately ranked under one or other of the clauses designated in the statute. Names happily are not things; and if the specification describes an invention uniting the indispensable requisites of novelty and utility, it will not be considered as of the essence of the claim, that it should be referred *eo nomine*, to any one of the heads of the statutory enumeration. A failure to adopt some one of the designations presented in that enumeration,

or the adoption of what the office might regard as an inappropriate designation, should not be allowed to embarrass the application, if the specification itself combines the characteristics mentioned.

It is due to the dignity of the subject and to the generous spirit of the Constitution, that the patent laws should be liberally construed, having ever in view the great end they were designed to subservise. They were enacted for the government of an office whose range of action is altogether above the barren field of mere technicalities. That office, in my judgment, would be forgetful of its mission, and disloyal to one of the highest interests of humanity, were it to permit itself to be entangled in a mesh of mere words, or palsied by doubts, born of intricate metaphysical disquisitions. It has to do with the substance of things, and to deal with the earnest, ingenuous, practical intellect of the age, and it should be dealt with frankly, not perplexing and discouraging inventors, by subtle distinctions, but kindly taking them by the hand, as the benefactors of their race, and strewing, if possible, their pathway with sunshine and with flowers.

As the reference given is regarded as an anticipation of this invention, the application must be rejected.

J. HOLT,  
Commissioner.

#### The Acacias.

These are among the most useful of trees, and besides, they form graceful ornaments in streets and fields. They have small flowers collected in balls or spikes of a white, red or yellow color. They inhabit all the warm countries of the world; some of them yield gum arabic, others gum senegal. The bark of one variety gives us the astringent substance called catechu, or *terra japonica*. The flowers of some are extremely fragrant, and are much used in Italy as a perfume. Many species have a bark possessed of valuable tanning properties. The timber is very durable, and it requires little or no cultivation. The Chinese use the yellow flowers to dye silks with, and it gives a color which is, as yet, unrivaled. One genus is known here as the Locust tree, and it is worthy of more general attention.

#### The Indian Mutiny.

The mutiny in India is likely to affect disastrously a vast amount of progressive industry. Within the last twenty years, the amount of the products of other countries consumed in India has increased from \$20,000,000 to \$85,000,000, and her native productions have more than kept pace with it. Every nation that trades with her becomes her debtor. In 1835, the surplus produce of India was \$40,000,000; in 1856 it exceeded \$125,000,000. Last year the balance due India for the excess of the exports over the imports was \$41,000,000. The specie importations have increased from \$14,000,000 in 1846 to \$62,000,000 in 1856. The present war puts a stop to all this trade.

#### Dishonesty.

A California correspondent writing to us says, in connection with other remarks, "we are now shipping from one to two millions of dollars monthly to the Atlantic States, for which we get paid in merchandise of the following kinds:—Boots and shoes made up of paper, leather and shavings, so that persons often wear out four pairs a month, unfinished pants and shirts, axes with bad handles, colliers' picks without steel." It is really dishonest to send such goods in exchange for hard cash, and we hope that such a suicidal system will soon be stopped.

Wm. D. Wilson, Editor of the *Iowa Farmer*, at Mount Pleasant, Iowa, writes to us that he intends to travel extensively through that State during the coming winter, and will undertake to sell patent rights on good agricultural machines adapted to that region. Mr. Wilson is a stranger to us, but we presume he can furnish satisfactory references if called upon to do so.

#### The Aquarium.

MESSRS. EDITORS:—There is one feature which no writer on the aquarium has yet noticed: when a tank is properly stocked, the water soon gets crowded with animalculæ, which swarm among the plants, and occupy the sides of the glass in countless numbers, made visible only by the aid of the microscope. These facts are in accordance with certain laws of nature, and the presence of vegetable and animal life always develops them. But observe the utility of these animalculæ; they contribute to the sustenance of the other living creatures by supplying them with food. The researches of chemistry have proved that these minute organizations respire in much the same way as plants, while animals generally absorb oxygen, and perish if the introduction of that gas is suspended. These minute organisms absorb carbonic acid gas, and give out oxygen in abundance. My experience convinces me that a tank which has been fitted up for some months, will sustain a much greater amount of animal life than one of the same dimensions but recently stocked. Beginners should distinctly remember the leading principles of the aquarium, and then success in maintaining one may, without much difficulty, be achieved. If the tank have not a distinctly self-supporting character, such as will preserve its strength without alteration of any kind, it may be concluded that there has been unskillful management in its stock.

H. D. BUTLER.

[The above communication will, no doubt, be interesting to those of our readers who have begun to stock aquaria; but we think the writer's remarks apply more especially to salt water tanks.—EDS.]

#### Heat and Cold.

A lady correspondent writes to us, giving her idea of the philosophy of the facts recorded in our recent article on this subject. We will give a condensation of her letter, which is to the effect "that heat is never strictly speaking evolved by the agitation of water; but, the cause of elevation of temperature, when water flows along shutes, tubes, or is shaken in a patent churn, is due to the friction of the globules of water against the solid material with which they are in contact." She finds fault with us for saying anything against poetical expressions, and, as a lady only can, defends the poets from the charge of writing false science, in such a manner that we must refrain from argument, hoping, however, to hear from her again.

#### A Steamboat Newspaper.

Among other innovations which the mammoth steamship *Great Eastern* is about to inaugurate, will be the publication of a daily paper on board for the benefit of the traveling public—the regular "public" of travelers—whom she may be bearing across the ocean. But this startling feature is anticipated on the western waters of the New World, for the New Orleans and St. Louis packet steamer *James E. Woodruff* now sails equipped with the force and material for the publication of a regular *daily paper on board* during her trips up and down the river, with a job office attached for the printing of bills of fare and other work.

LONGEVITY.—The *Pacific Sentinel* says that an Indian named Pedro died at Santa Cruz on the 7th September, aged 130 years. In 1784, when the Mission there was founded, Pedro was an old man, as is known to many people residing at Santa Cruz.

TRAVELING AMERICANS.—The amount expended by American travelers in Europe is estimated at \$10,000,000 annually. This is no small amount to be emptied into the pockets of European hotel keepers and railway companies.

CHLOROFORM LINIMENT FOR BURNS.—M. Bargiacchi states that he has found the extreme suffering produced by bad burns completely relieved by means of a liniment composed of chloroform and cod-liver oil.