

Such a conclusion could not long be entertained without attempts to put it in practice, and schools have been established both in America and Europe, subordinating classical training to scientific instruction. The Cornell University is such an institution, and although it gives special prominence to agriculture and the mechanic arts, making other scientific and classical instruction secondary, it yet deserves, in our opinion, to rank as the first school in the United States, when it is considered with reference to its scope and its immense endowment.

In saying this we do not disparage those scientific schools which, with a narrower scope, and on a smaller scale are doing most excellent work. Of these: the Polytechnic Institute at Troy, N. Y., and several others, cannot be too highly praised, for their judicious management and the thoroughness of their course of instruction. The organization of the Cornell University is, however, so radically different from these schools, that it must be looked upon as an experiment in American education. As yet it has not got fully under way, and its ultimate success or failure is problematical. We believe it will prove a triumphant success, and we have had this faith from the outset.

Its annual register has come to hand, and from it we gather that it has a large corps of able professors, and a very large class of students—four hundred and twelve being the number instructed during the past year.

The scheme of military instruction, in compliance with the act of Congress, has been partially developed, and is made accessory to the preservation of quiet, order, and health. The shops which are ultimately designed to form a marked feature of the institution are not yet ready, but it is hoped that another year will witness their completion.

The following extract from the register, will show what is designed to be accomplished by the labor department:

When the shops are in operation good practical machinists, who have already a sound ordinary English education, and who wish to make themselves thoroughly scientific master mechanics, can probably do much toward their own support, and at the same time perfect themselves in their special department, in making models of instruments, machines, and apparatus for the University and other illustrative collections. But this will require skilled labor—the labor of young men already more or less accustomed to the use of tools.

The largest part, however, of the existing corps is composed of young men who can give only unskilled labor. For these almost the only work at present is upon the University farm, or in the grading of roads and paths on the University grounds. The time usually given is three hours a day, from two o'clock to five P. M., except on Saturday, when more time may be taken. Much excellent work has been done, and many students, while doing much toward their support, have thus physically strengthened themselves. The price paid is just what would have to be paid to other parties doing the same work, and as a student has usually less muscular development than an ordinary laborer, his earnings must be less. An energetic and capable student, coming at the beginning of the long summer vacation—extending from the first of July to the middle of September—could earn enough on the farm to give him an excellent pecuniary start, which, with what he could earn during the Trimesters, would do much toward carrying him through the year. But during the year now begun, with very few exceptions, students commenced work at the beginning of the fall Trimester, and as their studies have taken much time they have had comparatively little opportunity to labor toward self-support. It is hoped, too, that some simple remunerative manufacture may be introduced which will aid in supporting students, but, at this time, the University authorities cannot recommend any young man to come relying entirely on unskilled manual labor for support. Some few have that peculiar combination of mental and physical strength required thus to entirely support themselves—the great majority have not.

Why would not a beet-sugar establishment be just the branch of manufacture needed? If the beet will grow well upon the lands of the institution it might afford employment for many, and at the same time aid much in the permanent establishment of an important branch of industry. It will aid, also, in sustaining the agricultural science department, in which there seems to be a deficiency of interest at present.

The library now numbers nearly twenty-five thousand volumes. An important feature of this library is the publications of the Patent Office of Great Britain, comprising about twenty-five hundred volumes. The Museums of Geology, Mineralogy, Botany, Agriculture, Zoology, and Technology, embrace many large and fine collections. In addition to these there are large collections of apparatus, etc., in chemistry and physics, as also collections in the fine arts. These collections are receiving valuable additions from time to time, and form a very useful and attractive feature of the institution.

Although agricultural science was intended to occupy a conspicuous place in the University course of study, the register shows that only thirty have studied agriculture out of the large number matriculated during the past year, while of those pursuing mechanic arts, engineering science, and the arts in general we find 106. This number will doubtless be augmented when the workshops are opened. We do not argue from these figures that agricultural science is less needed in this country than mechanical science, but that there is perhaps a greater avidity for the acquisition of knowledge on the part of young mechanics, or those who desire to become mechanics and engineers than among those who desire to cultivate the soil. It is the nature of the arts to stimulate a thirst for knowledge which agricultural pursuits, as they are conducted, do not. This is not the fault of the latter occupation *per se*. It is the fault of the present morbid state of society, which draws away the more ambitious youths to glittering centers of trade, depleting the farming classes of a kind of intellect which, if retained in it, would give a much higher intellectual tone to the occupation.

But we have extended our remarks to a much greater length than we intended. The Cornell University has our best wishes, and we hope the experiments will result in an improved system of education throughout the United States.

AMERICAN SILK.

The present state of this industry in the United States, is very satisfactory. Not only are important advances making in the manufacture of silk goods, but the growth of raw silk in various localities is on the increase.

We have been informed that the Dale Manufacturing Company, of Paterson, N. J., has been importing workmen from France, and making extensive preparations to commence the manufacture of dress silks, and we have seen dress silks produced in this country, which, in our opinion, are in no way inferior to French dress goods of the same class.

The Positive Motion Loom, described in No. 2, current volume of the SCIENTIFIC AMERICAN, weaves dress silks of a quality equal to those woven by hand, and at a very much more rapid rate, and is doubtless destined to become largely identified with the manufacture of silk dress goods, not only in this country, but abroad.

A great stimulus to silk culture has been given by the demand for American eggs in foreign markets. It has been found that by the purchase of these eggs the old stock, which in many European localities had become effete, may be replaced by a new, vigorous, and healthy stock, so that for some time the export of eggs from this country has become an important and growing business.

In this trade, California has as yet had the largest share, but Louisiana is destined to become a formidable competitor.

We have before us a specimen of cocoons, grown by MM. Rocci & Maillé, in Covington Parish, La., crop of 1868, which will compare favorably with any grown in any part of the world. These cocoons average about 450 to the pound. The entire crop, amounting in round numbers to 1,000,000 cocoons, was grown during March and April.

The original stock of this firm was introduced into Louisiana in 1845, and its offspring has ever since been remarkably free from disease.

Italy paid, in 1868, 50,000,000 francs to Japan for silkworms' eggs, and the Italian government offers, for 1869, a prize of 50,000 francs for the best sample of eggs to be sent to that government for examination. MM. Rocci & Maillé feel confident that their chances for securing the premium are as good, to say the least, as any others.

Some of these eggs, with specimens of cocoons, having been sent to Italy, the government deemed the matter of so much importance that it has sent a special agent to examine and report upon its merits. We are informed this agent is now here, and that his report will probably be very favorable, as the facts in the case are such as to warrant this belief.

This statement shows to what an extent the silk industry may be developed if properly fostered by our government, and also justifies the statements we have hitherto made in regard to the adaptability of certain sections of the United States for the culture of silk. They are also another proof of the large and varied resources of our country; resources so great that the enormous importations we are making of foreign products is a blot upon the statesmanship of our legislators as well as a serious drain upon the vitality of our institutions.

THE ELASTICITY, EXTENSIBILITY, AND TENSILE STRENGTH OF IRON AND STEEL.*

Although Sweden possesses in its numerous lakes and canals extensive means of water communication, yet owing to the severity of the climate this mode of traffic is necessarily suspended during at least five months in the year. In spite, however, of the manifest advantages of a rapid and uninterrupted means of intercourse, it was not until about twenty years ago that railway communication was first introduced into Sweden. The construction and management of these railways, or at least of the main lines, were undertaken by the government; for it was believed that the amount of traffic in a country so thinly populated would be insufficient to render any private speculation of this kind remunerative.

It might be supposed that a country possessing such vast iron-making resources as Sweden would naturally manufacture its own railway plant. It was soon found, however, that English materials could be obtained for considerably less than the cost of similar articles manufactured at home, and hence Sweden was for many years dependent chiefly upon England for its supply of railway materials. Indeed, the Swedish charcoal iron always commanded so high a price in the English market, that it was advantageously exported for the use of the steel manufacturers of Sheffield, while English iron of a lower quality, but suitable for rails, tires, axles, etc., was imported into Sweden; this interchange being facilitated by the free trade enjoyed by that country.

After the importation of foreign materials for the construction of railways had continued for about five years, the Swedish Diet called attention to the expediency of using products of home manufacture. As the question was one of great national interest the government was induced to appoint a scientific commission for the purpose of determining whether Swedish raw material was equally suitable for the manufacture of railway plant, and whether its superior quality would adequately compensate for its increased cost. The members of this committee were selected from among the most experienced men of the country, and consisted of Messrs. Ekman, Styffe, and Grill.

The execution of the experiments was confided to Mr. Styffe, who secured the assistance not only of certain practical engi-

* The above is the title of a work, by Knut Styffe, Director of the Royal Technological Institute at Stockholm. It has been translated from the Swedish, and supplied with an original appendix, by Christer P. Mansberg, Inspector of Railway Plans to the Swedish Government, and Associate of the Institute of Civil Engineers, and is published by John Murray, Bond Street, 1869.

neers but also of several men of science connected with the University of Upsala. It is an account of these investigations that forms the subject of the work before us.

Experience has taught us the necessity of thoroughly examining the elasticity, extensibility, and tensile strength of iron and steel intended for the construction of railway plant.

In England important investigations on the strength of these metals have been undertaken by Messrs. Fairbairn, Hodgkinson, Kirkaldy, and other engineers. On the continent of Europe experiments on this subject have been ably conducted by several eminent physicists, among whom may be especially mentioned Lagerhjelm, Wertheim, and Kupffer.

The Swedish committee in prosecuting their inquiries of course availed themselves of the results of these previous investigations, but extended the methods of experiment to the question immediately under their discussion. Their researches extended over a period of five years, and were prosecuted on account of the Swedish government without any regard to expense; the sole aim being to attain accurate results. In the present work the minute details of this important investigation are recorded with admirable fidelity and clearness; but while these details are of the greatest value to the man of science, it should be distinctly understood that it is by no means necessary to study them in order to arrive at the main results of the inquiry. Indeed these results are stated so plainly and succinctly as to be understood by any iron-master or practical engineer, while the refinements of the experiments and the investigation of the formulæ may, if necessary, be omitted without much prejudice to the reader.

The materials examined by the committee were obtained from the most renowned iron works of Sweden, and from the chief iron producing districts of England.

As noticed in the title of the work, the researches were directed principally to an examination of the elasticity, extensibility, and tensile strength of iron and steel; these properties being regarded as of prime importance in determining the value of railway materials. It is, however, to be regretted that no experiments were made on the relative capacities of different kinds of iron and steel to resist concussion; for railway materials are, by their nature, constantly exposed to shocks of this kind, and there seems to be a very uncertain relation between the strength of a material to resist tensile strains and to withstand the force of impact; the extensibility or power of extension under a tensile strain is, however, a character more worthy of reliance as a comparative measure between these two properties of the metal.

Formerly but little attention was directed to the connection between the chemical composition of iron or steel and its mechanical properties. During the last ten years, however, the subject has received considerable attention, especially with reference to Bessemer steel; and it is now usual to determine the carbon at most of the European steel works—thanks to the simple coloration test introduced by Prof. Eggertz.

In most of the tables appended to this work the author has given the amount of carbon in the bars examined. Considerable attention has also been paid to the influence of phosphorus on iron and steel; and the author remarks that he knows no instance of a good steel containing more than 0.04 per cent of this element.

The effect which slag exerts on iron is also noted, and under certain conditions its preference is said to be beneficial.

Not only does the author trace the connection between the chemical composition and the strength of the material, but he also examines the influence exerted by the manipulation to which the material has been subjected. In a valuable series of curves he shows graphically the manner in which the properties of iron and steel are affected by their chemical constitution and mode of manufacture.

In examining the results of some of these investigations, the manufacturer will be struck by the results obtained from "Cleveland iron" as compared with Staffordshire iron. These results are certainly not confirmed by general experience, and their explanation is possibly to be found in the author's note (p. 25) in which he tells us that the bars representing the Cleveland iron were procured through an agent, and were therefore probably selected. On the other hand, the so-called Staffordshire specimens were purchased in Stockholm, and nothing known as to their manufacture.

The author's experiments on hardening tend to corroborate a fact previously known; namely, that iron admits of being hardened, although to a far less extent than steel. When steel is hardened by being plunged into cold water, the scale of oxide formed upon its surface is thrown off, and it may be said that this behavior of the metal constitutes the only practical point of difference by which steel may be distinguished from iron.

But perhaps the most important part of Mr. Styffe's work is that which relates to the effect exerted by differences of temperature on the strength of iron and steel, as detailed in Chapter III. The subject had indeed been previously examined by Dr. Fairbairn, but in the Swedish experiments a lower limit of temperature was attained, the thermometer falling to the freezing point of mercury, or 40° Fah.

In Sweden the difference between the extremes of temperature in summer and winter is twice as great as the corresponding difference in England; and hence materials well suited for use in that climate may be dangerous for a Swedish railway.

As the same remark of course applies to other countries that suffer from severity of climate, the subject cannot be too attentively studied by engineers in Canada and certain parts of the United States.

The great point brought out by Mr. Styffe's researches is, that the bars of iron and steel tested by him for tensile strength, so far from being weaker, as generally supposed,

were actually stronger at low than at ordinary temperatures. Strange as these results may appear, the number of experiments made by the author and the care with which they were conducted, utterly preclude the supposition that any source of error has affected the results. But as the author applies these results to the question of the strength of railway materials in winter, Mr. Sandberg has deemed it necessary to institute experiments on this subject, the results of which are apparently opposed to the conclusion drawn by the author, and are presented in the form of a valuable appendix to this work.

Although the translator, as he admits, adopted a rough and ready method of testing which strikingly contrasts with the refined experiments of the author, he nevertheless has the advantage of experimenting with entire rails such as are really subject to shocks in railway traffic, while it must be remembered that the author employed bars so thin as to be little else than stout wires, and which therefore would be very considerably influenced by any slight irregularity of structure arising from the mode of manufacture.

Another source of difference between the results obtained by the translator and those by the author is to be sought in the chemical composition of the bars examined; for while Mr. Sandberg used ordinary rails, which may be supposed to contain a considerable proportion of phosphorus (the Cwm Avon rail, according to the author, contains 0.20 per cent). Mr. Styffe experimented for the most part on comparatively pure materials. But the chief source of discrepancy, doubtless, arose from the different manner in which the strain was applied in the two sets of experiments. The author examined the tensile strength of his samples, and, for this method of testing, his results are doubtless accurate: but the translator subjected his bars to the impact of a falling weight, and thus dealt with forces which are of a more practical nature. It is, therefore, as the translator justly admits, only the conclusions which the author draws from his results that require modification and not the results themselves.

To the scientific reader this work will prove an interesting and valuable work. It has received warm commendation from the scientific press of England, and will doubtless be equally well received in this country. The experiments will be of peculiar value to those interested in the manufacture of iron with charcoal and coke. We commend the work as one of much practical and scientific importance, and a valuable addition to the literature of metallurgy.

MODERN PRACTICES IN FINANCE.

The anxiety to become suddenly rich, which now so widely prevails in this country, has promoted a marked demoralization in business circles—quite different from what it was a few years since when our merchants and bankers were expected to keep themselves above even a suspicion of wrong doing.

We do not intend to say that all honor has fled the business community. On the contrary, New York, and other cities, can boast a large class of strictly honorable business men, but we do mean to say that certain transactions in and out of Wall street, if perpetrated fifteen years ago would have brought the authors to merited punishment and disgrace, but are now set down as merely shrewd operations, and their authors walk abroad among a host of admirers and would-be imitators.

The sad result of these iniquitous practices appear in the columns of our daily journals with startling frequency, in the shape of safe and bank robberies, defalcations, and other somewhat more genteel villainies. The men concerned in these things are simply noted down as "sharper," and flourish mightily on their ill-gotten gains. It would not be a difficult task to designate the parties who have been the chief instruments of this wide-spread demoralization, but when protected as they are by venal judges, it is useless for the press to expose them as they deserve.

Money in Wall street is loaned out at large usurious rates. Indeed, all respect for this wholesome law has long since disappeared from our money centers, and the "sharper" fleece all they can. Our Grand Jury has just now put on a show of virtue, and proposes to indict certain well-known money brokers, but we fear that the whole thing will be but a "flash in the pan."

Gas as a Calorific Agent.

While the use of coal gas for illuminating purposes has extended rapidly, in this country at least, its adoption as a calorific agent has been so slow as to disappoint the hopes of its early advocates. The advantages claimed for gas in this respect are cleanliness and freedom from trouble, it being unnecessary to carry coal or other fuel to feed the fire, or to remove the ashes, etc. The rapidity with which heat may be generated and the ability to instantaneously extinguish the fire are great recommendations—particularly in summer when it is desirable to perform the duties of the *cuisine* with as little elevation of temperature as possible.

The *Gas-Light Journal* says that, in England, and particularly in London, gas is largely used for cooking, and it is said to perform its office most acceptably. For families living in apartments, where the trouble and expense of carrying coal or other fuel would be great, gas has proved a great desideratum. By means of approved burners, and admixture with the proper portion of atmosphere air at the time of consumption, a large amount of heat is generated, and where sufficient ventilation may be had, the products of combustion are readily conveyed away, causing no inconvenience or injurious results. Possessing these advantages, it may appear strange that it is not more generally adopted; doubtless it would be, but for the high price of gas in this country; the ordinary

methods for generating heat have the preference because of their economy. The probability is that if the price of gas were reduced, so as to make it practicable to employ it for heating, the demand for it would increase in a large ratio, and the concession might be more than atoned for in the enlarged sales which would undoubtedly follow.

That the calorific properties of gas are equal to other agents used for heating, is proved by the fact that in analytical chemical laboratories, charcoal and other fires have been, to a considerable extent, replaced by gas, and the operations of boiling, evaporation, fusion, ultimate organic analysis, and even cupellation, are now performed by easily regulated gas furnaces, their use conducing far more to the personal comfort of the operator, than the troublesome and cumbersome stoves formerly employed. The inventions of gas furnaces, such as are constructed by Griffin and others in England, and Krause and Haskins in this country, have displayed much ingenuity, and, by their use, the laboratory of the chemist presents a much cleaner appearance than formerly—no dangerous sparks or cinders being formed, nor ashes being blown about the room, to the detriment of other substances in the vicinity.

From the success attending the use of gas stoves in the laboratory, it is safe to assert that many of the operations of the household could be performed in the same manner.

The introduction of the improved process of manufacturing gas by the Gwynne-Harris plan of decomposing high steam to produce hydrogen as a heating agent, and for a motive power, in lieu of steam power is commencing a new epoch in the history of political and domestic economy. The same process applied to the ordinary coal gas manufacture lessens the first cost of production so greatly that it will soon be a matter of consideration with gas companies whether the selling price may not be lessened, with a view to its introduction into these new industries; thus opening a much more extensive demand, which, in the aggregate, will largely increase the dividends of gas companies, and add a new element to the progress of the age.

Steel Rails—Their Durability.

The annual report of the State Engineer of New York, prepared by S. H. Sweet, Deputy Engineer, contains the following regarding steel rails: "Bessemer steel rails have been in regular and extensive use abroad over ten years. For some five years large trial lots have been laid on various American roads having heavy traffic, and during the last two years importations have largely increased. The manufacture of steel rails has also been commenced at four large establishments in this country, and some 7,000 tons of home manufacture have been produced and laid down. It is estimated that from 40,000 to 50,000 tons of steel rails are in use on our various railways. Among the users of steel rails are the Hudson River, Erie, and Pennsylvania Railway—10,000 tons or more each; the Lehigh and Susquehanna (entirely built of steel); also the Philadelphia and Baltimore, Camden and Amboy line; Lehigh Valley; New York Central; New York and New Haven; Naugatuck; Morris and Essex; Cumberland Valley; South Carolina; Chicago and Northwestern; Chicago and Rock Island; Chicago and Alton; Michigan Central; Lake Shore line; Chicago, Burlington, and Quincy; Pittsburgh, Fort Wayne and Chicago; also the Boston and Providence, Boston and Worcester, Boston and Maine, Boston and Albany, Eastern, Connecticut River, and other lines in New England.

"THE WEAR OF STEEL RAILS.—As no steel rails are reported to have worn out on our roads, the comparative durability of steel and iron cannot be absolutely determined. The president of the Philadelphia and Baltimore Railway states (in the letter before quoted) that the use of steel commenced in 1864, that the rails (25 miles in all) were laid on the most trying parts of the line; that none have been taken up on account of breakage, wear, or defect; that upon the portion of the line near Philadelphia, the first steel rail imported had already worn out sixteen iron rails; and that none of the steel rails have shown any imperfection, but are all wearing smoothly and truly.

"On the Pennsylvania Railway, the Report of the Chief Engineer for 1868 states that 11,494 tons of steel rails had been purchased, and 9,956 tons laid. The first were laid in 1864. They are all wearing smoothly, showing no change except the slight diminution of section to be reasonably expected from the heavy traffic. No steel rails have yet worn out. The report of the superintendent (Feb. 1869,) says: 'The use of steel rails continues with satisfactory results, and 4,544 tons of this material have been laid since date of last report.' It is officially reported that on the Camden and Amboy line, some of the steel rails laid three years ago are now good in places where iron lasted but a few months.

"The last report of the Engineer of the Lehigh Valley Railway says: 'Another year's wear has made no perceptible impression upon the 200 tons (of steel rails), the first of which was laid in May, 1864, none of which has broken or given out since last report. These rails have had a severe test, being, in those places in the track where they are subject to the greatest wear, laid with a chair, which is much inferior to the most approved joint now in use. There is no longer any possible doubt as to the superiority of steel over iron in economy, as in every other respect.'

"Unofficial reports from the Erie, Hudson River, and other roads, show that the above statements represent the average quality of steel rails. The last report of the New York and New Haven Railway states that 'the subject of steel rails has received special attention, and after a careful investigation of all the points involved, it has been determined hereafter to make all renewals of track with steel rails only; 2,900 tons of Bessemer steel rails have been contracted for on account of renewals for the present year.' The report of the Morris and Essex Railway for 1868 says: 'During the last

year one track through the tunnel has been relaid with steel—also some 150 tons of steel laid elsewhere. 'The wear of steel shows conclusively that economy will require its use on all heavy grades and sharp curves.' The last report of the New Jersey Railway and Transportation Company says: 'It is probable that steel rails will be gradually laid the entire length of the road, the greater durability of these rails, overcoming the objection to their increased cost.'—*Railway Times*.

Editorial Summary.

THERE seems to be no end to great engineering projects, for, besides the underground railroad which has got a start, books are now open for subscriptions to form a capital stock of \$6,000,000 for the purpose of cutting a ship's canal from New York to Newark. On the completion of the canal it is proposed to run ferry boats over it half hourly. The length of time which it is estimated a trip either way will consume is but 40 minutes—less time than it takes to go by rail at present from here to Newark. The proposed ferriage will be particularly serviceable to those who find it economical to do their transportation by team. The value of property alone to be created by its construction will reach, it is thought, between \$12,000,000 and \$13,000,000.

A GOOD APPOINTMENT.—Commissioner Fisher has recently determined to place all interference cases under the charge of a single Examiner, to be specially designated for that work and relieved from other duties; and we understand that John M. Thatcher, Esq., Principal Examiner recently in charge of the class of harvesters, etc., has been promoted to the place. The duties of Mr. Thatcher's new position are arduous and important, requiring for their successful performance a very high order of ability, with great industry and integrity. The Commissioner could hardly have made a better selection, and we are confident that the interests of inventors will be decidedly promoted by the new method of adjudicating these important cases.

THE Century Plant, about to blossom in Rochester, N. Y., has reached a height of 15 feet 9 inches, and will probably reach 20 feet. It has 20 branches and buds now visible, which are to bear the clusters. The lower branches are about 15 inches in length and 5 inches apart, where matured, and they gradually shorten until they reach the top. The lowermost arm is 11 feet 6 inches from the ground, and there are 105 distinctly formed buds in this cluster. We estimate there will be 1,500 flowers on the plant. The great beauty is the wonderful pyramidal form which it attains when in full bloom, the large clusters and numerous flowers in each, which will appear at the ends of the arms or branches, the lower ones being the longest, and gradually shortening in pyramidal form till they reach the top, where there will be a huge cluster of flowers.

A CALIFORNIA journal announces with becoming gravity that the problem of aerial navigation is solved, and that, within a year, travel will be habitually carried on between San Francisco and New York, Europe and China, by aerial carriages. It says that within four weeks, the first aerial steam carriage, capable of conveying six persons, and propelled at a rate exceeding the minimum speed of thirty miles an hour, will wing its flight over the Sierra Nevada, on its way to New York and remoter parts. The notice here given is very short, but we do not doubt that our citizens will organize to give hospitable welcome to the celestial visitor.

WE notice druggists' advertisements in some of our city exchanges of dry pure earth for surgical purposes. It is well known that earth has been used with great success lately as an application to putrid sores and ulcers. The earth kept for sale is not claimed to have any superior efficacy to other earth, but as it is difficult in large cities to obtain the proper quality of earth at short notice, its being kept in stock at apothecaries establishments, will prove a great convenience.

ON the 29th June we received a package from California having been only seven days in making the transit. This is one of quite a number lately received from various parts of California which have been only from seven to nine days in making the passage.

THE *Tribune* makes itself responsible for the statement that a man in Adair county, Iowa—name of the town not given—has invented a cannon which he claims will throw a projectile fourteen miles, and has gone to Washington to get a patent. He proposes to offer it to the Government for \$1,000,000.

THE underground railroad corporation has already commenced business and \$10,000 have been subscribed to begin work. The capital stock is fixed, we believe, at \$10,000,000, therefore there remains to be taken only \$9,990,000 to complete a work which interests all New Yorkers.

ALEX. T. STEWART returns an income for 1868 of \$3,019,218, upon which he pays a tax of upwards of \$150,000. Wm. B. Astor returns an income of \$1,072,212. Mr. Stewart is said to be the richest man in the world who has made his own money.

CREDIT was inadvertently omitted to the excellent article on "Copper, Brass, and Iron tubes," page 39, present volume, which was copied from *Engineering*.

LAVA has been known to flow over a layer of ashes, under north which was a bed of ice. The non-conductivity of the ashes saved the ice.