

ment in architecture. All the students are required to sketch their designs and model them in clay before cutting them in stone.

The plumbing section can accommodate 54 pupils, all of the necessary tools and benches being provided for carrying on the work in the most approved manner. The course of study includes the making of lead seams, all kinds of wiped joints, and sand bends. Instruction is also given in the working of sheet metal, in the erection of sewer pipes, etc. The instructions in plumbing amount to a course in sanitary engineering, as the principles of drainage, sewerage, and ventilation are thoroughly considered.

A department of electrical engineering is soon to be inaugurated. This will afford to students of electricity rare opportunity to perfect themselves in this science. Other departments will be added from time to time, as circumstances may require.

Our engravings truthfully represent many of the departments of this great institution, and give an excellent idea of the activity prevailing there. There is no longer an excuse for artists or artisans or students of the fine or mechanic arts for lack of proficiency in their particular departments, for persons without some ability cannot enter this institution, and when once entered they are taken in hand by a corps of competent professors and teachers, who will carry them forward rapidly and thoroughly through the various courses of study, enabling them to graduate with honor to themselves and credit to the institution. In bestowing this great gift upon the public in the prime of his life, Mr. Pratt has enriched the world with something more valuable than gold or silver. He has set an example which might be followed by other wealthy men to the great benefit of the country at large. Such institutions elevate the dignity of labor, raise the tone of society, improve the quality of work, and contribute to the happiness and comfort of wage earners.

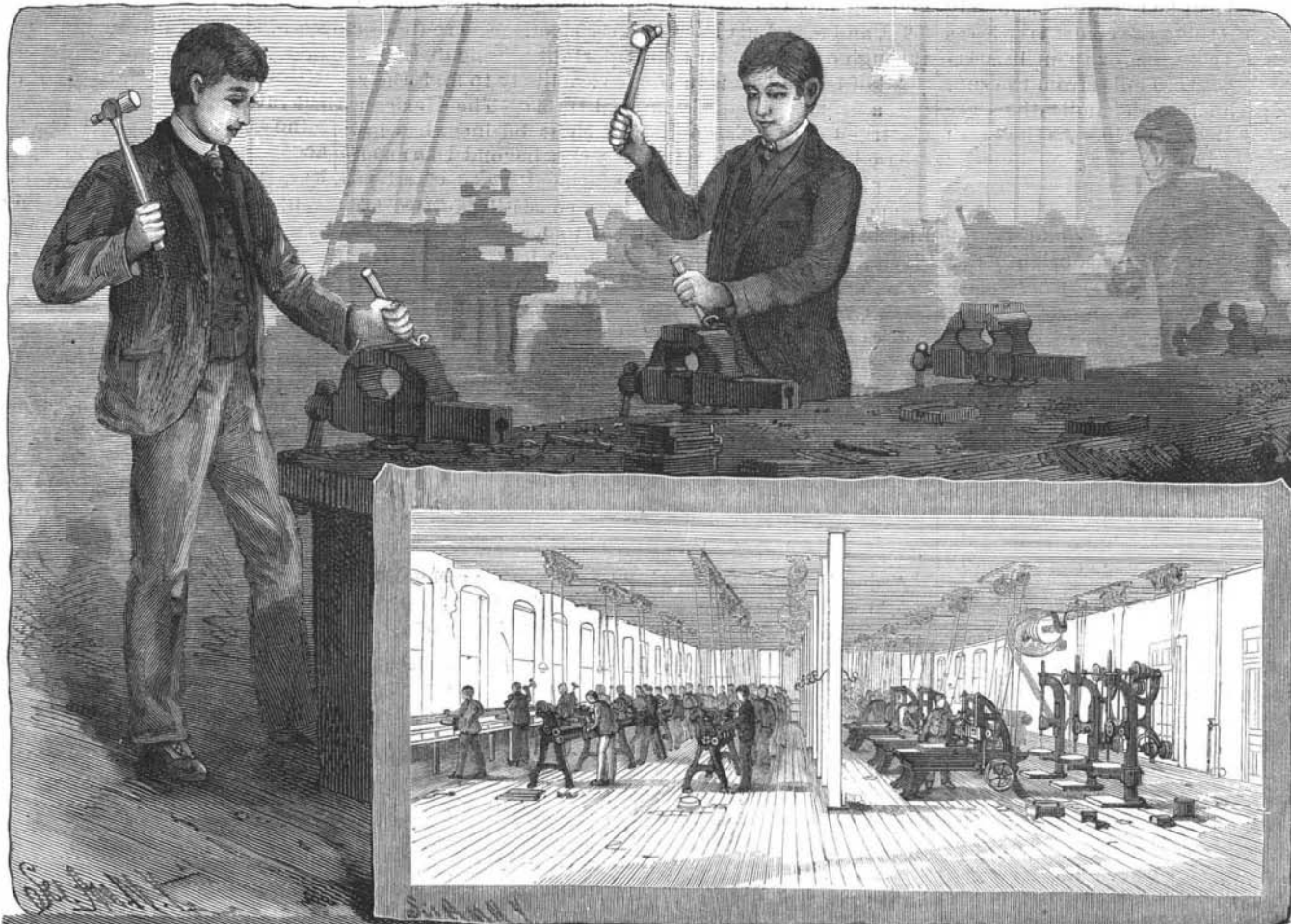
Man's War with Creeping Things.

The Philadelphia *Inquirer* asks: What shall be done with the pests? What brings them? How shall they be exterminated? Year by year they seem to increase. More locusts, more grasshoppers, more chinch bugs, more potato bugs, more cut worms, more weevil, more mosquitoes, more flies, more what not? In the struggle to maintain our lordship over all creeping and crawling things we are already having to resort to desperate remedies. In Illinois the farmers of several counties have resolved not to raise any wheat, barley, or rye for three years in order to starve out the chinch bugs. This looks almost like a victory for the chinch bugs, and it becomes an interesting question, moreover, whether such a lockout would exterminate them; whether they could not worry along without wheat, barley, and rye for three years about as well as the farmers by changing their diet to something else. It is

evident that man has a great deal to learn yet. He has to learn how to till the earth so that it will yield up more grain and less bugs. The pests would appear to represent a vast amount of misdirected energy. If the inventive mind of man can discover some way to make

take off the uncompromising squareness presented by the splash board, and so give the appearance of a carriage specially adapted for the new mode of propulsion. The motor, which is placed in the center of the body of the vehicle, is of Messrs. Immisch & Co.'s

1 horse power type, a current of 20 amperes with an electromotive force of 48 volts being used. Motion is communicated to one of the hind wheels by means of a small pinion on the main shaft of the motor working into a pitch chain, which passes over a series L shaped plates attached at intervals to the inner face of the rim of the wheel, so as to constitute in effect a driving pulley for the pitched chain to act upon. It was stated that the motor could be reversed so as to back the vehicle. The power is stored in twenty-four small accumulators of special type, occupying the space under the seats and said to be sufficient to propel the vehicle at a speed of about ten miles per hour



THE PRATT INSTITUTE—THE MACHINE SHOP.

the life and energy of the pests materialize in the shape of wheat, barley, rye, potatoes, etc., his crops would be immense.

AN ELECTRIC CARRIAGE.

Trial was made recently at the skating rink, St. Paul's Road, Camden Town, of an electric dog cart, built by Messrs. Immisch, of London, for the Sultan of Turkey. In appearance the vehicle does not differ from an ordinary four-wheeled dog cart with the shafts removed, and in this respect the design is perhaps open to criticism, as something might have been done to

for five hours; but at the trial nothing more than a few runs round the rink was attempted, sufficient to afford the visitors present the opportunity of having a ride, and no great speed could be attained, on account of the confined space and the consequent necessity for frequent sharp turns. The steering is effected by a shaft projecting through the footboard, and furnished with a hand-wheel. On the lower end of the shaft is a pinion which takes into a ring of teeth on the fore carriage. The brake is actuated by a lever, placed in a convenient position for the driver's foot, and the switch for turning on the power is attached to the splash board. The total weight of the vehicle, all complete, is about 11 cwt., the accumulators weighing about 7 cwt. The carriage appeared to run very smoothly, and to be under perfect control, although the operation of backing was not shown during the time of our visit.—*The Engineer.*

Colored Leather.

Modern leather manufacturers, says the *Shoe and Leather Reporter*, are surpassing the ancients in the diversity and beauty of the colors they are introducing. Many of the shades produced in upper leather are highly attractive. The Thebans were thought to have attained great proficiency in this art, but the variety of colors they are credited with was meager compared with the iridescent display of our epoch. Remnants of leather found in Theban tombs reveal the use of acacia and other trees in the tanning process. The Jews, after the exodus, probably put into practice the knowledge obtained of this art under the Pharaohs, in preparing rams' skins dyed red for the service of the Tabernacle.

The love of colors is as old as the human race. The art of dyeing leather, so long practiced on the Mediterranean, was afterward attained with difficulty by other European countries. But we need no longer to go to Egypt or the Mediterranean for instruction concerning it.



AN ELECTRIC CARRIAGE.

Prof. Barnard's Comet.

Prof. Lewis Boss, of the Dudley Observatory, has completed calculations of the orbit of the new comet discovered by Prof. Barnard at the Lick Observatory, September 2. Having remained nearly stationary, the determination of its path has been a work of great difficulty, and results attained can be regarded as merely approximate. According to these the comet is twice as far away from the earth as the sun is, or about 190,000,000 miles, and is about 170,000,000 miles from the sun. It is moving toward its perihelion, and indications are that this will be reached December 10. As the earth and comet are moving toward each other from opposite directions, the velocity of approach toward us is something unusual, about 3,000,000 miles a day. The comet will consequently increase in brightness, and by the middle of November will be sixty times as bright as at its discovery. Subsequent calculations will determine whether it will become visible to the unassisted eye. It came into our solar system with the small inclination of fifteen degrees to the plane in which the planetary orbits lie, and in such a way as to move in a direction contrary to that of the planets. The comet cannot readily be seen much earlier than 1 o'clock in the morning, but within a month it will be visible in the early evening hours, and in November will rise before sunset. The physical appearance indicates that it is intrinsically bright and that it will develop a large tail. Calculations indicate its nearest distance to the sun at 125,000,000 miles. Should it fall below this, the comet will be a brilliant object in November.

The Mexican National Railroad.

Rapid progress has been made this summer toward the completion of the Mexican National Railroad Company's "International" line, and President Raoul informs us that it is expected to open it for traffic before November 1, and possibly by October 15. This will make a second independent all-rail route from the Rio Grande to the city of Mexico. The Mexican Central road, from El Paso south, was opened in the spring of 1884.

At the close of 1883 the Mexican National Company had in operation 444 miles of track in northern Mexico and Texas, and 356 miles extending west and north from the city of Mexico. Owing to financial difficulties construction had been suspended, with a gap of 352 miles, lying between Saltillo, in the southern part of the State of Coahuila, and San Miguel, in the State of Guanajuato, to be finished in order to complete the connection between the capital of Mexico and the United States. In 1884 the original Mexican National Railway Company defaulted on its first mortgage bonds, and, pending a reorganization, no further building was possible. Toward the close of 1886 an agreement was entered into by the leading representatives of the first mortgage bondholders on the one hand and the Mexican National Construction Company and other creditors on the other, in accordance with which the present Mexican National Railroad Company was formed.

By the terms of the new agreement the Interoceanic line, running from the city of Mexico directly west 274 miles to the present terminus at Patzcuaro, and the International line, completed and uncompleted, from Acambaro on the former, 177 miles west of Mexico, north to Laredo, together with some minor pieces of track, were turned over to the new corporation. Possession was taken in July, 1887, and during the next month contracts were executed for the completion of the missing link in the International division. Work began at the northern end in October and at the southern end in December, and the builders are obligated to finish their task by October 1. Extensive machine shops are to be put up at Laredo, the Pullman Company has supplied a lot of sleeping and dining cars, and the new route will open with fair prospects for both passenger and freight traffic.

Taking St. Louis for the starting point, the distance from the principal cities of the United States to the city of Mexico by way of Laredo and the Mexican National route will be 1,905 miles, as against 2,585 miles via El Paso and the Mexican Central Railroad. The distance from St. Louis to Laredo is about 1,080 miles, from Laredo to Mexico 825 miles. From St. Louis to El Paso it is 1,360 miles, and from El Paso to Mexico 1,225 miles. The saving of 680 miles by the new line is equivalent to nearly thirty hours' time for passenger travel and the mails. The route offers superior attractions for tourists, crossing the Sierra Madre Mountains west of the city of Mexico at an elevation of 10,180 feet, or little less than two miles above the sea. The vertical ascent from the capital is 2,700 feet, most of it in a distance of sixteen miles. That part of northern Mexico traversed by the National road also compares favorably in interest with the Mexican Central's unattractive territory. The Central route, however, possesses an advantage in that it passes through half a dozen interesting cities, while the only cities of importance on the National road are Monterey, San Luis Potosi, and Toluca. The National is a narrow gauge, and the Central a broad gauge road.

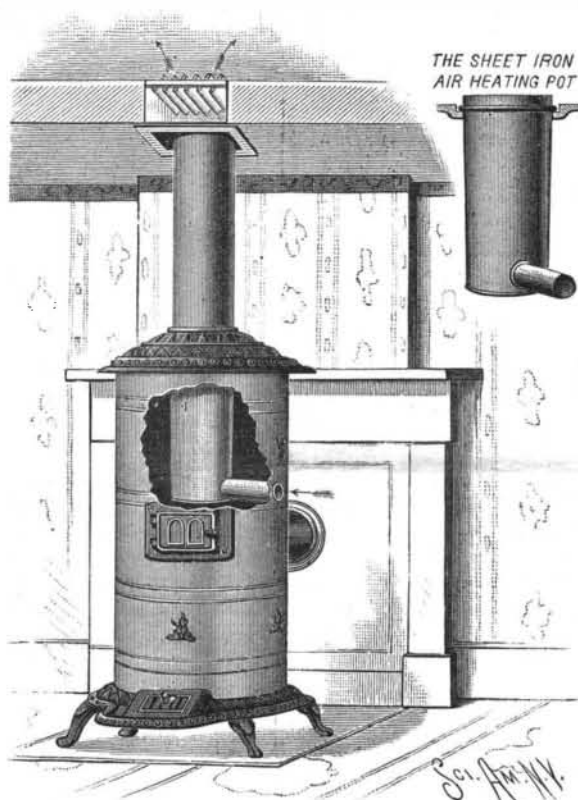
The new line going south from Laredo crosses the

northeast corner of the State of Coahuila, the western part of Nuevo Leon, the southeast corner of Coahuila, the center of San Luis Potosi, the center of Guanajuato, the northeast corner of Michoacan, and the northern part of Mexico. The ascent from the Rio Grande to the table land occurs principally between Monterey and Saltillo, the latter place having an elevation of 5,240, and San Luis Potosi of 6,090 feet. The route lies through or near one or two important mining districts.

All of the railroads in Mexico are likely to find their permanent profit chiefly in local traffic. The Mexican Central Company's domestic freight business has increased during the last four years beyond the most sanguine anticipations. The National road so far has been operated at a disadvantage, consisting of several disjointed sections and confined to local traffic exclusively. President Raoul looks for a considerable development of earnings after the line from the United States gets into operation. The new company's expenses so far have been heavy on account of needed betterments with a view to through business. Other narrow gauge enterprises to connect with the Mexican National are under way. All things considered, the outlook for this and the various other Mexican railroads appears to be brighter than at any time within the last four or five years.—Bradstreet's.

SIMPLE ATTACHMENT FOR STOVES.

A simple device for heating two rooms by means of a single stove has been devised by Mr. Henry Mead, of this city. As this idea is very simple, and is unpatented,

**SIMPLE ATTACHMENT FOR STOVES.**

it may be applied very easily to any stove in use. The purpose of the device illustrated is to utilize the heat space in stoves, which in ordinary cases is devoid of any use other than furthering the general exterior design and increasing the exterior heating surface, it not altering the outside appearance.

To accomplish this, the cover of the stove is removed, and a metal air heating chamber, having a slight flange near its upper edge, and a gas-tight bottom, is introduced. This pot or chamber should be so deep as to extend downward as far as can be done without interfering with the operations of feeding the coal to the fire. At or near the bottom of the chamber an air pipe of convenient size is fitted, and this extends to and through the side of the stove. Connection by pipe from the top of the pot to the register in the floor above completes the arrangement. Without additional fuel this plan has been found to furnish warmth enough in cold days to render needless any stove in the upper room.

The Herreshoffs as Ship Builders.

Charles Frederick Herreshoff, of Bristol, R. I., died of pulmonary disease at his home in that city, September 8, in the eightieth year of his age. Mr. Herreshoff was the father of the famous Herreshoffs, the boat builders, whose works, as a writer in the *New York Sun* shows, are about the most conspicuous thing left to remind Bristol of her trading days. The Herreshoff children played about the old ship yards. The Herreshoffs took to boats. Boats got into their blood more or less from both sides of the house. It wasn't strange, therefore, that John Herreshoff began whittling out boats as soon as he was old enough to manage a jack-knife. In his fifteenth year he built a good sized craft for sailing on the bay.

Then he lost his sight. Gradually a film came over

his eyes, and finally shut off forever the last dim glimpse of Bristol and her boats.

But he went on building boats just the same—not, of course, as if nothing had happened, for his methods of perception had to be radically changed. He had the task before him of carrying in his mind the models he worked upon. The objects he had seen with his eyes in the first fifteen years of his life he could summon up into his mind again.

Under the enforced habit of mental activity, without the interruption and suggestion of outside objects, his mind grew to be one of remarkable concentration and acuteness. He became able, for instance, to set up before himself, from a careful description, a piece of machinery, and to explain its workings and its faults. His sense of touch developed to a wonderful sensitiveness, too. He learned to recognize the power of lines by rubbing his fingers slowly over a marble, and how well he succeeded in finding the good and discarding the bad has been shown by many a craft.

But this was when Herreshoff was building only sailing vessels. It was not until after 1873, when Nathaniel Herreshoff became interested with his brother, that the Herreshoff steam vessels made their appearance. Mr. John Herreshoff had been thinking over the coil boiler idea for sometime, and when it was applied to steam craft it was so successful that the building of sailing vessels was at once abandoned. The industry at once jumped into prominence, and the shops were used for making every part of the vessel.

The average individual who has heard of Herreshoff would very likely expect to find him industriously at work upon a model or laying down the lines in some ingenious way for a new boat. He will be found usually in business hours sitting behind a little railing in one of the rooms of the office, quietly resting one arm on a desk at his side. He is very busy—just as busy as if his eyesight were as good as an eagle's. Secretary Young is sitting at the desk by his side and reading letters, bills, orders, all kinds of business communications. Herreshoff carries them swiftly along in his mind, one after the other. If you should happen to drop into the office about noon, say, you would see him get up, unlatch the gate to the railing with perfect ease, walk to the hat rack where his hat is hanging, with two or three more, and take his down without a fumble.

Mr. Nathaniel G. Herreshoff, who is not blind like Mr. John and others in his family, is the designer. He works out the models, makes his calculations, etc. Mr. John may run his hands over the models, bear the measurements read, and make suggestions. The beauty and effectiveness of the Herreshoff models are thus due, in their conception, almost wholly to the two brothers. But there are experienced men in every branch of the business to take them up and develop them into the much admired Herreshoff yachts.

The steel yacht which the Herreshoffs are now building will be looked for with considerable interest. Her plates have been fitted to each other as smoothly as the tiles in a floor. She is 148 feet in length, with 18 foot breadth of beam, and a 7 foot draught. Her engines, also built by the Herreshoffs, are of quadruple expansion type, and are beauties of simplicity and strength, capable of 800 horse power. Her contract calls for 17 miles an hour. The interior will be a model of beauty and safety. The woodwork is of highly polished quartered oak, and there are five watertight bulkheads. She will cost Mr. Brown about \$70,000 as she comes from the Herreshoff's hands.

Curious Minerals of Utah.

Included in the mineral resources of Utah, apart from its precious metals, are deposits of alum, some recently discovered veins of which are eighteen inches thick and several hundred feet in length, of dazzling whiteness and great purity. Beds of niter are also found sufficiently pure to readily fuse when thrown on hot coals.

Ozokerite or natural mineral wax, a rarity elsewhere, is here found in large quantities. It is air, acid, and water proof, and can be used for imparting these qualities to other substances. As an insulator it is said to be perfect, and would doubtless be found a superior insulating material for electrical appliances. It could also be adapted as the base of a cheap yet desirable paving material and for indurating piles and posts to prevent decay.

A somewhat similar discovery is gilsonite, found, on analysis, to contain about eighty per cent of carbon or asphalt in pure form.

Of the latter a vein has been discovered three feet wide and over a mile in length—a supply that, if worked, would be found almost inexhaustible.

As is now well known, the Great Salt Lake is an immense, limitless magazine of salt, that can be readily obtained in any desired quantity by the simple process of evaporation.

From this lake vast quantities of sulphate of soda are also secured, blown on shore at certain temperatures by the winds, where hundreds of tons are often piled up in a single night, that can be utilized in the cheap production of sal soda and carbonate of soda.