A RESULT OF THE MISSISSIPPI JETTIES.

As a direct result of the success of Captain Eads' jetties at the mouth of the Mississippi River, is noted the present remarkable demand for huge grain carrying barges for the transportation of wheat from St. Louis to the ocean-going vessels at New Orleans. This demand for barges is supplemented by the recent purchase of several of the most powerful towboats ever built at Pittsburg, and which were originally designed for the coal trade. With 20 feet of water assured at South Pass, where the jetties are located, the river transportation of grain to ocean huils bids fair to assume proportions that must jeopardize the overland carrying of grain between the upper Mississippi and the seaboard. Within the past few weeks the St. Louis and New Orleans Transportation Company and the Mississippi Valley Transportation Company have been in the market as purchasers for steamers and barges. The latter are of the variety known in Western waters as the "model" barge, in contradistinction to the coal or square barge. These craft are built to a model, and those recently contracted for are of the following dimensions: Length 225 feet, width 36 feet, hold 9 feet. The "cargo box" or receptacle for grain has a capacity for 60,000 bushels or about 1,500 tons. At present forty such barges are being built at different yards along the Ohio River, and the total number of barges that will soon find employment in the grain-carrying trade between the points named is placed by good authority at 120. A "tow" of such barges consists, under favorable circumstances, of five, a loaded barge drawing about eight feet. To make the round trip between St. Louis and New Orleans requires twenty days, and the freight on wheat averages 8 cents per bushel. The lack of return cargoes prevents this rate from being as great a "bonanza" as would appear from an income of $24,000 for a three weeks' job. Nevertheless it is a good thing for those engaged in this wholesale way of sending grain down the "Father of Waters." As a fair sample of the amount of merchandise carried by one "tow" of barges of less size than those described above, the following is appended: The steamer Jno. Gilmore's barges arrived at New Orleans within the past week, from St. Louis, with the following cargo: 680 bbls. and 315 half bbls. flour, 188 bbls. meal, 110 bbls. grits, 4,258 sks. corn, 200 sks. malt, 55 bbls. oil, 10 bbls. apples, 380 pckgs. lard, 786 bales hay, 39 pckgs. sundries, 101,499 bushels wheat, and 25,000 bushels corn in bulk.

STRENGTH OF YELLOW PINE.

From a paper read by Prof. R. H. Thurston before the American Association for the Advancement of Science, we find some very interesting facts relative to the strength of yellow pine and other timber. Prof. Thurston made experiments for determining the modulus of elasticity, using a very large number of specimens in his trials. He found that the deflection of timber bearing a load and supported at the extremities is very nearly proportional to the load, even far beyond the customary limits of strain, and that the modulus is very nearly constant for all moderate deflections. When higher loads (as one fourth or one eighth the maximum) were imposed for a considerable time, as ten or twenty minutes, the deflection gradually increased; on removal of the weight it steadily decreased, returning nearly to its original set. Heavy loads, long applied, produced fracture of pieces, the companions to which resisted considerably more when the load was increased steadily up to the moment of fracture. The maximum permanent load was apparently something less than one half and greater than one third the maximum load which could be sustained under ordinary test.

From the whole series of experiments Prof. Thurston drew the following conclusions: The elasticity of yellow pine timber, such as is usually used in construction, is very variable, the modulus varying from 1,000,000 to 3,000,000, the average being about 2,000,000 in small sections, and a little above 1,500,000 in large timber; the highest values are given as often by green as by seasoned timber; the density of the wood does not determine the modulus, the figure varying sometimes directly and sometimes inversely as the density, even where the amount of seasoning was alike; a high modulus usually accompanies high tenacity and great transverse strength; the resistance offered to transverse stresses is greatest where the lines of grain are vertical.

Prof. Thurston recommends the designing and constructing engineer to adopt a moderate value of the modulus in proportioning a work, and by careful inspection and test to secure the rejection of all material which is not of good quality.

A NOVEL IMPORTATION.

The *American Agriculturist* states that the large tea importing house of Messrs. Billinge & Wetmore, of this city, have recently received from their correspondent in Calcutta a very unusual and out-of-the-way consignment—this consisting of several tons of mahwa flowers, to be sold as cattle food. The idea of the "*effete* East" sending food to America seems strange enough. The mahwa tree and its edible flowers have already been fully described in the SCIENTIFIC AMERICAN and in the SUPPLEMENT, and we need only add that the flowers form such a valuable food product to the natives of India that in the expeditions made by the English against troublesome tribes, they have only to threaten to cut down the mahwa trees to bring the rebellious people to terms. A sample of the flowers as imported shows a soft sticky mass, having much the appearance of raisins of a poor quality, such as are packed in casks. When soaked in water the individual corollas swell out and assume a flattened, globular shape, about as large as an average cranberry, and are found to consist of a very fleshy cup, within which are a great number of anthers. At the instance of the *Agriculturist*, the consignees had an analysis made of this interesting product, and the report of the chemists shows that the flowers contain the remarkable amount of 63·40 per cent of sugar! This enormous percentage of sugar, without reference to other constituents, fully accounts for the value attached to the flowers in India as an article of food, and for use as a source of spirituous liquors. From a scientific point of view, the mahwa is a most interesting product; for it is rarely that we find the flower, the corolla of a plant, to serve any more than as a temporary purpose in protecting the reproductive organs within. For it to secrete more than half its weight of sugar, and thus become an article of economic value, and even of commerce, is most remarkable. The future of the mahwa as an article of trade in this country will, of course, depend upon its cost; and the commercial aspect of the article remains to be developed.

THE BRITISH ASSOCIATION MEETING.

The fiftieth annual meeting of the British Science Association began at Swansea, Wales, August 25. As usual the attendance embraced a large number of the best known promoters of science in the United Kingdom. The proceedings of the first session were purely of a business character, ending with a vote of thanks to the retiring President, Prof. G. J. Allman. In the evening, President-elect Andrew Crombie Ramsey, Director-General of the British Geological Survey, delivered his inaugural address, in which he considered at great length the recurrence of the same kinds of incidents throughout all geological time; in other words, the facts bearing upon the doctrine of uniformity of action and results, from the earliest geological epochs to the present day. In this address Prof. Ramsay considered the nature and evidences of metamorphism from the Laurentian epoch down to the pliocene period, arriving at the conclusion that at no period of geological history is there any sign of volcanoes having played a more important part than they do in the epoch in which we live. Mountain formation was next considered, the recurrences of the phenomena of mountain upheaval and development being discovered in every geological age. The recurrence of beds of various salts, chiefly rock salt, and the circumstances that produced them, were found to bear further evidence of the uniformity of physical conditions and causes throughout all time. Fresh water formations, deposited in lakes and estuaries, were traced from the Upper Silurian Blani beds of India down through geological time to the later Tertiary beds, showing the recurrence of similar conditions and geological operations in all ages. And equally striking testimony was borne by the successive glacial epochs, which have left their traces in abundance in various formations from almost the earliest paleozoic times down to the last post-pliocene period of ice. In summing up, Prof. Ramsay expressed the conviction that from the Laurentian epoch down to the present day all the physical events in the history of the earth have varied neither in kind nor in intensity from those of which we now have experience.

Reports of the subsequent proceedings of the association have not yet come to hand.

GREAT AND SUDDEN CHANGES OF TEMPERATURE.

Prof. Elias Loomis, in the current number of the *American Journal of Science and Arts*, offers an explanation of the great and sudden changes of temperature which frequently occur in some parts of the United States—a circumstance of which little account has thus far been taken. A very remarkable case of this kind occurred at Denver, Colorado, on January 15, 1875. In studying these sudden changes the first fact that attracts attention is that the air at Denver and its vicinity is very dry. Only one explanation of this dryness seems possible. The westerly winds from the Pacific Ocean have their moisture mostly condensed in passing over the Sierra Nevadas, so that between these mountains and the Rocky Mountains the air is extremely dry. By passing over the Rocky Mountains there is a further condensation of vapor, so that when the air descends on the eastern side of these mountains it is almost destitute of moisture. The vapor which comes up from the Gulf of Mexico is diffused over the Mississippi Valley and mingles with the dry air which comes from beyond the mountains, so that the dryness of the air rapidly diminishes as we advance eastward from the Rocky Mountains. Between 11 P.M., Jan. 14 (1875), and 7 A.M., Jan. 15, the thermometer at Denver rose 42°. The relative humidity fell from 71 to 21. The wind, which had previously blown from the northeast with a velocity of three miles an hour, at 9 P. M. veered suddenly to the southwest with a velocity of twelve miles per hour. The direction of the wind, the dryness of the air, and its high temperature, prove beyond a doubt that this air came from the West side of the Rocky Mountains, having been brought over the latter to Denver by a storm which had its center in San Francisco on Jan. 14, and which traveled about 1,400 miles in twenty-four hours. The vapor contained in this air would be mostly precipitated on the west side of the Rocky Mountains, so that it would descend on the east side deprived of its moisture, and with a temperature above that which prevailed in the Salt Lake basin, on account of the latent heat liberated in the condensation of the vapor. This warm and dry air supplanted the cold air which previously prevailed at Denver, and which still prevailed at neighboring stations east and north of Denver. After the center of low pressure had passed Denver, the northeast wind returned and brought back the cold air which had constantly prevailed at stations not very distant. In winter, during periods of extreme cold on the east side of the Rocky Mountains, when the temperature of Denver sometimes sinks more than 20° below zero, there prevails in the Salt Lake basin an average temperature of about 30°; and when by changes of atmospheric pressure this air is carried over the mountains it may reach Denver with a temperature of 50°, resulting from a precipitation of its vapor on the mountains. We then find a mass of air having a temperature of +50° in close proximity to a mass of air having a temperature of —20°, and by the movements of the atmosphere attending the progress of a great storm these different masses of air may be brought successively over the same station, causing a change of temperature of 50° in a single hour. Other cases of sudden change, which occur so frequently in the West, admit of similar explanation.

THE FAIR OF THE AMERICAN INSTITUTE.

The fair, considering the time which has elapsed since its opening on the 15th inst., is in good order, the majority of the exhibits being in position and in condition for examination; and while the character of the Exhibition is about the same as usual, it is on the whole very creditable, both to the managers and exhibitors, and it appears satisfactory to visitors.

We miss the display of electric lights, telephones, and other electrical apparatus, prominent features of former exhibitions; but it is possible they may appear later. The amateur department inaugurated this year is not as well patronized as we expected it would be, and most of the amateur exhibits are not creditable to our amateurs as a class. The photographic exhibits are evidently not all in place, but some that are to be seen are very fine. Mr. Rutherfurd shows several interesting photographs of solar spectra.

In the main building are a number of exhibits of which we may speak later.

In the machinery annex the main lines of shafting are driven by two fine horizontal engines, a Wheelock engine of 150 horse power, and a Whitehill engine of 50 horse power. An Otto gas engine of 7 horse power is connected with a line of shafting which drives several light wood working machines made by H. B. Smith. The New York Safety Steam Power Company exhibit several of their inverted vertical engines, and the Baxter engine is to be seen in different sizes. Colts' disk engine, made by the Colts Fire-Arms Manufacturing Company, is shown. It employs six pistons working in as many cylinders. The ends of the pistons act directly on a wabbling disk which carries the crank on the main shaft. In the line of woodworking machinery we find very little that is novel, although several of the prominent manufacturers are represented. Machinists' tools are almost entirely absent.

The Peerless Punch and Shear Company exhibit several foot and power presses, for descriptions of which we refer the reader to back numbers of this journal.

Among the novelties we find Allen's automatic grain weigher and register for weighing grain in the running stream. This machine takes care of itself, and weighs with perfect regularity, keeping tally of the amount of grain weighed with mathematical accuracy. A curious little machine for making cornucopias for putting up candies, groceries, seeds, etc., is exhibited by D. W. Seely, of Albany, N. Y. The paper goes through this machine literally "flying," and cornucopias are turned out at the rate of three hundred per minute.

Donald McKay.

Donald McKay, the once famous ship builder of East Boston, died at Hamilton, Mass., September 20. For many years his ships were in great demand. One of his first ships was the Washington Irving, for Enoch Train & Co.'s line of Liverpool packets. From that time until 1851 Mr. McKay built the Anglo-Saxon, 894 tons burden; New World, 1,404 tons; Moses, 700 tons; Anglo-American, 704 tons; A. Z., 700 tons; Jenny Lind, 533 tons; L. Z., 897 tons; Plymouth Rock, 960 tons; Helicon, 400 tons; Reindeer, 800 tons; Parliament, 998 tons; Moses Wheeler, 900 tons; Cornelius Grinnell, 1,118 tons; Sultana, 400 tons; Antarctic, 1,116 tons; Daniel Webster, 1,187 tons (lost at sea, 1853); Staghound, 1,534 tons. The discovery of gold in California created a demand for fast sailing vessels, and it was then that Mr. McKay's idea of clipper ships came into notice. Early in the season of 1851 he built the famous clipper ship Flying Cloud, 1,700 tons burden, which, under the command of Captain Cressey, made the extraordinary passage from Boston to San Francisco in 89 days. Mr. McKay, not satisfied with this, produced, in 1852, the Sovereign of the Seas, of 2,400 tons burden, the largest, longest, and sharpest merchant ship afloat at that time. She did not make so quick a passage to California as the Flying Cloud, yet, although she was dismasted, she beat the entire fleet of clippers that left at the same time by seven days, and on the homeward passage made the greatest run ever recorded.

Late in the fall of 1853 Mr. McKay launched the Great Republic, the largest merchant ship ever built, measuring 4,556 tons, and spreading 15,653 yards of canvas in a suit of sails. In the construction of this mammoth vessel, 1,500,000