

Certainly, from considerations of cheapness and practicability, they would seem to leave little to be desired. The multiplication of bridges across the great rivers of the West is a movement in the direction of advanced civilization.

Solidification of Powdered Metals.

Professor Chandler Roberts Austen dealt with the formation of solid metals by compressing strongly the powders of the constituent metals. Since 1878, the labors of Professor Walther Spring, of the University of Liege, have been mainly devoted to the study of the effect of compression on various bodies.

The Architect's and Builder's Edition of the Scientific American.

The November number of this splendid architectural journal has been out a few days, and may be obtained at book stores, news stands, or by mail direct from this office. Price 25 cents.

Besides two full pages of colored illustrations of new dwelling houses, the November issue contains engravings of a number of low priced houses, of recent construction, representing the latest designs and accompanied with plan views, showing the interior arrangements of the houses.

A small country church, with plan of the arrangement of the seats, and a stable and carriage house of moderate cost, are among the many other useful subjects treated in the November number; and any persons contemplating the building of a new house, or the remodeling of an old one, will find it to their advantage to consult all the back numbers (thirty-seven already published) of the ARCHITECT'S AND BUILDER'S EDITION of the SCIENTIFIC AMERICAN, and whoever does it will be very likely to save a good many dollars, besides being better satisfied with his improvement from the good suggestions he derived from their perusal.

THE cranks of the age are for the present turning from the congenial labor of inventing perpetual motion machines to invent a new language, which they call "Volapuk." It is a conglomeration of all the modern and some of the dead languages, and an experienced linguist can see little sense in it.

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FACTS AS TO LONG LIFE.

What tends to long life is a study with more profit as facts are used for data. The editor of a Boston paper, unread in theory, sent blanks through Massachusetts to men and women of eighty years and more, inquiring as to habits, state of eyes, teeth, hearing, and the like, getting over 3,500 replies, and if in these there is nothing to refute the assertions of the theorists, there is yet not anything to sustain them.

They ate meat, save in a few cases, ad lib., and though none of them, if we take their own word for it, have drunk freely of spirits, all, or nearly all, have taken of them on occasion. These old people are from cities, towns, agricultural and maritime districts, in nearly all cases leading active lives, eating three meals a day, the dinner being, as is the custom in New England, in the middle of the day, of meat and vegetables, and pie, and very hearty. Curiously enough, though the women are of medium height, the men are mostly tall, above the average; and so greatly do blue and gray eyes prevail that other shades are notable exceptions. Baldness is rare, the hair being usually brown and thick, but the teeth are very poor or entirely gone. The report says:

"These old people, men and women alike, are early risers almost without exception, and fully nineteen out of every twenty have observed this custom throughout life, except, perhaps, in some short period of youth.

Exercise has been hard up to sixty-five or seventy years, and after that period has consisted (when the regular occupations have been given up) of walking or gardening, or both. Except in cases of sickness, these old people are as active and as fond of constant occupation of some sort to-day as most men and women are at thirty-five. One of the most significant facts gathered in this canvass is that regarding occupation. Out of 1,000 men, throughout life, 461 have been farmers; 92 have been carpenters; 70, merchants; 61, mariners; 49, laborers; 42, shoemakers; 41, manufacturers; 23, clergymen; 23, masons; 16, blacksmiths; 16, bankers; 12 each iron workers, mill hands, physicians, and lawyers; and the rest are divided among nearly all the other trades and professions. Eight hundred out of twelve hundred have been farmers' wives, and all but about fifty of the remainder have been housewives."

Tea and coffee drinking was indulged in by fully two-thirds of the 3,500, with some of them to excess; and of the men, nearly all have both smoked and chewed tobacco, the amount daily consumed by some having been enormous.

Their cares were as heavy as those which come to most of the human family, their work not less arduous. Most of them led lives which some might call monotonous, yet with occasional excitement to them as great as the intenser kinds to those more used to it.

Summing up all that the compiler has set down from the answers sent to his questions, we find that all were regular in their habits, with plenty to occupy their hands and minds and getting plenty of fresh air. This seems to be at least a primal quantity in the solution of the problem of long life. Men like these, with plenty of work and fresh air, are able to eat and smoke, even to a point we would call excess, without injury, and even to drink at times with no evil resulting. It is those of sedentary habits, who do no hard labor and get little exercise or fresh air, who must be the most careful.

QUICK LETTER DELIVERY.

No mail service can be said to be good enough while a better one may be had. In New York City such possibility is clearly in sight, the means at hand, the way clear, and all that is wanted to take advantage of the conditions existing, an order from the postmaster-general and the preparation of a time schedule. Three lines of elevated roads traverse the city, with trains running constantly and rapidly, and horse car lines bisecting them at every principal point. How easy to dispatch a letter quickly by means of these, if only some of the "routine" and manipulation now employed were dispensed with! Now, a letter posted say in lower Broadway and directed to West 25th Street, must needs be taken to the general post office. Thence it goes uptown, perhaps by elevated train, perhaps by wagon, and to the sub-station nearest. As will be seen, it is delayed while en route to the general post office, again, if it goes by the elevated, while taken afoot to the sub-station. Supposing now the sub-stations were all arranged on the line of the elevated roads or the crosstown horse car lines, and let us suppose also that the carrier, on finishing his collections from the lamp post boxes, takes his letters directly to the nearest elevated railroad station, leaving the pouch for the first post car [a small section of a car would be sufficient for the purpose, and say there was such a one every 15 minutes]. With the letters assorted simply as to the nearest sub-stations, the work could be quickly done, a man from each ready on the platform to take the packet for his station, and then hurrying off to the near-by branch office or taking a crosstown car for it, leaving a mate to await the next trains, down and up.

In this way a rapid service could be had, and a reliable one.

Like many another rule observed in public departments and "circumlocution" offices, that which provides for all letters collected downtown going first through the general office, or uptown only through certain specified "distribution" offices, is a long way around without, by any means, being the shortest way to security. At present, the collector and the distributing clerk in the post office to whom he hands his mail pouch are held responsible for letters dropped in the boxes of a certain district. Would there be any less responsibility, any less security, in handing the same letters to a similar clerk on a moving train? The system of receipts now in vogue in the post office is good enough for the system here suggested. The collecting carrier, on turning over his letters to the mail agent, might get a receipt for them, with the time of day appended; the receiver, one of the messenger from the sub-station, and so on. Thus the claimant for a lost letter need only have a record of the position of the lamp-post box he dropped it in, and the time, in order that a "tracer" might be started after it.

The business messenger boy system grew directly out of a public need of quick delivery, and the local telegraph system as well. Both are too costly for the use of the general public, not to say too slow and uncertain. The allurements of duck-on-a-rock, mumble-the-peg, and street ball are likely always to prove too strong for the average messenger boy, as well as the inclination to walk and save his fare; and telegraph offices are too few and far between to venture competition with a public messenger service supplied with well trained, well tested, well watched servants of mature years.

At present, the time required to collect and deliver a letter varies from about two hours, under the most favorable conditions, to about four—under the least. Under the plan suggested it seems not unreasonable to estimate two hours as the longest period required, and the average time as much less. There are, of course, even quicker means of letter distribution than that outlined. There's the pneumatic, which, in Europe, has proved so efficient, and here in America has been improved on. It is proposed you put your letter in a lamp-post box, and, whisp! it is in the post office before you are gone. At the post office it is put into another pneumatic tube, whence it flies to the uptown sub-station. Thus, when you drop your letter in the box, you as good as put it into the hands of the letter-carrier in the far off sub-station near its destination; its dispatch depending on him.

No doubt we shall have such a system in the future for letters, and, indeed, for small parcels as well. Till then we might reasonably expect to have a system at least as rapid as the conditions already existing will supply, and in seeking for such a system we ought not to overlook the opportunities for quick letter transit offered by the horse cars, as well as the elevated roads.

The Russian Asiatic Railway.

The opening of the great Asiatic railway has just been celebrated at Samarkand, in Bokhara, about three hundred miles from the Chinese frontier and three hundred and forty from the boundary of British India. This is the present terminus, but an extension to Tashkend, two hundred miles further north, has already been surveyed. Although constructed for military purposes, the railway will probably be utilized to develop the country commercially, and under the military administration some experiments have been made in irrigation, which show portions, at least, of the arid country through which the road passes to be capable of extraordinary fertility. Near some of the rivers, where systematic irrigation has been carried on, nine crops of clover are obtained annually, and cereals produce a hundredfold. Although the ties, as well as the rails, tools, rolling stock, and a part of the provisions consumed by the workmen, were brought from Russia, the construction was pushed with great economy, as well as rapidity, nearly four miles of track having often been laid in one day, while the total average cost of the line, including land damages, track, stations, rolling stock and other equipment, and telegraph line, having been only about twenty-six thousand dollars a mile. One of the most serious items of expense was for the provision of a regular and sufficient water supply in that desert region, for all the stations, repair shops, and workmen's settlements, but everything was done in the most thorough manner, all the stations, as well as the barracks for the military guard, which were necessarily attached to the stations, being built of stone. The method of laying the track was devised with great ingenuity, and carried out with military precision. A permanent construction train was arranged, conveying two crews, each consisting of four or five hundred native laborers, with a hundred and fifty soldiers to act as guards and overseers, and fitted with sleeping berths, kitchen and hospital cars, traveling blacksmith and machine shops, and provision cars, and attended by a private train of five or six cars, which served as the dwelling of General Annenkoff and his suite. Every five or six miles a siding was built, and when the day's

work began, the construction train was transferred to the siding, to make room for the track-laying train, which was pushed to the extreme front of the line. The track laying train consisted usually of nine platform cars loaded with rails, eight loaded with ties, four with spikes, fish plates, and other accessories, and a dozen or so with material for stations and bridges and provisions and water for the workmen, the whole being just sufficient for a mile and a quarter of track. These trains were loaded at supply stations on the finished part of the line, and sent forward at regular intervals, and three of them were often required in a day. In order to unload them quickly, and with the least loss of time in handling and transferring materials, General Annenkoff, after some experience with the usual method, of taking the rails and ties from the sides of the cars, loading them on carts, or on the backs of camels, and transporting them to where they were wanted, equipped all the cars carrying ties and rails with runways on each side, fitted with rollers, and nearly meeting at the ends of the cars, so that the rails and sleepers, instead of being thrown overboard, and then picked up and carried where they were wanted, were simply shifted to the runways, and rolled rapidly forward to the front of the train, where they were immediately laid, or taken on trucks, if required, and carried to some point in advance.—*American Architect.*

An Interesting Discovery.

A botanical announcement of interest and scientific importance has recently been made in the Proceedings of the Natural Science Association of Staten Island. It is the discovery of a peculiar and rare hybrid oak, whose affinities and exact parentage and status have puzzled botanists and led to very different opinions as to its character. It is the *Quercus heterophylla* of Michaux, commonly known as Bartram's oak, and so designated because the typical example grew on the farm of John Bartram near Philadelphia, where it had been recognized as early as 1750 as a singular and aberrant form.

Mr. Wm. T. Davis has made the striking observation of its presence in considerable numbers and in a variety of stages near Richmond Valley Station, Staten Island, "in a low, wet piece of woodland," where, he remarks, "nineteen oaks have so far been discovered, each tree having a sort of individuality."

The point of interest is this: The oaks are addicted to hybridization, and a glance among the oaks in Gray's Manual of the Botany of the Northern United States discloses a section wherein are grouped a number of "anomalous or occasional, probably some or all of them hybrid forms." Here will be found the *Quercus heterophylla*, enumerated as "a state of *Q. Phellas* (the willow oak) with dilated and toothed or cut leaves." In the same paragraph its reference to a variety of the water oak (*Q. aquatica*) by De Candolle is quoted, while in a summary of the conflicting views of botanists relative to this perplexing tree, by Mr. A. Hollick, we find this assortment of guesses: "Pursh considered it as probably a hybrid. Nuttall thought it might be an anomalous variety of *coccinea* (scarlet oak). Barton says 'supposed to be a hybrid.' Torrey also considered it a hybrid. Noll says 'doubtless a hybrid.' Meehan says that it partakes of the character of *Q. Phellas* (willow oak) and *Q. imbricaria* (laurel oak). Buckley says that the tree at Mt. Holly is 'in a thicket near several willow oaks, of which it is plainly one.' Leidy thought that a specimen which he had obtained from Burlington County, New Jersey, indicated a hybrid between *Q. Phellas* and *Q. palustris*. Englemann contended for its specific rank at first, but finally came to the conclusion that it was a hybrid between *Q. Phellas* and *Q. tinctoria*."

The value of Mr. Davis' discovery appears from this review of previous opinions, as the accessibility of the locality and the number of the specimens may lead to definite conclusions as to the precise place of this tree in botanical nomenclature.

The weight of evidence as furnished by Mr. Davis is that the Bartram's oak is a hybrid, from the great variation of the forms of the leaves, as oscillating from entire margined elliptical examples to wedge-shaped pinnatifid states, between which are a series, graduated, and connecting the extremes, of leaves irregularly sinuous in outline and asymmetrically lobed on opposite sides. He also regards the willow oak (*Q. Phellas*) as certainly one parent, since a reversion to its characteristic willow leaf type is always obvious among the foliage of the Bartram oak. The other parent is doubtful, but in Mr. Davis' note on the locality and its occupants, he says: "There are eight additional trees greatly like those just described, and each one, as has been remarked, shows individual character, but a general resemblance in branching, foliage, and acorns runs through them all. The leaves are not glossy on the upper surface, but in a few trees are slightly downy on their under side, along the mid-ribs. The character and position of these oaks would indicate that *Q. Phellas* (willow oak), with *Q. palustris* (swamp oak), are the parents, and this latter tree abounds in the locality. The largest willow oak in the

wood stands close to an equally big swamp oak, and a typical *heterophylla* about six feet high is growing up within two or three yards of their trunks. This little tree is several hundred feet away from the others of its kind."

The leaves of these trees present an interesting diversity of shapes, and reveal their composite origin. Whereas the leaves of the willow oak are simple, entire margined, and of the willow leaf shape, the leaves of the other strains of oak, as the scarlet, swamp, or quercitron, which may presumably be intermingled in the *Q. heterophylla*, are lobed and pinnatifid. These diverse tendencies in the offspring produce an entertaining assortment of various forms, and are intrinsically valuable as a contribution to vegetable heredity.

Street Bridges.

A Frenchman who was awkward enough to allow himself to be run over in the boulevards, left by will 100,000 francs to the city of Paris for the purpose of building bridges over the streets at the most frequented and dangerous points. As no measure had ever been taken, the legitimate heirs of the deceased philanthropist sued the city recently to recover the money. This woke up the sleepers, and the common council have decided on building a specimen bridge over the boulevard at the breakneck corner of the Boulevard Montmartre. If five hundred people do not interfere with five thousand conflicting opinions, Paris will be converted into a modern bridged Venice for the exhibition.

This plan of bridging a crowded thoroughfare was thoroughly tried in New York several years ago, by the erection of a foot bridge over Broadway at the junction of Fulton Street. But it proved a failure. The time and labor of climbing the stairs and the danger in descending proved to be greater difficulties to the dear people than the direct method with all its risks. So the bridge was taken down. It cost the city about \$100,000. If such a bridge were provided with comfortable cars and cable to carry people up, over, and down, it would doubtless be popular.

Danger of Fire from Iron Steam Pipes.

The nature of the fire danger of all heating apparatus where flues or pipes are laid through or near wood-work seems to be misapprehended by many who might be supposed to be well informed upon such a subject. One editorial writer, addressing an audience of artisans, compares the methods by which wood is set on fire by steam or hot water pipes or hot air flues to "the drip of water falling always upon the same place," gradually wearing the hardest rock. "Thus," he adds, "a comparatively low degree of heat acting for years upon wood is able to first char, and then, under certain external influences, to set it aglow, and finally in flames." If his premise that "the temperature to which pipes and flues are raised is never high enough to set wood afire" is true—and it doubtless is not far away from verity—then the steadiness of the dripping would insure safety, no matter how long continued. Now, the manner in which a temperature too low to start rapid combustion in wood operates in originating a fire is by first reducing the oxide of iron (rust) to a metallic condition. This is possible only under certain external conditions, among them a dry atmosphere. Just as soon as the air is recharged with moisture, the reduced iron is liable to regain, at a bound, its lost oxygen, and in doing so to become red hot. That is the heat that sets the already tinderred wood or paper ablaze. Where there is no rust there is no danger from fire with a less than scorching temperature in the pipe or flue. Hence the necessity of keeping steam or hot water fittings in good order.—*The Sanitary News.*

Electrical Fire Engine.

A recent invention is Prof. S. S. Wheeler's electrical fire engine. It is intended to be worked by the current of an electric light wire, which can be tapped for temporary service anywhere that it is wanted. Each engine will carry on a reel some 500 feet of insulated fine copper wires, bound together, cable fashion, so as to equal a No. 3 wire for transmission of the current. As "it is a good deal easier to squirt electricity than to squirt water," the engine, it is intended, shall be placed near the fire and the electric connection made as is convenient. The powerful current of an arc light wire will not be required, that of the ordinary incandescent light circuit, which is much lower in intensity, being amply sufficient to run the motor of the engine. The great advantages claimed for the electric fire engine are that it can be instantaneously started up at full speed; that it is much lighter than a steam fire engine of equal power; that it costs one-third less; that it is safer and easier of control; that it is noiseless in its operations; and that it is economical. Where there are no electric light wires in the street to be tapped, it will not be impracticable to run it by means of storage batteries charged from a dynamo at the engine house or at any other convenient established point.