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(Illustrated articles are marked with an asterisk.)

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THE NEW YORK STATE CANALS BLUNDER.

The matter of the New York State canals improvement furnishes the latest evidence of the incredible looseness which too frequently marks the construction of our public works. The slipshod manner in which the first estimates were made, the readiness with which the committee, with the most meager, and, on the face of it, unreliable, data to go upon, passed the estimates, and the amateurish defense now set up by the State engineer in his attempt to explain why that estimate of $9,000,000 must now be raised to $16,000,000, constitute a chapter in the history of public works which would be discreditable if it related merely to the building of a country bridge or the laying of a length of village sidewalk.

The plan of improvement for which a sum of $9,000,000 was voted in 1895 included the deepening of the canals throughout their entire length of 454 miles and the lengthening of the locks throughout the system. These were straightforward engineering works of a kind which has often been executed before; it entailed no untried problems; the nature of the ground was ascertainable, and the general data was of a kind which should have enabled a closely approximate estimate of cost to be made. In his published statement explaining the enormous increase of $7,000,000 in the estimated cost, the engineer gives as one reason the fact that deepening the canal has caused the old walls in many places to slip into the canal. The public will ask how these walls could be expected to do anything less when the dredge, in deepening the canal, dug away their foundations. It is further explained that it was found to be impossible to use the material dug out of the canal for raising the embankments, as at first contemplated, and that suitable material had to be excavated elsewhere, thus entailing a double amount of excavation.

To an engineer this explanation is even less satisfactory than the last; for, surely, if there was any one thing more than another that was ascertainable from the records, it was the nature of the material met with in the first construction and subsequent maintenance of the canal.

WHY ARE AMERICAN FASTER THAN ENGLISH LOCOMOTIVES?

The persistent discrediting by The Engineer, of London, of the records attributed to American locomotives has at last given way in the face of testimony so reliable as to establish the accuracy of these records beyond a possibility of doubt. The offending parties in the present instance were the officials of the Atlantic City Railroad, who had dared to assert that they were running a regular scheduled train at a speed of sixty miles an hour, and keeping well within the schedule at that.

In the midst of a voluminous correspondence, most of which proved on a priori ground that such performance was simply impossible, there appeared a letter from Mr. Clement E. Stretton, an English authority on locomotive matters, stating that a year or two previously he had himself taken the very greatest precautions in timing a train on this particular road, and that speeds equal to and exceeding those under discussion had been accomplished. Thereupon The Engineer announced, editorially, that the time had come, at least as far as that journal was concerned, to admit that American locomotives were undoubtedly faster than English locomotives, and correspondence was invited to discuss the causes of the difference. For some weeks past a vast number of letters has been published, some of which persisted in casting doubt on the correctness of the records, while others attributed the difference to construction of track and rolling stock, and a small minority, consisting mainly of those who had visited America and seen our locomotives at work, traced the superior power and speed of our locomotives to the proper causes.

Undoubtedly the fundamental difference between the two national types lies in the boiler capacity, the American boiler having from fifty to seventy per cent more heating surface and steam-raising capacity than the English boiler. Next in importance is the larger area of the steam ports in our engines, enabling them to receive and discharge the steam freely when running at high speed; and lastly, there is the smaller diameter of the American driving wheels, giving a larger tractive effort and a higher piston speed with its consequent increase of the indicated horse power. If the loads hauled, the grades, the weather and all other modifying circumstances are the same, the speed of two trains will vary as the indicated horse power, and the indicated horse power will vary as the piston pressure and the piston velocity. Good results at the piston can be maintained by providing free passages between a boiler which can furnish ample supplies of steam and the back of the piston, and an instant release of the steam from the front of piston. High piston speed can be secured by keeping down the size of the driving wheels.

Now all of these conditions are provided in the typical American locomotive. The boiler power is liberal, extravagantly so, judged by European methods; the steam passages are large, and the piston speed is high. On the other hand, the boiler power of the English engine is relatively limited; the steam passages are cramped and the driving wheels are large, giving a low piston speed. Hence it follows, as naturally as the day follows the night, that the American locomotive can haul bigger loads or haul its loads faster than those of the English type. Whether it can do the work more economically is another question. The advantage on this score would probably lie with the English engine, which is known to be a proverbially light coal burner.

THE ARCH IN STEEL BRIDGE CONSTRUCTION.

The suspension and the cantilever systems of bridge construction have heretofore been preferred in building the largest bridges, or rather the bridges of longest single span. For lengths below five or six hundred feet the simple end-supported truss and the arch have been chosen to span the rivers or ravines, but when the proposed structure has exceeded that length, engineers have preferred to adopt the suspension or cantilever structure. The popularity of the latter forms is due to the fact that erection can be carried out without the use of falsework or scaffolding, which is not only costly, but in many cases is prohibited by the natural features of the site.

Of the four forms of bridge—the truss, the arch, the suspension and the cantilever—the arch, if artistically designed, is perhaps the most beautiful; moreover, where it is possible to erect it by the cantilever or overhang system, it is, for the longer spans, the most economical. This is due to the fact that it is self-contained and does not, like the other forms, require shore arms or anchorages to counterbalance the weight or resist the pull of the central river span. At the time when the plans for the great 1,710-foot cantilevers of the Forth Bridge were published, Mr. Max Am Ende presented an alternative plan for a bridge with steel arches carrying a suspended floor, and showed that it could be erected for less cost than the cantilever design of Mr. Baker or any design for a suspension bridge. A similar comparison was made by the same engineer when the plans of the proposed North River Bridge were published, and a similar economy was shown in favor of the arch design. It was proposed to build out the trussed arches by overhang, tying them back by steel cables to temporary anchorages on shore. Whether or not the calculations of strength, stability and cost were sound, it is certain that, once erected, an arch of this magnitude would have an imposing appearance and a beauty which could not be surpassed by either of the other systems of construction.

What will be by far the largest steel arch, or arch of any kind, ever constructed is now being built across the Niagara Gorge on the site of the upper suspension bridge. At this point the cliffs are 1,268 feet apart, and 840 feet of this opening is to be spanned by a handsome trussed steel arch. What a great advance this is upon previous construction may be judged from comparison with the new railroad arch a couple of miles down the river, which was recently completed for the Grand Trunk Railroad. This has a span of 550 feet and is only surpassed by the Louis I bridge at Oporto, Portugal, which measures 566 feet in the clear. The deck of the structure will be 50 feet wide and will provide room for two trolley tracks, two driveways and raised walks for foot passengers.

The site will be advantageous for construction as the cliffs on either side will afford good anchorage for the two halves of the arch during the time they are being built out to a connection at the center of the gorge.

ELECTRIC TRACTION ON THE NEW YORK ELEVATED ROADS.

The Rapid Transit Commission has charge of the interests of the people of New York, and in furtherance of its efforts to secure improved transit facilities it has extended a standing invitation to the Manhattan Railway Company to submit a plan for the extension and improvement of the elevated roads in this city. The invitation of the citizens' commission has been steadily ignored by the company. Only at such times as there seemed to be any likelihood of a tunnel road being built has the company had anything to say, and then it has been voluble in its expressed intention to extend and improve its system. We heard many promises of this kind when the first rapid transit tunnel scheme was under review by the Appellate Justices; and now that the Metropolitan Street Railway Company—the most powerful rival of the elevated roads—has been talking of building the tunnel, the Manhattan interests have "authorized" a "statement" of the great change they are preparing to make on their system.

The public will judge for itself of the probability of these costly improvements being made except under the spur of absolute necessity. According to the authorized statement of Mr. Gould, the system is to be electrically equipped, the present steam locomotives being replaced, either by electric locomotives, or by a system similar to that on the Chicago elevated roads, in which motors are applied to each car of the trains. If the change should be made, it will constitute by far the largest electrical equipment in existence. In every twenty-four hours as many as 3,500 trains are

dispatched over the various lines and this calls for the constant service of 330 locomotives of from 200 to 250 horse power each. If this be the case it would require from 75,000 to 100,000 horse power to operate the whole system successfully. That the change would greatly improve the system cannot be doubted. Electric traction would not only be more cleanly and less noisy, but there would be a great acceleration in the speed due to the more rapid starting power of the electric motor. At the same time it is certain that even this improvement would merely enable the elevated roads to give reasonable accommodations to their present patrons—it would leave untouched the great problem of how to handle the passengers who wish to get quickly and without a stop from the lower city to the upper districts.

SUGGESTIONS FOR LABELS AND TRADE MARKS IN CHINA.

In a report recently published from United States Consul Samuel L. Gracey, of Fuchau, China, he says: On the above subject commercial missions must bring large results to nations who take intelligent methods to ascertain the needs of the world's markets and adjust their manufactures to the demands of distant peoples. The associated chambers of commerce of England sent out an expedition which submitted to its promoters matters of interest which may prove to be of the greatest importance to English trade. In order that the United States may enlarge foreign trade, it is of the first importance that its manufacturers should know not only what suits American tastes and prejudices, but what other people like and will have, and how to prepare and deliver such goods. The establishment of a commercial museum in Philadelphia and the projecting of another in San Francisco is the first organized effort of the United States business men to supply needful information and illustrations of the world's products and demands. One of the most valuable uses of such museums is the exhibition of samples of the kinds of goods used in foreign lands and illustrations of the methods of preparing and putting up such goods as command the favor of the purchasers.

A writer in a recent number of an English commercial paper says: "Closely allied to the previous grounds of the success of foreign producers is the question of packing, as to which there is a general consensus of opinion that our (England's) foreign competitors, and in particular perhaps the United States, take much more trouble than we do. The following instance is cited: HongKong—candles. British makers absolutely decline to alter their system of packing to that adopted by Continental markets; consequently, they have lost the whole trade. The personal factors which enter into successful competition must not be ignored. It is important that our manufacturers of textile fabrics should know what are the desires or prejudices of purchasers in the different markets of the world, as regards quality, weight, sizing, dressing, and the finish which will often sell low priced goods; preferred lengths and widths, and the manner of putting up and packing, freight charges, etc. An unfortunate trade mark will often doom an otherwise desirable product to failure. This is particularly true in China."

Mr. Gardner, English consul at Amoy, says: "It has not unfrequently occurred that the sale of foreign goods has been greatly crippled by having some label placed upon it that was offensive to Chinese superstition or tastes. Many colors have peculiar recognition by the people; some offend their tastes and others their superstitions. Some are all right on some kinds of goods and all wrong on others. The Chinese will often buy biscuits, needles, thread, matches, soap, medicine, scent, sweets, etc., for the sake of getting a lucky label. Some colors and combinations of colors are to the Chinese unlucky." The same gentleman has furnished his government with some four hundred designs for trademarks and labels which, in his judgment, would be popular with the Chinese people. I have no means of knowing what he has furnished, but from my own observation of what is displayed in shops and what is manifestly pleasing to the people, I give herewith a few specimens of things most frequently seen, and which I therefore think must be popular.

Simply naming these things will not supply sufficient data from which to prepare them. It must be remembered that Chinese art is very peculiar, and a tiger, as ordinarily represented by foreign artists, would not meet with favor with these people. It must be a tiger according to Chinese imagination and art, of unreasonable length of body or bigness of head or curve of tail, and impossible attitudes. On a popular Japanese match box is displayed a monkey standing on its front feet, head nearly touching the ground, with hind feet up in the air, and tail whipping the skies. The grotesque and even hideous, to the American mind, tickles the fancy of the dwellers in Far Cathay. No description can supply adequate information to an engraver or colorer by which he could produce the real thing, and any departure from the Chinese fancy in such things would brand the goods at once as the product of a "foreign devil" and doom it to defeat.

A Chinese dragon differs from a Japanese dragon in its contortions. A royal dragon must have five claws, while the plebeian beast has only four. A stork must always stand on one leg or, flying, must present an enormous spread of wings and trailing long legs. All Japanese birds, when flying, must have a tendency downward, never up or on a straight course. To a Japanese, nothing is preferable to the representation of snow-capped, sacred Fusiyama, as seen on nearly all Japanese fans, screens, etc.

The following are some of the labels, trade marks, etc., which would be useful in the trade of the Far East:

Animals.—Lion, tiger, deer, fawn, leopard, ape, elephant, camel, dragon, buffalo, man plowing with water buffalo, boy riding water buffalo, woman in bright robes holding a long-necked vase on her shoulder while on one side of her is a monkey holding a chrysanthemum in its mouth. Many of these animals are represented in various attitudes—leaping, running, standing on hind legs; some with enormous heads out of all proportion to the body, while some have a long body out of all proportion to the other parts.

Trees.—Banyan, fir, pine, olive, palm, fern, yucca, cactus, tea plant, tea field, orange, banana, pineapple, etc.

Fish.—Dolphin, double dolphin, reversed, carp, double carp, crab, lobster, etc.

Birds.—Pheasant, peacock, paddy bird, stork, cormorant, duck, goose, cock, generally represented flying.

Flowers.—Chrysanthemum, sunflower, lily, rose, twining vines, jessamine, wisteria, etc.

Objects.—Women, archer, trident spear, umbrella, fans (open and shut), open fans with quotations from the classics written on them, long fans (oblong, square and round, all having figures of flowers, animals, birds or butterflies painted on them), houses, temples, books, arches, coolies carrying chests of tea or other articles suspended from ends of bamboo, soldier, flags, banner, ships, junks, sampans, battleship, men fishing with cormorants, tobacco pipe, opium pipe, abacus or Chinese calculating machine, dragons, a long dragon lantern borne aloft on poles by eight or ten men, kites of many shapes, men flying kites, men playing with shuttlecock with feet, wedding chair, wedding procession, lanterns in scores of different shapes, Chinese hats with different colored buttons, mountains, rivers, bridges of granite slabs with high, sharp, arch, and canal boats in canal.

Geometrical figures.—Square, triangle, circle, octagon, square inclosing circle, triangle or octagon and vice versa, a circle with triangles pendent, circle with triangles above and below, large octagon inclosing two smaller ones with figures between the lines and circle in the center and other combinations of figures, Chinese characters for good luck, happiness, longevity, health, prosperity, double happiness; checkered figures, stripes in bright yellow, green, blue and red.

Fruit.—Pear, orange, pumalo, banana, grapes, lichee, mango, pineapple, arbutus, persimmon.

Insects.—Caterpillar, dragonfly, cricket, butterflies of many shapes and colors.

Illustrations of all these things could be obtained at a small expense and could be supplied by consuls in different parts of the Chinese empire.

GOLD JUBILEE IN CALIFORNIA.

Preparations are being made for a celebration at San Francisco of the fiftieth anniversary of the discovery of gold in California. Beginning on Monday, January 24, the whole week will be devoted to the entertainment of the vast crowds that will be present. The citizens and merchants have already contributed $50,000, and more will be forthcoming if required, and the citizens of the State will contribute as much more, besides expending large sums in exhibiting in the most liberal manner the splendid mineral resources from each of the several counties. One of the legacies surviving the former occupants of the State is a fondness for public shows, and in this instance the whole State unites in celebrating in the most extraordinary manner an event fraught with the most wonderful results to the whole world.

Fifty years ago Capt. Marshal found the first gold nugget in Eldorado County. Gold had been discovered previously in San Diego County by the mission fathers, who suppressed the fact, owing to the dread of the consequences upon their Indian wards by the influx of adventurers, sure to be attracted by such an announcement.

For the fifty years ending January 1, 1897, California has produced $1,303,571,598 of gold. In this short space of time the world has been enriched by this amount from one State alone. What the consequences have been by the addition of this store of wealth is a matter of history. In no such brief period has civilization, material prosperity to the masses or inventive genius been so stimulated or advanced with an equal degree of rapidity as in this one, and California throbs with pride in the consciousness that out of her exhaustless resources this magic result has been accomplished.

All classes of citizens, from the Chinese to the aborigine, will unite in the celebration of the event. The former by processions of dragons, and the latter by displays recalling the habits of past generations. Floats representing the progress of the State from Cabrillo and Drake to the present will appear in grand procession, while the government will thunder its salutes from the quaint 16-inch guns at the Presidio, with all those from the surrounding forts of the bay, together with the guns from every ironclad and cruiser that can be concentrated in the harbor of San Francisco. Plans have been laid for an illumination with colored fires of each island in the bay and on every one of the hundred peaks that are visible from the peninsula, promising a spectacle seldom exceeded in splendor. The whole country west of the Rocky Mountains will be in San Francisco on this "jubilee" week. At least 500,000 persons will be present, the large majority of whom will be more or less directly interested in mining.

The most impressive fact of this celebration will be a display of mining resources of the State and the machinery for extracting its mineral wealth. A very large appropriation has been made for this purpose. The Mechanics' Pavilion, the largest building in the State and fitted up with motive power and shafting, has been engaged, and all the manufacturersof mining machinery in the West are preparing to compete for the distinction of making the most creditable display.

The agents of Eastern manufacturers are united in an effort to demonstrate the superiority of their fabrications, and the result cannot fail to be the most splendid display of invention and ingenuity expended in perfecting mining processes that was ever known. The opportunity will be given of comparing present processes with those employed half a century before.

The pitiful resources of the miner of '49, by which so great wealth was extracted from the soil, with the wonderful mechanical devices of the present, will be shown side by side.

THE FRUIT CURE.

The so-called "fruit cure," although not much heard of in England, says Nature, is well recognized at various places on the Continent, where so-called grape cure stations have been established. In a recent number of Modern Medicine and Bacteriological Review there is an interesting article on the subject, in which the historical side of the question is dealt with. Thus we are told that many medical authorities in the tenth century became enthusiastic in their writings over the remarkable curative virtues of grapes, while a certain Van Swieten, of a more modern date, is said to have "recommended in special cases the eating of twenty pounds of strawberries a day." The same gentleman also reports a case of phthisis healed by strawberries, and cites cases in which maniacs have regained their reason by the exclusive use of cherries as food! These instances rather savor of the miraculous; but there is no doubt that the so-called grape cure, for indigestion and other evils, is carried on in many places on the Continent, and that people betake themselves to Meran, Vevey, Bingen, or to Italy and the south of France with the intention of devoting six weeks to the cure, during which time they are expected to have gradually accomplished the feat of consuming from three to eight pounds of grapes daily, as the case may be. Grapes are said to exercise a salutary action on the nervous system and to favor the formation of fat, that is to say, when fruit of good quality is employed; if the grapes are not sufficiently ripe, and are watery and sour, the patient may lose rather than gain in weight. Dr. Kellogg, director of the Sanitarium Hospital and Laboratory of Hygiene at Battle Creek, Mich., is of opinion that the valuable results obtained by a fruit diet in cases of biliousness which he has observed are due to the fact that noxious germs habitually present in the alimentary canal do not thrive in fruit juices.

A HUMANE RAT TRAP.

A recently issued patent in the way of traps for rats, mice, etc., duly mentioned in another column, seems to us worthy of some additional notice. The inventor describes ordinary traps as "at best inhuman and cruel, as they kill the animal more or less quickly, subjecting it to torture arising from its imprisonment, as well as the possibly much greater torture arising from the contemplation of its impending fate," and adds that "these animals soon become very shrewd, it often happening that after a few have been caught and killed the others become so knowing that it is impossible to tempt them into traps with any kind of bait." As a more humane and efficient method of ridding a house of these pests the inventor provides a trap which, as the rat goes into its wide open entrance, will spring upon the body of the rat an elastic band to which are attached bells and bunches or tufts of cotton or other material, painted or coated with phosphorescent paint. The rat, it is claimed, will then "immediately run away, with the bells tinkling and the plumes waving, so frightened that he will make a tour of all his holes and runways, meeting all his brethren and frightening them by the sound of the bells, the phosphorescent tufts, and his fantastic appearance." It would not be strange if "this being kept up for a short time would drive all the rats away."