

iodide of potassium. Upon the paper there bears a steel needle, R (Fig. 2) provided with a platinum point. This needle is connected by a wire with a pedal, P, situated upon the track. On another hand, the axis, E, of the cylinder is in communication with the negative pole of a battery, P, of which the positive pole is connected with the lower part of the pedal. When a train passes, its weight depresses the pedal, the circuit is closed, the iodide of potassium is decomposed at the point where the needle touches the paper, and the iodide set at liberty is shown by a black dot.

Upon the length of a section, a pedal may be arranged about every mile. Each is connected by a special wire with a needle of the watch tower, and all these needles are arranged along a generatrix of the registering cylinder. When a train passes over a pedal, the corresponding needle, which carries a number reproduced upon the pedal, marks a black dot upon the paper. At every instant the employe knows, then, over what pedal the train has just passed. He sees whether an express train is upon the point of telescoping an excursion one, whether two trains running in different directions upon the same track are about to meet, etc., and he prevents such catastrophes, since he can forewarn the engineers of the trains. In fact, in the center of the interval comprised between two pedals there is what is called a contact apparatus. This consists of a metallic drum about 80 centimeters in diameter and 20 in height. The locomotive carries a metallic brush, which, at the moment of the passage of a train, causes the drum to revolve. This drum is protected against rain, snow and frost by a galvanized iron box, but at the two extremities of the same diameter, AA' (Fig. 3), it projects from the box. These are the parts that the brush touches. As this latter is very long (1.3 meters) it is capable of establishing a metallic communication with the drum, even if the unprotected parts of the latter are covered with frost, since it makes them revolve.

In the watch tower there are arranged in a row, like the keys of a piano, a series of commutators, each of which carries two numbers, those of the pedals between which is situated the drum with which the commutator enters into relation. When the employe puts his finger upon a commutator, a battery actuates a relay, which serves to put the rail in communication with the drum. The brush of the locomotive, electrically insulated from the general metallic mass of the engine, communicates with one of the extremities of the wire of a Hughes electro-magnet, the other extremity of which is connected, through the intermediary of a battery carried by the locomotive, with the latter and the rail. Consequently, there is a closed circuit when a drum is in contact with the brush. At this moment the electro-magnet is freed, and this sets in action a steam whistle, the sound of which warns the engineer.

It will be seen that the engineer does not have to observe at a distance optical signals which fog, for example, may render difficult to see. He is forewarned by a shrill sound that makes itself heard upon his engine, and he is so much the better warned in that the noise of the whistle continues so long as he has not himself closed the armature of the electro-magnet by hand. It will be seen that it is very difficult for him not to take notice of this signal.

Fig. 2 gives a diagram of the Pellat system. The needle, J, is put in communication with the pedal, Q, while the cylinder, E, is in relation with the negative pole of the battery, P, located in the watch tower. The commutator, F, is connected with the positive pole of the battery, P, which actuates the relay, R, and permits of making the drum, U, communicate with the rail, V. For all the pedals there is but a single return wire, which is utilized likewise for the circuit of the battery with which each commutator can communicate. All the wires that run from the registering apparatus to the various pedals are in a subterranean cable of about the diameter of the finger, and it is its lead covering that serves as a return wire. From a watch tower it is possible, also, to communicate with the stations situated in the same section. By means of other commutators, G, and of the wire, N (Fig. 2), it is possible to actuate at the stations any sort of optical signal, in order to give warning of the approach of a train.

Fig. 1 represents a model that was sent to the Chicago Exposition. In the foreground are observed the commutators, by means of which the stations are put in communication, back of these the commutators, and, still further back, the needles and the registering apparatus. The track, which is not figured, has a length of seven meters. It has twenty-five pedals, and upon this track move two small locomotives, by means of which can be realized the different possible causes of collisions of two trains.

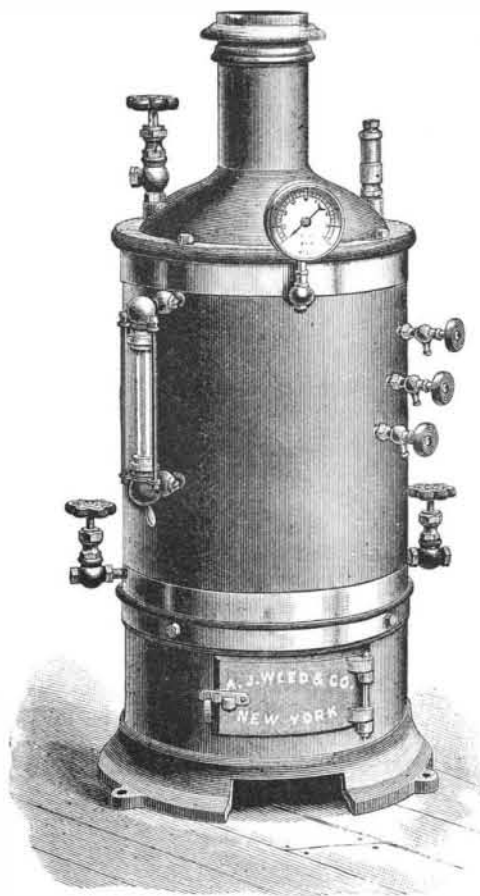
Upon the whole, Mr. Pellat's system presents several interesting peculiarities: At every instant one knows the precise situation of all the trains that are running along a section. It is possible to enter into immediate communication with one or more engineers and warn them, by a most striking signal, located upon their en-

gine, that there is danger of a collision, and that they must, consequently, diminish their speed and take account of the situation.

No other system presents these various advantages. There is reason to hope that this system will be put upon trial. Practice will doubtless suggest modifications of detail, and we shall see by comparison whether the block system is to be retained or replaced by this new safety apparatus.—*La Nature*.

THE WEED STEAM BOILER.

This is a boiler in which the shells are made of solid steel tubes a quarter of an inch thick, with flat steel heads welded in, the first considerations in its construction being safety and durability. There are no screw or rivet joints, and no cast iron is used in the boiler proper. In the smallest size the tubes are made of seamless drawn brass, and in the larger sizes of steel, the tube holes being accurately drilled in perfect alignment, and the tubes fitted into the heads with patent expanders. The boilers are readily cleaned by removing a brass plug screwed into the bottom heads. The fire box is a solid casting into which the lower end of the boiler shell is set and to which it is firmly screwed. The inside of the fire box is lined with a non-conducting material to prevent waste of heat, and any description of fuel may be used—coal, wood, charcoal, crude oil, or gas, small pieces of fire brick being placed on the grate bars where an oil burner is employed, or a section of the grate bar being removed for the insertion of a gas burner when gas is burned.



THE WEED STEAM BOILER.

The boiler is completely furnished with all the necessary fittings, and the attachments used are the best made, including the well known Crosby steam gauges and safety valves. The boiler is made by A. J. Weed & Co., 106 and 108 Liberty Street, New York City.

A Cemented Irrigation Canal.

The Gage irrigation canal at Riverside, in Southern California, is 22 miles long. This canal has been in use for twelve years. It was found several years ago, says the *Pacific Lumberman*, that a great deal of water escaped by reason of gophers burrowing in under the canal, thereby injuring the canal to such an extent that it was found absolutely necessary to devise some means of preventing the enormous waste of water. It was finally decided to regrade and cement the whole canal, and the contract for doing this work was awarded to the Gray Bros., of San Francisco and Los Angeles, for about \$120,000.

The cement was spread 1½ inches thick on the banks, and mixed one part cement to four parts fine sharp sand. At times more than 300 men were employed on this work, as it only could be done during the rainy season, when the water was not wanted for irrigation purposes. The first section of this work has been done now for about two years, and the cement holds perfectly good. Where heavy fills of earth were made, about 8 inches of masonry were used. It has been found that since this work has been finished the water company has received more than twice the amount of water obtained from the uncemented canal, thus showing that friction, evaporation, and loss of water by leakage were more than 50 per cent. This is supposed to be the longest irrigating canal known that is cemented throughout.

Big Trees in a Mining County.

Mariposa is a California county that has contributed immensely to the mineral wealth of the State. The county is seamed with quartz veins and is penetrated by the mother lode. The run of ores yields from \$10 to \$15 per ton, though numerous pockets are struck here and there running up into the hundreds per ton. There are several fine veins of good marble in the county. Silver and copper are also found. In topography, the county resembles Amador, Calaveras and El Dorado, and shares with Calaveras, Tuolumne, Fresno and others the possession of the marvelous sequoia forests which have made that region famous. Besides, the world-famed Yosemite Valley is in the northern part of the county, so that it has altogether better known scenic attractions than any other part of the State.

The sequoias are mammoths among trees, the Methusalehs of the forest. The sequoia timber belt along the Sierras extends from Calaveras on the north to near the head of Deer Creek on the south, about 200 miles. The sequoias are of California and are never seen outside this belt. They seem almost imperishable. No known trees in the world compare with them and their kin, the redwoods, for gigantic size. A tree from 300 to 400 feet high, 30 feet thick in the trunk, is a great curiosity, and yet there are a number of such. In the Calaveras Big Tree grove there are 150 trees more than 15 feet in diameter and 10 about 30 feet. One of the fallen monarchs must have been 450 feet high and 40 feet in diameter. The "horseback ride" as it is called, one of the wonders of the grove, is a hollow trunk through which a man can ride upright on horseback 75 feet, and theatrical performances have been given in it.

The State grove, in Mariposa County, is 15 miles south of Yosemite, and has 427 trees, including 134 over 15 feet in diameter, 18 over 25 feet, and 3 over 33 feet. A daily stage coach has been driven through one, 120 children and a piano crowded into another. A single tree would furnish two rail fenceings 20 to 30 miles.—*Min. and Sci. Press*.

Remedy for Snake Bite.

BY C. D. R. KIRK, M.D., OHUQUALAK, MISS.

A few weeks ago a negro and his wife brought their eight-year-old boy to my office for treatment for snake bite, which had occurred only thirty minutes before their arrival. There were two wounds about an inch and a half apart, from which the blood was flowing rapidly. The snake was a long, blunt-tailed moccasin—a "copper belly"—and known to be almost, if not quite, as poisonous as the "cotton mouth" moccasin. The boy had stepped on the snake, and as his pants were short, the snake had a fair strike at his leg about five inches below the knee.

After some explanation and much persuasion, I induced the man to apply his mouth to the wound and suck the poison out. Immediately after each draw, I gave the man some strong alcohol to rinse his mouth, which I assured him would destroy the poison and prevent it from being absorbed. After thoroughly emptying the fang wounds in this way, and the blood had ceased to flow, I injected a half drachm of saturated solution of permanganate of potash in each wound; the boy also drank a small drink of diluted alcohol. A string which the man had tied around the leg remained until morning, when the boy, after a full night's sleep, awoke well, without pain or swelling; no further trouble.

A strong solution of the permanganate of potash gives almost immediate relief from pain, and from repeated trials I believe it destroys the poison or makes a chemical change which renders the poison harmless.

I was called some five or six miles to see a negro man who had been bitten about two hours before my arrival by a "rattlesnake's pilot," which is known to be equally as fatal as the rattlesnake. The patient was suffering most excruciating pain, which extended to his leg, having been bitten on the top of his foot, which was very much swollen. I immediately injected a strong solution of permanganate of potash, which gave immediate relief, and he was soon well.—*Ecl. Med. Jour.*

The Excellent Dock Facilities of Southampton.

The American liner *Paris*, on her arrival at the port, went alongside the quay on Wednesday at 7:20 P. M. The first bag of mails was landed within five minutes and the whole 465 bags which she brought were landed and checked in 13½ minutes, and the mail train was at once dispatched to London. The passengers commenced to land at 7:40, and a special train left with them at 8:15 P. M. The discharging of cargo commenced at 10 P. M., and although the vessel brought a large cargo she was cleared out in the course of Thursday. She took on board 2,400 tons of coal, and were it not for an extraordinarily large amount of cargo which she had to take, she would have been ready for sea on Friday evening. She left at midday on Saturday, with 250 saloon passengers. The second saloon berths were all taken, and she had a fair complement of third.

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.

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 selected 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, re-

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.

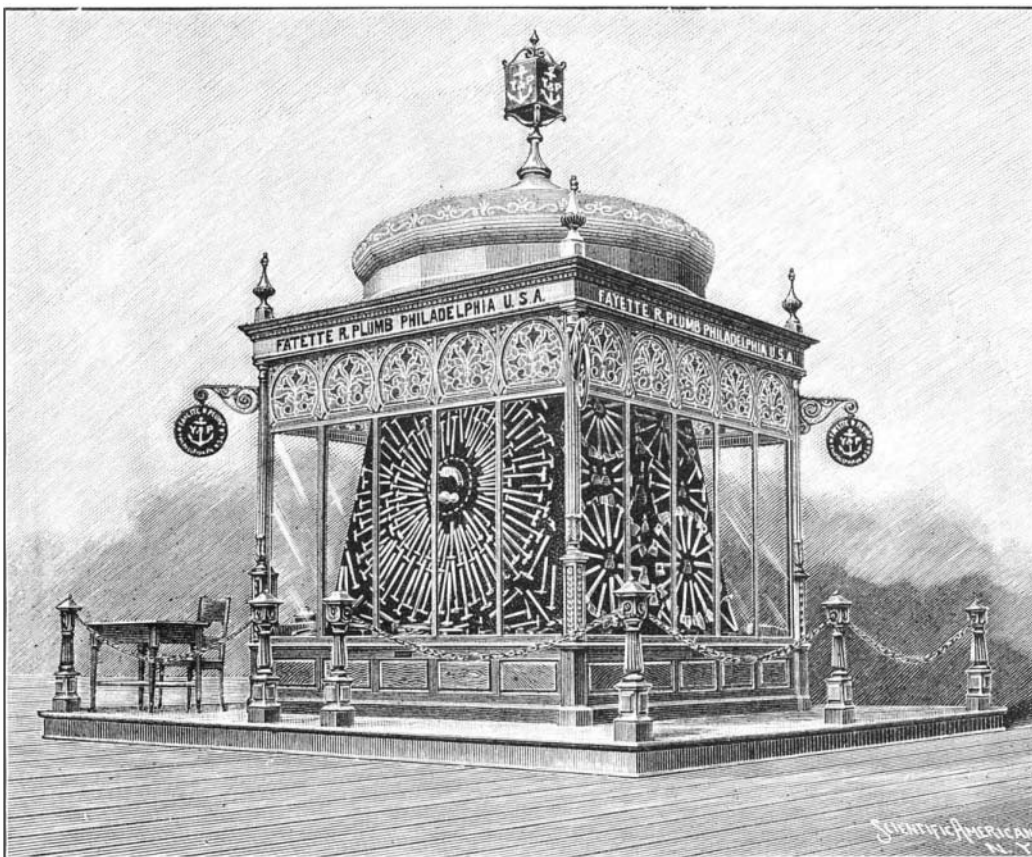
Wheat culture in California has been so perfected that it seems possible for California wheat growers to meet any possible competition. In a recent issue of the *Hollister Advance*, of San Benito County, Cal., the editor predicts that the day of the steam thrasher is about done, and that the experience 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.



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

bagged, 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