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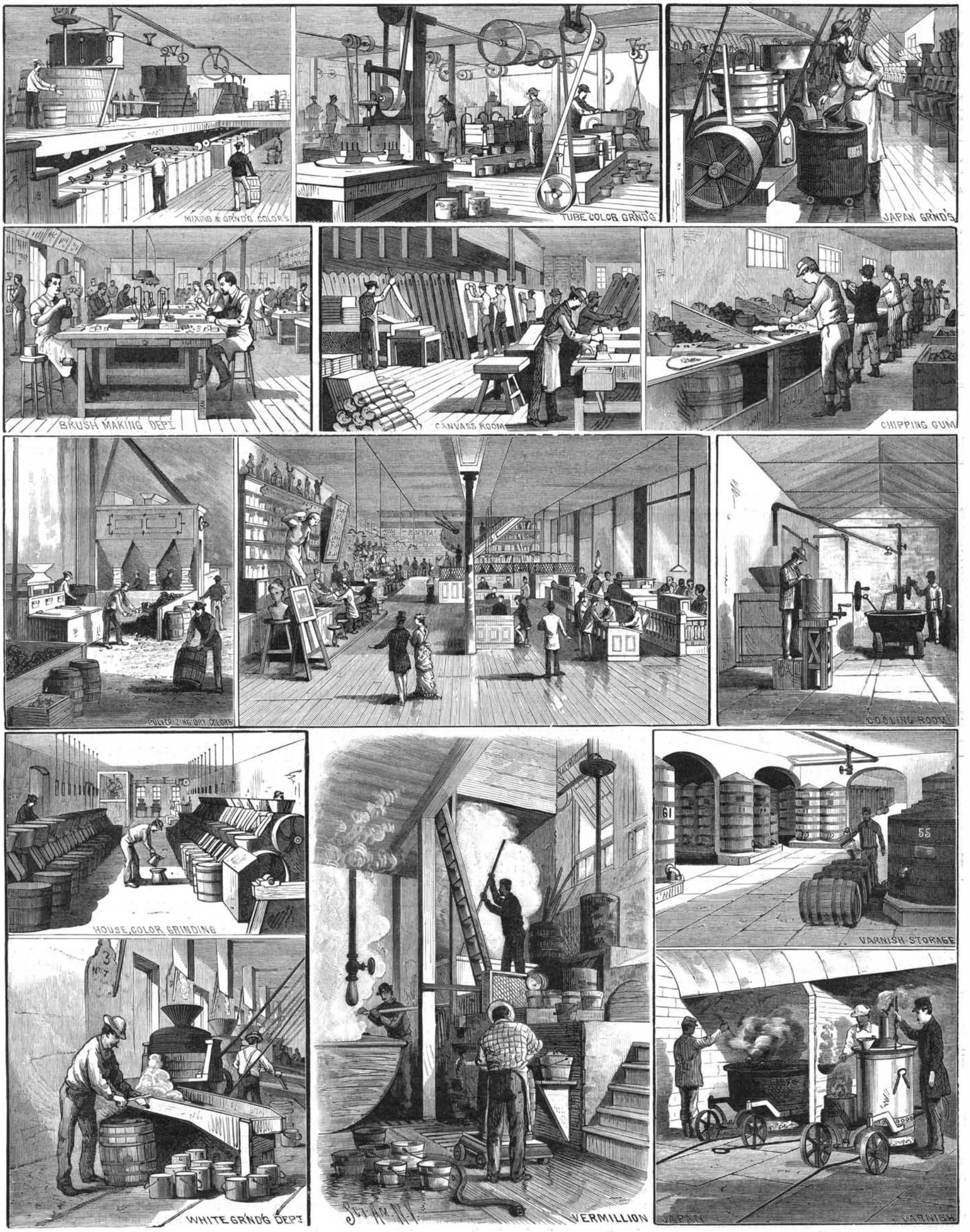

THE PAINT AND VARNISH MANUFACTURE AS CONDUCTED BY F. W. DEVOE & CO. [See page 308.]

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NEW YORK, SATURDAY, MAY 17, 1884.

REMOVAL.

The SCIENTIFIC AMERICAN Office is now located at 361 Broadway, cor. Franklin St.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 487,

For the Week ending May 17, 1884.

Price 10 cents. For sale by all newsdealers.

ELEVATED CITY RAILWAYS CAUSE EYE TROUBLES.

The introduction of the elevated railways in this city has also brought in a peculiar class of optical troubles, due to the lodgment of iron dust in the eyes of pedestrians and others who have occasion to travel or pass under the railway structures. Hundreds of such cases are now treated at the hospitals, and most of them are successfully cured, the particles being removed by a gouge-shaped instrument about the size of a sewing needle. The pieces are too firmly held to be removed by magnets.

The trains have a high speed between stations, and are quickly brought to a stop. This requires strong braking, which grinds off the iron from the shoes in fine showers, and the iron particles fly in all directions.

A magnet applied by us to the tops of the crossties attracted a large quantity of very fine iron dust. Each passing train deposits its quota of iron, not only on the cross ties, but upon the street below. We passed a magnet along the gutter of the street near the stations, where dust usually accumulates, with the result that large quantities of iron particles were secured upon the magnet. The same experiment was also tried in Broadway, through which no elevated railroad runs, and while iron particles were attracted, the quantity was far less than at the railways. By passing the magnet along a distance of only six feet near a railway station, more iron was attracted than by passing it along an entire block on Broadway.

These particles varied in size from one-sixteenth of an inch to dust so fine as hardly to be distinguished by the naked eye, and were frequently entirely invisible, requiring the aid of the microscope to reveal them. Viewed under the microscope, their dangerous character becomes apparent. The greater part were bordered by a jagged fringe with very fine points, compared with which the point of a cambric needle appeared dull. Not infrequently the projections were hook-shaped and barbed similar to a fish hook, which will account for the difficulty experienced in removing them from the eye, into which they have been driven—the closing of the eyelid and the rubbing which thoughtlessly followed, assisting to more firmly embed them in the cornea.

In order to determine whether iron particles could be attracted while floating in the air, a magnet exposing about one square foot of surface was suspended in mid air under one of the railroad tracks, and although the magnet was by no means a strong one, it attracted to itself iron particles in spite of a strong wind which blew at the time.

Further, the awnings of shop keepers along the lines of the elevated railroad are discolored by iron rust in a very short time, and require frequent renewals, since washing fails to remove the stains which the rust produces.

The evil above described being manifest, the question of its prevention naturally suggests itself. The subject is worthy the attention of inventors.

THE LITTLE SHOP.

It is time that notice should be taken of the work done as well as of the place taken by our small shops. The "big concerns" do not monopolize all the skill and mechanical capability in the country. They may profess to do the best work and produce the best results, because they are furnished with the best tools. But they do not monopolize all the mechanical skill, nor collect all the best workmen. Many of the best manipulators, and a very large proportion of the most exact mechanics, are in the little shops; content, may be, to be the foremen, when in a big shop they would be only first class workmen. The small shop men are valuable in any shop where mechanics, rather than operatives, are required, because they are generally "men at a pinch," "expediency men," and generally excellent workmen.

The proprietor of a large manufacturing establishment, building fine tools of a particular character, claims that his best men come from small shops where makeshifts and contrivances are the rule. "Such men," he says, "can make the shop hum" by their methods.

It is very convenient to have a shop full of adapted tools, but it is also convenient to have in the shop graduates from "the little shop" who can contrive as well as tend a machine.

The Blanchard Lathe.

The "last lathe" of Thomas Blanchard is an invention that proves itself worthy the name in perpetuity instead of being confined to the turning of wooden lasts. This invention was made public more than sixty-three years ago—January, 1820—and was afterward adapted to wheel spokes, hat blocks, wig blocks, and a large number of other irregular forms. Although Mr. Blanchard made many improvements on his original device, the main design is retained in the latest adaptations—that of guiding a rapidly revolving and longitudinally feeding cutter head by a model. Except for exact corners, there is hardly any simple form that cannot be reproduced by the Blanchard method; of course, a production with a body and members, as a statuette, or a vase, or many other articles, could not be turned as a whole in the lathe.

A few changes have been made in the Blanchard lathe within the last twenty years, but these were mainly adaptations of well known mechanical movements for the special work to which the particular lathe was assigned. The writer well remembers Mr. Blanchard, thirty years ago, and in conversation he then stated that of all his inventions that of his "last lathe," as he called it, was one that required no radical change. Yet he would be surprised to see one of his machines turning out from 600 to 700 carriage wheel spokes every ten hours, made from the toughest hickory, and not only that, but changing its feed automatically to suit the work. This change is quite ingenious. There are two feeds to the longitudinal progress of the cutter head along the machine, and where the sawed spokes are small and the amount of material to be removed is little, the feed is very rapid; but as the cutter head approaches the hub end of the spoke the curve makes the material to be removed more, because the spokes as sawed present only straight lines from end to end. The feeds are by pulleys and belts, and when the time comes for changing the movement of the cutter head, it releases a lever and holds another, each carrying idler pulleys, so that the fast or swift feed pulley is released and the slower pulley takes its place. The work is so nearly automatic that the attendant has only to take out the turned spoke and put in a sawed blank; but at the rate of over one a minute his place is no sinecure.

Disinfection of Egyptian Rags.

In relation to the proper disinfection of rags imported into the United States from Egypt, the State Department has, upon careful and mature consideration of the subject commensurate with the interests involved, decided upon the following methods of disinfection, either of which will be satisfactory to the health authorities of New York city, New Haven, and Boston, who have been consulted in respect to the matter, viz.:

1. Boiling in water for two hours under a pressure of 50 pounds per square inch;

2. Boiling in water for four hours without pressure; and

3. Subjection to the action of confined sulphurous acid gas for six hours, burning 1½ to 2 pounds of roll brimstone in each 1,000 cubic feet of space, with the rags well scattered upon racks.

Full and explicit instructions have accordingly been given to Mr. George P. Pomeroy, Agent and Consul-General at Cairo, and Mr. Francis McNally, a citizen of the United States, has been designated as the Inspector. He will have immediate supervision, under the Consul-General, of the process of disinfection, will be required to give the subject his earnest personal attention, and furnish a proper certificate. Mr. McNally's certificate will show the following facts: The name of the consignee in the United States, the place where the rags were disinfected, and the process of disinfection, which must be one of the processes hereinbefore described.

After that the Consul-General is to authenticate the certificate given by the Inspector. This process is to be observed in the case of every bale of rags, which is to be also marked "Thoroughly inspected," with the name of the inspector.

The Parasites of Money.

The *Frankfurter Zeitung* states that Dr. Reinsch has found, as the result of a long series of minute investigations, that the surfaces of 50-pfennig pieces (sixpences) which have been long in circulation are the home and feeding ground of a minute kind of bacteria and vegetable fungus. An extended series of observations showed that this is the case with the small coins of all nations, the thin incrustation of organic matter deposited upon their surfaces in the course of long circulation rendering them very suitable for this parasitical settlement. Dr. Reinsch scraped off some of these incrustations, and with a small scalpel divided them into fragments, which were subsequently dissolved in distilled water. The employment of lenses of very high power showed the bacteria and fungi distinctly. This is a matter of no little importance from a hygienic point of view. It has now been conclusively established that bacteria form the chief agency in the propagation of epidemic disease. The revelation that they have a chosen domicile in the most widely circulating medium which probably exists in the world presents us with a new factor in the spread of infectious disease. There is, however, a remedy. Where coins have been in circulation for a number of years, if they are washed in a boiling weak solution of caustic potash they will be cleansed from their organic incrustation, and so freed from the unwelcome guests which they harbored.

A Cough Remedy.

One of our English contemporaries, in reply to an inquirer, recommends a sirup made of the following ingredients for colds and coughs: Take 18 ounces of perfectly sound onions, and after removing rind make several incisions, but not too deep. Boil together with 13½ ounces of moist sugar and 2¾ ounces of honey in 35 ounces of water, for three-quarters of an hour; strain, and fill into bottles for use. Give one tablespoonful of this mixture (slightly warmed) immediately on attack, and then, according to requirement, five to eight half tablespoonfuls daily. It is said that this recipe was that used by the Zulu Caffres when visiting Europe some two years since, and who suffered much from the climate, but invariably recovered upon its use.

ORANGE JUDD, who has ably managed and edited the *American Agriculturist* for thirty years, has retired from the latter paper and removed to Chicago, where he is employed as editor of the *Prairie Farmer*. We wish Mr. Judd great success in his new field of labor, and we congratulate the *Prairie Farmer* on its good fortune in procuring the services of so valuable a coworker.

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Casting of a Heavy Gun.

On May 6th, the largest gun ever constructed in this country was cast at the South Boston Iron Works in fulfillment of a contract with the Government. In the advance foundry of the works is a large pit, which is always used when guns of any size are to be cast. This pit is about 40 feet deep and a dozen feet wide, built in a circular form, the outside being of large iron plates riveted together; and as there is only a depth of about 12 feet to the level, these plates have to be anchored down to keep them in position and to withstand the pressure of the water. Next to the iron plates is a brick wall 12 inches through, and inside of this a thick layer of cement and sand. This pit, to be made available for the work, had to be made deeper and a number of other alterations made. Into this had been placed for the casting, termed a flask or circular mould, which is made in sections, and consists of an exterior body of iron with a layer of sand and cement on the inside about six inches thick, which is covered with a composition of blacking. In the interior of the flask, which was about four feet in diameter, was placed the core, consisting of a long wrought iron flue, around which is placed a layer of rope, and over this a thickness of sand and cement. Into the interior of this core during the casting cold water is run in by a pipe down one side and forced out boiling hot on the other side.

Near the pit are situated three furnaces, each of which contained about 36 tons of iron, which at 4 o'clock in the afternoon, after having been subjected to an intense heat for twelve hours, had been reduced to a molten mass. Connected with each of the furnaces were long troughs for the conveyance of the hot metal to a large iron tank a few feet from the pit, known as the pool or mixer, and from which two short troughs ran into the flask.

At a few minutes past 4 o'clock it was announced that everything was in readiness. Superintendent Asbrand and Foreman Woods took their positions near the pit, and the begrimed workmen with ladles in hand arranged themselves on each side of the troughs and near the flask. Each one was silently and patiently waiting when, at 4:24 o'clock, the foreman sang out, "Let her go," and immediately from each furnace came a stream of molten iron which threw out thousands of sparks in every direction. The hot mass ran into the flask with a seething noise. At the end of twenty-four minutes the flask was filled to the brim, and those in charge announced that as far as it had gone the casting had been very satisfactory. While the iron is cooling the stream of cold water will be kept running through the core, and a wooden fire will be kept burning outside and all around the flask. The core will be removed as soon as the iron is cooled sufficiently.

This casting was made with the breech up, and in order that the gun may be perfectly strong the mould is constructed about five feet longer than what the gun is intended to be finally, and the part not wanted is cut off. When completed it will be about thirty feet in length, of 12 inch rifle, weighing 212,000 pounds, and worth $28,000, about half the sum that a steel gun would have cost. It is calculated to be able to throw a projectile six miles. This company is also under contract to furnish to the United States a 10 inch wire-wrapped cast iron rifle gun, a 12 inch rifled mortar, and another gun similar to the one cast, but shorter.

Evergreens.

Mr. W. D. Boynton communicates to the *American Garden* an article on planting evergreens, which should interest a great many persons, for there are but few varieties of trees which are more beautiful than groups of balsams, pines, and firs, and they are among the most likely to thrive after transplanting.

As to the season for transplanting, says Mr. Boynton, either fall or spring is good. The *when* is not so important as the *how*. I lean a little toward the spring planting, however, as the ground is then more moist, and no other vegetation in the way about the roots and stems to obstruct the work of taking up the young trees.

My first and main precaution is to secure the body of mould immediately around the tree that contains most of the feeding roots in a tree of small growth. I have this lifted out carefully with the tree in the center, as little disturbed as possible, and then wrap coarse sacking about the whole, drawing it up around the trunk and tying firmly. In this shape they can be loaded into a wagon box that has a thick layer of straw in the bottom, and taken home. They should be set out at once, watered, and staked.

The reader will understand that this way of taking up can only be practiced on short distances, where the trees can be taken home and set out in a few hours at the most. If they are to be shipped, the mould must be detached, and moss worked in among the roots and bound around them. Even here I hold to the idea of wrapping coarse sacking around the whole, and fastening around the stem. The whole mass is then moistened, after which treatment they will stand quite a journey and come out in good condition.

If the planter finds that the roots are at all dried up when he comes to set them out, the tree may as well be pitched into the brush heap at once, for it will sooner or later find its way there. Never use manure of any kind around the roots of a young evergreen tree. Vegetable mould is good, but they do not need a rich soil. They should always be staked firmly, for they offer a thick top to the wind, and if twisted about, the roots cannot get a hold.

Death of Prof. Samuel D. Gross.

This eminent physician, lecturer, and author, who has been prominent in the medical world for the last half century, died in Philadelphia, May 6, in the 79th year of his age. He was born near Easton, Pa., and graduated from the Jefferson Medical College of that city in 1828. In 1833 he became a lecturer at the Medical College of Ohio, and in 1840 he accepted the chair of surgery in the University of Louisville. In 1850 he succeeded Dr. Valentine Mott in a similar position in the University of New York, and after that was for 26 years Professor of Surgery in Jefferson Medical College, until 1882, when he resigned from advanced age. Dr. Gross was active as a lecturer and author throughout all of his long life. His lectures on the "Elements of Pathological Anatomy," published in 1835, at once took a high place, but his "System of Surgery," which first appeared in 1859, is his most elaborate work; it has ever since been a standard authority among surgeons, and up to 1872 had passed through five editions. An honorary degree was conferred upon Prof. Gross by the University of Oxford, and also one by Cambridge, and he was a member of the American Philosophical Society; the Imperial Medical Society, in Vienna; the Medical Society of Christiania, in Norway; the Royal Medical and Chirurgical Society, of London; the Medico-Chirurgical Society of Edinburgh; the Medical Society of London; the British Medical Association, and of almost all the medical societies in this country. The remains were cremated, according to the special directions of Prof. Gross, at the Washington, Pa., crematory.

Incidents in the Life of a Distinguished Doctor.

In a memorial sketch contributed to the New York *Medical Journal* by Doctor W. Gill Wylie, on the life and works of the late Doctor J. Marion Sims, many interesting facts and incidents in his life are given. We omit what the writer says of Doctor Sims' professional work, and confine our extracts to the biographer's testimonial of his deceased friend's personal habits and methods, which carry with them good example for others to follow:

"He was truly master of himself. Vices he had none, not even of the smallest kind. The animal in him was completely under control. His habits and his appetites were always guided by his reason. I have known him, day after day and month after month, rise at seven, take a simple breakfast, consisting of a glass of milk and Southern hominy, bread and butter, and sometimes an egg. At eight enter his carriage and make a few morning calls on severe cases. At nine return to his office and see patients till one or one thirty, and take a simple lunch of steak, potatoes, etc. At two enter his carriage, visit patients, operate, etc., returning home usually about five or six, write letters, and at seven take a plain dinner of one kind of meat and vegetables. He never took wine, nor coffee, nor tea, nor condiments of any kind. At the table he was usually talkative and playful, talking about the topics of the day, the theater, of which he was very fond, etc. After dinner he usually wrote letters and did light work, reading journals, etc., or passed his time with his family or friends in the drawing room. About nine thirty he would usually go to his bedroom, where he read or wrote, sometimes lying in bed, until midnight, when he would retire for the night. It was always marvelous to see him so continuously and persistently intent upon his work. He had a habit of writing down ideas at night, by means of a pamphlet, the edge being placed on paper so as to guide his pencil without a light.

"When one was familiar with his capacity for endurance, his power of concentration, his unbounded enthusiasm, his deliberate, persistent, painstaking work, backed up by his unselfishness and undaunted moral courage, it was not surprising to witness his success. His motto as a boy was: 'Duty before pleasure.' Later in life he needed no motto; it had become a habit for him to do what he thought was right. Difficulties, obstacles, and trouble were as nothing to him when once he had made up his mind to act. He went directly at a thing, and he kept at it until it was mastered. It was this great painstaking and persistent work that made things so clear and so definite to him, and enabled him to express his ideas so lucidly. It was also this power that developed his self-reliance and his moral courage, and made his instruments and his methods of operating so near perfect that those who claim to improve or modify them are merely working backward over the same ground that Marion Sims traveled over in perfecting them. His was the inductive method, or working and perfecting method—a developing method. He cleared away complications, and gradually simplified ideas and instruments till they approximated the truth and the best.

"He was no idle dreamer; he never wandered into intangible mysticism; there was neither confusion about his work nor indefiniteness about his aims.

"His mind was always aggressive, progressive, receptive, and ingenious. He was a leader—*a practical genius.*"

THE Cincinnati flood of 1884 will probably never pass out of the minds of those who were there at the time, but the height to which the water rose is well illustrated in a handsome photograph sent us by the Cordesman & Egan Company, manufacturers of woodworking machinery. The water is here seen to surround their large building up to the second story signs, but they write us that they were all straightened out and their machinery running within a week after the water subsided.

[From the Rochester *Union and Advertiser.*]

The Patent Question.

Mr. George Ticknor Curtis appeared lately before the House Committee on Patents, and advocated a bill for the appointment of a commission to revise and amend the patent laws. This bill was introduced by your member, Colonel Greenleaf, some weeks ago. It provides for a commission of three persons, one of whom shall be a lawyer of at least ten years' practice in patent cases, and assigns to them the duty of examining, revising, and improving the patent system; the report of the commissioners to be made in print at the beginning of the next session of Congress.

Mr. Curtis said that he had seen with great concern a state of feeling, of alarm and apprehension, suddenly arising among the inventors of the country, caused, doubtless, by the pending in this Congress of an unusual number of bills, some of which are considered as radical and injurious to the interests of inventors, while others, whether wisely framed or not, touched upon matters on which the patent system needs, or is supposed to need, amendment. But he did not appear in the interest of any particular class, or of any individual. He came before the committee to suggest that something ought to be done to quiet the apprehensions that had been excited, and to satisfy the great patent interests of the country that the House of Representatives is not inimical to them, or disposed to legislate in a spirit unfriendly to them.

The bill for a commission, introduced by Colonel Greenleaf, was, he thought, the very measure which would assure these great interests of the determination of the House to deal justly with the inventors; and at the same time would afford ample opportunity to introduce, after suitable inquiry, all the changes and improvements in the system that can be reasonably required.

Mr. Curtis said that what he wanted to see was a well digested, harmonious, and consistent patent code, accomplishing on the one hand all that protection and encouragement of the arts and sciences that Congress is constitutionally bound to give, and on the other hand properly guarding the public interests. He went through with a great many particular topics in the patent laws—such as the remedy or proceedings in the courts, the duration and extension of patents, damages recoverable, innocent purchasers of patented articles, reissues, the principles which define an invention and infringement, the specification and claims, and a great many other heads—pointing out the expediency of now bringing all the laws relating to this peculiar species of property into one comprehensive and exact text. He dwelt particularly on the present unsatisfactory state of the law concerning the effect of a foreign patent on an American patent as to the time of expiration of the latter. He suggested many other questions which he thought could be and ought to be now settled by positive enactment, so that inventors may know what to expect. He thought it was a mistake for Congress, some years ago, to take from the Commissioner of Patents the power of granting extensions under a standing law. It was true that three years had been added to the term. But legislate as you will, he said, declare what public policy you will, make the term of a patent whatever you will, there will always be cases which will come to Congress for special relief, because the patentee has not received, or thinks he has not received, the remuneration which he should have had. If he thinks so, you cannot shut him out, for he comes here by the right of petition.

This brings a crowd of cases before the committees of Congress, which cannot and do not investigate them as they ought to be investigated; and yet there is now an inclination to require applicants for extension to make out their whole case to the full satisfaction of the committees before they will report a bill giving leave to go before the Commissioner and prove that the extension ought to be granted.

Mr. Curtis' remarks were listened to by the committee with close attention, and subsequently they voted to report the bill to the House with a recommendation that it be passed.

A Stenographic Patent Bill.

The bill introduced by Mr. Young in the House of Representatives is as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section forty-eight hundred and eighty-six of the Revised Statutes of the United States be delared to include, and it is hereby amended so as to include, in the meaning of the words "useful arts," the art of phonography, stenography, or short-hand, and that any invention, discovery, or improvement new and useful therein shall entitle the discoverer, inventor, or improver thereof to a patent on the terms and conditions set forth in said section.

[Phonography or short-hand is recognized by the Patent Office as one of the useful arts, and any new and useful improvement therein may be patented. It therefore seems like a waste of talent for Congress to re-enact a law that is already in operation.]

THE work has been commenced on the structure of the New York approach to the Brooklyn Bridge. An excellent engraving of the improvement as it will appear when completed, was published in the SCIENTIFIC AMERICAN of April 12.

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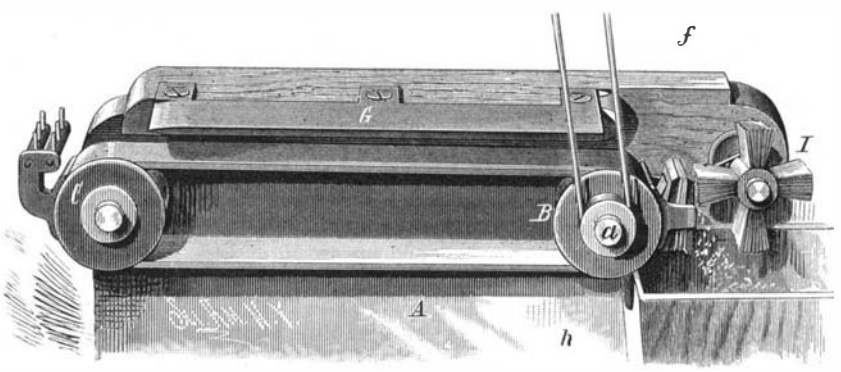
COLLECTING AND REMOVING WASTE FROM SPINNING MACHINES.

The apparatus herewith illustrated can be attached to any kind of spinning machine, and will keep the roller beam and floor clear of waste, beside enabling the spinner to do a third more work than could be done without it. Beneath the electrical rod, G, travels a belt carrying two cushions that touch each face of the rod; these are followed by a comb. All the loose fibers and broken threads are drawn to the rod, thus keeping the roller beam clean, and by gathering the waste that would accumulate on the floor, prevent it from becoming dirty and worthless. The waste is taken from the comb by the rapidly revolving brush, I, and deposited in the box.

By the use of this device the threads are prevented from running double or winding around the rolls, thereby lifting them and forming imperfect threads. The rolls being kept clean, the usual under cleaner is dispensed with. The roller beam and mule carriage being kept clean, the fly waste is kept out of the yarn and off the spindles. The waste is saved in a clean condition instead of becoming dirty refuse. One of the most important features of this device is that by using it manufacturers can avoid the making of a very large per cent of what is now styled imperfect cloth.

Further particulars regarding this invention may be obtained from the patentee, Mr. W. A. Delmage, 11 Bridge Street, Lowell, Mass.



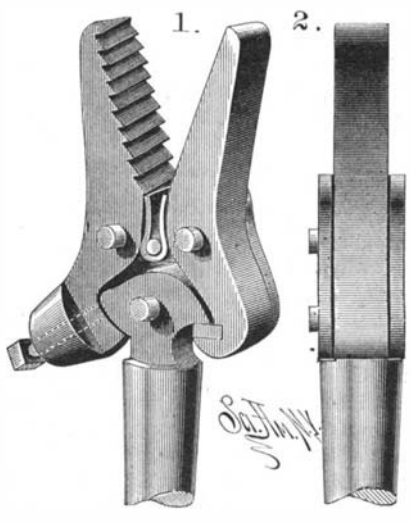
APPARATUS FOR COLLECTING AND REMOVING WASTE FROM SPINNING MACHINES.

Fall of a Meteorite.

It is reported that the French Academy of Sciences has just received an interesting account of a meteorite which fell not long ago near Odessa. A bright serpentine trail of fire was seen one morning to pass over that town; and the editor of one of the papers, surmising that a meteoric mass might have fallen from the sky, offered a reward to any one who would bring it to him. A peasant, who had been terribly frightened by the stone falling close to him as he worked in the fields, and burying itself in the ground, answered this appeal. He had dug the stone out of the soil, and preserved it, keeping the matter quite secret from his neighbors, as he feared ridicule. This stone was found to be a shapeless mass weighing nearly eighteen pounds. The fall of another meteorite, which in its descent wounded a man, was also reported; but it had been broken into fragments and distributed among the peasants, who preserved them as talismans.

IMPROVED WRENCH.

An invention recently patented by Mr. D. M. De Silva, of Corning, N. Y., is shown in the accompanying engraving. The tapering jaws and the handle are pivoted between two plates forming a head block; each jaw has a curved arm extending back from the pivots in the direction of the handle. The handle has cams that bear on the inner sides of the curved portions when the jaws are open, and they move along the curves when the handle is passed to the right—the jaws having been placed on the object to be turned—and wedge the arms apart, forcing the jaws together with great power for gripping the object. Since the force of the grip is in proportion to the force applied to the handle, the object offering great resistance will be gripped accordingly. The jaws are opened by a spring, placed between them, when the handle is shifted back. A hook onone of the jaws comes



DE SILVA'S IMPROVED WRENCH.

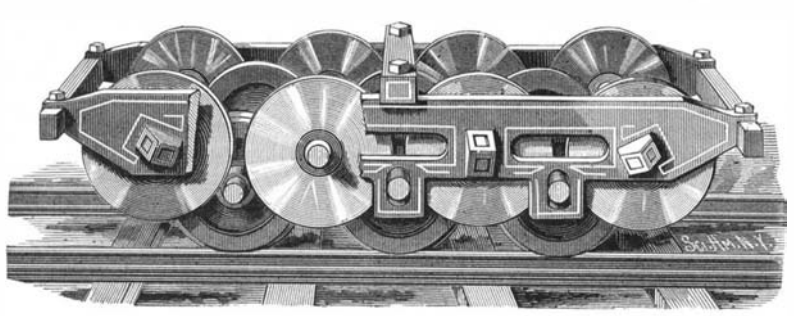
in contact with a shoulder formed on the handle to limit the backward swing of the handle to a line with the jaws. In order that the arms may be set to grasp small articles, one of the arms is provided with an adjusting screw that can be set in against the cam to lessen the extent of opening of the jaws. One or both of the jaws may be serrated to obtain greater holding power; one may be made with a beveled face, whereby the corners of the serrations at the highest side of the face will bite quickly, causing the jaws to grip more securely and without slip.

Measuring the Height of Trees.

In a recent number of the SCIENTIFIC AMERICAN SUPPLEMENT we gave a description, with illustrations, of a simple instrument for measuring the heights of trees, monuments, etc., with directions for its use. It is a cheap and efficient contrivance, styled a dendrometer, and was said to have been invented by Mr. Kay, forester to the Marquis of Bute. We are now, however, in receipt of a communication from a subscriber in Vienna, Austria, saying that the writer used this instrument to his great satisfaction forty and more years ago in buying timber for mining purposes. The invention was awarded a first class silver medal by the Scottish Arboricultural Society.

CAR TRUCK.

The axles of the wheels of the railway car truck shown in the engraving have their bearings against superimposed wheels which are so placed as to bear upon opposite sides of the journals of the axles above their centers. The superimposed wheels are made as large as is practicable; and are arranged in pairs—one upon each end of an axle extending across the frame. The arrangement and construction of the truck will be readily understood from the cut, in which a portion of the frame is cut away in order to show more clearly the journal formed by the superimposed wheels.



McCONNELL'S CAR TRUCK

This plan makes a slowly rolling bearing for the car axle, and the large size of the upper wheels causes their journals to turn at such a reduced velocity as to have but very little friction, so that all liability of heating is obviated. Thus wear of the bearings is reduced, and a large saving of oil and waste effected. Increased steadiness in running is also accomplished by this method.

This invention has been patented by Mr. A. E. McConnell, 197 Clio Street, New Orleans, La.

English vs. Arab Swords.

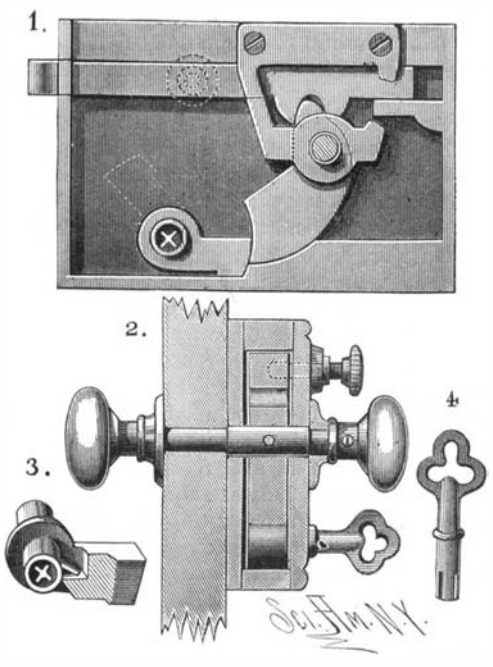
An English manufacturer of cavalry swords has recently made some severe criticisms of the manner of testing swords for the British army. The sword blades are taken to an official viewer, who is a civilian, and by him tested as regards balance, weight, and length. They are also gauged as regards size. Then the real test is applied. They are struck on a butcher's block by the viewer, and, if the result is considered favorable, they are passed. The operation is, of course, liable to great uncertainty, as no two men will strike with equal force, nor will the same man at different periods of the day. A method of testing swords much more severely, and in a way certain to be uniform, is afforded by a machine now in use by private manufacturers of the best goods, but it has not been adopted by the Government. The swords used by the Arabs in the Soudan have a heavy curve, and an edge which is kept as sharp as a razor, for use in cutting only, and not for thrusting, which is the only practice known in European swordsmanship. The Eastern swordsman seldom or never guards with his sword, and the hilt is made so small as to allow no play whatever to the wrist, so that when he cuts he does so from the shoulder, bringing into action all the strong muscles of the forearm and the back. The terrific force of a cut made in this way may be estimated from the accounts we have of the Sikh war, and many battles in India, where arms, heads, and legs have frequently been taken off at a single blow, which far exceeds anything that has been or probably can be done by the light, slightly-curved sword used in the European fashion. This is the reason why the hilts of all Eastern swords are made so small—not wholly in consequence of the smaller hands of the natives, but because a larger hilt would be a disadvantage, by weakening the firmness of the grasp, and consequently the force of the blow, in this method of cutting.

Traps for Inventors.

As soon as the United States Government grants an inventor a patent, and the *Official Gazette* of the Patent Office announces the fact, that inventor receives an alarming addition to his mail every day for a week. Advertisements, circulars, and letters come to him from patent agents, patent venders, patent institutes, bureaus, and all sorts of companies, firms, and individuals. All of these letters and circulars express a warm interest in the invention in question, and a desire to benefit the inventor. They are all philanthropic in tone, and suppress any indication of desire for gain. It is for the inventor's good only that they write. On closer investigation it is found, however, that every one of these disinterested individuals needs some pecuniary acknowledgment before any business can be done with them. One man wants a $5 or a $10 fee for advising the inventor what to do; another wants money to print circulars of the invention; another wants to exhibit the model in a room with other models, or wants to make a model; others want to negotiate for territory or sell rights, and so on. But every one needs more or less money in hand to do these things. The inventor who gets his first patent is dazed at all these offers, and sees so many tempting methods employed to make money that he is often deluded into parting with his coin without any very definite understanding of what he is to get in return. All sorts of traps are set for unwary inventors. There is a class of men who prey on them. Inventors, as a class, are enthusiastic and sanguine. They believe their devices are of the greatest benefit and highest importance. Men who acknowledge and recognize this, and who praise their inventive genius, are apt to gain their confidence, and too often this confidence is abused. Any respectable and reputable patent soliciting firm will advise its clients to be exceedingly careful of the persons with whom they transact business in patents or patent article. There are so many frauds that it is difficult to segregate them from people in legitimate business.—*Mining and Scientific Press.*

A NEW LOCK.

The bolt of the lock herewith illustrated has two studs projecting from its lower edge, to form a recess in which enters the toe formed at the upper end of the weighted tumbler secured to the knob spindle. The bar shown in the lower part of Fig. 1, and detached in Fig. 3, is turned by a key to a position in which it will not interfere with the movement of the tumbler; or to the position indicated in Fig. 1, where it locks the tumbler and prevents the shifting of the bolt. Threaded into the lock case is a screw pin, which enters a hole in the side of the bolt as a further security against unlocking. When the lock is used as a latch only the lock bar is swung back and away from the tumbler, leaving the latter free to be moved by the knob spindle. When the knob is released, the bolt will be thrown outward by the downward movement of the tumbler acted upon by its own gravity. The lock can be readily made for either a right or left hand door, and as it is entirely devoid of springs or delicate parts liable to be broken, it can be cheaply, strongly, and durably made; it can be used either as a latch or lock, the adjustments for either being easily made.



MIKESELL'S NEW LOCK.

This invention has been patented by Mr. M. L. Mikesell, of Muscatine, Ia.

A writer in the *Medical Times and Gazette* recommends the use of hot milk as a restorative. Milk when heated above 100° F. loses its sweetness and density, but has a most beneficial influence over mind and body when exhausted by labor or mental strain. Its effects are more invigorating and enduring than those of alcoholic stimulants.

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Digging Wells.

The Massachusetts *Ploughman* some time since had the following directions in regard to digging wells:

The old way of digging a well and stoning it up so as to leave it about 3 feet in diameter, is a very good one if the water is to be drawn up with buckets; but if only with a pump, it is a very poor way; for if, as is the usual custom, the well be covered at the top, it leaves a very large space for dead air, which often becomes so bad that it affects the quality of the water, and also makes it unsafe to enter the well. When a well thus stoned has only a pump in it, the covering should be under water, or very near it; but if it is known that only a pump is to be used, the expense of stoning may be saved, and the water kept in a much better condition. This is done by digging the well in a dry time, and when dug as low as possible a cement pipe, some 2 feet in diameter and 2 or 3 feet long, is sunk at the bottom, and worked down as low as possible by digging out the inside. The pipe should be covered over with a flat stone, through the middle of which a two-inch hole has been drilled; directly over this hole stand up drain pipe, then begin to fill in the hole. When filled as high as the top of the first piece of drain pipe, put on another, being careful to have it straight with the other and the line perpendicular; continue filling and adding drain pipe until it is as high as the surrounding ground; or if the pump is not to stand directly over the well, then when it is filled within 4 feet of the surface put in the pump pipe and lead it off in a trench to where the pump is to stand. When it is found that the pipe is all right, finish filling the well, leaving some durable mark that the position of the well may be known.

A well of this kind is reliable and permanent, requiring no repairs; the water is cool and free from impurities that open wells are subject to; no insects or animals can find their way into it, and the cost is not more than one-half that of a well that is stoned. If dug, as it should be, when the springs are low, a constant supply of water that is as pure as the underground springs is secured. As the well is always full, there is no chance for bad air to injure the water, and, in fact, but little danger of being polluted by surrounding cesspools compared to that of open wells.

The Victims of Car Coupling.

Notwithstanding the great number of automatic couplers invented, probably most railroad men to-day are not convinced that there is one that meets the requirements. Even if they were, they would hesitate to adopt one which might not couple with the cars of their connections. Thus to the necessity of finding an efficient apparatus by which cars may be coupled without going between them there is added the further necessity of uniform and simultaneous action by the railroad companies concerning a matter not well understood, and regarding which opinions at present are likely to be very diverse.

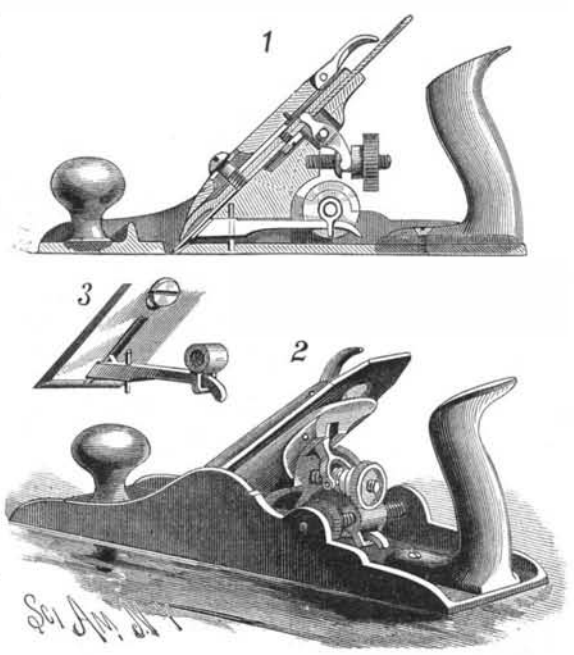
But the crushing and mangling of men by the thousands calls for some effort, at least, to prevent it, even if the way is not quite clear and action will be difficult. It justifies extraordinary methods, efforts, and expenditures. If it is true, as it probably is, that the railroad companies do not generally know of apparatus that will prevent the coupling slaughters, they should lose no time in finding out, in testing whatever has any promise with such thoroughness and completeness that they will all thereafter know what can and what cannot be done by the appliances offered for their use.

If they had had to pay for the killed and maimed brakemen, as they do for killed and maimed passengers, they would have been terribly exercised about the matter long ago; for the stockholder, not coming in contact with the victims, feels such things only in his pocket; and the pressure of the stockholder to save money *plus* the humanity of the operating officer is certainly more effective than the humanity alone. But even a modification of the employers' liability law, which would give the employe substantially the same rights as the passenger, might not greatly help in this matter; for, as we have said, the sufferers in car coupling are largely guilty of "contributory negligence," which would exonerate the company, even if a passenger were a victim. This kind of contributory negligence, though a good reason why the victim should not receive damages, is not always a good reason why the employer should not pay them.

This matter should not be allowed to rest, but its agitation by the inventors of car couplers alone is hardly likely to be fruitful. The railroad men should take it up, and they should need no other incitement than the regiments of men their cars have crippled and the companies of them they have killed.—*Railroad Gazette.*

BENCH PLANE.

Fig. 1 is a vertical longitudinal section, Fig. 2 is a perspective view, and Fig. 3 shows the arrangement for securing the lateral movement of the plane iron of a bench plane for which letters patent were recently issued to Mr. N. E. Curtis, of Mauston, Wis. In the upper surface of the bed piece is a groove to receive the screws which clamp the plane and cap iron together. This groove is long enough to permit the greatest required range of longitudinal movement of the plane iron, while it holds the sides of the screw head so closely as to admit of little or no lateral motion of the iron at that point. Fulcrumed in the bed piece is a lever, the short arm of which enters a hole in the cap iron; the long



CURTIS' BENCH PLANE.

arm is engaged by a milled nut on a screw threaded stud projecting from the back of the bed piece. By turning the nut the plane iron is adjusted longitudinally in the usual way. The plane iron and cap iron are held in place by a clamping lever similar to others in use; but the distance between the screw and the lower end has been shortened, and the distance between the screw and cam lever pivoted in the upper end has been increased, thereby securing greater leverage and increasing the firmness with which the plane iron is held in place.

A lever is fulcrumed in a mortise in the lower portion of the bed piece, so as to swing in a plane parallel with the face of the plane body. One arm of the lever is beveled and provided with a tongue entering a groove in the back of the plane iron. The long arm extends beyond the rear of the bed piece, and is moved by a traveling nut carried upon a screw journaled transversely in the plane body and having a milled head. By turning the screw in one direction or the other the lever is correspondingly moved, and the plane iron, by means of its engagement with the lever, is swung laterally, the clamping screw being the center of motion.

This construction enables the user to readily and accurately adjust the cutting edge of the plane iron so that it will be parallel with the face of the plane, and also enables him to quickly place the cutting edge at any desired height.

On the Pennsylvania Railway the average consumption of fuel for all passenger trains is 56 pounds per train mile.

A PHOTOGRAPHIC REVOLVER FOR AMATEURS.

The apparatus which we are about to describe, and which is manufactured by Mr. E. Enjalbert, is very ingenious, very well conceived, and will, we believe, meet with great success. It is a true pocket revolver with barrel, stock, and cock, but instead of serving to throw deadly leaden balls it is designed for taking very small photographic negatives four centimeters square. Upon pulling the trigger the sensitized plates succeed one another, and the operator can thus suddenly take ten successive photographs without touching his weapon. These small photographs may be afterward enlarged, and serve as useful documents for tourists, amateurs, and artists.

With this little revolver there is no longer any focusing to be done, no more plates to be changed, and instantaneous views are obtained by an exposure of one-fiftieth of a second. The apparatus is always hermetically closed to the light, and it permits of following objects in motion with great facility, and without its being necessary to take accurate aim as with an ordinary revolver, since it is merely a question of taking such a general view as is comprised within the field of the objective.

The apparatus consists of five principal parts, which are shown in detail in the annexed figure.

1. *The Barrel.*—In this is adjusted the rapid, rectilinear objective, which consists of two achromatic menisci that are symmetrically arranged to give a focal distance of 0·042 mm. The revolver may be used from a distance of 4 5 meters, since, owing to the combination of the lenses' curves, the different planes are then all in focus. The ever tedious operation of focusing is thus avoided. The diaphragms accompanying the apparatus are placed in the very interior of the objective, between the two lenses.

2. *The Camera.*—This consists of a cylinder, H, that contains a shutter, A, and a frame holder, C. It is into the front end of this chamber that the barrel is screwed. The shutter, A, is capable of revolving freely upon its axis. It contains an aperture, B, equal to a quarter of its surface, and carries a small clockwork movement that gears with the pinion of the axis of the camera. This clockwork movement, when its spring expands during its revolution, necessarily carries along the shutter. The spring is wound up by revolving the cylinder, G, when it is in place. At this moment, in fact, it catches and holds the end of the axle, which enters a square aperture in its center. Upon pulling the trigger the two teeth seen at K are thrust forward. The first of these, which, when at rest, stops the shutter, now frees it and allows it to make one revolution that opens and instantaneously closes the apparatus. The shutter, on reaching the lower end of its travel, abuts against the second tooth. The shuttle-motion that occurs in the rear when the trigger is freed disengages this second tooth, and allows the first to engage with the starting notch again, so that the shutter is then ready to operate anew if the spring is sufficiently taut.

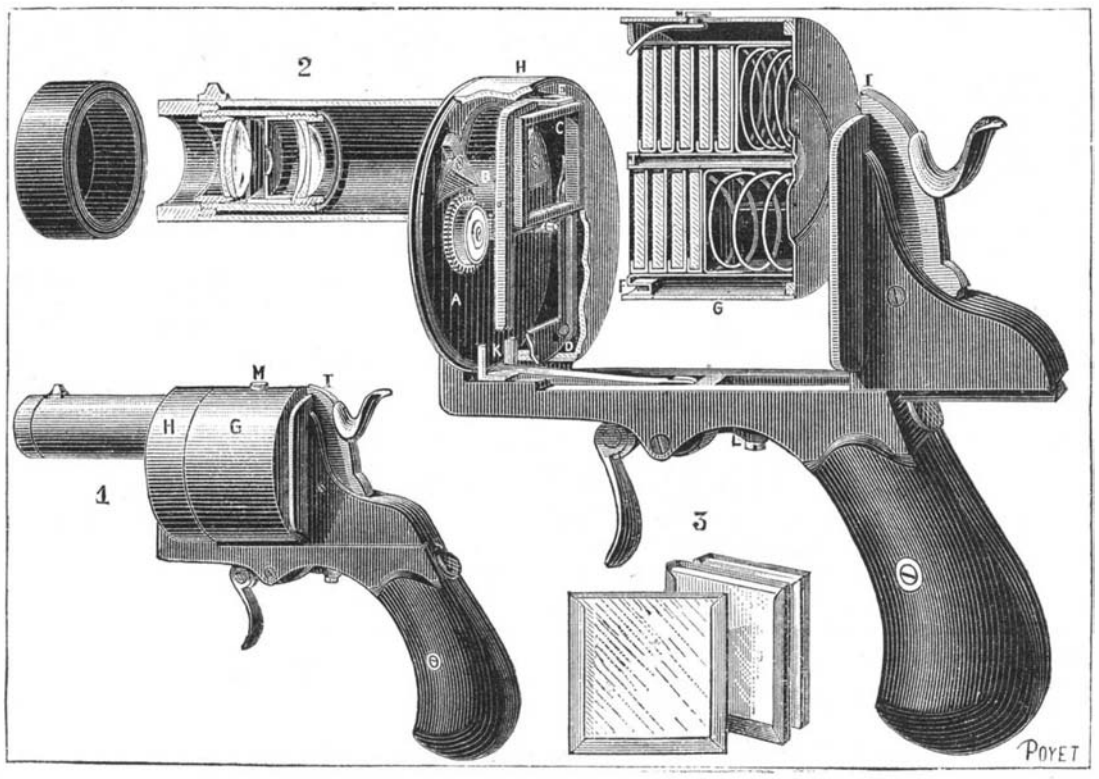
The frame holder, C, is hinged beneath, at D, and terminates above in a bent tooth, E, which causes it to advance or recoil a distance equal to the thickness of one of the frames, according as it has in front of it the upper or lower case. This motion is obtained by means of the rabbet, F, at the bottom of the cylinder.

3. *The Plate Cylinder.*—This is divided into two rectangular compartments in which slide two plates that are thrust forward by spiral springs. The upper case contains the sensitized plates held in their frames (shown of actual size in Fig. 3), while the lower one collects them in measure as they have been exposed.

The cylinder, G, revolves through the friction of its edges against the chamber, H.

When the upper case is opposite the aperture, C, the tooth, E, forces back the frame holder, the first frame enters the open space in front of it, and the glass is thus in place for the operation. In order to remove this glass and substitute the succeeding one for it, the cylinder is made to perform one entire revolution. The first glass remains in the aperture, C, in the camera, when the cylinder begins to revolve. Then, the revolution continuing, when the second compartment comes opposite this glass the tooth, E, enters the rabbet, F, and the glass naturally enters the said compartment. The revolution still continuing, the cylinder takes its position again, and the second glass, now become the first, is, in its turn, made to enter the camera.

3. *The Movable Breech*, which is fixed upon the stock by a dovetail, serves to shove the cylinder, G, up against the camera, H. It carries a spring cock, whose extremity, I, enters a recess in the back of the cylinder and prevents the latter from revolving, and also indicates the position of the cases when they are well opposite the objective.



ENJALBERT'S PHOTO-REVOLVER

(Fig. 1.—One-half actual size. Fig. 2.—Slightly reduced. Fig. 3.—Sensitive plates—actual size.)

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5. *The Stock* connects the different parts of the apparatus with each other. The trigger actuates a lever that passes under the cylinder, G, and that terminates, as before stated, in two teeth, K. The small turn button, L, beneath the trigger serves as a catch.

The manipulation of the apparatus is simple, and may be sufficiently understood from the foregoing description without further dwelling upon it.

This photo revolver offers but one drawback, and that is that in certain cases it may frighten those at whom it is directed. But it is easy to remedy this by covering it with a handkerchief so as to hide its terrifying aspect.—*La Nature.*

AMERICAN INDUSTRIES.—No. 89.

[SEE FIRST PAGE.]

THE MANUFACTURE OF PAINTS, VARNISHES, BRUSHES, AND ARTISTS' MATERIALS.

Only those directly connected with the business can fully realize how enormous has been the increase of American production in this line during the present generation. The growth has been far more than proportionate to the increase of the population, for two reasons—first, the manufacture here has been so improved that we now import very little except raw materials; and second, the condition of the great body of the people has been steadily improving, so that we have more comfortably and tastily fitted up homes, workshops, and business houses, to say nothing of the great demands which modern railway and steamboat traffic have given rise to. And all these causes contribute to making the business in paints and varnishes of much more importance, proportionately, in our industries, than it was a generation ago.

In our first page illustrations we give representations of some of the most important details of the manufacture, as conducted at the extensive paint works of Messrs. F. W. Devoe & Co., in New York city, and at their varnish factory in Newark, N. J. Their manufacture includes colors of all kinds, either dry, ground in oil or water, or in pulp, ready-mixed paints, colors in japan for coach and carriage and railway car painting, and fine varnishes and japans, with every variety of brushes, artists' materials generally, and mathematical and surveyors' instruments.

Although in many pigments the manufacture has been greatly changed within a recent period—more especially since the introduction of the aniline colors—the making of dry white lead and of zinc white, which constitute a large portion of all the paint used, and form the basis of many of the colors, has remained substantially unchanged through a long period. Formerly white lead was largely imported, but there are now some forty corroding establishments in the United States, and imported white lead is almost unknown. In zinc white, however, we still import our best qualities, Messrs. Devoe & Co. using the Vieille Montagne product, made in the largest establishments of the kind in the world, at Paris and Liege. This is a purer article than that made here, from the fact that the American zinc white is made direct from the ore, while that which they import is made from the metal, and, although the house makes all grades of colors which have a popular demand, they sell none carrying the label of their own name and trademark which is not strictly what it is stated to be. White lead and zinc white are much adulterated, for the cheaper paints, with chalk, barytes, and other adulterants.

In making and preparing for use the various pigments which go to make up the great variety of colored paints, an extended knowledge of chemistry is indispensable. Chemically manufactured colors, such as chrome yellow and green, Prussian blue, and vermilion, are not durable when in exposed conditions, but either of these may be mixed with vehicles which will add greatly to their permanence. Ultramarine blue, as now made—for that made from lapis lazuli has been entirely superseded by the cheaper artificial blue—is a durable color, but care is required in mixing it with white lead to be sure that the lead is pure, for that adulterated with barytes is very injurious, causing the blue to fade quickly. Carmine, also, if mixed with varnish instead of oil, is a durable color, although much of the durability of any color is largely dependent upon the ground on which it is spread and the exposure it receives, as well as the vehicles used in mixing. There has long been a good deal of difference of opinion among painters as to the use of white lead and zinc—some strongly advocating one and some another—but these differences are now resolving themselves into pretty general unanimity of opinion that zinc white has many advantages for interior work, and that for exposed situations the most durable white is a mixture of white lead and zinc white in nearly equal parts. But however the painters or the public may differ in opinion on this point, the doctors all strenuously oppose the use of white lead as eminently injurious to those who make it and the painters who use it.

In the manufacture of all their goods the firm start with the raw material, and carry it forward through all the successive stages. Mr. Isaac Wyman Drummond, E.M., Ph.D., has direct charge of the chemical examinations and experiments necessary, and the importance of the most careful attention in this department for the making of durable colors cannot be overestimated. The permanence of colors in secondary or mixed paints depends primarily on the chemical relations of the colors and pigments employed. These secondary colors are produced by various combinations, and the rule is to use the least number of colors possible to secure the desired tint. It is thus that, with the best of skill in the chemical manipulations, and experts to attend to the mixing and all the details of the manufacture, a variety of colors and an excellence in quality is attained which it would be impossible for any single workman to hope to reach.

In our illustrations are given thirteen views of as many different departments of the business, besides one showing the interior of the large and handsome store at the corner of Fulton and William Streets, New York.

In the left hand corner at the top of the page is shown the mixing and grinding of the pigments for standard colors, while adjoining it in the center is a view of the process of making the finer artists' colors furnished in tubes. The engravings are necessarily small, from the desire of the artist to bring into the group as many departments as possible. There is nothing, perhaps, that would be entirely new to the well informed mechanic in the manner of mixing and grinding the colors, but the advantages possessed by a large establishment for doing this work, with ample power and the most perfect mills, make it an easy matter to secure great fineness and uniformity in the product. The constituents required for the different colors and shades are accurately weighed and measured out before they are put into the mills, and the work is afterward done with mechanical precision. The grinding of the artists' tube colors is done on a circular glass table on which, in a regularly changing ellipsis, revolves a heavy granite block.

On sanitary grounds alone, the extent to which ready ground and mixed paints have come into use within the last few years is a matter of public good fortune. The grinding and mixing of paints were among the most unhealthful parts of the business, when done in the old way, as the dry powder was to some extent absorbed by the skin or taken in by breathing, while its being directly taken in through a scratch in the skin was not uncommon, and all tended to give a high death rate among painters before the attainment of middle life.

The pulverizing of dry colors, shown at the left, about the middle of the page, is done with powerful mills, the pigments, when large enough to require it, being first passed through a breaker and then ground between heavy stones, and bolted to secure uniform fineness, much in the same way that flour is ground.

The white lead and zinc grinding, shown immediately below, forms a most important part of the business. The lead or zinc, with its requisite quantity of oil, is placed in a mixer, which has a trough or gutter in a circle, on a bed about six feet in diameter, in which rolls around a stone also about six feet in diameter, and eight inches face, until the oil has been thoroughly incorporated to make a paste or pulp. Thence this is drawn by pipes into mills on the floor below, where it passes between powerful grinding stones, and comes out slowly in a thick paste of great fineness and entire uniformity.

In the grinding of colors for house painting, or what should be more properly styled the making of the ready mixed paints for use without change, the firm do an extensive business. A large portion of their goods are simply ground in oil to a paste consistency, leaving the painter to thin and put in such drier as deemed best; but in those goods sold in cans, pails, etc., ready for use, the requisite driers and all necessary ingredients are incorporated, and the buyer only has to select the color or shade required from the sample on the label or specimen sheet.

The making of vermilion, shown in one of the views, requires a large department. This is principally made from carbonate of lead and bichromate of potash, with water, the resulting liquid being left to settle in large tanks, the sediment being laid out in batches to dry, the final moisture being absorbed by chalk blocks on which the rough cakes are placed. This vermilion has been in practical use for several years; it does not turn brown or blacken, but retains its brilliancy under exposure to sun or weather.

In all the varieties of umber and sienna made, of which the manufacture includes everything known to the trade, the raw umber and sienna are imported by the hundred tons, and burnt, ground, and passed through all the requisite processes on the premises, as is also the case with the various grades of Vandyke brown. For their ivory black the firm buy ivory chips from the manufacturers of billiard balls and ivory goods, and burn it themselves, to be entirely sure of having a perfectly pure article, which they sell in the powder or in the form of drop black.

As a substitute for the chrome or Paris green, the firm have for several years been making a very popular shade of green, known as the "Park Lawn Green," which is much used for window blinds, agricultural implements, ornamental iron work, and machinery, and they also make another shade, known as "Clover Leaf Green," which is strong and brilliant, and with great covering properties.

Of coach and car colors, ground in japan, the firm make a specialty, and furnish all the supplies required by several prominent railway lines. It is absolutely necessary that the identical shade adopted shall be preserved in all subsequent orders, and that the materials shall be the same, so that the wear will be uniform, and on this account they usually make up large lots at one time, so as always to have a supply on hand. For these colors the firm received a gold medal at the National Exposition of Railway Appliances in Chicago last year.

Not the least among the departments of the business is the large tinshop, where the pails, cans, and painters' tinware are made. Everything of that kind required is made on the premises, the most improved machinery being employed, and every piece being made by a pattern that cannot fail to secure absolute uniformity.

The brush making department of the business covers the manufacture of every kind and grade of brushes known to the trade, from the fine sable to those made of bristle—brushes for the japanner or varnisher, the painter, or the artist—and for all classes of work. The deftness with which the hands put together this work, the facility with which they even up the tufts of almost silky fineness, or separate bristles which have split points, or which have been laid with the roots where the points should be, is something quite wonderful to one who has never seen the work in progress. Everything in this room is made according to sample, and specimens to work by are hung up near every work table.

The making of artists' canvas boards requires a large department. Only the best English linen is used, made especially for the purpose; this is first stretched tightly on the frames, and workmen go over each inch of the surface to remove all pin heads or imperfections of the flax—then come successive coats of specially prepared lead and filling, to make a smooth, firm surface, such as best adapted to make an even and permanent surface for the artist's work.

The manufacture of surveying and mathematical instruments, to be used in railroad construction and for engineers, architects, and draughtsmen, as well as for technical schools, has naturally grown out of the gradual expansion of the business into the filling of all the wants of artists, and everything required by contractors who use their paints. A view of this department has been necessarily omitted from our illustrations, but here are made squares, triangles, compasses, pantographs, and a large variety of other instruments, while the transits, theodolites, and levels furnished by the firm have been approved by and are in the use of the United States Coast Survey.

For the making of varnish and japan the works are at Newark, N. J., and representations of some of the leading details in this branch of the business are shown in the views on the right of the page. The first operation in order is the chipping, which is in reality little more than the removal of the outside crust or coating, and the separation of any impurities. There are in all some thirty different resins or gums of which varnish is made, included in which are principally amber, copal, gum cowrie, animé, and common resin. There are natural lacquers from India and China, and drying oils which resinify by oxidation in the air, but oil varnishes proper are composed of an intimate combination of a drying oil with a fused resin, which hardens by the oxidation of the air. Besides these there are varnishes which have a volatile liquid holding in solution resins or gums which, on the evaporation of the solvent, leave behind a vitreous coating on the surface varnished.

The oil used is principally linseed, which from its high drying property and its general constancy in quality is the great favorite in nearly all varnishes. It is obtained as new, sweet, and free from rancidity as possible, and then clarified and allowed to settle for weeks, after which it is drawn off for use. By boiling, the fatty constituents of the oil—glycerine, palmitine, etc.—are volatilized. The various methods of mixing the oils and gums or resins, and the manner and extent to which they are heated together or separately, necessarily vary with the particular kind of varnish or japan being made. It is a branch of the business which calls for the greatest knowledge, experience, and care, together with a skill which can only be acquired by long practice and observation. The resin must be so prepared as to be readily soluble in oil, and then so incorporated as to form a compound which shall be perfectly soluble in turpentine, and so that, on the evaporation of the latter, a hard surface will form before dust, under ordinary circumstances, will attach to the varnished surface. The high success of the firm in this branch of their manufacture, through many years of steadily increasing business, affords the best criterion of the quality of their goods.

The works of the firm in New York city have a frontage of 200 feet on Horatio Street and 175 feet on Jane Street, with a floor space of about four acres. This part of the business is under the especial superintendence of Mr. James F. Drummond, a member of the firm who has attended entirely to the manufacturing since 1856. A view of the main salesroom, at the corner of Fulton and William Streets, forms one of our illustrations, the business department being under the direct personal supervision of the two other members of the firm, Messrs. Frederick W. Devoe and J. Seaver Page. The first floor above, of the full size of the store, is devoted to artists' supplies and painters' sundries, including an assortment of almost everything even remotely connected with painting and decorating. The firm have a branch house in Chicago under the style of Coffin, Devoe & Co.

A Suggestion about Color Blindness.

May not some people, who know well the difference between colors, yet fail to characterize by their proper names the colors recognized? This question is asked by a Kentucky correspondent, who suggests that some of the railroad employes discharged because of not being able to recognize a red, a white, or a green light, may still, as many of them undoubtedly are, be able to distinguish a light which means danger from one that does not. It is so simple, in such a matter, to learn to call things by their right names, where there is the capability of distinction, that we should be inclined to think the failure to do so indicated too low an intelligence for its possessor to be in any way intrusted with responsibility for human life.

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Correspondence.

A Suggestion as to Railway Sleepers.

To the Editor of the Scientific American:

Your article in a late number of the SCIENTIFIC AMERICAN, calling the attention of inventors to devise a substitute for the increasing demand and diminishing supply of railroad sleepers, suggests one feasible and practicable way of meeting this great demand. There are thousands of acres along the lines of all roads that might be planted to chestnuts. The chestnut tree will grow on all except wet land, and when once planted is always there, as they sprout from the stump.

The chestnut is a rapid grower, and is all useful for sleepers, poles, and stakes. About fifteen will grow on an acre at six feet apart, and at twenty-five to thirty-five years (according to soil) they will be worth a dollar each—better than money at compound interest.

Would it not be well for railroad companies to consider this, and encourage the planting of chestnut trees?

E. MYRICH.

Ayer, Mass., May 5, 1884.

The Walled Lakes of Iowa.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN of April 19, in speaking of the walls aroupd lakes, whether they are the work of an extinct race or natural formations, you say that in his "Geology of Iowa," Prof. Charles A. White presents as a theory "that in shallow portions of lakes, the ice along the shore freezes fast to everything along the bottom, whether sand, gravel, bowlders, or mud, and the *expansive power of water in freezing* is exerted upon them, acting upon them from the center of the lake in all directions toward its circumference." I have resided on the shore of a walled lake for 24 years, and have recorded observations and measurements two or three times a day of the outward movement of the ice, for months at a time, together with the temperature.

Ice never expands when freezing, but water in the act of changing into ice expands. After the ice is once formed, it is subject to the same laws as other bodies, and is expanded by heat and contracted by cold. The ice in these lakes, as months of careful measurements and observations have demonstrated beyond a doubt, invariably expands when the temperature is rising and contracts when the weather is growing colder. I have seen it shove up on the shore ten to fifteen feet in the course of a month without gaining an inch in thickness, keeping about twenty-two inches thick. The most fragile vessel can be filled with water and frozen solid without bursting, provided a small vent hole is kept open for the escape of the surplus water. The only expansion in freezing is just this, and no more: each crystal of ice as it forms occupies a larger space than the water did of which it is composed. When a tight vessel with water begins to freeze ice soon forms all over the top, surrounding the water with an unyielding coat. The little crystals of ice as they are formed are forced into the water, causing such a pressure that the water bursts out at the weakest point. This same cause, heat and cold causing the expansion and contraction of ice, is the principal cause of the glacial movement, forcing rivers of solid ice to move on down to the sea or plain with a slow but irresistible movement.

E. H. ATWOOD.

Maine Prairie, Minnesota, April 26, 1884.

Sea Monsters Unmasked.

In all probability, monsters wonderfully and fearfully made equaling in ugliness those described in the fables of history, inhabit the sea and occasionally present themselves to view, assuming to the excited beholder both the appearance and movement of a serpent. In the SCIENTIFIC AMERICAN of Dec. 27, 1879, one of these monsters was most graphically portrayed by Daniel C. Beard, who in his description pointed out the fact that a giant cephalopod moving upon the surface of the water would appear to have all the characteristics of a huge serpent. "The fin, or what was supposed to be the serpent's tail, can be readily accounted for by the fact that in some species of the cephalopod the longest tentacle widens and flattens at the end, and might easily be mistaken for a caudal fin."

Mr. Henry Lee, in his work "Sea Monsters Unmasked" (London, 1883), admits the probable existence of monster sea serpents, and clearly shows that nearly all of those which have been seen can be accounted for by the forms and habits of known animals—calamaries or squids of great size. During the past ten years our knowledge of the inhabitants of the vast deep has been enlarged and extended, especially in regard to the so-called monsters; deep sea dredgings have brought up fishes of unknown species; cuttle fish measuring more than sixty feet have been met with on the coast of Newfoundland.

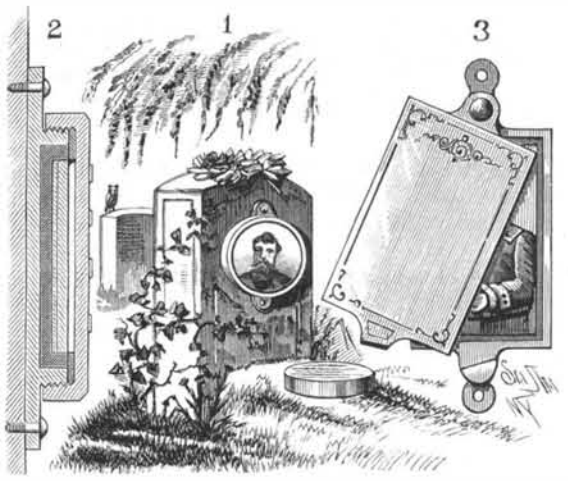
The cuttle fish is described as being most sensitively timid, watching its captor, and upon the slightest movement belching forth its ink, which rolls over and over like a volume of smoke and mixes with the water with marvelous rapidity. It is very intelligent, soon learning to discriminate between friend and foe, and in time becomes quite tame, ceasing to shoot its ink unless irritated.

Squids propel themselves backward by forcing out a stream of water from a tube pointed in a direction contrary to that in which the animal is going. The body tapers toward the tail, which is provided, at a short distance from the end, with two flat fins, one on each side, so that this portion of the body resembles in shape the government "broad arrow." When swimming in smooth water, the tail is raised above the surface to a height which might be three feet or more in a large individual; "and, as it precedes the rest of the body, moving at the rate of several miles an hour, it of course looks, to a person who has never heard of an animal going tail first at such a speed, like the creature's head. The appearance of this 'head' varies in accordance with the lateral fins being seen in profile or in broad expanse. The elongated tubular looking body gives the idea of the neck to which the 'head' is attached; the eight arms trailing behind (the tentacles are always coiled away and concealed) supply the supposed mane floating on each side; the undulating motion in swimming, as the water is alternately drawn in and expelled, accords with the description, and the excurrent stream pouring aft from the locomotor tube causes a long swirl and swell to be left in the animal's wake, which, as I have often seen, may easily be mistaken for an indefinite prolongation of its body. The eyes are very large and prominent, and the general tone of color varies through every tint of brown, purple, pink, and gray, as the creature is more or less excited, and the pigmentary matter circulates with more or less vigor through the curiously moving cells."

The author concludes that we here have the "long marine animal" having "two fins on the fore part of the body near the head;" the "boiling of the water," the "body round and of a dark color," the "waving motion in the water behind the animal, from which the witnesses concluded that part of the body was concealed under water," the "head raised, but the lower part not visible," the "head being long and small in proportion to the throat, the latter appearing much greater than the former," causing the spectator to think that "it was probably furnished with a mane."

TOMBSTONE.

The invention lately patented by Mr. S. R. Miller, of Mount Union, Pa., relates to that class of tombstones on which the photographs of the deceased are held in suitable



MILLER'S TOMBSTONE.

frames. The photograph is placed within a glass covered casing which is bolted to the tombstone, and which is made air and water tight, so that the picture will not be injured. When the casing is made circular as in Fig. 1, a cap is screwed on firmly. When the picture holder is square as in Fig. 3, the cover is pivoted at its top, so that it can be swung to one side. The inner side of the cover is provided with a packing of rubber—shown in the sectional view, Fig. 2—so that the cover will at all times form an absolutely close joint with the frame.

Preservation of Cast Iron.

The common practice of painting the unfinished portions of machines is not very attractive, and that of making all cast iron of some uniform color for all machines is almost offensive. In most cases the use of paint on the cast iron is intended to make a contrast between the unfinished material and the polished parts; incidentally it is also to prevent oxidation and a blotchy appearance. But if the oxidation was general, and even, and permanent, nothing could be finer; for the red oxide of iron is even more agreeable to the eye than the blue-green oxide of copper or bronze, which is so much admired. There is no question about the durability and the permanency of iron oxide in color and texture any more than of that of bronze or brass; the browned gun barrels of fowling pieces are instances.

Experiments have been made to avoid the dauby annoyance of paint by less mechanical means. The cast iron, after being pickled to remove the scale, was left to dry with the acid still on it. Then it was cleaned with a wire brush, and scraped with a coarse file. The result was a mottled surface, the lower portions being a grayish brown, and the outer or upper portions bright. The surface was then swabbed with crude petroleum, and before it was dry was rubbed with a wire brush. Such treatment insures an unchangeable surface, and gives an agreeable color. Even without the petroleum the rust of the acid insures a very pleasing and permanent effect; but the petroleum prevents after stains, and mellows and blends the tints. In either way used it is an improvement on paint. Cast iron has a beauty of its own that is no more dependent on paint than that of bronze or brass.

Sorghum Sugar.

Prof. Collier, late chemist of the U. S. Department of Agriculture, has long been an ardent believer in the idea that sorghum is in time destined to furnish all the sugar needed in this country, and probably yet more for export. He has just published a volume* presenting the most important facts bearing on this subject, as obtained from extended examinations of different varieties of sorghum, and the actual working results of numerous trials on a practical scale. In an address before an agricultural convention in Connecticut, four years ago, the Professor predicted that, within five years from that time, we would be producing our own sugar. He then referred to the large possibilities of making sugar from corn stalks, then, as now, almost entirely wasted; pointed out the wasteful manner in which sugar was made at the South and in Cuba from the sugar cane, and claimed that, either from sorghum or beet raising, though preferably from sorghum, we could more regularly and economically obtain all the sugar the country would consume.

We are very far as yet from having attained the development of this industry that was then predicted, but that we are progressing toward it there is much proof. Counting the average consumption of each individual at about forty pounds a year, we produce only about one-eighth of the total supply required. The trouble seems to have been that, though the sorghum has been demonstrated to have sufficient saccharine matter, and can be raised at a cost not greater than that of sugar cane, the amount of crystallized sugar obtained therefrom has generally been far below what had been expected. In some of the trials most excellent results have been reached, but more often, owing to the planting of wrong kinds of sorghum and defective methods of manufacture, the results have been disappointing to those who at first were most confident of an early and brilliant success. Prof. Collier has enjoyed exceptional advantages for the observation of all that has thus far been done in the United States in this direction, and now admits that "there are still many unsolved questions relating to the perfection and cheapening of working processes," but claims that, with proper conditions, and attention to the rules for practice which experience has shown to be necessary, the "successes will greatly outnumber the failures" in the manufacture of crystallized sugar from sorghum.

Turning and Grinding.

A good finish to a turned cylinder, as a shaft or stud, can be obtained by means of the turning tool—the square nosed tool fed with water. But it may be safely asserted that the apparent truth will not stand the test of trial, except as an approximation to truth. It is almost impossible—probably it is absolutely impossible—to turn a shaft or stud perfectly true; and in most cases the deviation is so great as to be sensible to the touch. Resting thumb and finger against opposite sides of a turned and finished shaft while revolving fast will in most cases prove that, however carefully turned, the shaft is not round. Still more exact tests have demonstrated that the best specimens of turning, from the cleanest and most homogeneous steel, retain in a proportion the faults of the less carefully wrought specimens.

The reasons are obvious; the stud or shaft is suspended on centers at the ends, the intermediate length being unbraced, except in the occasional use of the steady rest. And the tool post and carriage and the tool of a lathe are parts which as a whole are not absolutely rigid. In turning, also, the speed is not so rapid as to prevent vibration, or repulse and return.

The best results are obtained by grinding; a swiftly revolving corundum wheel traversing the more slowly revolving shaft. By this means the plug and template gauges are constructed, which are so perfect that the plug inserted in the template is air tight, although it turns so freely as to suggest perfect lubrication. This method of finishing for fits is becoming quite general in the fitting of journals in the best machine tool manufactories; almost absolute perfection in the fit of boxes and bearings having been already assured.

A Sheet Iron Hen.

The *Inter-Ocean* describes a novel invention as follows. It was not patented through the SCIENTIFIC AMERICAN Patent Agency.

An ingenious fellow in Ohio has constructed a sheet iron hen that promises to lay him a golden egg. It is finished up to life, full size, cackles, clucks, and looks with one eye at a time so naturally that it will deceive the oldest hen hawk in the country. It is so arranged that when a hawk, mink, or polecat pounces on to it, the back springs open and the wings fly up and force the assailant on to a ravenous buzz saw that makes 1,700 revolutions per minute. After moving half a minute the saw stops, the hen closes up, folds its wings, and begins to cackle as though it had just laid an egg. One winding up will answer for three massacres, provided the rather delicate machinery does not get clogged up too much with the blood, bones, and feathers. He set a freshly painted one out in the sun to dry the other day, which attracted the attention of a fine old cat belonging to a doctor who had been poking a great deal of fun at the fool thing. The hen is there, but the cat is hence.

* Sorghum; Its Culture and Manufacture Economically Considered as a source of Sugar, Sirup, and Fodder. By Peter Collier, Ph.D. Robert Clarke & Co., Cincinnati, Ohio.

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Hickory.

Some of our native woods cannot be equaled or be superseded by any foreign woods; in all our knowledge of natural history there has been found nothing possessing the excellent qualities of our native hickory. It is not, as commonly supposed, that good hickory must be grown in the north to be of the best; its habitat extends from the Green Mountains in Vermont, following the coast range, the Alleghanies, and the Blue Ridge through the Carolinas, and even to upper Florida. And, contrary to general supposition, the very best of the hickory used in the arts, where toughness is required, is obtained from North Carolina and eastern Tennessee.

"It is wonderful what toughness the hickory timber of that mountain region is capable of," said a wheel maker recently. "We can turn a piece completely around a circle without breaking a fiber." This, of course, after it is thoroughly steamed.

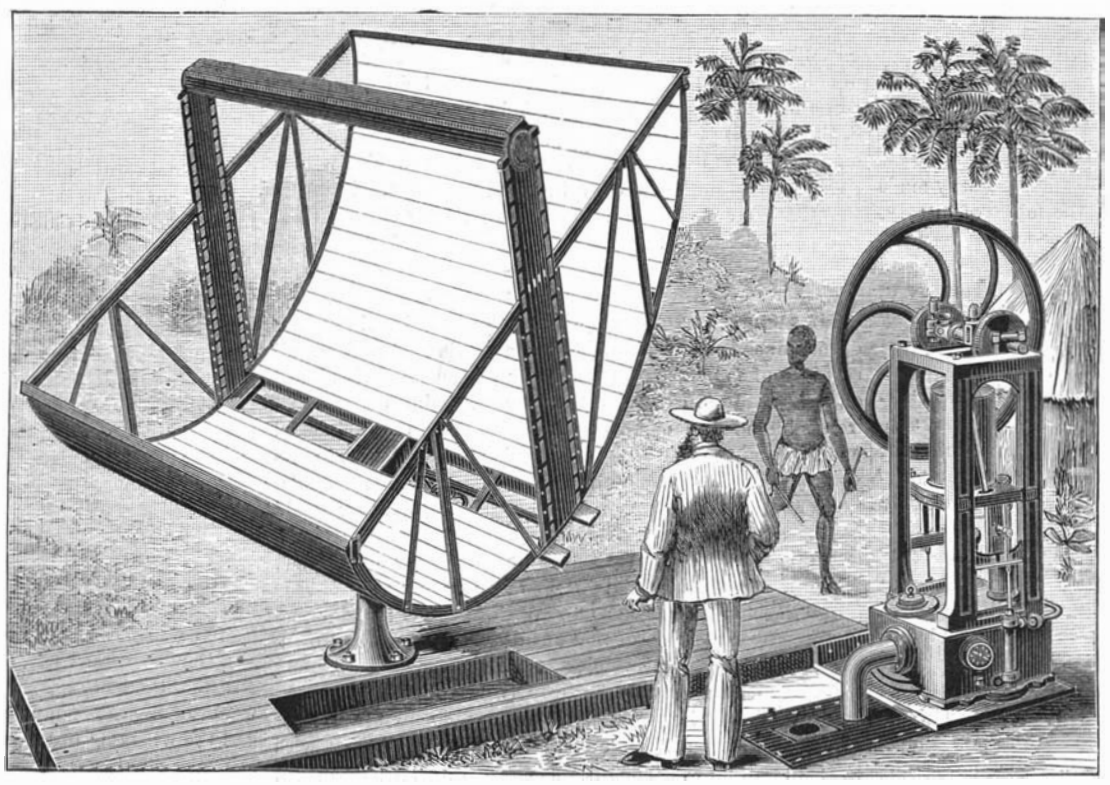
ERICSSON'S SUN MOTOR.

We illustrate the curious steam engine designed by Capt. John Ericsson, and built by him in this city in 1883, in which the use of coal is dispensed with, and steam power is generated by the heat of the sun. The generator consists of a large concave reflector, in cradle or trough form. The rays of the sun fall on this reflector, and are by it concentrated against the outer surface of the horizontal bar or heater, which stretches across and above the reflector. Said bar is hollow, and so are the side pillars that support the bar or heater; they are hollow, and contain water; they constitute in fact a portion of the boiler. When the hollow horizontal bar is highly heated by the sun's rays its contained water is converted into steam, by which the engine is worked. Such in brief is the construction of this novel and economical steam motor.

For tropical countries, and wherever sunshine is plentiful, this engine would seem to have great utility. The bottom of the rectangular trough consists of straight wooden staves, supported by iron ribs of parabolic curvature secured to the sides of the trough. On these staves the reflecting plates, consisting of flat window glass silvered on the under side, are fastened. It will be readily understood that the method thus adopted for concentrating the radiant heat does not call for a structure of great accuracy, provided the wooden staves are secured to the iron ribs in such a position that the silvered plates attached to the same reflect the solar rays toward the heater. Fig. 2 represents a transverse section of the latter, part of the bottom of the trough, and sections of the reflecting plates; the direct and reflected solar rays being indicated by vertical and diagonal lines.

Referring to the illustration, it will be seen that the trough, 11 feet long and 16 feet broad, including a parallel opening in the bottom 12 inches wide, is sustained by a light truss attached to each end; the heater being supported by vertical plates secured to the truss. The heater is 6¼ inches in diameter, 11 feet long, exposing $130 \times 9{\cdot}8 = 1{,}274$ superficial inches to the action of the reflected solar rays. The reflecting plates, each 3 inches wide and 26 inches long, intercept a sunbeam of $130 \times 180 = 23{,}400$ square inches section. The trough is supported by a central pivot around which it revolves. The change of inclination is effected by means of a horizontal axle—concealed by the trough—the entire mass being so accurately balanced that a pull of 5 pounds applied at the extremity enables a person to change the inclination or cause the whole to revolve. A single revolution of the motive engine develops more power than needed to turn the trough and regulate its inclination so as to face the sun during a day's operation.

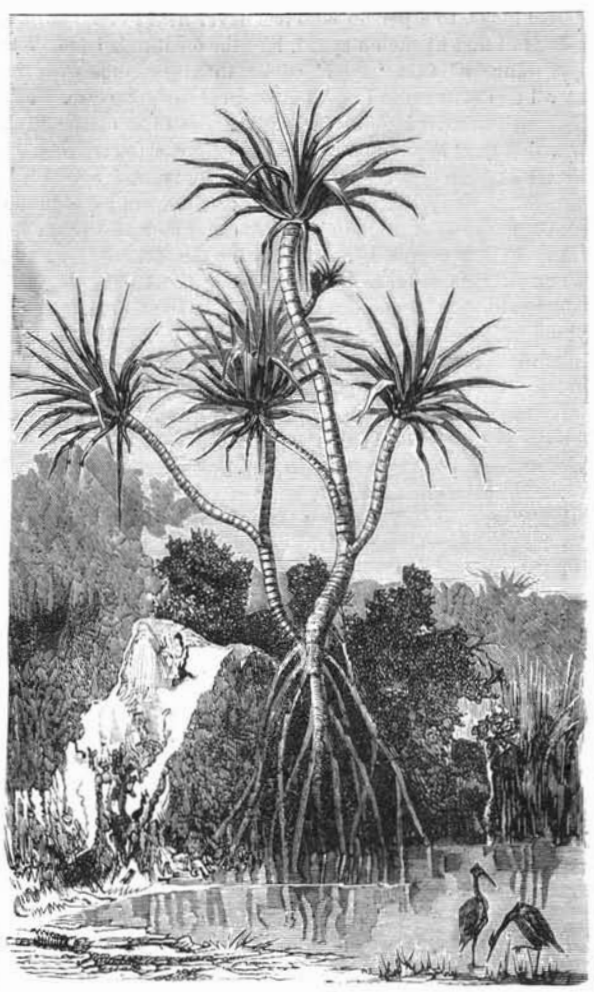
The motor shown by the illustration is a steam engine, the working cylinder being 6 inches in diameter with 8 inches stroke. The piston rod, passing through the bottom of the cylinder, operates a force pump of 5 inches diameter. By means of an ordinary cross head secured to the piston rod below the steam cylinder, and by ordinary connecting rods, motion is imparted to a crank shaft and fly wheel, applied at the top of the engine frame; the object of this arrangement being that of showing the capability of the engine to work either pumps or mills. It should be noticed that the flexible steam pipe employed to convey the steam to the engine, as well as the steam chamber attached to the upper end of the heater, has been excluded in the illustration. The average speed of the engine during the trials last summer was 120 turns per minute, the absolute pressure on the working piston being 35 pounds per square inch. The steam was worked expansively in the ratio of 1 to 3, with a nearly perfect vacuum kept up in the condenser inclosed in the pedestal which supports the engine frame.—*La Nature.*



CAPT. JOHN ERICSSON'S NEW SOLAR ENGINE.

A BEAUTIFUL HOUSE PLANT.

The usefulness of large numbers of stove plants is due to their singularly graceful forms when young as compared with those of full sized specimens seen growing wild in the tropics, or here and there in large gardens where space is provided for the development of large growing stove plants.



THE SCREW PINE (*Pandanus utilis*).

Among palms, dracænas, aralias, and similar plants, we have many instances of this, so to speak, doubleness of character, and although many of these assume in the adult stage forms more or less attractive, it may be safely said that such plants are of little value for garden purposes, except when young. To this class of plants belong the Pandanuses, or screw pines. Travelers tell us how noble an appearance many of the screw pines have when seen luxuriating in groups, or in the form of large, weird-looking, isolated specimens along river banks or sea coasts, or crowning stony hills; the tall naked stem, from which long arm-like branches are produced near the top, and stretch out horizontally; the long stilt-like aerial roots, which, growing out of the branches, extend down to the ground, where they ramify freely, and so afford safe anchorage to the tree against strong winds and heavy rains; the large sheaves of long sword-shaped leaves borne on the end of the branches—these are all characteristic features of the Old World tropics, and especially of the Mascarene Islands.

But screw pines are not tree-like in habit; we have the graceful little P. pygmæus, the small unarmed P. inermis, and the bushy, variegated P. Veitchi and P. javanicus. These form either flat-topped, table-like plants, or dense globose shrubs, sometimes growing out from a rift in the side of a rocky coast or mountain, or creeping by means of their snake-like stilts—the aerial roots—along the surface of the soil, until they become many yards in circumference. Such are screw pines "at home." As to their uses, they are almost as valuable to the natives as palms. Their pine-apple-like fruits are eaten in a variety of ways; the roots are used as ropes, and are made into baskets, mats, and hats, as are also the leaves, which are, moreover, used for paper making, nets, etc. In Mauritius the leaves of P. odoratissimus are made into bags, in which coffee, sugar, and grain are exported, and the "bases" used by fishmongers in this country are made from the sugar bags.

In the Palm House at Kew there are several gigantic specimens of Pandanus, the immense plant of P. odoratissimus being one of the attractions of the house, and perhaps the finest specimen of the kind in Europe. For horticultural purposes the screw pines are much valued in this country, only, however, in a small state. The most popular, perhaps, is P. Veitchi, a graceful variegated species from the South Sea Islands. Whether used for table decoration, or as an exhibition plant, this is always effective, and as it is easily grown and propagated, it has become one of the most frequently used among plants for decoration and exhibition.

Before the introduction of this species we possessed in P. javanicus variegatus our only variegated Pandanus; and if not so graceful as P. Veitchi, and less fitted for decorative uses, owing to the strength and sharpness of its spines, it still ranks second, its beautiful variegation being much more permanent than that of P. Veitchi, which is apt to "run out" when the plants get large. P. utilis is a dark green species with purple spines; it is quite as graceful as the variegated species and equally useful. The plant known as P. candelabrum must be referred to this species, as also must some of the screw pines, known in gardens under the names sylvestris, odoratissimus, and media. It is a native of Mauritius. P. pygmæus is the P. graminifolius of gardens.

It is a pretty little plant, more like a Freycenetia than a Pandanus. The leaves are narrow, pale green, and edged with white spines. It branches when only a foot high, and continues to grow horizontally rather than in an upright direction. It is a native of Madagascar. P. inermis, a spineless, bluish-green leaved species; P. Pancheri, a broad leaved plant with white marginal spines and a flesh-colored keel; P. decorus, P. ornatus, and P. Vandermeeschi are other species cultivated in gardens, and all more or less ornamental when young.

It would be difficult to refer all our garden screw pines to their proper botanical position, the characters of young plants being so very different from those of flowering specimens. Being all natives of extremely hot countries, the Pandanuses will thrive only in our warmest stoves; they require plenty of water always, and grow well in a mixture of peat and loam, with a little sand added. The variegated kinds should have a light position close to the glass, in order to fully bring out their beautiful markings. In fact, all the species prefer a light position, although they thrive fairly well in a shaded one. We must remember that naturally they grow in very open places, seldom, if ever, occurring under the shade of trees.—*The Garden.*

The Health of Cincinnati Improved by the Floods.

For the second time it has been proved in Cincinnati that a flood, instead of being followed by sickness, prepares the way for a period of unusual healthfulness. It was so after the flood of last year, and is so now. A prominent physician says that the flood cleaned and purified that part of the city which has always been the starting place for all the diseases which have prevailed. The flooding of the lower stories of filthy buildings, the moving of household goods to other parts of the city and the moving of them back again, and the general cleansing which the flood made necessary seem to have destroyed the lurking germs of disease. In the bottoms, where there is usually more or less of diphtheria, scarlet fever, malaria, etc., at this time of year, there is now hardly a case of sickness reported. In other words, the human pig sties have been washed out. The doctors are complaining that they have nothing to do.

Hot Lemonade for Diarrhœa.

Some people prefer hot lemonade to the usual form, but it is only recently that we have seen it recommended in diarrhœa. Dr. Vigouroux recommends a glass of *hot* lemonade every hour, or half hour, as an easy, agreeable, and efficient treatment for diarrhœa.

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DR. LE PLONGEON'S LATEST AND MOST IMPORTANT DISCOVERIES AMONG THE RUINED CITIES OF YUCATAN.

(*Continued from page* 294.)

On the eighth day of the work, while Dr. Le Plongeon was making moulds in a grand castle, not very distant from the spot where he discovered the stone work illustrated in last issue, he suddenly heard much shouting, and soon a man arrived, breathless with excitement, to tell him that they had "found a queen"! Arriving at the spot [Plate 1] we saw a figure on its back, about one and a half meters north from the center of the monument, and exactly on a level with the surface of the earth. The figure was thickly coated with loose mortar. One leg was broken off below the knee, but we found it under the figure, and afterward adjusted it in place to make a picture. The head of the statue rested on a stone painted bright red, that represents the tongue of a serpent, the peculiar shape of which Dr. Le Plongeon long ago discovered to be the letter *chi* or *ch* of the Maya alphabet.

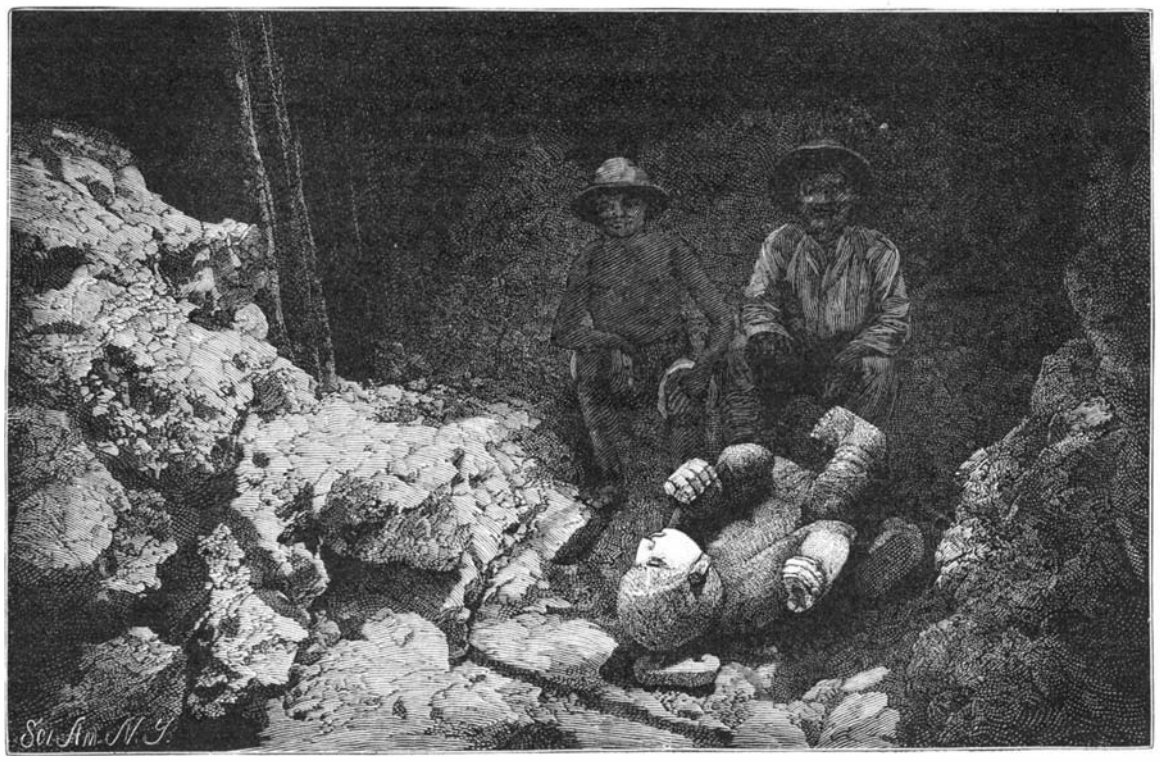

Plate 1.—DISCOVERY OF FIGURE IN MOUND.

When the figure was placed upright we hardly knew what to call it, it appears so human, yet so apish. In the position it occupies it is ninety-seven centimeters (about three feet) high; so if standing would represent a very tall person. It is made of white limestone, and painted dark brown. The head is flat at the top and back, and apparently hairless, but painted blue, and over that are red streaks from the forehead down to the shoulders. The eyes are open, and painted blue round the lids. The nose is not pierced, but the clumsily made ears have each a large hole. The mouth is closed, and lips painted red. On the back part of the top of the head a hole is pierced, so that a string can be passed through, perhaps to secure a bunch of plumes, perhaps to keep a banner in place, for in the palm of the right hand there is a groove, as if for a round stick to fit in. The hands are not altogether human; where the fingers begin there seem to be mittens, the other ends of which are nowhere visible. [Plate 2.] The fingers, like the toes, were furnished with nails made of shell, and fitted in place with mortar, so as to look very natural, even in color. Unhappily, nearly all were fallen, but we found some of them. A necklace is indicated by a line of red paint around the throat. Garters, below the knees, are painted blue and red. The loins are covered with an ornamented *uiit*, a scanty garment yet in use among the aborigines, and anciently worn by Egyptian laborers. The right foot is turned in, as if the individual had been club-footed. The sandals are painted blue, and close up round the heel, but the very elaborate and fanciful fastenings are red. On one heel is the name Cay Canchi, written with red paint. This image may possibly represent the sacred monkey of the Mayas, as the Cynocephalus was emblematic of the god Thoth among the Egyptians. On the facade of a very grand and extensive edifice at Chichen we see, close to a written and illustrated account of the creation, a figure exactly resembling the Cynocephalus of the Egyptians. We have also found it in Izamal and Usemah, both kneeling and sitting, and it was doubtless a much venerated object among the Mayas.

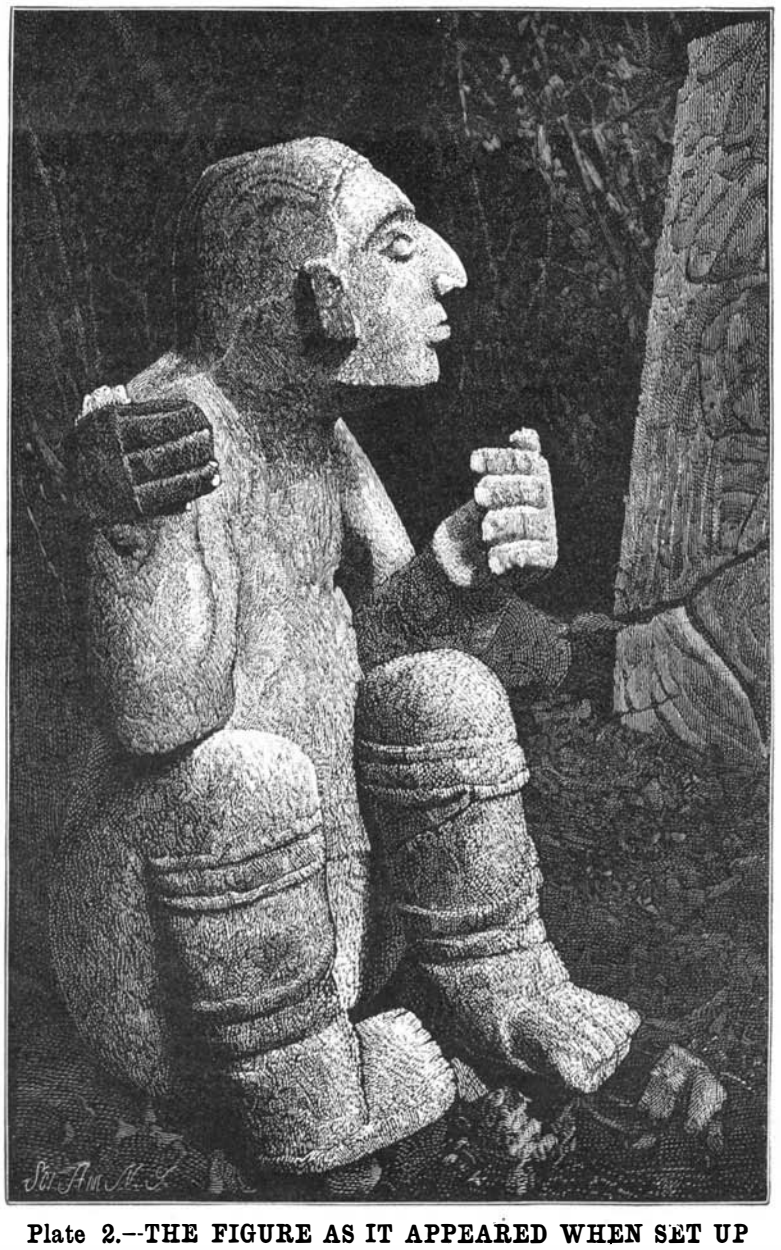

Plate 2.—THE FIGURE AS IT APPEARED WHEN SET UP

Stimulants for Chrysanthemums.

Last year I was induced to try an experiment in chrysanthemum growing, and for this purpose I purchased one pound of sulphate of ammonia, which I bottled and corked up, as the ammonia evaporates very rapidly. I then selected four plants from my collection, and put them by themselves, and gave them a teaspoonful of ammonia in a gallon of water twice a week. In a fortnight's time the result was most striking, for although I watered the others with liquid cow manure they looked lean when compared with the ammonia watered plants, whose leaves turned to a very dark green, which they carried to the edge of the pots until the flowers were cut. As a matter of course the flowers were splendid. The ammonia which I used is rather expensive, as I bought mine from a chemist's shop; this year I intend getting agricultural ammonia, which is much cheaper. I have also tried it on strawberries, with the same satisfactory result, the crop being nearly double that of the others; it is very powerful, and requires to be used with caution.—*The Gardeners' Chronicle.*

Two Dangerous Parasites.

One of the most dangerous to health and life of all the parasites infesting man is the *Dochmius duodenalis.* This nematoid worm was discovered by Dubini at Milan in 1838, and thirteen years later Griesinger made known its relation to a disease known as tropical anæmia, since which time many observers have noted its occurrence in Egypt, Brazil, Austria, and in most tropical and semi-tropical countries; throughout Northern Italy it is tolerably common.

The parasite may be described as follows: The male measures four lines, the female six lines in length; the head is tapering and pointed, and is flexed forward, the mouth being directed toward the ventral surface. The mouth is armed with four claw-like hooklets arranged irregularly, which converge toward the center of the oral cavity. The female has a sharp pointed tail; that of the male is blunt, and is provided with a bi-lobed, cup-like hood, which is supported by eleven horny rays—the median one dividing into two at its summit.

The females are much more numerous than the males, and the mode of reproduction is oviporous, the larvæ reaching maturity within the maternal body, and being expelled alive. These larvæ are expelled in the fæces, and are believed to pass through their intermediate stages in dirty water, from which they are conveyed to the intestine of their unfortunate host by being swallowed by drinking.

Once in their proper habitat—the duodenum—they cut their way through the intestinal mucous membrane by means of their sharp hooks, and suck the blood; here they rapidly reach maturity. On their removal a tiny spot from which the blood oozes is left, surrounded by an area of congestion.

The disease caused by these bloodthirsty worms is known by the various names of Egyptian chlorosis, tropical anæmia, and anchylostoma disease. The symptoms are those of progressive anæmia (loss of red blood corpuscles), *plus* swelling and pain of the upper portion of the abdomen, diarrhœa, and intestinal hemorrhages. The affection is often accompanied with a longing for strange and innutritious substances, such as chalk, clay, and wool.

Tropical anæmia is usually a fatal disease, though if but few worms have been introduced into the intestine the symptoms are but slight, and life is not materially shortened. Victims of the disease may die in collapse within a few weeks or even days after the first symptoms, or may drag on a wretched existence for months or many years.

Another terrible parasite is the Guinea or Medina worm (*Dracunculus medinensis*). It has been known from time immemorial, as there can be but little doubt of the "fiery serpents" which afflicted the Israelites being only examples of this nematoid, and Plutarch clearly refers to it in his "Symposiacon." The Medina worm measures from one to six feet in length, and is about one-tenth of an inch in thickness. The body is cylindrical, and terminates in a curved and pointed tail. The head is somewhat convex and flattened, and is provided with a central mouth surrounded by four equidistant papillæ.

The *Dracunculus* produces living young, the body containing an immense number of hatched embryos held within the uterine ducts.

The adult worm lives in the subcutaneous cellular tissue, especially that of the feet and legs, but may occur in almost any part of the body. In these situations it lies somewhat coiled, and sometimes stretched out, and single individuals or sometimes many examples are found in the same person.

By the irritation caused by its presence first an abscess—accompanied by various severe local and general symptoms—and then a consequent sinus is formed, from which the microscropic, sharp-tailed embryos already spoken of make their escape, never maturing in the tissues which contain the parent worm. These find their way into some pool of water, and there effect an entrance into the bodies of microscopic crustaceans belonging to the genus *Cyclops.* Here the embryos change their skins, increase in size, and complete their larval development.

Should one of these crustacean bearers with its contained parasites be swallowed with drinking water by man, the worms arrive at sexual maturity in the stomach of the latter, and here too sexual congress probably takes place. The females then make their way to the sites already mentioned, while the males probably die and are cast off in the fæces.

The Guinea worm, as its name suggests, is most common in North Africa and neighboring countries; it has, however, been found in almost all tropical lands. The attacks of this parasite are almost always accompanied with great suffering and injury to health, and even death is by no means an infrequent occurrence.

The order of the nematoid worms contains many genera dangerous to man, besides the two examples above described, among which may be mentioned the dreaded *Trichina spiralis*, and the little less dangerous *Filaria bancrofti*; the latter lives in the blood, and is the cause of a most dangerous and intractable form of chyluria and bloody urine.

RALPH W. SEISS.

AT Norwich, England, a drive well has been put down to a depth of 157 feet, and might have been driven deeper if required. The tube was two inches internal diameter. At Montreal, Canada, a drive well tube has been driven 174 feet.

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Green Corn for Pigs.

In the summer and early fall feeding of pigs, we have found sweet corn one of the best and most convenient kinds of fodder. Pork is made to the best advantage by putting the pigs, as soon as they are weaned from the sow and have learned to eat milk and meal, into the pen, and keeping them there under full feed until they are ready for slaughter in November or December. With a good breed of swine there is no difficulty in making March pigs weigh from 250 to 300 pounds at eight or nine months old. With plenty of Indian meal and skimmed milk they will grow rapidly until the corn is large enough for cutting. About the first of August, this should be given as an additional ration. The pigs will eat the green stalks and leaves with the greatest relish after the ears have been plucked. It is an excellent appetizer, helps the digestion of more solid food, and promotes the thrift of the animals. Field corn may not be quite so nutritious, but no better use can be made of that, after the ears are in milk, than to cut and feed it to fattening swine. It costs much less to make pork in summer than in cold winter weather.—*American Agriculturist.*

How to Handle Bees.

A bee raiser in Ireland communicates to the *Farmers' Gazette* (Dublin) his experience in the management of bees, from which we extract as follows:

Some people get into a fury of excitement whenever they see a bee or hear its hum, though it be only intent on gathering a little honey from the nearest flower. They shout and wallop about them with hands or handkerchiefs, as if they were being attacked by an enemy. Such are just the people who generally get stung. Let the bee alone, even though it be buzzing close to your face. In all likelihood it is only animated by curiosity. Make a fuss about it, strike it, or get it entangled in your clothes or hair, and blame yourself if you feel its javelin. When engaged in collecting honey or pollen from the flowers, no amount of teasing will cause it to sting unless you hurt or entangle it. Even when a swarm fills the air you may safely walk about in the midst of it, only let your motions be slow and deliberate. Should they alight on your hands or face, never mind, they will soon fly again; they are only resting. In such a case go slowly aside, and give yourself a gentle shake or two, but refrain from brushing or beating at the bees. Avoid, however, standing in the line of the flight of bees going from or returning to their hives. At such times they have such an impetus that before they are aware of your presence they get entangled in your hair, and are apt to resent your obtrusiveness. So much for one's passive behavior. Let us now suppose ourselves engaged in necessary action. First let us learn these principles:

1. Bees never attack when their stomachs are filled with honey or other liquid sweet. This is their normal condition when swarming, and therefore they are then harmless, as also when returning laden to their hives.

2. Neither do they attack when thoroughly frightened. We frighten bees by blowing smoke among them, or by rapping rather violently on their hives.

3. When bees are alarmed in a hive by smoke or concussion, their first impulse is to fill their honey bags from their combs.

4. Bees in a hive that is constantly being rapped against will in a few minutes rush bodily out from among their combs into any empty skep or box set over them.

Suppose now we wish to get all the bees out of a common straw hive. We provide the needful empty skep and four wood or iron pins, six or seven inches long, a roll of burning rags, unless we possess a modern bellows, smoker, or tobacco pipe, and a stool or empty pail, on which to steady the hive while operating. We now approach the hive, blow three or four whiffs of smoke into the entrance to drive in any loiterers, gently raise the edge from the floor board, and repeat the smoking. Without the least jar, now lift the hive boldly up, and gently turn the mouth upward. If the bees show any sign of being ill-natured, give them a puff occasionally. Set the crown of the hive on to the stool or pail, and see that it is steady, and having the side where the bees are thickest raised an inch or two, now fix the empty skep over the other by sticking two of the pins into the lower hive, about an inch or two below the highest part of its edge, so as to support the edge of the empty skep. The other pins, sharpened at both ends, are placed as supports between the skeps. They will thus touch each other at one side, the other being open so as to give a full view.

Now commence rapping, gently at first, but gradually with more force, against the sides of the lower hive. In a few seconds the bees will commence to run as if for life to the upper hive. Among them may be seen the queen if a sharp lookout be kept. The great art here is in keeping the bees in one continuous, steady stream. Once they take a stand it is not so easy to dislodge them. Five to ten minutes should suffice to finish the operation if the room be warm. The driven bees may now be shaken about or tumbled from one hive to another without the slightest risk of stings.

If the weather be cold, or the operation be performed at a season when there is no unsealed honey in the hive, a little warm sirup should be sprinkled on the bees before commencing to drive.

In our modern hives we use less ceremony in dislodging the bees. After a whiff of smoke, we simply lift the frames of comb one at a time, give them a shake in front of the hive or skep we want to get the bees into, and in a minute whisk off the few that remain with a feather.

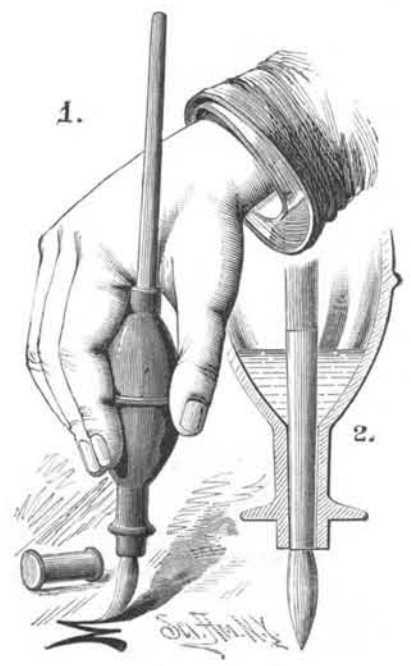
In getting bees into a hive we either pour them down in front of it, directing their course to its entrance with a feather, or shake them at once on the top of the frames, and cover instantly with a cloth.

To secure a swarm that has issued and clustered on a tree or bush, we advise, if possible, to cut the branch off after all are settled. If this be done gently, the bees can then be carried to the stand they are to occupy, laid down at the door of their new hive, and directed with a feather, as before; otherwise we hold an inverted skep below the cluster, give the branch one sharp rap, cover the skep, into which the bees will fall, with a cloth, and carry it to its future abode.

To make a simple examination of a colony in a bar frame hive, the quilt is removed, a puff or two of smoke given, and the frames are lifted one at a time, with as little jar as possible. Both sides can be examined, the queen seen and captured if desired, and the entire secrets of the hive discovered without hurting a bee or receiving a sting.

FOUNTAIN ATTACHMENT FOR MARKING BRUSHES.

A rubber bulb is provided with necks at opposite ends, through which the handle of a marking brush of the usual construction is passed. The lower end of the brush handle is flush with the end of the lower neck, which has a vent extending from its lower end up into the bulb. The lower neck is flanged so as to keep the brush proper away from a table or surface upon which it may be laid. A cap is passed over the lower end when the brush is not in use.



FOUNTAIN ATTACHMENT FOR MARKING BRUSHES.

To fill the fountain bulb, its sides are pressed together, the air being thereby expelled, and its lower end dipped into the ink. When the pressure is removed, the bulb expands and the ink is drawn into it through the vent. A slight pressure on the bulb forces a small quantity of ink through the vent to the brush. Fig. 2 plainly shows the construction. The attachment can be applied to any brush of the common form, and can easily be taken from one and applied on another. The handle need not be changed in any way to adapt it to be used with the fountain bulb.

This invention has been patented by Mr. P. C. Forrester, of Leavenworth, Kansas.

To Photograph Silverware,

Says the *Brit. Jour. of Photo.*, is somewhat difficult, owing to the white or frosted parts impressing the sensitive film before the burnished portions, which in silver, under certain conditions, are practically black.

But if the burnished portions be dulled, much of the difficulty vanishes.

One method of dulling the surface is by dabbing the burnished or excessively bright parts lightly but evenly with a piece of common glazier's putty. This produces a dead surface which photographs remarkably well, and enables the most delicate designs to be clearly depicted.

After the photograph has been made the putty is easily removed by brushing it over with clean, dry whiting, or better still precipitated chalk.

If the putty itself is made of precipitated chalk, all chance of scratching the surface of the silver will be avoided. A little of the chalk mixed with almost any kind of oil will answer.

Another method is to dull the surface with moisture by causing a dew to form upon the surface of the silver in the following manner:

After the image is focused and the plate is ready for exposure, a piece of ice is placed inside the vessel. The metal being a good conductor of heat soon becomes very cold, and moisture of the atmosphere quickly condenses upon it in the form of dew, and so dulls the surface.

When this occurs the exposure must be made immediately, before the formation of tear drops.

A long exposure should be made, and the development restrained, in order that the detail in the darker portions may be fully brought out. Some skill is required in arranging a set of silver pieces as to light and shade, so that each may be brought out in good relief.

Electric Girls.

The introduction of illuminated ballet girls has greatly added to the attractions of the spectacular stage. Girls with electric lights on their foreheads and batteries concealed in the recesses of their clothing first made their appearance a year ago, but as yet the use of illuminated girls has not spread beyond the stage. There is, however, a great future awaiting the grand idea of incandescent girls, and there is reason to believe that in a very short time private houses will be lighted by girls instead of stationary electric lights.

The formation of the Electric Girl Lighting Company is an event second in importance only to the invention of electric lights. This company proposes to supply girls of fifty candle power each in quantities to suit householders. The girls are to be fed and clothed by the company, and customers will, of course, be permitted to select at the company's warehouse whatever style of girl may please their fancy.

A very beautiful design for a front hall girl is now on exhibition at the company's office, No. 409 Gold Street. The present system of lighting the front hall of a dwelling house has the disadvantage that the light—whether it be a gas light or an electric light—must be kept burning all the evening, and that a servant must be employed to answer the bell. Thus there is a double expense—the cost of the light and the cost of the servant. The Electric Girl Lighting Company will furnish a beautiful girl of fifty or a hundred candle power, who will be on duty from dusk till midnight—or as much later as may be desired. This girl will remain seated in the hall until some one rings the front door bell. She will then turn on her electric light, open the door, admit the visitor, and light him into the reception room. One girl thus performs the duties of lighting the front hall and answering the bell, and her annual cost is much less than that of a servant and a gas light. If, however, any householder should desire to keep the electric girl constantly burning and to employ another servant to answer the bell, there can be no doubt that the electric girl, posing in a picturesque attitude, will add much to the decoration of the house.

Under the present system electric lamps or gas burners are fixtures, and cannot be moved from place to place. The electric girls, on the contrary, are movable. One girl can be made to give as much light as a large sized drawing room chandelier, and she can be moved from one room to another, leading the way to supper, for example, and placed wherever she can do the most good. There can be no comparison between a beautifully designed and chastely executed electric girl and a massive chandelier that constantly threatens to fall on somebody's head; and every householder of æsthetic instincts will be glad to exchange [illegible] chandeliers for girls.

An inexpensive electric girl of one or two candle power will be of great use when a person desires to go from one room to another in a dark house. Instead of having to carry a candle in his hand and incur the risk of dropping it or of having it blown out by a draught of air, the happy possessor of an electric girl can turn her on and send her before him to light the way. The student who is now troubled by the flicker of his gas light, or his inability to move the electric light from one part of his desk to another, can be made perfectly happy by an electric girl with a ground glass shade, who will take any position that the student may desire in order to throw light on his book or paper. No one who becomes accustomed to such a girl will think of returning to old fashioned methods of lighting.

The new company propose to furnish the new light at a little less than the charge made by the Edison and Brush Companies, and promise that in a short time their light will be decidedly cheaper than gas. Their plant already comprises 2,500 girls, and both electric boys and footmen will be at the command of the public as soon as certain experiments as to the possibility of enabling electric boys to give a steady light are completed.—*N. Y. Times.*

A Watch Made to be Pounded.

When a visitor to the office of the American Bank Note Company sat down to talk to Mr. Lee, that gentleman put a piece of white paper under a stamp, pounded on it, and laid the paper aside. When the visitor arose to go away, Mr. Lee put the paper under the stamp again, and pounded it once more. "You talked eight minutes," said he; "that wasn't bad." He showed the piece of paper to the caller, who saw upon it two printed clock dials. One showed the hands at four minutes to 4 o'clock, the other showed them at four minutes past 4 o'clock. "We keep that stamp," he said, "so that you sha'n't go away and say you came here at 11 o'clock in the morning, or that you had to wait an hour and a half, or make any other misstatements which can be guarded against."

"No," he added a moment later; "that stamp is the latest wrinkle in office furniture. It is an ordinary stamp with a clock attachment. The hour hand is simply a raised point upon a movable circle. The minute hand is an arrow on another revolving circle. The usual inked tape passes over these indicators and the outer circle of hour figures. Beside the clock face is a cylinder with several faces, each bearing a word—one is 'approved,' another is 'wired,' another is 'answered,' others are 'delivered,' 'Lee,' 'received.' Thus a business man is able whenever he sends away a letter, telegram, or package, receives an order, or transacts any business whatever, to record the precise moment at which the thing was done. It costs $20. I did not invent it. I bought it."—*N. Y. Sun.*

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Sumac.

Ever since the war sumac has been an article of regular production in the United States. Previous to that time the use of sumac grown in this country had been comparatively insignificant, while we imported a good deal annually from Europe. After the war the negroes and poor whites in Virginia were encouraged to gather the leaves of the sumac, then growing abundantly in a wild state there, by the ready sale it commanded, and mills for its grinding were set up in Richmond, Petersburg, Lynchburg, and other places. This was immediately heralded by the newspapers as a new industry, which was the fact, but far greater importance was given to the matter than it really deserved. The American sumac was from the first, and is still, a direct competitor, for many uses, with that raised in Sicily, but the latter has steadily sold at a materially higher price, its value in the market to-day being $100 to $110 per ton, as compared with $75 to 80 per ton, which is the selling figure for the American. The article is used in dyeing, as a mordant, and in tanning, for the manufacture of goat skins into morocco. The American sumac is said to be fully as strong in tannin as the Sicilian, although the analyses made have varied greatly, which is probably mainly due to the different plants tested, and the different stages of their growth; American sumac, however, has a greater proportion of coloring matter than the former, but is not, as a rule, as carefully gathered, cured, and ground as the Sicily article. The plant has been carefully cultivated in Sicily for generations, while most of that gathered here is of wild growth, although the probability that it would make a good paying crop, under proper cultivation, has been repeatedly urged.

The owners of sumac mills urge upon collectors the following points: The leaf should be taken when full of sap, before it has turned red, begun to wither, or been affected by the frost; either the leaf bearing stems may be stripped off, or the entire stalk cut away, and the leaves allowed to wither before carrying to the drying shed, but they must be neither scorched nor bleached by the sun. The Virginia crop reaches from seven to ten thousand tons annually, and is collected between the 1st of July and the earliest frost.

Characteristics of Criminals.

Recently, in France, considerable attention has been paid to an examination of the criminal class with reference to its physical and associated characteristics. M. Lacassague has drawn attention to the frequency of tattooing among criminals, and the violent nature of the scenes depicted by them in this voluntary mutilation. The same writer has also pointed out that criminals, as a class, are tall; thus in 800 subjects examined by him, 623 were taller by 6 centimeters than the average, and some exceeded the normal height by 10 and 20 centimeters. These observations were corroborated by M. Ferri, in Italy.

In 1882 Dr. Manouvrier has remarked that among criminals, notoriously with murderers, the jaw is more developed than is usual; and that while the cranio-mandibular index normally varies between 12·8 and 13, among the convicts it attains the remarkable number of 14·7.

MM. Heger and Dallemagne, in a comparative study of the skulls of assassins and ordinary persons, have confirmed the statement that the forward projection of the skull is greater among the former. They have also shown that criminals have a larger facial index and smaller vertical index than the peaceable citizens, but no difference is observed in the cephalic index.

M. Heger has affirmed the larger capacity of the criminal skull over that of the usual type, the relative proportions being as 1,538 is to 1,490. But this has been contradicted by a number of observers who claim the reverse, but it is suggested that this may be explained by supposing that the former examined the crania of murderers only, while in the later studies those of all classes were included, among which the incendiaries are said to have small heads. M. Flesch has said that affections of the heart exist among criminals to the extent of 20 per cent; the persistence of Botal's orifice, 10 per cent; contraction of the vascular system, 5·5 per cent. But his researches upon cerebral lesions are much more important. He has demonstrated a certain atavism in the cerebral convolutions, already indicated by Benedikt, as, for instance, the medium lobe of the brain being shaped as among the mammals, the separation of the eulcarian fissure from the occipital, the opening of the fissure of Sylvius, and the formation of an operculum of the occipital lobe.

Histology has also detected certain anomalies in the brains of those criminals whose autopsy has been made. Thus Spika has found the pigmentation of the nucleum of the tenth, seventh, and fifth pairs in a murderer's brain; also Golgi and Marchi have detected the pigmentation of the nervous cells in the brain of a convict.

The school of criminal anthropology in Italy has also made important contributions to this list of facts. M. Mano has examined the hands of criminals, and he has discovered among individuals convicted of murder, among those guilty of inflicting wounds, a great preponderance of large and short hands; while with thieves the frequency of long and narrow hands is less considerable. As to the question of tattooing, he finds that the larger number of tattooed persons is among the assassins and assailants.

M. Lombraso, together with M. Mano, has studied criminality among infants. They examined 980 infants, and especially 160 from the houses of refuge. They found that the criminal type could be recognized at that age, associated with bad tendencies in the proportion of 7·4 per cent. The loss of a moral sense was recognized in 44 per cent, and a veritable propensity to crime in 10 per cent. Out of 29 infants they have observed the disappearance of the criminal tendencies partly through non-inheritance, partly under the beneficial influence of their surroundings, and partly because their criminal passions existing at a certain period disappear in maturity.

The typical criminal physiognomy has been recognized among murderers in Germany in the proportion of 36 per cent, among thieves in that of 25 per cent, among insolvents and persons convicted of bigamy to the extent of 6 per cent. Among females this type was found in 28 per cent. With ordinary men and women this type was only found 14 times among 815 individuals, 8 of whom were doubtful.

Tomasira, Bono, and Depaoli have asserted the great capacity of the orbits or eye sockets and prevalent daltonism. M. Bono also insists upon the swiftness of vision among criminals.

But perhaps the most curious observations were made upon the different strength of the two hands. By means of the dynamometer MM. Mano and Lombraso observed that 23 per cent of the criminals examined possessed more power in the left hand, while the number of ordinary subjects having this peculiarity was only 14 per cent. In addition, in examining left-handed people their number among the criminals far exceeded that among others, with a stronger showing to this effect among women than men.

It was also found among criminals that the right lobes of their brains were more developed than the left, while the weight of the brain was in many cases excessive. In general sensitiveness and in sensitiveness to pain the criminals fell below the average. In ruddiness of the skin, criminals are very deficient, requiring three and five drops of nitrate of amyl to provoke a blush.

M. Henri Ferri has shown that the jaws of criminals are large, that in fact a jaw of large dimensions coexists not only with the greatest development of the negative functions, but with greater ferocity and stubbornness, being greatest among murderers, smaller among thieves. Criminals' skulls are flattened.

These scattered facts, selected from many others, indicate to what interesting and possibly useful conclusions this study of criminal anthropometry may lead.

A Strange Coincidence.

PROF. R. A. PROCTOR, the English astronomer, and also editor of *Knowledge*, has contributed to that journal a series of articles on Coincidents and Superstitions, many of which he relates as occurring in his own experience; others are obtained from various sources.

But the circumstance I am now to relate, says Professor Proctor, seems to me to surpass in strangeness all the coincidences I have ever heard of. It relates to a matter of considerable interest apart from the coincidence.

When Dr. Thomas Young was endeavoring to interpret the inscription of the famous Rosetta Stone, Mr. Grey (afterward Sir George Francis Grey) was led, on his return from Egypt, to place in Young's hands some of the most valuable fruits of his researches among the relics of Egyptian art, including several fine specimens of writing on papyrus, which he had purchased from an Arab at Thebes, in 1820. Before these had reached Young, a man named Casati had arrived in Paris, bringing with him from Egypt a parcel of Egyptian manuscripts, among which Champollion observed one which bore in its preamble some resemblance to the text of the Rosetta Stone. This discovery attracted much attention, and Dr. Young having procured a copy of the papyrus, attempted to decipher and translate it. He had made some progress with the work when Mr. Grey gave him the new papyri. "These," says Dr. Young, "contained several fine specimens of writing and drawing on papyrus; they were chiefly in hieroglyphics, and of a mythological nature; but two which he had before described to me as particularly deserving attention, and which were brought, through his judicious precautions, in excellent preservation, both contained some Greek characters, written apparently in a pretty legible hand. That which was most intelligible had appeared at first sight to contain some words relating to the service of the Christian Church." Passing thence to speak of Casati's papyrus, Dr. Young remarks that it was the first in which any intelligible characters of the enchorial form had been discovered among the many manuscripts and inscriptions which had been examined, and it "furnished M. Champollion with a name which materially advanced the steps leading him to his very important extension of the hieroglyphical alphabet. He had mentioned to me in conversation the names of Apollonius, Antiochus, and Antigonus, as occurring among the witnesses, and I easily recognized the groups which he had deciphered; although, instead of *Antiochus*, I read Antimachus, and I did not recollect at the time that he had omitted the *m*."

Now comes the strange part of the story:

"In the evening of the day that Mr. Grey had brought me his manuscripts," proceeds Dr. Young (whose English, by the way, is in places slightly questionable), "I proceeded impatiently to examine that which was in Greek only, and I could scarcely believe that I was awake and in my sober senses when I observed among the names of the witnesses *Antimachus Antigenis (sic)*; and a few lines farther back, *Portis Apollonii*, although the last word could not have been very easily deciphered without the assistance of the conjecture, which immediately occurred to me, that this manuscript might perhaps be a translation of the enchorial manuscript of Casati. I found that its beginning was, 'A copy of an Egyptian writing,' and I proceeded to ascertain that there were the same number of names intervening between the Greek and the Egyptian signatures that I had identified, and that the same number followed the last of them. The whole number of witnesses was sixteen in each. . . . I could not, therefore, but conclude," proceeds Dr. Young, after dwelling on other points equally demonstrative of the identity of the Greek and enchorial inscriptions, "that a most extraordinary chance had brought into my possession a document which was not very likely, in the first place, ever to have existed, still less to have been preserved uninjured, for my information, through a period of near two thousand years; but that this very extraordinary translation should have been brought safely to Europe, to England, and to me, at the very moment when it was most of all desirable to me to possess it, as the illustration of an original which I was then studying, but without any other reasonable hope of comprehending it—this combination would, in other times, have been considered as affording ample evidence of my having become an Egyptian sorcerer."

The surprising effect of the coincidence is increased when the contents of this Egyptian manuscript are described. "It relates to the sale, not of a house or a field, but of a portion of the collections and offerings made from time to time on account or for the benefit of a certain number of mummies of persons described at length in very bad Greek, with their children and all their households."

The Seventeen Year Locust.

This is "seventeen year locust" season in Virginia. According to the *Prairie Farmer*, considerable alarm is felt in some quarters at the announcement. It is a blessing to the country that these voracious fellows are by nature prevented from making a raid all over the country the same year. The history of this insect is curious and interesting. The eggs are deposited in small slits made by the female in the branches of trees. In a short time the eggs hatch, and the young larvæ follow down the branches to the trunk, down this to the roots, along the roots to their tips, where they fasten themselves by the beak, through which they draw sustenance. They also attach themselves to other succulent roots. Here they remain for nearly their entire existence of almost seventeen years without other change than a gradual increase in size. They come nearer the surface as the period of transformation approaches. They make cylindrical holes some half an inch in diameter, which they carefully cement and varnish, so as to be impervious to water. In this they remain for several days. They finally issue from the ground, crawl up a tree or stump, take a rest, and cast their skin. They come out in the evening, and by morning the perfect insect is ready for flight. They seem to prefer the oak to other trees, but will take up with many others, having rather a liking for the apple tree. They usually appear in the latter part of May, and they disappear in about six or seven weeks.

Animal Remains in Coal.

Professor Miall, F.G.S., in a lecture on "Animals of the Coal Period," recently delivered at York, England, said that there were to be found associated with seams of coal, and especially with beds of shale even below coal seams, the flattened impressions of various creatures which once had life. There had been seen shells and other fossils, and the squeezed impressions of the bodies of crustaceans or insects. These remains were, however, extremely fragmentary, and were as black as the shale in which they were embedded; it was, therefore, a matter of considerable difficulty to put them together in order to find out their original shape or to what sort of animal they belonged. But during the last 100 years a number of naturalists had engaged themselves in this task, and had brought to light a variety of results. Naturalists, indeed, believed that our common pond mussel was represented by an ally in that very remote period. It was found that the fresh water animals of the coal period were very much more like recent animals than were the marine forms of the earlier times like those of the present day. Many of the common shells of Europe were represented in extremely remote antiquity. But marine shells and other productions of the sea were not mixed up with the beds in which had been discovered land shells and the remains of land animals. All the marine productions kept, as it were, to themselves, and they were found in special beds or layers; but the marine beds seemed to mark the time when some low barrier which kept the sea at a distance was suddenly broken down, and the water of the ocean made an incursion upon either a fresh water area or a land area, and left behind it some marine shells.

Fossil centipeds, such as might now be commonly seen in our gardens and fields, had been discovered in coal measures. Scorpions, too, had been traced by their fossil remains, and thus proved to be closely akin to the scorpion of our own day. Cockroaches resembling in all essential features those with which most of us are familiar had been discovered in considerable numbers, and those of the present time formed perhaps one of the most ancient types of animal life now to be found upon our planet. Then there came the crayfish, which could be tolerably matched nowadays. But there had been animals which had disappeared from the earth altogether, without having left behind them any animal very similar to themselves.

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ENGINEERING INVENTIONS.

A car coupling has been patented by Mr. Alexander M. Fraser, of Bathurst, N. B., Canada. The invention consists in the peculiar construction and arrangement of a sliding coupling hook combined with adjusting devices, so the ordinary drawbar and link may be used, and the action is automatic.

A car coupling affords the subject of a patent issued to Mr. A. Judson Chapel, of Arkansas City, Kan. It is automatic, and the drawbars are of ordinary construction, with flaring mouths to receive the link, but there is a special form of holes in the upper and lower faces of the drawbar, conforming to a peculiar shape of the coupling pin.

A gas pump has been patented by Mr. William J. Ferguson, of Baltimore, Md. The piston has a valve incorporated in it, and there are improved means for tightening up the stuffing box in the lower end of the cylinder, making a pump especially adapted for changing the tension of a gaseous medium in refrigerating machinery.

A car coupling has been patented by Messrs. Franz F. Von Ainbach, of Hautzenbuchl, and Anton Hauger, of Judenburg, Styria, Austria-Hungary. The coupling includes specially devised coupling cylinders and pistons, fastened to the cars by ball and socket joints, the drawbars having hooks, or mouths for receiving the links, so as to form a yielding connection, with other specially devised and arranged parts.

A ditching machine has been patented by Mr. Elmer H. Smith, of Quinton, N. J. The invention covers an improved plow shifting and elevator belt tightening apparatus, giving an endless elevator that may be shifted up and down with the plow, and there is a contrivance for shifting the plow and lower roller frame and belt tightener by one hand wheel, making the machine very simple.

A water tube steam generator has been patented by Mr. Charles Ward, of Charleston, West Va. This invention is an improvement on a former patent issued to the same patentee, and consists principally in placing the "separator" inside the circulating system of pipes and inclosing it with firebrick, so that it serves as a radiator, and space, heat, and cost are economized.

A car coupling has been patented by Mr. George C. Loar, of Quincy, Ill. On top of the drawhead is a housing, in which is a vertical bolt with its lower end beveled, so that when the link enters the throat it forces up this bolt against a spring, and as soon as the hole in the link passes under the bolt the spring forces the latter down, with other devices to make a simple and economical automatic coupler.

MECHANICAL INVENTIONS.

An improved nut lock has been patented by Mr. Jacob McAfee, of Dallas, West Va. The invention consists of a split nut, with an inclosing band, and a key or wedge to be inserted between the band and the nut, to force the two sections of the nut to closer embrace upon the threaded bolt, so as to hold thereto firmly.

A machine for reciprocating tools has been patented by Mr. Fred. R. Patch, of Sutherland Falls, Vt. The invention consists in the combination with two cylinders, each with an open and closed end, and the ends of the cylinders connected by a tube, of pistons and piston rods, one of the pistons being reciprocated, and the pressure of the one reciprocating the other to which the tool is fastened.

A forge hammer has been patented by Mr. James H. Baker, of Westville, Ohio. The invention relates to improvements in die blocks, and consists in the peculiar construction and arrangement of parts; the rack and pinion can be combined by suitable mechanism with the hammer to shift the die block automatically after each stroke, so that the stock will be struck in a different place each time if desired.

AGRICULTURAL INVENTIONS.

A fertilizer distributing attachment for rollers has been patented by Mr. Sandford C. Meddick, of Ovid, N. Y. A reciprocating bar with plates on its lower and prongs on its upper edge is so arranged in the hopper and geared with one of the roller shafts, by simple mechanism, as to effect a uniform distribution of the fertilizers as the land is rolled.

A milking stool has been patented by Messrs. Czar D. Goodman and Frederick J. Smith, of Granby, Conn. The invention covers an improved milk pail holding attachment, contrived for ready and convenient adjustment to suit various conditions and requirements, and so the pail may be readily lifted off the holder for emptying and replaced without changing the fastening devices.

MISCELLANEOUS INVENTIONS.

A bottle stopper has been patented by Mr. Max Rubin, of Philadelphia, Pa. This invention covers an improved construction and arrangement to facilitate the discharging of liquids from bottles, with security against evaporation and spilling.

A faucet has been patented by Mr. Edward Myers, of Webb City, Mo. It has auger points to bore their own way into a barrel, and is so contrived as to keep the borings out of the faucet, thus boring its own hole of entrance and straining the fluid from the shavings so made.

An eight day clock alarm has been patented by Mr. C. Fred. Luqner, of Montgomery, N. Y. It has a dial and cam so connected with the clock work as to sound an alarm once each day for eight successive days without winding, the alarm mechanism having to be wound only once a week.

A trunk has been patented by Mr. William J. Large, of Brooklyn, N. Y. In this trunk the tray is hinged to suitable arms or links, so the tray may be swung upward out of the trunk, while at the back is an auxiliary tray with the front or movable tray hinged to it, with means for securing it to the body of the trunk.

A spring bed bottom has been patented by Mr. John McIlhone, of St. Louis, Mo. It is a one piece bed bottom spring, with two conical coils and a tie formed of elongated loops, with specially shaped arms and crosshead, the parts being easily made and assembled, and giving great elasticity, with a large surface support for the mattress.

A rein fastener has been patented by Mr. Norman N. Hazelton, of Lamoni, Iowa. It is an improved hook and catch device for connecting harness straps, particularly tugs and reins, being contrived for attachment to the straps without stitching or riveting, and more substantially than with buckles, and one that can be made very cheaply in malleable iron.

A heating stove has been patented by Mr. William A. Winfree, of Elizabethtown, Tenn. The stove is composed of inner and outer cylinders, with the space between divided by an inclined flange, so the smoke and other products of combustion are distributed between the two cylinders, and traverse an extensive heating surface before passing to the flue.

A shifting buggy top has been patented by Messrs. George Engelhart and Charles Weidner, of Attica, O. The buggy top supporting rail and the "lazy back" supports are so made that the rail may be readily taken off without taking off the lazy back when it is desired to remove the top and use the vehicle as an open buggy.

A bird cage has been patented by Mr. Jabez S. Musgrave, of Bloomfield, N. J. The invention consists of making an inclosure, of any suitable material, suspended within or attached to the inside of the cage, in such way as to afford quick and easy access thereto for the bird in case the latter be attacked by cats, or other birds or animals.

A fire escape has been patented by Messrs. David Ware and Charles W. Richman, of Philadelphia, Pa. The invention relates to that class of fire escapes in which the rope runs over friction devices in a casing, a rod being secured on one of the side surfaces of the block, holding a traveler, to which a band or belt is fastened, with a hook or like device at its free end.

A wagon tongue support has been patented by Mr. Jacob Bower, of Lafayette, Ind. It is an improved front wagon gear, in which the tongue has a pivoted button on its upper side near the wagon, in connection with a spring, hook, and chain beneath, by which the tongue may be held up so the horses will not feel its weight, or by unhooking the chain it may be dropped.

An enlarging camera has been patented by Mr. Thomas C. Roche, of Brooklyn, N. Y. This is a camera box specially devised for the use of sensitive bromide of silver gelatine paper, as a substitute for the more expensive solar cameras heretofore used, and in which artificial light may be used; it also provides increased facilities for focusing and enlarging portions only of the negative.

A fire escape has been patented by Mr. Francis D. Parmelee, of Hillsdale, Mich. This invention covers a special arrangement and construction for controlling the movement of a rope by means of a case in which are friction pulleys, an attachment being made in an upper story of a house, and one or both ends of the rope having a harness attachment which may be fastened about the body.

An improved plastering has been patented by Mr. James Morrison, Jr., of New York city. The invention covers a plastering slab, that can be fastened to walls and ceilings and is fire and water proof; there are long strands of cocoanut fiber extending longitudinally the length of the slab, and embedded therein, the slab being made of plastic plastering material, and its upper face being roughened to receive a hard finish.

A method of and means for cultivating fruits and vegetables has been patented by Messrs. John W. Groves and Valentine Minich, of South Oil City, Pa. The invention covers a method of growing, through holes in a tank, barrel, etc., and in the arrangement of such vessel to rotate horizontally, with a perforated water supply tube in the vessel, and various other combinations.

A trunk lock has been patented by Mr. Edward A. Judd, of New Britain, Conn. The invention is in that class of locks in which a stop holds the bolt, or the bolt is released upon the closing of the lid, but it is novel in construction and arrangement, making a very convenient and cheap lock, with no protruding parts, so that it is especially adapted for roll desks, pianos, etc.

A die for pressing clay fence posts has been patented by Mr. Ephraim Ivett, of North Ferrara, O. In order to make such posts with an ordinary brick or tile machine, a die is provided with an apertured plate on which sliding plates are so held that they can be adjusted for making posts of a greater or less diameter, or any shape, rods being so fitted as to make longitudinal apertures also.

An adjustable proscenium has been patented by Mr. Imre Kiralfy, of New York city. In combination with the proscenium wall of a theater is an adjustable frame for decreasing the size of the stage opening as much as the nature of the play may require, it being adjustable for height and width as desired for ballets, society plays, or spectacular pieces, according to the number of persons to appear.

A fire escape has been patented by Mr. George Sinfield, of Portland, Oregon. This invention provides for raising a rope ladder by means of a pole, and so that when a crossbar reaches the desired window it will be pushed through the window opening, and the bar will catch on the edges thereof, or a hook will catch on the sill, the apparatus being mounted on a specially devised truck therefor.

An improvement in calendars has been patented by Mr. Joshua F. Tannatt, of Springfield, Mass. A peculiarly slotted and perforated flat holder, of card or other material, holds by friction and exposes a folded calendar sheet, which may be printed on both sides, so that by suitably turning the sheet and changing the positions of its folded portions the different months are presented in succession without tearing off or detaching any portion of the sheet.

A hose coupling has been patented by Messrs. Garritt M. Van Riper and James O. St. Clair, of Republic, Mich. The invention combines, with a handle piece, links connecting it with side pivots, and an elastic packing between the meeting end portions of the coupling sections, so that when the handle piece is closed to lock the sections it compresses the packing, and the handle piece goes into a locked position.

A tension device for sewing machines has been patented by Mr. Hiram Holden, Jr., of Spencer, Mass. This invention is applicable to wax and dry thread machines, and is particularly intended to slack the tension while the needle is passing the thread through the work, and the tension device is arranged in duplicate, both tension wheels being on one supporting stud, and so contrived that either may be adjusted without interfering with the other.

A fire escape has been patented by Mr. Charles I. Pittman, of Halifax, N. S., Canada. The invention consists of a brake block with a sling suspended, and a friction block through which the rope on which the descent is made is rove, so the weight of the rider produces pressure on the rope to graduate the descent, making a simple and efficient device, adapted to be placed in a small case attached to the wall at the side of a window.

A process of and apparatus for the treatment of ramie and jute have been patented by Mr. Nicholas Arthurs, of New Orleans, La. Specially contrived floating wharves are made to carry a raft, which, loaded with the stalks, may be sunk for their thorough wetting, then raised and the water pressed out by rollers; from thence the partially dried material is pressed between corrugated rollers to further dry it and break up the woody fiber, after which a scratcher or beater, with blades or knives on drums, beat the broken up stalks to separate the lint or fiber from the woody material.

NEW BOOKS AND PUBLICATIONS.

THROUGH SPAIN ON DONKEY BACK.

W. Parker Bodfish has illustrated, for D. Lothrop & Co., a very attractive little volume on travels in Spain. The sketches which embellish the book are numerous and well executed, and the descriptive notes accompanying the drawings enable one to form a very good idea of the peculiar manners and customs of the Spanish people.

THE UNITED STATES ART DIRECTORY AND YEAR BOOK. Compiled by S. R. Koehler. Cassell and Company, New York, London, and Paris.

The design of this book is to furnish a practical guide for art patrons, students of art, etc., by pointing out the more notable art objects of the United States, and the facilities for study in, and the commerce of art. It has an art chronicle of exhibitions held during the year, recent monuments, notable buildings, the growth of museums, etc., with detailed mention of national and local institutions, and has a list of 76 illustrations.

THE ENGLISH ILLUSTRATED MAGAZINE. Macmillan & Co., New York.

This is an attractive monthly profusely illustrated with finely executed views of English scenery, manufacturing towns, etc. The May number contains a description of Nottingham and its lace industry, with engravings of the different kinds of lace manufactured there, and descriptions of the processes by which the different varieties are produced.

GLUE; ITS RAW MATERIALS AND THEIR FABRICATION. Covering also gelatine, gelatine veneers and foils, isinglass, cements, pastes, mucilages, etc. By F. Dawidowsky. Henry Carey Baird & Co., Philadelphia. Price $2.50.

The author of this book, a German technical chemist, made a thoroughly practical treatise, based upon actual experience, which was easily comprehended by the ordinary workman, and met with great success in Germany; but the translator, Mr. William T. Brannt, has made extensive additions to the original, including a description of the most recent American processes. The subject is taken up, at the beginning, with an account of the different sources of the raw material and the methods of preparing it for the manufacture; the operation of a glue factory is described in detail; the different ways of preparing gelatine are given; the various kinds of glue and gelatine, with special directions for their preparation, are mentioned with a degree of fullness which cannot fail to be of value to all who use either to any extent, while there are more than fifty pages on cements and pastes, giving a great number of receipts. The book seems to be the product of a thorough acquaintance with all the established methods of conducting the business, both in this country and Europe, but the author says the glue industry has reached its highest development in the United States, adding that "many improvements which would be derided as chimeras in Europe have been introduced here, and give to the American glue industry an ascendency which will render competition by the European glue boiler impossible for at least ten years to come." It is interesting, in this connection, to recall the fact that the late Peter Cooper made great improvements in this industry, in which he laid the foundation of his fortune, and there are New York leather merchants of the present day who well remember how he used to visit the hide and leather stores in the Swamp, half a century ago, gathering up the horns and offal of hides and skins to make into glue and gelatine. Owing to the improved manufacture and extended use of glue, tanners are now able to obtain more than the nominal sum Mr. Cooper used to pay for this glue stock, and all who are interested in learning the details of the manufacture, and the various kinds and qualities of product, can find in this book the best presentation of the whole subject that has ever yet been made.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Electrical Alarms, Bells, Batteries, etc. See Workshop Receipts, v. 3, $2.00. E. & F. N. Spon, 35 Murray St., N. Y.

60 Lathes, new and second-hand, 12" and 14" swing, plain and screw cutting. J. Birkenhead, Mansfield, Mass.

Blacksmith Drilling Machines for ⅛ to ¾ inch diameter, $22.50. Pratt & Whitney Co., Hartford, Ct.

Mills, Engines, and Boilers for all purposes and of every description. Send for circulars. Newell Universal Mill Co., 10 Barclay Street, N. Y.

Wanted.—Patented articles or machinery to manufacture and introduce. Lexington Mfg. Co., Lexington, Ky.

Speaking of Raleigh's first expedition to Carolina, Bancroft says: "The keenest observer was Hariot, the historian. He observed the culture of tobacco; accustomed himself to its use, and was a firm believer in its healing virtues." This was in 1585. The famous tobacco of the Indian council is now that of the Golden Tobacco Belt of North Carolina. It is no longer crude leaf as the Indians smoked it, but still a natural and pure leaf, prepared for the pipe or cigarette in the shape of Blackwell's Durham Long Cut.

Wanted.—Patented articles and machinery to manufacture. C. F. McGill, New Haven, Conn.

All Books cheap. School Electricity, N. Y.

Brush Electric Arc Lights and Storage Batteries. Twenty thousand Arc Lights already sold. Our largest machine gives 65 Arc Lights with 45 horse power. Our Storage Battery is the only practical one in the market. Brush Electric Co., Cleveland, O.

Cyclone Steam Flue Cleaner. The best in the world. Crescent Mfg. Co., Cleveland, O.

For Freight and Passenger Elevators send to L. S. Graves & Son, Rochester, N.Y., or 46 Cortlandt St., N. Y.

Sewing machine, water closet, & other light castings made to order. Lehigh Stove & Mfg. Co., Lehighton, Pa.

"How to Keep Boilers Clean." Book sent *free* by James F. Hotchkiss, 86 John St., New York.

Stationary, Marine, Portable, and Locomotive Boilers a specialty. Lake Erie Boiler Works, Buffalo, N. Y.

Railway and Machine Shop Equipment.
Send for Monthly Machinery List
to the George Place Machinery Company,
121 Chambers and 103 Reade Streets, New York.

The Hyatt filters and methods guaranteed to render all kinds of turbid water pure and sparkling, at economical cost. The Newark Filtering Co., Newark, N. J.

"The Sweetland Chuck." See ad. p. 316.

Steam Boilers, Rotary Bleachers, Wrought Iron Turn Tables, Plate Iron Work. Tippett & Wood, Easton, Pa.

Iron Planer, Lathe, Drill, and other machine tools of modern design. New Haven Mfg. Co., New Haven, Conn.

Pumps—Hand & Power, Boiler Pumps. The Goulds Mfg. Co., Seneca Falls, N. Y., & 15 Park Place, New York.

Best Squaring Shears, Tinners', and Canners' Tools at Niagara Stamping and Tool Company, Buffalo, N. Y.

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, $40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN Patent agency, 361 Broadway, New York.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Machinery for Light Manufacturing, on hand and built to order. E. E. Garvin & Co., 139 Center St., N. Y.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, polishing compositions, etc. Complete outfit for plating, etc. Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Curtis Pressure Regulator and Steam Trap. See p. 286.

Woodwork'g Mach'y. Rollstone Mach. Co. Adv., p. 286.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 286.

Job lots in Rubber Belting, Packing, Tubing, and Hose. 75 per cent off belting. John W. Buckley, 156 South Street, New York.

Drop Forgings. Billings & Spencer Co., Hartford, Conn.

We are sole manufacturers of the Fibrous Asbestos Removable Pipe and Boiler Coverings. We make pure asbestos goods of all kinds. The Chalmers-Spence Co., 419 East 8th Street, New York.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Emerson's 1884 Book of Saws. New matter. 75,000. Free. Address Emerson, Smith & Co., Beaver Falls, Pa.

Hoisting Engines, Friction Clutch Pulleys, Cut-off Couplings. D. Frisbie & Co., Philadelphia, Pa.

Barrel, Keg, Hogshead, Stave Mach'y. See adv. p. 302.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423. Pottsville, Pa. See p. 301.

For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, Send for catalogue to Rowley & Hermance, Williamsport, Pa.

The Porter-Allen High Speed Steam Engine. Southwark Foundry & Mach. Co., 430 Washington Ave., Phil. Pa.

Stephen's Vises. Special size for amateurs. See p. 301.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works. Drinker St., Philadelphia, Pa.

Gears.—Grant, 4 Alden St., Boston.—Water motors.

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Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) E. R.—An inducement for making canaries sing, as practiced by fanciers, is to place the bird near a singing bird. The bird will probably not sing under any conditions until after moulting time.

(2) F. W. G. says: In your issue of April 12, answer No. 2, C. S. F. asks in relation to the power required at top or center of small saws, and your reply is that they require less power to cut when stock just clears flange, and that is the way makers make benches, etc. I have had an experience of sixteen years running such saws and handling men who are running them, and know there is a mistake somewhere. The reason the makers put table close to flanges I have always been told and believed was so a given diameter of saw would cut as thick as possible, while always on hard cutting we like to have the saw just barely reach through, and think should you or C. S. F. take a saw frame suitable for a 14 inch saw, and put on a belt as narrow as will drive it, so it will slip at any increase of work, then saw a 2 inch or 3 inch piece with table down and another cut with table up, and prove experimentally that it rips easiest and with less power with stuff at rim of saw. I may not have put the idea very plainly, as I am more acquainted with saws and machinery than with pen, but would like you to try it and see if you were not wrong in your answer as given, if not in your theory.

(3) E. P. C.—Carbon bisulphide is the same as bisulphide of carbon. The original patent states that "lead nitrate is heated in the retort," presumably dry. By this means the hyponitric acid is obtained—peroxide of nitrogen is synonymous with hyponitric acid. Nitrobenzine is equivalent to nitrobenzol, and may be described as benzol in which one of the atoms of hydrogen has been replaced by one of nitrogen dioxide. In order to make these various chemicals, a knowledge of chemistry together with a certain amount of manipulatory skill is essential. These processes of manufacture may be found accurately described, in Roscoe and Schorlemmer's Treatise on Chemistry.

(4) E. O. K.—The heating of factories by steam in pipes, placed about two feet below the ceilings, is much in vogue now, as being quite safe and convenient. There has as yet been no publication in regard to the detail of this system. There is little market here for hickory tool handle stock. Tool handles are made in large quantities in Maine and New Hampshire, where the stock is very cheap.

(5) G. E. W. asks: What metal in the shape of a small bar or rod will expand the most when exposed to heat of 105 degrees? Please give size of rod. A. Zinc more than any other metal has the property of expanding. The size of rod is not material; expansion is simply a factor of its length. A receipt as follows is frequently given as an expansion metal: Melt together 9 parts of lead, 2 parts of antimony, and 1 part bismuth.

(6) L. L. M. asks: What would you suggest as a means of taking out lemon stains from cloth? A. Wash out with warm soapsuds or ammonia water.

(7) A. W. G. asks (1) for a recipe for a powder or mixture that will kill the nerve of a hollow tooth. A. Use creosote. 2. Will above be painful while operating? A. No. 3. Will it in any way injure the tooth, so as to make it useless for masticating food? A. No. 4. After the nerve is killed, can the tooth be filled without pain? A. Yes. 5. After the nerve of a tooth is killed, does the tooth stop decaying? A. No.

(8) C. G. L. asks if there is any way to distinguish genuine from imitation morocco—that used for binding books. A. When the leather is seen in a finished binding, it is often impossible to tell by the books alone, so closely is the imitation made to resemble the genuine; but the wear very quickly shows, the imitation being generally of sheepskin, and quickly becoming ragged and unsightly with such use as would not at all injure the genuine. Goatskin, from which genuine morocco is made, is of a closer, stronger texture than sheepskin, which is of a spongy fiber, and one of the weakest leathers made; morocco, too, is tanned with sumac, while sheepskin is only tanned with alum. Unless the imitation is very poor, one generally needs to cut a piece of leather, or even see it in the whole skin, in order to closely determine its kind and quality, but such examinations being impracticable in book stores, as also in shoe stores, the ordinary customer has to take most of his purchases at retail in this way largely on faith in the representations of the seller.

(9) J. R. asks: 1. How is papier mache made waterproof? A. Take 26 ounces alum and 4 ounces white soap, and dissolve them in a quart of water; into another vessel dissolve 2 ounces gum arabic and 1 ounce glue, in the same quantity of water as the former, and add the two solutions together, which is now kept warm and the article dipped into it, and then suspended until perfectly dry. A second immersion increases the efficacy of the treatment. 2. How are ferns and leaves bleached? A. Steep the leaves into a solution prepared by mixing about 1 drachm chloride of lime with one pint water, adding sufficient acetic acid to liberate the chlorine. They should not be allowed to remain in the solution too long (about ten minutes), as they are apt to become brittle.

(10) E. J. T. incloses the following clipping from a Western newspaper, and asks if the assertion therein contained is correct? "Sirius, the brightest star in the heavens, is said to be *one hundred millions* of miles away from the globe that we inhabit. It is as big as sixty of our suns put together. Its light, though traveling at the enormous rate of one hundred and eighty-six thousand miles a second, reaches us after a journey taking sixteen years." A. Sirius is about 20 millions of millions of miles distant, and supposed to be about 400 times larger than our sun, if its light is of the same intensity. It has a companion about 7 seconds distant, or 40 times the distance of the earth from the sun. This companion must also be of immense size to enable it to be seen from the earth. A ray of light from Sirius is three and a quarter years, not sixteen years, in reaching the earth.

(11) N. S. writes: I have a small, thin ivory rule that is warped edgewise, how can I staighten it? A. Pressing it between clamps and heating it in an oven to about 212° for a short time, letting it cool slowly, may straighten it for a time, but we do not think it will be permanent.

(12) S. H. asks: 1. What is your advice to a young man of 21 who wishes to be a first class machanist? Are there any schools that make the teaching of mechanics a specialty? If so, where, and where to address for particulars? A. We think that much benefit will come from entering one of the mechanical schools for study during winter, and doing practical work in a machine shop during summer. Best schools are Stevens Institute, Hoboken, Cornell University, Ithaca, N. Y., Troy and Boston Polytechnics, etc. 2. Should a boiler be emptied when hot or cold? A. Cold. 3. What is the best kind of oil to use in a cylinder? A. What is termed here cylinder oil is much approved. 4. What is best oil to keep a boiler free from lime? A. There is no oil that will prevent lime deposit.

(13) W. H. G. asks if there is any way to make white metals and alloys fill and take fine impressions in plaster of Paris moulds suitable for ornamental work? A. Yes. Use type metal.

(14) W. W. asks whether the increase twist of a drill takes out the chips better than the regular twist? A. For holes of 3 or 4 times the diameter we are unable to discover any difference. For deep holes we think that the increase twist is a favorite.

(15) A. B. W.—Volcanic rocks that are porous are so little known here that it will be very difficult to suggest any practicable way of quarrying it. Much depends upon its disposition to split in any particular direction. This could be ascertained in a very short time by any practical stonecutter. If it cannot be split off from a ledge by wedging, or by drilling and wedging into the drill holes, we cannot suggest a better way than to drill and blast off very large blocks, and saw the blocks into shape with sand saws. We have published nothing that would be of any assistance to you.

(16) H. R. T. asks what he can use to paint an engine and pulleys to make them look like new? A. First paint the articles in a japan color such as the following:

Asphaltum	3 ounces.
Boiled oil	4 quarts.
Burnt umber	8 ounces.

Mix by heat, and when cooling thin with turpentine. Then coat them with a suitable transparent or light varnish.

(17) F. S. W. & Co. write: What would be most durable for the roof of our bakery? We had on tin, and in less than two years the sulphur from the fires and the steam destroyed it so that you can break through with the fingers. It has a fall of about 1 in 10, which will be too flat for slate. We were advised to use galvanized iron, how would copper do? A. Galvanized iron would not be any better than tin; copper is better than either. We should think, however, that by using some coal tar roofing or asbestos paint, a more suitable material and far less expensive than copper would be obtained.

(18) J. H. sends for name of Floridian plant the leaves of which, he states, are used as a febrifuge. A. The plant is *Viburnum obovatum*. We should judge from the gentian-like bitterness of the leaves that they might possess tonic properties. One other species of the genus (*V. lentago*) has been used in domestic practice as an antiperiodic, and possibly the plant under consideration may have the same remedial qualities.

(19) F. M. C. writes: In the *Boston Globe* of the 18th March, I read a note describing a locomotive built by the Portland Locomotive Works for the Northern Pacific Railroad. In the course of the description it said: "It has Joy's valve motion, an English invention, and the first one of this kind ever built here," etc. I would like to know if this is the only valve motion, excepting the link? If not, what others are there? A. It is an error to say that this Joy's valve gear is the first used in this country. They are in use both on locomotives and propeller engines. In Joy's valve gear, also Strong's, Marshall's, and some others, the motion is obtained by link connection, without the usual link of Stephenson and other similar valve motions. You will find a description of Joy's gear in *Engineering* (English) for April 14, 1882, and of Marshall's in the same work for June 23, 1882.

(20) G. W. M. asks how to dress and treat a fur bear skin. A. The following is recommended: After having cut off the useless parts, and softened the skin by soaking, remove the fatty matter from the inside and soak it in warm water for an hour. Next mix equal parts of borax, saltpeter, and Glauber's salts (sodium sulphate) in the proportion of about half an ounce of each for each skin; spread this with a brush over the inside of the skin, applying more on the thicker parts than on the thinner; double the skin together flesh side inward, and place it in a cool place. After standing twenty-four hours, wash the skin clean, and apply in the same manner as before a mixture of 1 ounce sal soda, ½ ounce borax, and 2 ounces hard white soap, melted slowly together without being allowed to boil; fold together, and put away in a warm place for twenty-four hours. After this dissolve 4 ounces alum, 8 ounces salt, and 2 ounces saleratus in sufficient hot rain water to saturate the skin; when cool enough not to scald the hands, soak the skin in it for 12 hours; then wring out and hang it up to dry. When dry, repeat this soaking and drying two or three times till the skin is sufficiently soft. Lastly smooth the inside with fine sand paper and pumice stone.

(21) W. A. E. asks for a preparation which will securely attach coarse cotton cloth to glass when exposed to the weather. A. Use four parts glue, melted with the least possible quantity of water, and one part Venice turpentine. If desirable this can be mixed with starch to form a thick paste. See also list of cements given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

C. H.—The sample is clay such as is used in making certain varieties of pottery. Its value will depend upon the percentage of its constituents, and a chemical examination would be necessary for this purpose. The coating of red on several of the specimens is indicative of iron, in which case its value would be very slight.

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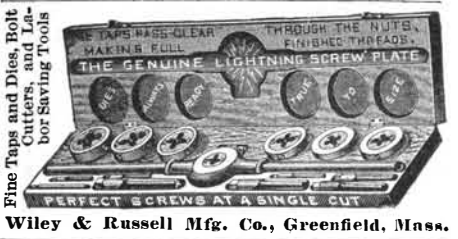

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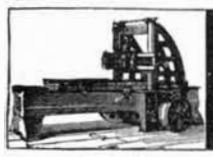

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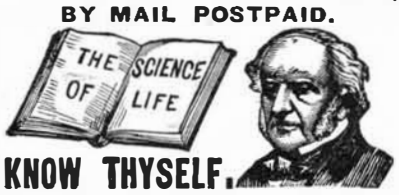

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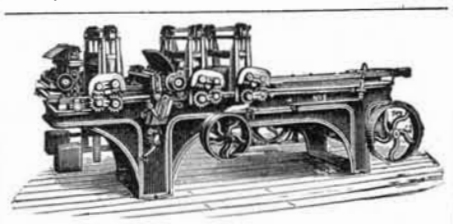

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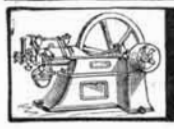

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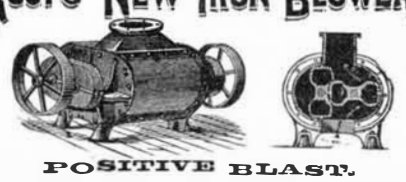

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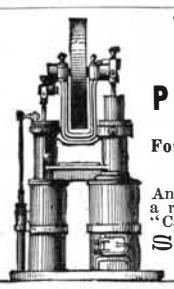

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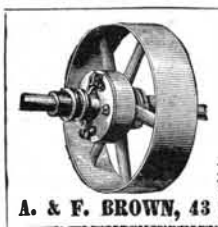

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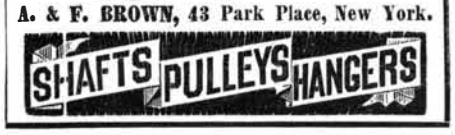

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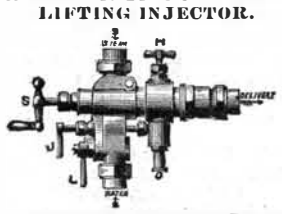

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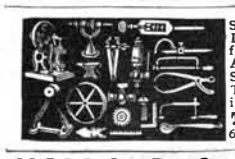

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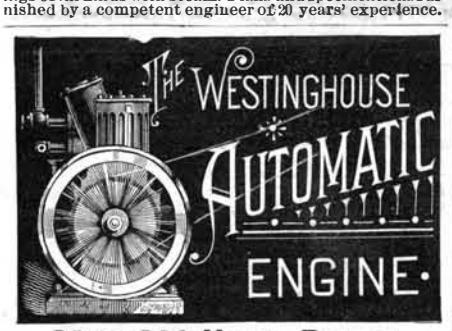

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