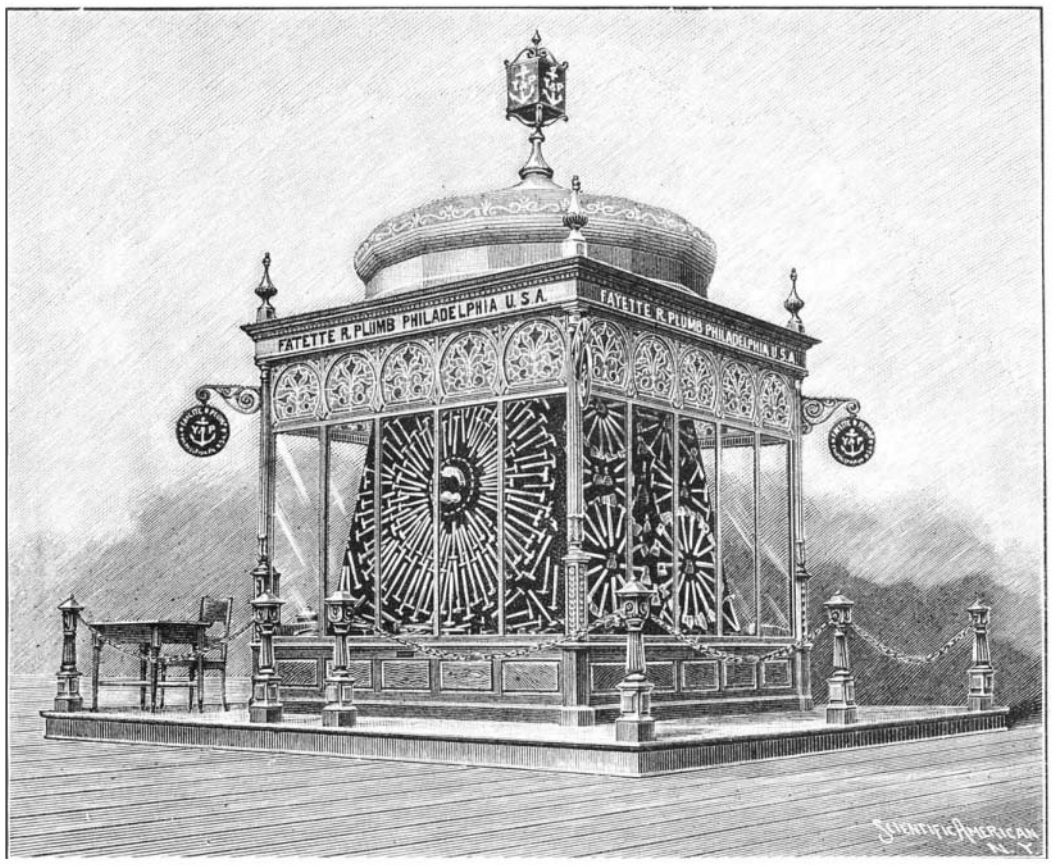
Decision Relating to Cary's Patent.

Letters patent No. 116,266 were granted June 27, 1871, to Alanson Cary for an improvement in furniture springs. The improvement related to spiral springs usually made in a conical form of steel wire, and used in upholstering sofas, chairs, etc. Such springs were made of hard-drawn wire, coiled, and forced to a proper shape; but in coiling the metal was unavoidably weakened, the outer portion being stretched, and the inner portion crushed. The invention consisted in subjecting the spring to "spring temper heat," which is about 600° F., by means of which a complete homogeneity in the metal was produced, thereby increasing its durability and power of resistance. The same process, however, had been long before used in the manufacture of "wire bells" for clocks, and in the manufacture of hair balance springs for marine clocks; the object being in the one case to give tone to the bell and in the other to increase the elasticity and durability of the spring. The Supreme Court rules that this use constituted an anticipation, notwithstanding that the purpose of the process was different from the purposes of the prior use, and that experts in the tempering of steel were surprised by the results produced by the patented process.

A WORLD'S FAIR EXHIBIT OF HAMMERS, EDGE TOOLS, ETC.

The great variety of tools shown in the very tastefully arranged exhibit of Fayette R. Plumb, of Frankford, Philadelphia, is indicated by the accompanying illustration. The business was established in a small way nearly forty years ago, but it has ever since shown a large and steady growth, owing to the high standard maintained for the goods manufactured, and the plant at present comprises several large buildings, fitted up with all the latest improved machinery and appliances. It is said that the establishment is now the largest and most complete in every department of any of the kind in the world. The manufacture comprises nearly everything in the line of edge tools, hammers and sledges, and railroad, miners' and blacksmiths' tools. All these goods are constantly carried in stock, and special tools are also made to order after any model furnished. A large and handsome illustrated catalogue describing these goods is sent on application.



THE WORLD'S COLUMBIAN EXPOSITION—FAYETTE R. PLUMB'S EXHIBIT OF HAMMERS, SLEDGES, EDGE TOOLS, ETC.

Progress of the Sugar Industry.

The New Orleans *Times-Democrat* says: The United States paid bounty on 358,000,000 pounds of sugar in 1891–92, and on 429,243,170 pounds last year, while the calculations of the collector of the internal revenue estimate the crop this year at 691,449,000 pounds. If it is anywhere near these figures, it will exceed the largest crop ever known in ante-bellum or slavery days. This increase shows what Louisiana is capable of in the matter of sugar production, and leaves no doubt whatever that the State can fill the sugar demand of the whole country if the bounty law is allowed to run for the original time provided for it by Congress—fifteen years.

This improvement has been brought about largely by the use of new and improved—and very expensive—machinery, which has called for the expenditure of millions of dollars.

The truth of this is shown by the figures of the old and new process sugar turned out. It was but a few years ago that our planters manufactured the bulk of their sugar in open kettles. The bounty law has driven them from it, and to-day only 19 per cent is made by that process. When it is noticed that the plantations using improved machinery secured 2,718 pounds of sugar per acre, and the old mills only 1,111 pounds, we can readily realize that every planter in the State would make the change if his finances allowed it.

Dr. Robert A. Lamberton.

Dr. Robert A. Lamberton, president of Lehigh University, died at his home in Bethlehem, Pa., September 1, of apoplexy. Mr. Lamberton was born in Carlisle, Pa., December 6, 1824. After the resignation of Dr. Henry Coppe in 1880. Dr. Lamberton was elected to fill the vacancy. Dr. Lamberton was a born educator, for in 1880 the number of students in Lehigh University was 200. To-day 600 are on its roster.

Castor Oil.

The castor oil bean—seeds of *Racinus communis*, *Palma christi*, *Racinus sanguineus*, of the East Indies and Italy, also of the Southwestern States and California, and identical with the "Hiquerillo" of the South American states, where it grows in abundance without cultivation.

The beans contain from 50 to 60 per cent of oil; 100 pounds of clean seeds yielding about 30 pounds of fine oil at first pressing, 15 pounds of a second quality by additional heat in pressing, and an additional 5 to 10 pounds by heating the mass with steam or in an oven and a final pressing; the last being only suitable for burning in lamps.

In Italy, Calcutta, and Madras, for the best oil the pods are dried in the sun or by artificial heat, and the beans that do not discharge themselves from the pod are thrashed out with flails or by treading. The beans are then pounded with wooden mallets or rams to crush the shells. A better plan, as practiced in the United States, is to pass the beans through a pair of rollers made of very hard wood or iron, set about three-sixteenths inch apart, so as to just crush the bean without making a pulp, the beans being thrown into a hopper above the rolls. Then for cold-pressed oil, which is the best, the crushed beans are placed in flat canvas bags, holding about one gallon each, and piled on flat iron plates, alternating plate and bag, in a screw press, or, if on a large scale, a hydraulic press, where by slow compression the oil runs to a receiving tub. This process renders nearly one-half the contained oil. For the balance, the cakes should be removed, crushed and heated to about the boiling point of water, rebagged, and again subjected to the press, or, what is preferable, to keep the two qualities of oil separate, use a separate press and greater pressure.

There are two methods of clarifying the crude oil as it comes from the press. The first, by sun exposure in shallow tanks made of tin and covered with glass to prevent dust or leaves from falling into the oil. One day's exposure to a clear sun will separate the milk and glutinous matter, which settles, when the clear oil can be decanted from the top. The other plan is to heat the oil in the tanks partly filled with water, by means of a jacketed kettle or steam coils, if convenient, so as to boil the water slowly. This coagulates and absorbs the glutinous matter and dirt that may accidentally get into the oil by handling. On cooling in the tanks, by shutting off the heat, the impurities settle in the water, and the oil can be drawn off from the top. If then found to have any foreign matter, it should be filtered through cotton cloth. With the strong solar heat of tropical countries, the solar process is preferred.

A small pressing plant of ten gallons of oil per day, as suggested by our Honda correspondent, will need a pair of hard wood rolls 8 inches long, 6 inches diameter, fitted in a wooden frame, a scraper on each roll at the lower side, a crank at opposite sides, or geared much after the style of sugar cane rolls; an oil press, which can also be made of hard wood and laid horizontally, which will allow the oil to drop directly into the pan. The plates may be three-sixteenths inch thick and about one foot square. The bags may be only squares of light canvas, folded cornerwise over a half gallon of the crushed beans and laid between the plates. The solar process of clarifying requires a tin vat or pan, three feet diameter by one foot in depth. The clarified oil may be dipped from the top.

Rice and Wheat Harvesting.

The rice harvest is now on in Louisiana and the low prices for rice now prevailing, the *Louisiana Planter* says, are forcing a cheaper harvest than ever before, but even with this economy a profit on rice culture seems out of the question.

Wheat culture in California has been so perfected that it seems possible for California wheat growers to meet any possible competition. In a recent issue of the *Hollister Advance*, of San Benito County, Cal., the editor predicts that the day of the steam thrasher is about done, and that the experience of this season shows that the new *wheat harvester* will cut, thrash and sack the grain at less cost than the mere thrashing by the old method. It says that an owner of the harvester will cut and thrash wheat at the rate of $2 per acre, the farmer boarding the men and feeding the horses. Five men are required to run the harvester, whose combined wages are $12 per day. Twenty-four horses are required, with an extra pair in case of an accident. A fair day's work is thirty acres, as work cannot be started very early in the morning and not until the grain is thoroughly dry. The *Hollister Advance* reports six harvesters at work in San Benito County, and expects triple that number working next season.

It has long seemed imperative that there should be some reform in the Louisiana rice harvest, and that the Mosaic if not the Adamic sickle should be abandoned and the McCormick, Osborne, or other harvester adopted. There are advantages pertaining to California that make possible machine harvesting there when it might be impracticable elsewhere. They have a rainless harvest, no ditches and immense fields. Our disadvantages in machine harvesting rice are our frequent rains during the harvest season and our numerous ditches and small fields.

In the western part of the State, in the prairie section, machine harvesting has become the rule, *i. e.*, rice is there cut and bundled by machine. Hence it has become possible to exist in rice culture there when impossible in the river parishes and along Bayou Lafourche.

Our contemporary says: Rough rice now is worth no more in Louisiana than oats are in Ohio and Indiana, pound for pound, and yet we learn of no economic move along the river in the matter of the cost of the harvest other than the cutting down of the laborers' wages. This is always an unpleasant remedy, but, of course, now unavoidable. If the rice industry is to continue in the river parishes there must be some radical change in the cost of its harvest, and the efforts and experiences of the farmers of California suggest the direction in which to look for relief.

The Parsee "Towers of Silence," India.

A Parsee correspondent from Central India, Maneck K. Thanewala, mechanical engineer and textile manufacturer, writes us relative to the Parsee funeral obsequies, as described in the SCIENTIFIC AMERICAN in 1886, and gives more exact particulars. When life is extinct the body is wrapped in clean clothes and placed on polished stones on the floor, the face of the deceased being exposed to the gaze of a dog three or four times during the recitation of the funeral sermon, the glance of the dog being supposed to have power to scare away the Evil One. With the same idea a dog is conducted over the way by which a dead person has been carried, to make it again suited for use by man and beast. The dog must also have certain special marks, be of yellow color, or white with yellow ears, and have two black spots over his eyes. The body is carried on an iron bier, accompanied by male relatives and friends, to one of the so-called "Towers of Silence," a number of which are to be seen near Bombay and in many other places in India. They are circular, unroofed, stone structures, in solitary places, where the bodies are left uncovered and exposed to the sun and rain, to be devoured by vultures, numbers of which are always to be seen in the neighborhood. The bones are afterward thrown indiscriminately into a central pit of the structure. Illustrations and more extended description of the burial ceremonies will be found in SCIENTIFIC AMERICAN SUPPLEMENT, No. 925.

Our New War Ship Minneapolis.

The Minneapolis, a sister ship of the commerce destroyer Columbia, was launched August 12, at Philadelphia, in the yard of Wm. Cramp & Son's Ship and Engine Building Company. The Minneapolis was christened by Miss Washburn, in the presence of Mayor Eustis, of Minneapolis, Vice-President Stevenson, Secretary Herbert, etc. The new vessel is 412 feet long, beam 58 feet, mean draught 22 feet 6·5 inches, displacement 7,350 tons, indicated horse power 21,000. The hull is steel and has a double bottom, with considerable space between the two skins, this space being divided by numerous bulkheads into watertight compartments. The Minneapolis is, before all, a commerce destroyer, and is not intended to fight, so she is not armored. Her conning tower is of mild steel and her protective deck is a variety of turtleback, and is 4 inches thick on the sloping portion. The gun shields are 2 inches thick, or only sufficient to protect the gun crews from the fire of machine guns. Patent fuel will be stowed to a thickness of 5 feet around the machinery. The armament consists of one 8 inch standard breech-loading rifle, two 6 inch rapid-fire rifles, and eight 4 inch rapid-fire rifles. The secondary battery is composed of twelve 6 pounders, four 1 pounders, and four Gatling guns. The vessel is provided with five torpedo launching tubes. The 6 inch guns are loaded at one operation, as fixed ammunition is used, the powder and shot being combined in an immense cartridge, standing nearly 6 feet high.

The Minneapolis will be driven by triple screws. Two of the screws are located as usual, one under each counter, a considerable distance above and away from the line of the keel and forward of the stern post. The third screw is placed in the midship line, close down to the keel and just forward of the rudder. Each of the three engines is independent of the others, and is contained in a watertight compartment. The midship screw will be used under ordinary circumstances, as this screw will drive the vessel at a speed of ten knots an hour with great economy of fuel. The use of all three engines will send the speed up to twenty-one knots an hour or even more. The Cramps expect the Minneapolis to make twenty-three knots on her trial trip, which would insure her builders $400,000 as prize money in addition to the contract price of $2,690,000.

There is probably only one vessel afloat which could lead the Minneapolis an unfruitful chase—the Campania; but owing to the unwarlike appearance of the Minneapolis, it would, doubtless, be possible to creep within range of the "ocean greyhound," and once in range, any superiority of speed would be of little avail. The Minneapolis can not only run away from a line-of-battle ship, but can lead such a vessel a chase that would soon consume all the available fuel. The nominal radius of action of the Minneapolis—that is, the distance that she can steam without recoaling—will be 26,240 miles. This is the theoretical radius; but without doubt the Minneapolis will have a practical cruising radius of 15,000 miles. It is upon this wonderful power of making long runs, half way round the world if necessary, that the Minneapolis will deserve the name which she bears equally with the Columbia, of the "Pirate." This name is, of course, not officially recognized by the Department of the Navy, but was given by the shipbuilders when the vessels were only known as cruisers Nos. 12 and 13. The inhabitants of the city of Minneapolis should begin at once, if they have not already done so, to raise a subscription for the silver service, and it may be safely said that as our Western friends do not do things by halves, the new cruiser will have a silver service second to none.

A Remarkable Arizona Ruin.

Near Flagstaff, Ariz., and on the Upper Verde, there are the ruins of castles still in as good a state of preservation and much resembling many of those in the north of England and Scotland, the ages of which we may approximate with a considerable degree of certainty. One in particular that is very interesting stands near the head of the Verde River on a peak that constitutes the extremity of a spur of the Bradshaws. The peak is granite, and rises abruptly out of the valley on three sides, while the fourth is protected by the mountain spur, which is about 100 feet higher and hangs an impassable precipice above the smaller. On this shelf or bench the building was constructed of stone and cement in such a position that one on the ruins can get a good view of the entire width of the valley and fully five miles either up or down it. Through the taller mountain a volcanic rift has allowed a perpetual stream of water to flow, though it was fully 60 feet beneath the base of the castle and back of it, so that the water came out underneath the cliff and flowed across the mesa into the river. In order to protect themselves against a water famine in a time of siege the inhabitants cut a fissure through the solid rock fully 60 feet, and changed the course of the stream so that it flowed out on the opposite side of the rock and directly through the fortification, making it impossible to cut off the supply. This building was over 400 feet in length by 250 in width. One of the walls yet stands, four stories in height, though some earthquake has changed the surface of the mountain until the outer one has fallen and the one now standing leans considerably toward the north. This structure alone contained over 200 rooms, and could have easily accommodated a thousand people. Back of this is a cave, partly natural and partly artificial, that extends more than 100 feet, and through which they descended to the water. This was also cut up into rooms, each one of which was nicely plastered with some kind of cement that is now in a good state of preservation. There are niches in the walls, where they evidently kept their jewels and valuables, and I am informed that two small rush bags were found in one of them, though I did not visit it first and did not see them. A number of jars filled with parched beans were taken out, and one of these jars, or ollas, holding about a bushel, is in the possession of Mr. Drew, who has a ranch near by, and is used all the time for holding drinking water. It is of a very dark-colored material, thoroughly glazed, but, outside of the heat necessary to do the glazing, it has not been affected by fire. It has been cracked almost entirely around, but has been mended with some kind of gum so deftly that, though it had been in his possession for years, Mr. Drew had not discovered it until one day recently when we were examining it together.

In this cave about twenty skeletons were found. The skulls of some of them had been crushed, while others appeared to have died natural deaths, though the bones were so badly decayed that had fatal wounds been inflicted on any other part of the body than the head it could not have been discovered when we made our examination. These remains were scattered about the inner rooms in evidently the same position in which they had fallen from starvation or had been laid by the hands of their comrades after being stricken down by their foes. Around the bony necks were found the amulets and on the wrists the shell bracelets that protected them from evil or served them as ornaments during life.

This structure was built altogether different from the fortresses of Zuni and Acoma, neither does it resemble any of the pueblo buildings in New Mexico. Judging from the mass of cement scattered about on the cliff, these walls must once have been fully six stories in height and the buildings almost as large as the Casa Grande in the Gila River Valley.—*San Francisco Chronicle.*

The Need of Improved Waterways.

Among the most interesting papers as yet written on the subject of a waterway from the lakes to tidewater and its effect upon transportation rates is that recently presented to the Water Commerce Congress in Chicago, by George Y. Wisner, of Detroit. He favors a radical enlargement of the Erie canal, or the construction of a new canal along practically the same route. "Canada has expended $52,000,000," he says, "in constructing canals and $215,000,000 in cash and guarantees for railroads for the purpose of diverting American trade through Canadian ports, yet of the 390,000,000 bushels of grain received at the Atlantic ports of the United States and Canada in 1892, only 27,400,000 bushels, including Canadian grain, was received at Montreal. The investigation made by the Senate committee of interstate commerce in 1889 shows that Canadian canals, with rebates making them practically free for St. Lawrence River freights, have had but little effect in diverting traffic from American ports. . . . It will not do to assume that Canada will soon become an integral part of the United States, for such an event is so improbable that to delay the improvement of transportation routes, with the hope of thus being able to accomplish the purpose for less money, will cripple the commercial growth of the country far in excess of anything that can be saved; besides, the surest means of inducing Canada to come into the fold is to place our commerce in such an independent condition as to have no need of the natural advantages she has to offer. . . .

"At the present rate of increase the receipts of grain at Atlantic ports would probably exceed 600,000,000 bushels annually before the canal could be completed. At least one-half of this amount would go direct by lake and canal, and the rate on the whole would be governed by that on the waterway. The average rate by lake and railroad for the past four years has been 8·5 cents per bushel, and allowing 1·5 cents for higher rate of winter traffic, the net decrease would be at least four cents per bushel, or $24,000,000 for yearly shipments of grain, while that on merchandise and other freight would be fully as much more, making a total of $48,000,000. If the work should be undertaken by the government, money could be obtained for the project at 3 per cent, at which rate the above annual decrease in cost of transportation would be the interest on $1,600,000,000. The canal can undoubtedly be constructed for less than $200,000,000, which at 4 per cent for interest and maintenance would leave a net balance of $40,000,000 annually in favor of the project. The benefits to be derived should not, however, be measured by this amount, for the home prices of manufactures and agricultural products are those which they bring in foreign markets less the cost of transportation, and consequently any decrease in the cost of the transportation adds a like amount to the value of all productions used for domestic consumption."

Shorthand.

The Bureau of Education at Washington has issued a monograph on "Shorthand Instruction and Practice," by Mr. Julius Ensign Rockwell. Mr. Isaac Pitman is mainly the author of the system that is followed in the United States, and although the art of stenography is very old, dating from the first epoch of legal advocates, he was the first to make a scientific study of phonology and base his alphabet on its principles. Those who have followed his system of reporting have been able to write as many as two hundred words a minute and read their notes with facility, and the venerable author of this system is still living and active in his old age, and has had the satisfaction of watching all the stages of the revolution in the art of transferring thoughts to paper which he has been chiefly instrumental in promoting. In this country the number of persons receiving instruction in shorthand from July 1, 1889, to June 30, 1890, was 57,375, and of this number 23,325 were males and 26,005 females. All these were taught in schools and classes, and out of this whole number 7,228 were instructed by mail. In 229 schools and classes in which shorthand was introduced during the scholastic year ending June 30, 1891, the number of persons taught orally was 4,150, which, with those instructed by mail, made a grand total of 4,738. Of those taught orally, 2,474 were males and 1,658 were females. This is as near a correct statement of statistics as Mr. Rockwell has been able to arrive at, and it shows the vast extent of the use of shorthand instruction in this country in all the departments of life.—*Boston Herald.*

Our Fundamental Units of Measure.

Among the interesting papers read before the Engineering Congress at Chicago, was one on the above subject by Dr. T. C. Mendenhall, Superintendent of Standard Weights and Measures, from which it appears that in many respects the most important legislation upon the subject was the act of July 28, 1866, making the use of the metric system lawful throughout the United States, and defining the weights and measures in common use in terms of the units of this system. This was the first general legislation upon the subject, and the metric system was thus the first and, thus far, the only system made generally legal throughout the country.

In 1875 an International Metric Convention was agreed upon by seventeen governments, including the United States, at which it was undertaken to establish and maintain at common expense a permanent International Bureau of Weights and Measures, the first object of which should be the preparation of a new international standard meter and a new international standard kilogramme, copies of which should be made for distribution among the contributing governments. Since the organization of the bureau, the United States has regularly contributed to its support, and in 1889 the copies of the new international prototypes were ready for distribution. This was effected by lot, and the United States received meters Nos. 21 and 27 and kilogrammes Nos. 4 and 20. The meters and kilogrammes are made from the same material, which is an alloy of platinum with 10 per cent of iridium.

On January 2, 1890, the seals which had been placed on meter No. 27 and kilogramme No. 20, at the International Bureau of Weights and Measures, near Paris, were broken in the cabinet room of the Executive Mansion by the President of the United States, in the presence of the Secretary of State and the Secretary of the Treasury, together with a number of invited guests. They were thus adopted as the national prototype meter and kilogramme.*

Preserving Bodies in their Natural Form and Color.

The following preservative fluid is employed by G. E. Wiese: 600 grammes of sodium hyposulphite dissolved in 5,000 grammes of water and 75 grammes of ammonium chloride dissolved in 250 grammes of water. The two solutions are mixed together and added to 4–6 liters of spirits of wine. The bodies of the animals to be preserved are simply immersed in the above preparation; and it is claimed that they will retain their original form and color for almost an unlimited period.

* Reference to the act of 1866 results in the establishment of the following equations:

$$1 \text{ yard} = \frac{3600}{3937} \text{ meter.}$$

$$1 \text{ pound avoirdupois} = \frac{1}{2{\cdot}2046} \text{ kilo.}$$

A more precise value of the English pound avoirdupois is $\frac{1}{2{\cdot}20462}$ kilo. differing from the above by about 1 part in 100,000, but the equation established by law is sufficiently accurate for all ordinary conversions.

As already stated, in work of high precision the kilogramme is now all but universally used and no conversion is required.