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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 198,

For the Week ending September 13, 1879.

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THE AMERICAN WAY.

One of the secrets of the variety and success of American manufactures is the readiness with which the manufacturers receive suggestions from their customers. If a buyer from a distance says that an article would better meet the wants of his locality if certain alterations were made, the American maker hastens to supply him with the thing he wants. Not unfrequently he will send a competent man to study the conditions of the distant region, that the required adaptation may be more certain and efficient, or an entirely new contrivance invented to supply the need.

In English and other European shops the man who wants something new constructed, or an alteration made in some standard article, is very apt to be snubbed. They have no time to waste on such experiments; and even if the new device should prove a slight improvement, they think it wouldn't pay to alter patterns and machinery to make it.

The result is, American manufacturers are not only monopolizing the home trade by the superior quality and fitness of their products to meet home wants, but by the same tactics they are gaining a permanent footing in foreign markets.

A characteristic illustration is furnished by a correspondent of the London *Times*, writing from Sydney, New South Wales. He says:

"It is a great thing to get control of the market, and the first thing is to get a good footing, and the Americans are certainly pushing for that with an energy which at least deserves success. Our railway department is putting together three large new locomotives from Philadelphia. Their design is the result of close personal observation of our precise wants by one of the partners in the firm of Baldwin & Co. I am not prepared to say whether these engines will prove in every respect better than those which we get from England, but I do not remember any English firm taking the same pains to study what we want to deal most successfully with—the steep gradients and sharp curves of our railway on the Blue Mountains. Perhaps it is not worth the while of the English makers to attend to such petty details, but the Americans think differently."

And, we may add, American manufacturers do not consider such details "petty." Tools and machinery are somewhat like animals and plants, in needing to be thoroughly adapted to their environment. The difference between an organism which thrives in England but will not in Australia, and one of the same genus which will thrive in Australia, may be inappreciable to the unskilled observer; but it is vital, and outweighs all the points of resemblance. So a machine, perfect from the standpoint of England or America, might fail utterly to meet the different needs of another region, though the alteration required to adapt it to the new conditions might be comparatively slight and easily perceived by an expert on the spot.

THE PROPOSED PANAMA SHIP-RAILWAY.

The St. Louis *Exporter and Importer* has taken pains to get from several engineers of high standing an opinion as to the feasibility of the ship-railway project for the Isthmus of Darien, set forth in the communication of Captain Eads already placed before the readers of this paper.

Chief Engineer Chanute, of the Erie road, writes that he had already given considerable attention to the scheme, arriving at conclusions almost identical with those of Captain Eads as to its feasibility and general features. He would, however, double the number of wheels proposed for each cradle, so as to give an average load of five tons to each wheel, sustaining the cradle, ship, and machinery (say 10,000 tons in all) on 500 trucks of 4 wheels each. To carry these wheels he proposes eight parallel tracks, 13 feet between centers, or 96 feet over all; the cradle to be 500 feet long, 50 feet high, and 44 feet wide, with a total base of about 110 feet. Instead of the 500 foot turntables suggested by Captain Eads, Mr Chanute would make the turntable a part of the cradle by giving the trucks a transversing motion, at right angles to the axis of the cradle, sufficient to enable them to assume the proper position on the chord subtending the curves adopted, for a length equal to that of the cradle. Grades of one per cent would have to be adopted, and with a railway 60 miles long a steamer could be transferred from ocean to ocean in 12 hours by the employment of about 8,000 horse power. The cost of working should not be over one fourth of a cent a ton a mile, the weight of the vessel and cradle being included, or three fourths of a cent a ton a mile on its contents. Even at half the traffic estimated by the canal commission the road would pay handsomely.

Mr. C. Shaler Smith thought the only question in doubt was one of finance. Though a grand undertaking it would be by no means a difficult one, and the estimate of Captain Eads, $50,000,000, would fully cover the outlay. The enterprise would most undoubtedly pay. The tidal variation at Panama—20 to 25 feet—would make the handling of shipping there comparatively easy. At Aspinwall, with a tidal variation of about 18 inches, the entire lift would have to be made by supplied power. A caisson on an inclined plane would probably be the best form of lifting dock. He would hang the ship in the cradle in flexible slings composed of woven bands of steel wire rope, 5 feet wide and 1 inch thick. These slings would be connected with the cross heads of a number of hydrostatic presses placed along the cradle and connected by a pipe common to all, so that the ship would be always carried on an even keel, the same as though floating in a caisson. Ten parallel tracks, of 3 feet gauge, rails not less than 6 inches high, and tracks 10 feet apart, would be needed. This would give a total wheel base of 93 feet by, say, 460 feet for the largest cradle. Assuming a maximum load of 9,500 tons, 432 trucks, or 1,728 wheels, would be needed—a result substantially in accordance with that arrived at by Mr. Chanute.

As a method of supplying power for the transportation of the cradle, Mr. Smith suggests the Belgium wire rope towage system. If possible, level grades should be carried up to the base of the summit hills, and then by concentrating all the grades at one point the cradles could be moved over the summit by powerful stationary engines. If the summit can be passed, however, with a maximum grade of 20 feet per mile, then movable engines, drawing the cradles and themselves by steel wire towlines, laid in the middle of each track, and passing over and grasped by "Fowler clip pulleys" attached to each engine, will be the most economical method of locomotion in all probability. The power needed to transport the greatest load, with curves of 12,000 feet radius and grades of 20 feet per mile, would be 200,000 pounds, requiring steel ropes of 1½ inch diameter each. However, as these would form a costly part of the outfit, the relative economy between this system and that of the locomotive engine, for this peculiar service, can only be determined by exact calculations.

Mr. Henry Flad, C.E., writes that he has taken pains to inform himself in regard to the surveys and estimates for ship canals across the Isthmus, and has carefully estimated the cost of construction, maintenance, and operation of a ship railroad. Briefly stated, his opinion is as follows:

1. That the first cost of the construction of a ship railroad will not be one fourth of that of a ship canal.

2. That a ship railroad can be constructed in probably one third of the time required to construct a ship canal.

3. That ships can be transferred on such a railroad with absolute safety, and with the same dispatch as through a ship canal.

4. That the cost of maintenance will be less for the railroad than for the canal.

5. That although the cost of transferring ships by ship railroad will exceed that of passing them through a ship canal, the difference will be insignificant compared with the saving of interest on the first cost.

6. That the ship railroad will therefore offer a better and safer investment for capital.

The unanimity of these experienced and able engineers with regard to the feasibility and economy of a ship railway for the Isthmus is, to say the least, noteworthy and encouraging. Like all grand undertakings it presents an almost inexhaustible field for engineering skill and inventive talent; and it is gratifying to see that American engineers are so prompt to grapple with the novel difficulties presented.

RECENT INDUSTRIAL PROGRESS.

Speaking of the revival of industry that has taken place since preparations for the resumption of specie payment were begun in the spring of 1877, Secretary Sherman said, in a recent speech:

In the production and manufacture of cotton the progress during the past four years has been unexampled, showing an increase of 30 per cent. The increase in the number of bales taken within the last two years over the two preceding years is 417,517, or more than 14 per cent. The present cotton year, ending in September, will show a more rapid rate of increase. The number of spindles has increased from 7,114,000 in 1870, to about 10,500,000 in 1878, an increase of over 47 per cent. The woolen manufacturing industry has recently received a strong impetus, which in a few weeks sent up the price of wool 20 per cent, and greatly encouraged the business of wool growing, and started many of the woolen manufactories that had been lying idle. The production of breadstuffs and meats has been enormously increased within the last year or two, and a ready market has been found for the surplus production. The net increase in pork packing is 38 per cent. The increase in beef production has been constant and progressive, stimulated by prices that have scarcely declined during the past two years. There has been a marked revival in the iron trade during the last two years. In 1873 the production of pig iron in this country reached its maximum, amounting to 2,868,278 tons. Under the influence of the panic it fell off to 2,093,236 tons in 1876. In 1877 it increased to 2,314,585 tons, and in 1878 to 2,577,361 tons. This year, it is believed, the production of iron will be as great as that of the most prosperous year in the history of this product.

The Yellow Fever.

The steady progress of the epidemic in Memphis has been less startling than last year, but for all that, sure and fatal. From 20 to 30 new cases daily, in a town so depopulated as Memphis now is, and where of those that remain so many are protected by previous attacks, is indicative of a potent and concentrated infection. Of other towns, Corinth, Miss., has had one or two cases. Mayersville, Miss., is also reported as suffering. It has been very properly decided to continue perfecting the system of isolation of Memphis, under the rules of the National Board of Health, which have already given such good results, to use every possible means to induce the negroes, who constitute the main source of danger in Memphis, to move into camps, and thus deprive the fever of material to work on; to secure the isolation of cases and affected houses, blocks, and districts, and to effect this by combining as far as possible the resources of local, State, and national boards with those of the Howard Association and of the taxing district and county authorities, and thus limit the spread of the disease.

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Dr. W. L. Coleman, of San Antonio, Texas, who was ordered by the National Board of Health to investigate the origin of the yellow fever prevailing in Memphis, has been at work for a month past, and his investigations convince him that the germs were imported direct from the West Indies, and that they passed the New Orleans quarantine unchallenged, and arrived in Memphis some time in June.

THE COMMISSIONER OF PATENTS IN A DILEMMA.

It will be remembered that in 1877 the roof of the Patent Office building was destroyed by fire, and a great number of models were burnt and broken. Since then a great deal of discussion has arisen as to what improvements should be included in the repairs, and considerable time consumed in getting the necessary appropriation allowed by Congress before the work could proceed. But finally a plan was decided upon and an appropriation granted, and the work has progressed quite rapidly during the summer.

The iron work for the support of the roof and the new gallery is already nearly completed and in place, and the whole building is expected to be roofed in by the middle of October. But owing to the breaking up of the old roof to allow the ironwork to be placed in position, considerable inconvenience has been experienced from the rain. A correspondent of the Philadelphia *Bulletin* relates the observation of a gentleman who had business with the Commissioner of Patents, and called upon that official during one of the days of the late severe rainstorm, and found him sitting in a corner of his office, having moved his desk away from the usual place in the center of the room, in order to escape the rain which was trickling down through the roof and the floors above. A colored messenger, having collected all the available spittoons, was engaged in moving them about from place to place in the Commissioner's room wherever he saw signs of a new leak, in order to protect the carpet from the rain. Several of the adjoining rooms occupied by the Deputy Commissioner and clerks of the Patent Office and a portion of the hall of the main floor were in a still worse plight. Beyond the temporary inconvenience of the officials no damage was done, as the records and files of the Patent Office were kept in better sheltered quarters.

THE RED SPIDER ON ROSES.

H. M. Hill, Clancey, Montana, sends us specimens of his roses, the leaves of which are seared and yellow, and asks the cause and cure.

A careful examination shows that the plants have suffered from what is commonly known as the red spider (*Tetranychus telarius*). It is a true mite and not a spider, though belonging to the same subclass.

Among the mites we find many species, some beneficial to man, others noxious. In a list of the former we may mention the locust mite (*Trombidium locustarium*, Riley), which preys upon both the locust and its eggs. It is an important auxiliary in checking the multiplication of the Rocky Mountain locust. Another species (*Uropoda Americana*, Riley) preys upon the Colorado potato beetle; while still another (*Trombidium muscarum*, Riley) infests, in the larva state, the common house fly.

Among the noxious species are the itch mite, the cheese mite, the jigger or harvest mite of the more Southern States (*Leptus Americanus*, Riley), and the one at present under consideration, the red spider.

A curious fact in the life history of these tiny creatures is that they are born with but six legs, though in the adult state they have eight.

The red spider, which is such a pest to the florist, thoroughly dislikes water. It cannot thrive in a humid atmosphere nor on plants often drenched with water. On the other hand it multiplies rapidly in a dry air, so that some florists consider it a certain evidence that their plants are not receiving sufficient water when the spider appears.

Drench the leaves of infested plants often with water in which is a little whale oil soap. See that every leaf is thoroughly moistened, and repeat the sprinkling frequently according as the weather is hot and dry, and the pest will soon disappear. It is bad on vines and shade trees only in the hot, dry weather of midsummer, and needs most watching then.

RAPID PHOTOGRAPHING.

Mr. Muybridge's method of photographing horses in rapid motion has lately been applied in San Francisco to the study of human action, particularly that of athletes while performing their various feats. In order to display as completely as possible the movements of the actor's muscles, they wore brief trunks only while performing, and thus all the intricate movements of boxing, wrestling, fencing, jumping, and tumbling were instantaneously and exactly pictured.

The first experiment was in photographing an athlete while turning a back somersault. He stood in front of the camera motionless, and at a signal sprang in the air, turned backward, and in a second was again in his original position, and in his very tracks. Short as was the time consumed in making the turn, fourteen negatives were clearly taken, showing him in as many different positions.

The same man was also taken while making a running high jump. The jumping gauge was placed at the four foot notch, in order to give an easy jump, as in making it fourteen stout hempen strings had to be broken, as in photographing trotting horses. From the camera to a point beyond the line on which the jump was made, a number of strings were stretched. The two base lines were only a few inches above the ground, and from them to the apex the strings were placed an equal distance apart. In jumping, seven of the strings were broken in ascending and seven in descending. The strings were tautly drawn, and so connected with the camera that as each one parted a negative was produced.

Other pictures were taken of men raising heavy dumbbells, and the various movements of boxing, fencing, and the like.

CURING BEEF BY INJECTING BRINE.

The infiltration system of salting beef, by filling the blood-vessels with brine, is attracting considerable attention in Australia. In some recent experiments at Brisbane, bullocks were treated as follows: At the instant of killing the animal's heart was laid bare, and incisions were made in both ventricles. Into the orifice of the left ventricle a pipe was inserted, and a stream of weak brine was forced through the blood-vessels, washing out all the blood. Pressure was obtained by having the brine in an elevated tank. After the expulsion of the blood the right ventricle was closed by a clamp, and stronger brine was forced in until all the blood-vessels were full. In this way the distribution of the brine through every part of the meat is said to be complete and the curing perfect. It is proposed to send to the Sydney Exhibition a whole bullock thus preserved.

LIFT LOCKS AND LOCKING-TIME.

At the Paris Canal Congress one of the chief objections urged against a ship canal with locks was the alleged great delay incident to locking. It was said that from one to two hours would be consumed in entering a ship, closing the gates, filling the lock, opening the gates, and leaving. The eminent English engineer, Sir John Hawkshaw, said that fifteen minutes would suffice for all these operations. Admiral Ammen says that this estimate is still further reduced by General Weitzel, U. S. Engineer, to eleven minutes. General Weitzel has for many years been engaged in building and operating locks, and in July next will have completed, at Sault Sainte Marie, Michigan, the largest lift lock on the globe. Its dimensions are: Length, 515 feet; breadth, 80 feet; lift, 18 feet; gates to admit vessels of 60 feet beam.

The Mississippi River Commission.

The first session of the Mississippi River Improvement Commission was held in Washington, August 20. A committee was appointed, composed of General Harrison, of Indianapolis; Professor Mitchell, of the United States Coast Survey, and Major Suter, of the Engineer Corps, to submit recommendations as to the best method of obtaining and compiling statistics of the trade, commerce, etc., of the Mississippi Valley, and such other data as may be required for the use of the commission. Another committee was appointed, consisting of General Comstock, of the Engineer Corps; Professor Mitchell, of the Coast Survey; Major Suter, of the Engineer Corps; and Major Harrod, of New Orleans, to prepare a plan for the future work of the commission, and to make such recommendations as they deem necessary with regard to the use and expenditure of the existing appropriation of $175,000.

St. Louis has been selected as the permanent headquarters of the commission, and the office there will be under the immediate charge of the permanent secretary, who will be the executive officer of the commission, and act under the direction of a committee to be selected from among the members who reside in the West.

Sir Rowland Hill.

Sir Rowland Hill, to whom the world is so largely indebted for cheap postage, died at his home in Hampstead, England, August 27, at the age of eighty-four years. Sir Rowland was born in Yorkshire, December 3, 1795. His first occupation was as mathematical tutor in a school near Birmingham. As secretary of the South Australian Commission, he aided, in 1835, the founding of the colony of South Australia. It was about this time that he first turned his attention to the defects in postal organization, and in 1837 he published a pamphlet on the much needed postal reform. His exertions resulted, in 1838, in the appointment of a special committee of the House of Commons, and in August of the same year the commission reported in favor of adopting the plan of a uniform low rate of postage, as recommended by Mr. Hill, the evidence having proved that injurious effects resulted from the old state of affairs to the commerce and industry of the country, and to the social habits and moral condition of the people. In 1839 more than two thousand petitions were presented to Parliament in favor of the scheme, and in 1840 it was carried out.

The labors of Mr. Hill in putting the scheme into execution were protracted and severe. For many years he held the office of Secretary to the Postmaster General. He was knighted in 1860, and retired from office in 1864, on account of failing health.

Henry J. Rogers.

Henry J. Rogers, who assisted in the erection of the first telegraph line between Baltimore and Washington, died at his residence in Baltimore, August 20, aged sixty-nine years. He was subsequently superintendent of the North American Telegraph Company, and was the author of the code of marine signals now in use at all the ports of the country.

THE AMERICAN SCIENCE ASSOCIATION.

The annual session of the American Association for the Advancement of Science began, August 27, at Saratoga, New York, with an unusually full attendance of members. Considerable preliminary business was transacted, but no papers were read.

The address of President Barker was the principal feature of the morning session. In the course of his remarks, the object of the association was declared to be the advancement of science not only by the discovery of new truth, but also by the diffusion of that already known. To this end it extends a cordial recognition to all organizations of what ever sort whose objects are akin to its own. Being itself national in character—for science knows no country and no section of country—it gives its indorsement to all local enterprises, and stands ready to assist them in any legitimate way. Whether it be a State, geological, or topographical survey, an academy of science, or association or individual seeking to unravel nature's secrets, the association desires to strengthen their bonds and to uphold them in the communities where they are located. Its province is to awaken an interest in pure science; or, where such interest already exists, to develop it to the full. It invites all interested in science to its membership, and opens its sessions to all comers. That its periodical and migratory meetings, in the words of the constitution, have actually done what they were intended to do, have promoted intercourse between those who are cultivating science in different parts of America, have given a stronger and more general impulse and a more systematic direction to scientific research, and have procured for the labors of scientific men increased facilities and a wider usefulness, no one who has watched its history can doubt.

Less perfect acceptance, we fancy, will be accorded Mr. Barker's subsequent remarks, in which he excludes inventors from the ranks of original investigators and discoverers. It is true that in very many instances the discoverer has not been an inventor, and that discovery has usually been the real mother of invention; true, also, that original research is the storehouse out of which comes invention. But it will not do to assume, as Mr. Barker appears to, that discoveries are made only or generally by men who "patiently investigate truth for its own sake," and "deny" themselves "the good things of this life to obtain it." There is rising up among us a generation of inventors, who are also explorers and discoverers of the most energetic and successful type; and they push the work of investigation and invention with no intention of denying themselves the good things of life. Their inventions pay; but their discoveries are none the less scientific and honorable.

On the second day the proceedings of the association assumed their regular scientific character. A number of interesting papers were read and discussed, and in the evening the retiring president, Prof. O. C. Marsh, delivered the customary address, reviewing the "History and Methods of Palæontological Discovery." It will be found in full, commencing in the current issue of THE SCIENTIFIC AMERICAN SUPPLEMENT.

In Section A, the address of Prof. Ira Remsen, Chairman of the Sub-Section of Chemistry, was read, in the absence of the author. It was devoted to the chemistry of the organic compounds, a department sadly neglected in American colleges. This paper was followed by one on the "Experimental Determination of the Velocity of Light," by Albert A. Michelson, U.S.N., specially describing and illustrating the experiments lately conducted at the Naval Academy at Annapolis. This valuable paper also appears in full, with numerous illustrations, in this week's SUPPLEMENT. The result obtained—186,305 miles a second, with a probable error of 3 miles—falls nearly midway between those of Foucault and Cornu. Prof. Newcomb, who has been conducting a series of similar investigations, expressed the belief that Mr. Michelson's results are probably within $\frac{1}{500}$ of correctness.

In Section B, the first paper was by Prof. Warren Upham, of the Geological Survey of New Hampshire, on the "Succession of Glacial Deposits in New England." It was read by Prof. C. H. Hitchcock, and discussed by Profs. Martin, Lislie, Gardner, S. H. Cook, W. H. Niles, Worthen, and Hall. The conflict of opinion showed how far the subject is from being thoroughly and satisfactorily worked out.

The second paper was by Prof. J. M. Safford, of Nashville, on "The Thinning Out and Absence of Upper Silurian and Devonian Formations in Tennessee."

It was followed by a discussion, after which the recently discovered copper veins at Blue Hill, Me., were described by Professor C. H. Hitchcock, of Dartmouth College, who exhibited specimens of ore containing 34 per cent of copper. Evidences of silver and even of some gold have been discovered, and probably the silver will be ultimately worked with success. Major Powell spoke of the work done on the eastern flanks of the Rocky Mountains and on the eastern side of the Sierra Nevada.

Among the remaining papers of the day, that by Dr. Clarence J. Blake, on the "Consonantal Expression of Emotion," was the most interesting. A number of linguists and ethnologists took part in the discussion which followed, bringing out many curious and amusing peculiarities in the pronunciation of foreign, cultivated, and savage languages.

A PNEUMATIC DISPATCH TUBE.—Shavings from a planing mill in Chicago are, by an air-blast, blown 700 feet, through a 15 inch sheet iron pipe, to a distillery, where they are burned for fuel.

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